

# Fogarty International Collaborative Trauma and Injury Research Training Program

Program Review 2005-2014

Fogarty International Center

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## Executive Summary

According to the World Health Organization, over five million deaths per year are caused by trauma and injury, including both intentional and non-intentional types. Furthermore, over 90% of the injury-related deaths occur in low- and middle-income countries (LMICs) due to factors such as access to quality

### Program Goals

The program currently solicits collaborative research and research training activities that will strengthen the capacity of institutions in LMICs to conduct human injury and trauma research by:

- Providing training in (1) research design, methods, and analytic techniques appropriate for trauma research; (2) advanced degree trauma and injury research; and (3) scientific presentation and publication
- Supporting mentored research using state-of-the-art methods
- Supporting faculty and mentors at LMIC institutions to foster in-country trauma-research networks

emergency trauma care or rehabilitation services, unenforced or nonexistent preventative policies, and working or living in unsafe conditions. To address this challenge, the Fogarty International Center (FIC) and its partnering institutions Office of Behavioral and Social Sciences Research, National Institute of Neurological Disorders and Stroke, National Heart, Lung and Blood Institute, National Institute on Alcohol Abuse and Alcoholism, and the U.S. Department of State's Bureau of International Security and Nonproliferation established the Collaborative Trauma and Injury Research Training Program (Trauma Program) in 2005. The program has sought to create a cadre of researchers in LMICs who conduct research and research training related to the diagnosis, prevention and treatment of injury and trauma.

Over the past decade, thirteen awards were funded in six regions of the world: Sub-Saharan Africa, East Asia and Pacific, Middle East and North Africa, Latin America and the Caribbean, South Asia, and Europe and Central Asia.



## Scientific Publications

Publications allow program grantees to share relevant and important research evidence with the global trauma and injury community. To date, over 105 publications have been published with Trauma Program support. The majority of these publications focused on issues related to road traffic injuries (topics also associated to alcohol drinking and/or automobile driving) and self-inflicted injuries like suicide. See Table 2 for a heat map of publication topics.

## Training Trauma and Injury Researchers

Training the next generation of trauma and injury scientists is central to the Trauma Program. Over 280 individuals have received long-term trauma and injury research training to date. In fact, long term training experiences were identified in eleven of the 13 programs, with most training experiences ranging between six and 24 months. Eight of the 13 programs held workshops or symposia.

In Egypt, a collaboration between the between the Ain Shams University School of Medicine in Cairo, Egypt (hereafter Ain Shams) and the University of Maryland, Baltimore (UMD) School of Medicine created the Injury Prevention Research Training that later spread to other Middle East countries. The success of the program was recognized and called upon in May 2005 by the Iraqi Kurdish Ministry of Health after the bombing of Erbil in northern Iraq. The Ministry of Health requested UMD and Ain Shams to develop a week-long course on emergency preparedness and response. Led by the Trauma Program grantee, they worked with the government and to improve trauma research capacity at the Kurdish Health Ministry and established a formal medical emergency response plan. The training was designed to help health professionals with supervisory roles assess the current level of emergency relief capabilities and manage disaster situations. Training components included rescue, decontamination, triage, stabilization, evacuation and treatment plans, as well as communications in post-disaster recovery. Additional funding from NIH and the World Bank (the latter through the Iraqi Central Ministry of Health) allowed for additional disaster preparedness training courses for physicians in Afghanistan, Iraq and Egypt.

A collaboration between the University of Iowa (UI) and the University of Babeş-Bolyai in Cluj-Napoca, Romania resulted in the creation of the Injury and Violence Division of the University's Center for Public Policy and Public Health. The Center Director and the six researchers within the Division were all trained under the UI International Collaborative Trauma and Injury Training program. Through this Trauma award, the team also established Romania's first child injury registry, then subsequently received funding from the European Union to expand it as part of the European Union Trauma Data Bank. The team is now expanding trauma data infrastructure to Armenia, Georgia, and Moldova.

The project has also supported the 2007 launch of the Cluj School of Public Health at Babeş-Bolyai University. Not only is the Cluj School Romania's first degree program in public health, but it is currently the only Public Health program taught in English in the entire Central and Eastern European region.

## **1.0 Introduction**

### **1.1 Program Review**

The John E. Fogarty International Center (FIC) at the National Institutes of Health (NIH) supports international collaborative research and training programs that advance the NIH mission through international partnership. Guided by the FIC Framework for Program Assessment,<sup>1</sup> FIC routinely conducts reviews of each of its extramural programs. The purpose of these reviews is to analyze program implementation, identify near-term outputs, and document program outcomes, impacts and lessons learned.

The International Collaborative Trauma and Injury Research Training Program (“Trauma Program”) was reviewed over the course of several months in early 2015. This report describes the results of the Trauma Program review and is organized into six sections. After a brief review of major findings and recommendations (Executive Summary) the report provides a description of the methods used to collect and analyze the data (Section 1). The next two sections describe program history, context and implementation (Sections 2 and 3). Evidence of the Trauma Program’s outputs, outcomes and impacts are documented in Section 4 in four categories: leveraged funding (Sub-Section 4.1); enhanced empirical evidence (Sub-Section 4.2); capacity building impacts (Sub-Section 4.3); and policy or program outcomes (Sub-Section 4.4). Lastly (Section 5), the report describes evaluation conclusions and recommendations.

### **1.2 Methodology**

The approach taken to review the Trauma Program is broadly structured using the guidelines specified in the FIC Framework for Evaluation<sup>2</sup> and key elements highlighted in the program’s logic model (Appendix A). Alongside the Framework and logic model, consultations with FIC staff were held to develop a set of evaluation study questions (Appendix B). These questions helped guide the types of data that were collected and reviewed in order to obtain the answers necessary for this evaluation.

Portions of the evaluation were contracted to third parties: the NIH Library and Office of Portfolio Analysis led sections of the bibliometric analysis and CRDF Global drafted the initial versions of the case studies (Appendix C). All material was reviewed and approved by FIC staff and NIH community members with equity in the program.

#### **1.2.1 Data Collection**

Data primarily came from administrative sources including NIH databases (e.g. NIH RePORT, MEDLINE, SPIRES, IMPACII, CareerTrac) and grantees’ progress and final reports. When possible, data was cross referenced with a second source or the actual grantee to confirm accuracy or solicit extra detail (e.g. trainee names and training dates). The majority of data spans the time period from FY2005 to FY2014, however, some publication data spans a slightly different time period due to the nature of citation counts.

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<sup>1</sup> “Framework for Program Assessment (Evaluation and Review),” Fogarty International Center, <http://www.fic.nih.gov/About/Staff/Policy-Planning-Evaluation/Pages/evaluation-framework.aspx> (April 2005)

<sup>2</sup> See footnote 1.

Data on award characteristics, mechanism, funding, grantees, Funding Opportunity Announcements (FOAs), and publications was extracted from relevant NIH databases. Additional bibliometric resources were obtained and utilized with the assistance of the NIH Library personnel. Available applications and progress reports were manually reviewed to supplement information about individual projects' objectives, outputs and outcomes. Whenever possible, data was crosschecked across multiple sources to ascertain validity.

### **1.2.2 Case Studies**

In an effort to provide more robust qualitative evidence of the outcomes and impacts of Trauma Program grantees, this evaluation utilized case studies for all 13 awards funded under the program. The structure of these case studies was designed to capture more distal impacts such as how scientific evidence and research capacity may have informed policy or programs. Sources of information for each case came from available applications, progress reports and final reports. All grantees were given an opportunity to review, and provide comments and additional information on their respective case study before finalizing.

## **2.0 Program Background and Landscape**

According to the World Health Organization, over five million deaths per year are caused by trauma and injury, including both intentional and non-intentional types. Furthermore, over 90% of the injury-related deaths occur in low- and middle-income countries (LMICs) due to factors such as access to quality emergency trauma care or rehabilitation services, unenforced or nonexistent preventative policies, and working or living in unsafe conditions. In addition, data from the Centers for Disease Control and Prevention demonstrate that the leading cause of death from non-natural causes in U.S. citizens traveling abroad is motor vehicle crashes.<sup>3</sup> Given this heavy burden, both domestic and international, reducing the mortality and disability associated with intentional and unintentional injuries is a critical priority in global health research.

### **2.1 Program Origin**

Despite the global health burden associated with trauma and injury, in 2000, virtually no research or research training programs focused on trauma and injury in LMICs. Responding to this gap, FIC conducted a literature review, produced several background working papers, and conducted a needs assessment to help identify research and training gaps. Simultaneously FIC convened an internal NIH consultation in late March 2003 with attendees from six other Institutes and Centers (ICs).



Photo courtesy of Dr. Junaid Razzak, Aga Khan University

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<sup>3</sup> David A. Sleet, David J. Ederer, Michael F. Ballesteros, "Injury Prevention," Centers for Disease Control and Prevention, <http://wwwnc.cdc.gov/travel/yellowbook/2014/chapter-2-the-pre-travel-consultation/injuries-and-safety>

Based on a demonstrated need, FIC sponsored a two day consultation in partnerships with the National Institute of General Medical Sciences (NIGMS), *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), National Institute of Mental Health (NIMH), National Institute of Biomedical Imaging and Bioengineering (NIBIB), National Institute of Neurological Disorders and Stroke (NINDS), and National Heart, Lung, and Blood Institute (NHLBI). This consultation brought together approximately 40 researchers in the field of trauma and injury from both developing countries and the United States to advise the NIH about needs and priorities for research, training and the development of new technologies to reduce the burden of trauma and injuries in developing countries. Recommendations of this group, with expertise ranging from the basic sciences to clinical care, were taken into consideration in developing FIC's training and research program on trauma and injury in FY 2004.

## 2.2 Program Purpose and Objectives

The Trauma Program funds awards to conduct research and capacity building relevant to the health needs of LMICs on issues related to the diagnosis, prevention, and/or treatment of injury and trauma. The overall aim of the program is to support grantees in designing and implementing short and long-term training activities to fill specific gaps in human trauma and injury research expertise at collaborating LMIC institutions with an ultimate goal of developing a critical mass of scientists, nurses, and health professionals who conduct injury research, understand the pathophysiology, and prevent or treat injury or the sequelae of injury in their country.

The specific objectives of the program are to 1) increase the expertise of trainees from LMICs in human trauma and injury-related research; 2) foster an interdisciplinary, collaborative relationship between U.S. and LMIC scientists, nurses, bioengineers and imaging researchers; 3) generate data for health care policy, guidelines and procedures in injury disease clinical treatment and prevention programs; and 4) enhance the implementation of validated interventions in specific LMIC contexts. Some additional objectives varied between the 2004 and 2010 FOAs. For example, in 2004 one such goal was to help train individuals in identifying the legal, ethical and social implications of trauma and injury research. However, in 2010 this goal was removed and replaced with an objective to “increase the capacity of LMICs to plan for, adapt to and prevent the potential trauma-related consequences of climate change.”



Photo courtesy of Peter Donkor

## 2.3 Program Model and Structure

The Trauma Program logic model traces program activities, outputs and outcomes, and impacts in the policy, practice or research of trauma and injury (Appendix A). As the logic model indicates, there are two activities supported by the Trauma Program: 1) the individual, 5-year awards funded under a D43 mechanism; and 2) network meetings facilitated by the Trauma Program Officer to bring together Trauma Program grantees and other relevant stakeholders.

To meet the qualifications of the D43 mechanism, the application must demonstrate collaboration with a LMIC institution. While some training may take place in the U.S., the program encourages grantees to conduct training-related research in the LMIC. The emphasis is on medium to long-term training, defined as 3 or more months of training effort for mid-career to advanced in-country researchers.

## **2.4 Program Niche**

There are other NIH investments in trauma and injury that complement the efforts of FIC's Trauma Program.

- National Institute of General Medical Sciences (NIGMS): Since the early 2000s, the NIGMS has funded research centers that conduct research and provide guidance on best clinical practices and treatments for patients who suffer from life-threatening burn and severe physical trauma. NIGMS also houses the Office of Emergency Care Research which was created in 2012 to help coordinate the emergency-care research activities within NIH.<sup>4</sup>
- National Institute of Child Health and Human Development (NICHD): NICHD's branch of Pediatric Trauma and Critical Illness focuses on research and research training in pediatric trauma, injury, and critical illness. The branch primarily conducts research and research capacity activities under one of three interdependent research areas: critical care, emergency care or injury and violence.

Neither of these sets of activities focus on the global setting and the unique struggles within low-resource settings. As such, the Trauma Program is the only program that supports research and research training across the spectrum of trauma and injuries in the global arena from the prevention, treatment and interventions of specific trauma, as well as basic, clinical and translation research as it pertains to trauma and injury.

## **3.0 Program Management and Partnerships**

### **3.1 Applications and Success Rates**

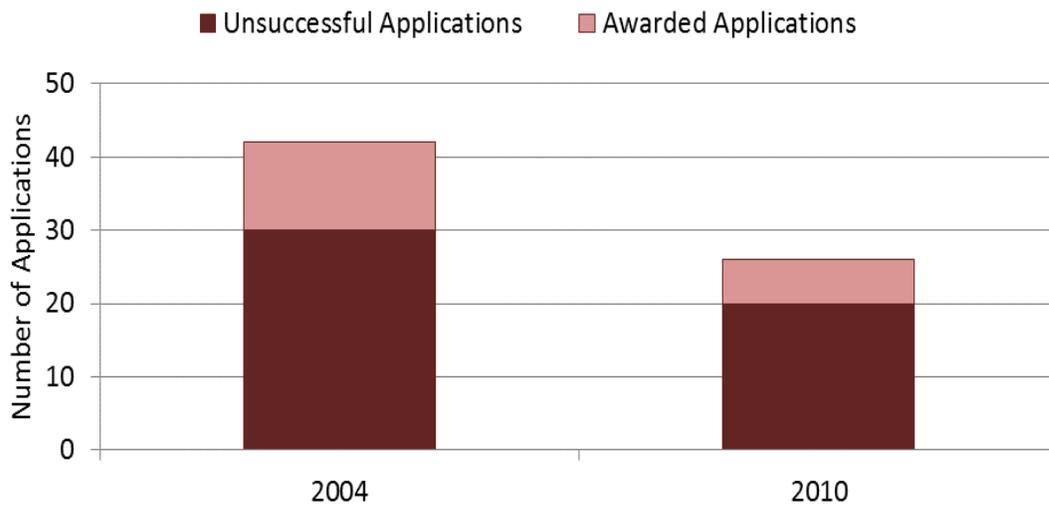
Over the past ten years, the number of applications received, grants funded, and overall success rate have fluctuated. Figure 1 represents the number of applications excluding recompeting supplements per each competition year.

Under the first funding announcement ([PAR-04-083](#)), there was a total of 42 applications of which 12 grants were awarded; a 29% success rate. In 2010 ([RFA-TW-09-002](#)), there were 26 applications (15 new and 11 recompeting) and six grants were awarded. Of these six grants in the 2010 cohort, one was awarded to a new applicant and five to recompeting applicants; an overall success rate of 23%. All recompeting supplements (n=29) during the past ten years were awarded.

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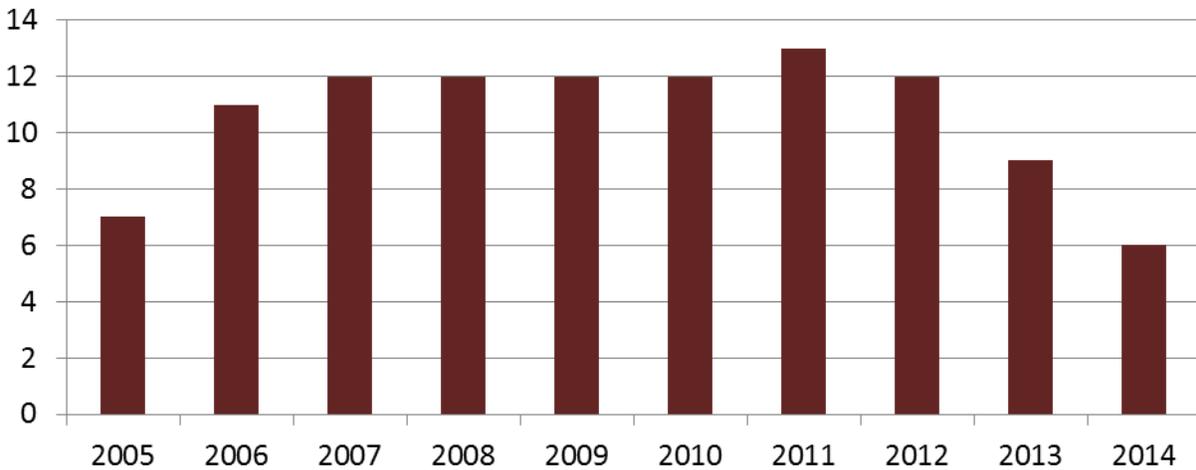
<sup>4</sup> "NIGMS Fiscal Year 2014 Congressional Justification," National Institute of General Medical Sciences, <http://publications.nigms.nih.gov/cjs/2014/index.html> (2014)

Figure 1: Number of Trauma Applications and Awards by Funding Cycle



In total, 13 awards have been funded. On average, 11 were funded each year during the past ten years with the peak in 2011 when awards under the first Program Announcement (PA) were closing and the awards under the second Request for Applications (RFA) were just starting (Figure 2).

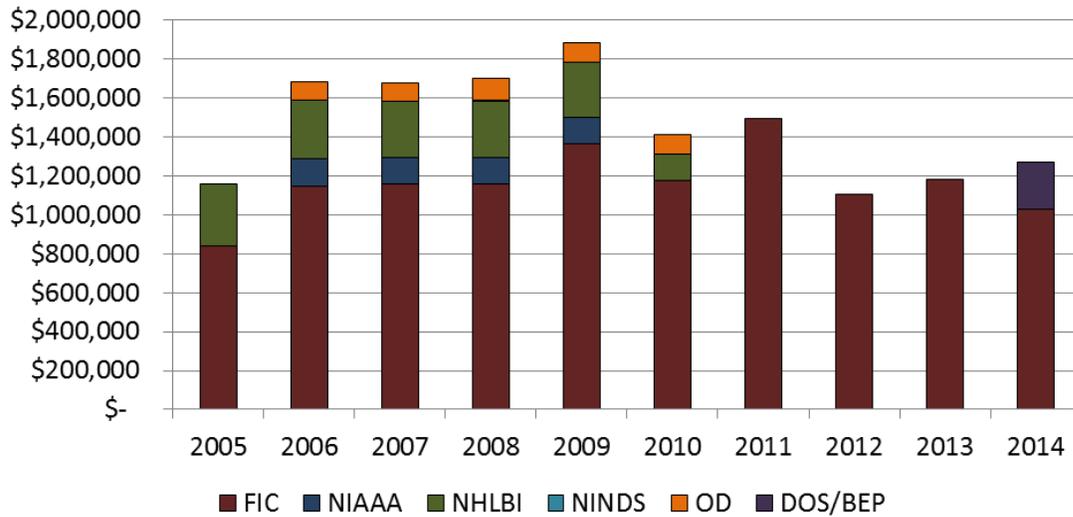
Figure 2: Number of Active Awards (FY2005-2014)



### 3.2 Funding by Program Partners

The total cost of the Trauma Program in aggregate was just under \$14.6 million over ten years with each of the 13 awards costing an average of \$158,500 per year. Given that trauma and injury is cross-cutting and transcends the interests of many ICs, the Trauma Program has successfully leveraged funding from four partners (OBSSR, NINDS, NHLBI, NIAAA) and the US Department of State's Bureau of International Security and Nonproliferation. In total, partners have contributed \$2.3 Million (or 20%) to the program (Figure 3) with the majority of co-funding during the first funding cycle.

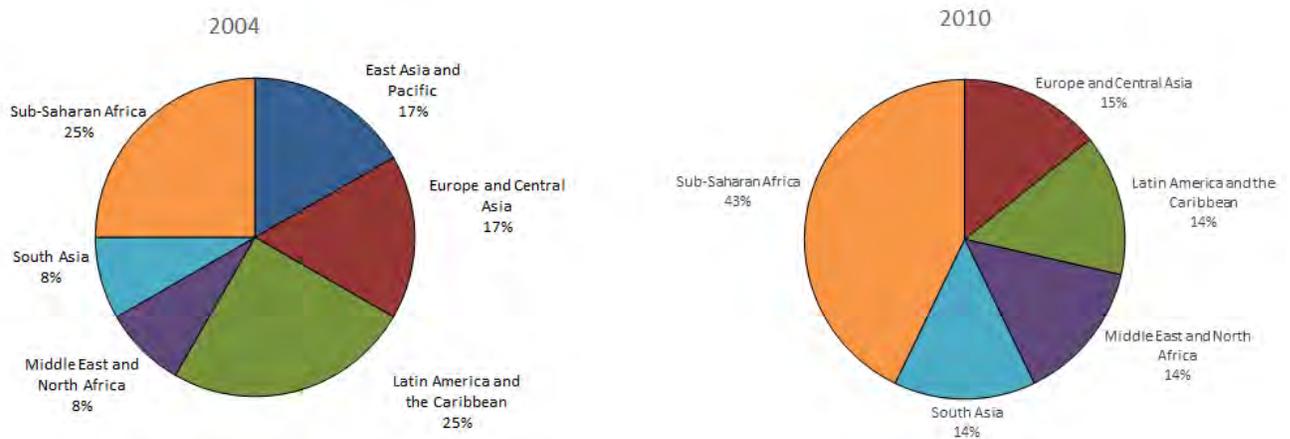
Figure 3: Funding Source by Trauma Program Partners (FY2005-2014)



### 3.3 Program Snapshot by Region

During the first funding round, 12 awards were granted in six different regions of the world. Both Latin America (Colombia and Argentina) and Sub-Saharan Africa (South Africa and Ghana) received three awards each (Figure 4). In the second round of awards, issued in 2010, three awards focused on Sub-Saharan Africa<sup>5</sup> and one award was issued to build capacity in each of the following regions: Middle East and North Africa, Latin America and the Caribbean, South Asia, and Europe and Central Asia.

Figure 4: Distribution of Trauma Awards by Region (by FOA)



<sup>5</sup> One award in 2010 was multi-regional, focusing on both Sub-Saharan Africa and Europe and Central Asia.

### 3.4 Program Snapshot by Research Category

The Trauma Program promotes research and research training in a wide spectrum of injury- and trauma-related topics (e.g. suicide, emergency medical services, road traffic injuries) and the processes of care (e.g. treatment, diagnosis, prevention). In an effort to better understand the topical breadth of the Trauma Program portfolio, a manual categorization process was implemented.

Using the abstracts and subsequent publications, each project was categorized as focusing on intentional or unintentional injury. Projects were further categorized as seen in Figure 5: Sub-categories under intentional injury included self-directed (e.g. suicide), interpersonal (e.g. domestic violence), and collective (e.g. war). Of note, gender was included as a category, however, the majority of publications focusing on women were included in the interpersonal and sexual violence topic bins and therefore, a gender-specific category was not included in the final Figure 5. Sub-categories under unintentional injury and trauma included road traffic injuries, poisoning, burns, occupational, alcohol abuse, drownings and falls. Notably, the majority of unintentional injury projects focused on road traffic injuries (Figure 6) and only four of the 13 projects covered both intentional and unintentional injuries.



Photo by David Rockkind for Fogarty/NIH

Figure 5: Grantee Project by Intentional Topic

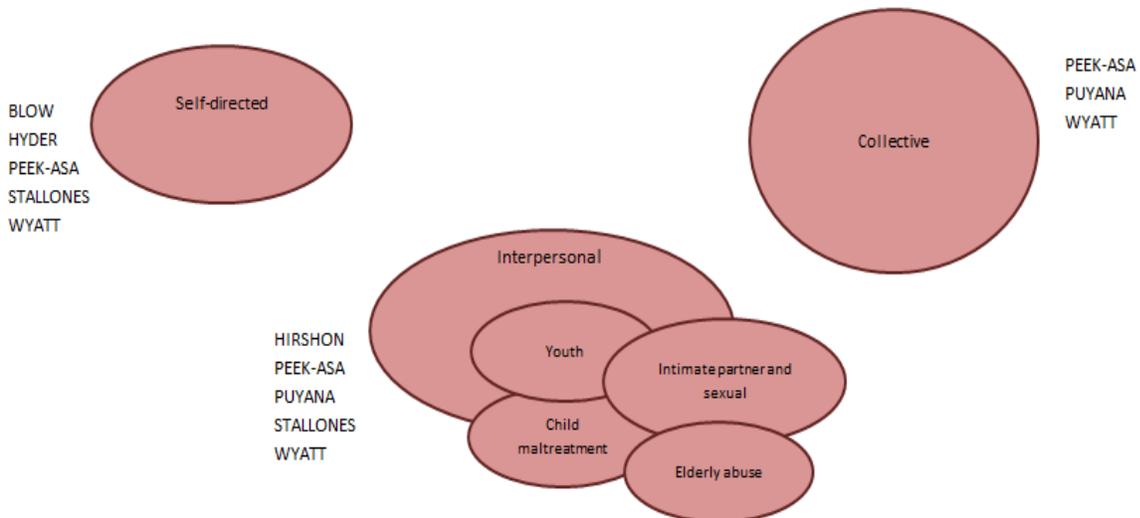
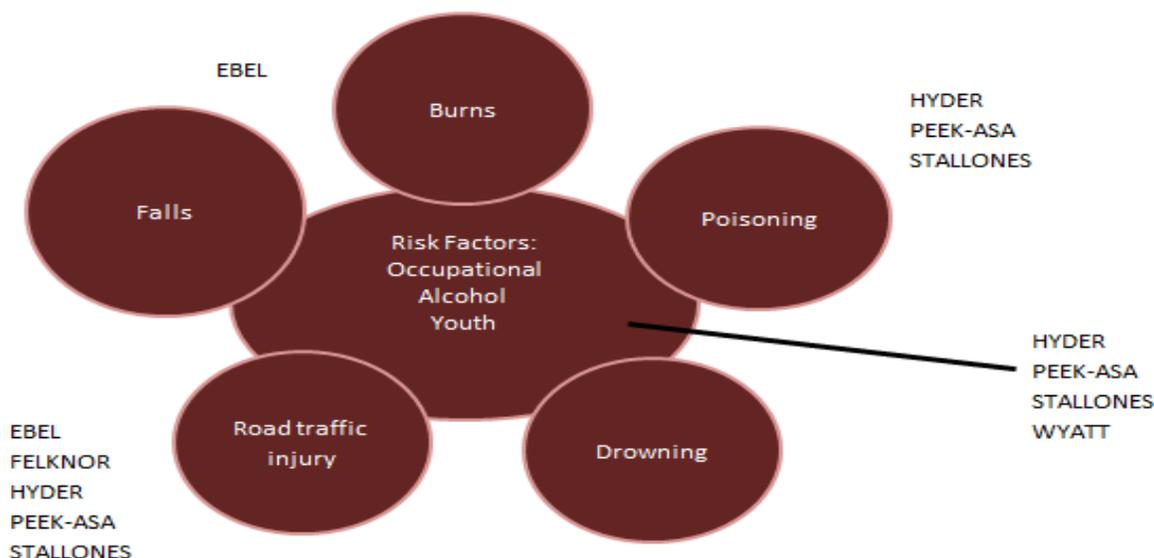


Figure 6: Grantee Project by Unintentional Topic



## 4.0 Program Results

Over the past decade, the Trauma Program has generated significant scientific advances that have informed trauma-related policies and programs, enhanced knowledge of the impact of trauma in LMICs, increased trauma research capacity, and improved measurable policy and practice outcomes. A number of Trauma projects have demonstrated the ability of the program to inform national policy and public health programs in LMICs. In the sections below, we review the contributions of the Trauma Program in terms of traditional scientific outputs (e.g. publications, citations, posters, etc.). We then discuss and provide data on the increased trauma research capacity resulting from Trauma awards. Finally, we review the policy and public health outcomes informed by Trauma award contributions in scientific evidence, capacity building, and partnership creation.

One Trauma award gained national support through editorial articles published in Colombia's national newspaper, *El Tiempo*, in 2008, helping to raise awareness in violence, trauma and injury prevention. For more information see the Billiar/Puyana case study (Appendix C).

In 2007, a Trauma award collaborated with local reporters from Ghana's leading newspaper, *The Daily Graphic*, to help publicize and advocate for increased road safety. The same program tailored a workshop on the principles of road safety and trauma care systems for members of Parliament in Ghana. Twenty members from the health, transport and judiciary committees spent two days discussing legislative and regulatory approaches to road safety and the role of the Ministry of Health in strengthening trauma care. For more information see the Mock/Ebel case study (Appendix C).

### 4.1 Leveraged Funding and Support

Grantees and trainees alike report their ability to successfully obtain additional funding (during or after their tenure as a Trauma Program grantee) as a result of the program. Such funding not only allows for the continuation and sustainability of the trauma research but demonstrates the success of the Trauma Program in creating a cadre of independent trauma researchers.

The Trauma Program leveraged funding from a broad range of countries. Several projects were able to leverage additional funding from government institutions and others engaged with local media to catalyze additional interest and promote awareness. Two such examples can be found in the text box above.

Several projects have also leveraged additional funding through other activities and mechanisms, most notably from other FIC sponsored awards (Table 1).

Table 1: Examples of subsequent NIH awards

<p>PUYANA (D43TW007560; Colombia):</p> <ul style="list-style-type: none"> <li>• Enhancing Research Informatics Capacity for Health Information in Colombia (ENRICH), 2009-2015, from the <i>Informatics Training for Global Health</i> program</li> <li>• Capacity Building for Decompressive Craniotomy in Colombia, 2012-2016, from the <i>Brain Disorders in the Developing World: Research Across the Lifespan</i> program</li> <li>• eCapacity for Trauma Information Systems and Research Education (ECATIS), 2014-2017, from the <i>Global Health Research and Research Training eCapacity Initiative</i> program</li> </ul>
<p>BRANAS (D43TW008972; Guatemala):</p> <ul style="list-style-type: none"> <li>• Building Local Capacities in Ethics Training and IRB Review in Guatemala, 2014-2018, from the <i>International Research Ethics Education and Curriculum Development Award</i> program</li> </ul>
<p>CAINE (D43TW007273; China):</p> <ul style="list-style-type: none"> <li>• The Depression Hypertension Coach Study, 2013-2018, from the <i>Grand Challenges in Global Mental Health: Integrating Mental Health into Chronic Disease Care Provision in Low- and Middle-Income Countries</i> program</li> <li>• eCapacity Development and Growth in the ASPIRE Network [eC.ASPIRE], 2015-2018, from the <i>Global Health Research and Research Training eCapacity Initiative</i> program.</li> <li>• China-Rochester Suicide Research Training (CRSRT), 2011-2016, from the <i>Chronic, Non-Communicable Diseases and Disorders Across the Lifespan: Fogarty International Research Training</i> program</li> </ul>
<p>CARNEY (D43TW007566; Argentina):</p> <ul style="list-style-type: none"> <li>• Traumatic Brain Injury in Latin America (Bolivia): Lifespan Analysis, 2007-2011, from the <i>Brain Disorders in The Developing World: Research Across the Lifespan</i> program</li> <li>• Pediatric Traumatic Brain Injury in Latin America (Argentina, Bolivia and Ecuador), 2009-2014, from the <i>Brain Disorders in the Developing World: Research Across the Lifespan</i> program</li> <li>• Managing Severe TBI without ICP Monitoring – Guidelines Development and Testing, 2012-2017, from the <i>Brain Disorders in The Developing World: Research Across the Lifespan</i> program</li> </ul>

Trauma grantees were also able to obtain funding from sources beyond FIC such as:

- Bill and Melinda Gates Foundation (\$3 million USD) and the Hewlett Foundation (\$2 million USD) who contributed to facilitating research and research capacity in injury care at KNUST.
- Atlantic Philanthropies (approximately \$2.5 million USD) contributed to supporting capacity development in the Nursing Department at the North West University in South Africa.
- Elsevier Foundation and other donors (\$76,000 USD) who contributed funds to the U.S. and Guatemalan universities to continue their research partnerships.

Trainees were also successful in securing their own funding for their research. As reported, trainees from four Trauma awards received additional funding for trauma and injury research; however, this data is limited to those reports that clearly stated a trainee received an award as a principal applicant. Only long-term trainees reported receiving new funding.

The five funded research from Trauma trainees, as reported were:

- Colombian trainees received additional funding during the Trauma grant period from the Colombian government and a private fund for traffic research.
- A South African trainee received two large research and capacity building grants totaling over \$2.7 million USD from international funders.
- A Colombian trainee is the major foreign collaborator (MFC) for a FIC award received after the end of the Trauma award.
- An Argentinian trainee was the MFC for two additional FIC grants funded during the Trauma award.
- A Croatian trainee received a grant from the Croatian Ministry of Science, Education, and Sport to conduct injury prevention training for physicians across the country.

Other grantee-submitted documents report that trainees were able to continue their research through other funding sources. Using recent publications as evidence, it may be inferred that trainees from two other Trauma awards continued their research, and were likely funded through academic institutions.

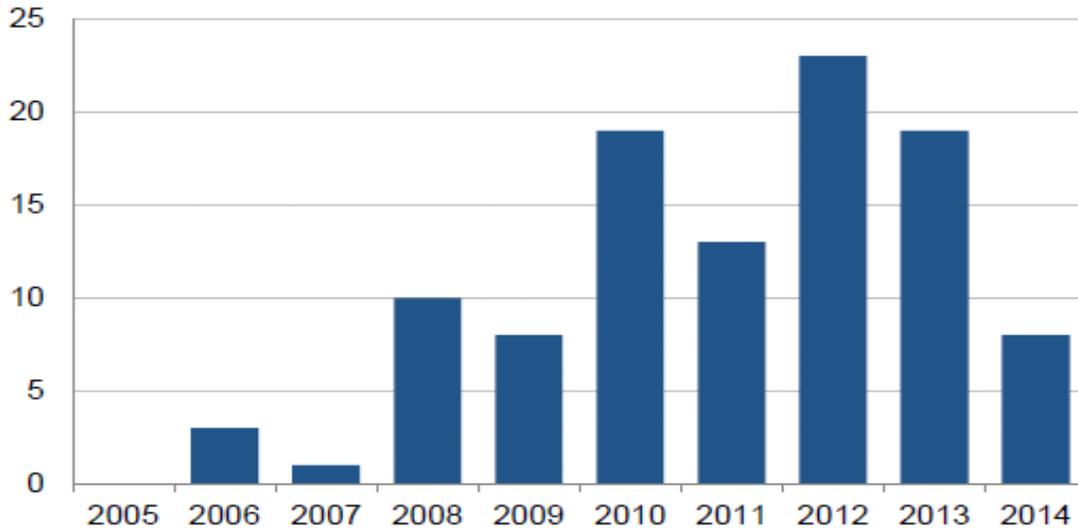
## **4.2 Enhanced Empirical Evidence**

### **4.2.1 Publications**

Trauma projects contributed to progress in key areas of trauma research by generating evidence on intentional and unintentional injury subjects ranging from road traffic injury to interpersonal violence to drownings. A bibliometric analysis of all-cited publications produced under the funding of the Trauma Program were pulled and analyzed by the NIH Library using the NIH RePORTER and Web of Science. A total of 104 publications were analyzed and categorized. Given there is a predicted publication lag of a

couple of years, there were no publications citing Trauma Program awards published in the first year of the program (2005). In 2012, there was a peak in publications with over 20 new articles being published that year (Figure 7). From 2012 to 2014 there has been a decreasing trend in number of publications each year, likely due to the fact that the number of active awards dropped after 2012 (Figure 2).

Figure 7: Publications per Calendar Year



Using those 104 publications, a heat map table (Table 2) was created using the top 20 major MeSH terms to describe the publication. The darker cells indicate more publications on that topic for that year than in other years and compared to other topics. Excluding the first MeSH term "wounds and injuries," the next three topics most common for these publications was suicide, alcohol related injuries and road-traffic injuries.

Table 2: Publication Topics by Research MeSH Terms by Year (2005-2014)

Major MeSH	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Wounds and Injuries	0	2	1	3	4	9	5	6	3	4	37
Suicide/attempted suicide/suicidal ideation	0	0	0	4	2	4	3	5	3	0	21
Alcohol-Related Disorders/Alcoholism/Alcohol drinking	0	0	0	1	2	4	2	6	3	0	18
Accidents/Traffic accidents	0	0	0	1	3	6	2	2	2	2	18
Emergency Medical Services	0	0	0	2	0	0	1	4	1	1	9
Occupational Exposure/Diseases/Accidents	0	1	1	0	1	1	1	0	2	1	8
Agriculture/Agricultural Workers' Disease	0	1	1	0	1	1	1	1	1	1	8
Brain Injuries	0	0	0	0	2	2	1	2	1	0	8
Impulsive Behavior	0	0	0	1	1	1	0	2	2	0	7
Health education/Knowledge/Personnel	0	0	0	3	1	0	1	0	2	0	7
Population Surveillance	0	0	0	1	0	1	0	3	0	1	6
Polymorphism	0	0	0	0	1	0	1	2	2	0	6
Rural Population/Health Services	0	0	1	0	2	2	0	0	0	0	5
Developing Countries	0	0	0	1	0	1	0	1	2	0	5
Mental health/Mental disorders	0	0	0	1	0	1	0	1	1	1	5
Social adjustment/Control/Support	0	0	0	1	0	0	1	0	2	0	4
Receptor, Serotonin, 5-HT1A/genetics	0	0	0	0	0	0	1	2	1	0	4
Sleep Disorders	0	0	0	0	1	1	1	1	0	0	4
Automobile Driving	0	0	1	1	1	0	0	0	1	0	4
Abdominal injuries	0	0	0	0	0	0	2	2	0	0	4

A citation analysis of 77 publications published between 2005 and 2012 was also completed (Table 3). (Note: The analysis was bounded at 2012 because publications must be at least 2 years old to have received enough citations for bibliometric indicators based on citation counts to be reliable). All citation impact data was obtained from Essential Science Indicators (ESI).

Table 3: Citation Impact (2005-2012)

<b>Bibliometric Indicator</b>	<b>Value</b>
Number of articles	77
Number of citations (Times cited)	731
Mean citation count	9.49
Median citation count	5
Self-citation rate	3%
Portfolio h-index	13
# of articles in the top 10% for citations	9
% of articles in the top 10% for citations	11%

#### **4.2.2 Other Research Outputs**

In addition to publications, the Trauma Program has generated additional research outputs related to trauma and injury in LMICs. These outputs include registries and databases, accreditation standards, education curricula and materials, new resources for research and an IRB.

Specific examples of these outputs include:

- **Government Entity:** Trainees assisted in the design and implementation of the Colombian National Observatory of Road Safety, a new government entity that will concentrate on data collection and research to improve road safety in the country.
- **Guidelines:** Trainees and program faculty in Guatemala have participated in the establishment of the country's first National Trauma Council, created by the Guatemalan President. As part of this Council they have set guidelines for the designation of trauma center hospitals in the country.
- **Registries:** Trainees from various projects in Bosnia, Croatia, Mozambique, Pakistan, Romania, Serbia and The Gambia have established registries and databases.<sup>6</sup> Four countries have new registries that are primarily local and at hospitals; and three have established databases that are collecting nationwide data (e.g. car crashes, spinal cord injury).

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<sup>6</sup> Mehmood, A., Razzak, J. A., Kabir, S., MacKenzie, E. J., & Hyder, A. A. (2013). Development and pilot implementation of a locally developed Trauma Registry: lessons learnt in a low-income country. *BMC emergency medicine*, 13(1), 4.

- **Education Materials:** Trainees in Colombia contributed real-time video materials in operative trauma care for a partner organization that established a video library to educate resident surgeons on operative techniques and intra-operative decision-making.

### 4.3 Enhanced Research Capacity

Given that trauma is one of the leading causes of mortality and morbidity in LMICs, building local and national capacity to address research and evidence needs is an essential step in addressing this challenge. Training the next generation of researchers on the science of trauma and injury is an integral part of the Trauma Program. Indeed, at the cornerstone of the Trauma Program is a research training component that aims to build a cadre of researchers in the field of trauma and injury.

To help determine capacity building outcomes for Trauma grantees, the following sections will examine the number and nature of trainees reported in the last ten years.

#### 4.3.1 Training Models

Trauma awards are encouraged to use a wide range of training activities and models with the goal of training individuals to be independent researchers. The awards within the Trauma Program have utilized a range of training model(s) as indicated in Table 4. These training models included short-term, in-country trainings (less than three months); medium-term trainings (three to up to six months); long-term U.S. and/or in-country trainings (six months or more); and workshops or symposia (varied from one day to two weeks).



Photo by Richard Lord for Fogarty/NIH

Long-term trainings were the most common: 11 Trauma projects incorporated long-term training. All long-term trainees returned to their country and most reported accepting positions in academia or the government.

All medium-term trainings and two of the short-term trainings were held in the U.S (See Figure 8A and 8B). Short-term trainings in the U.S. provided short, concentrated courses to select trainees; however, short-term trainings in-country were meant to engage a broader audience and help establish far-reaching regional

networks. In some instances short-term trainings were duplicated in other countries in the region. Workshops and symposia expanded the reach of the training program to non-researchers, thereby, helping to establish more collaborations.

Table 4: Training Activities by Award

Trauma Project	Short-Term ( < 3 months)	Medium-Term (3 – 6 months)	Long-Term ( 6 – 24 months)	Workshop / Symposium (varied)
BILLIAR/PUYANA; D43TW007560			✓	✓
BLOW; D43TW007569		✓	✓	✓
BRANAS; D43TW008972	✓		✓	✓
CAINE; D43TW007273			✓	✓
CARNEY; D43TW007566	✓		✓	
COOK/PEEK-ASA; D43TW007261	✓	✓	✓	✓
EBEL/MOCK; D43TW007267	✓	✓	✓	✓
FELKNOR/AMICK; D43TW007564	✓			
HIRSHON/DISCHINGER; D43TW007296	✓		✓	✓
HYDER/MACKENZIE; D43TW007292	✓		✓	✓
SASSER/WRIGHT ; D43TW007262			✓	
STALLONES; D43TW007257	✓	✓		✓
WYATT; D43TW007278			✓	
Total:	<b>8</b>	<b>4</b>	<b>11</b>	<b>9</b>

Figure 8A: Long Term Training Locations (n = 11)

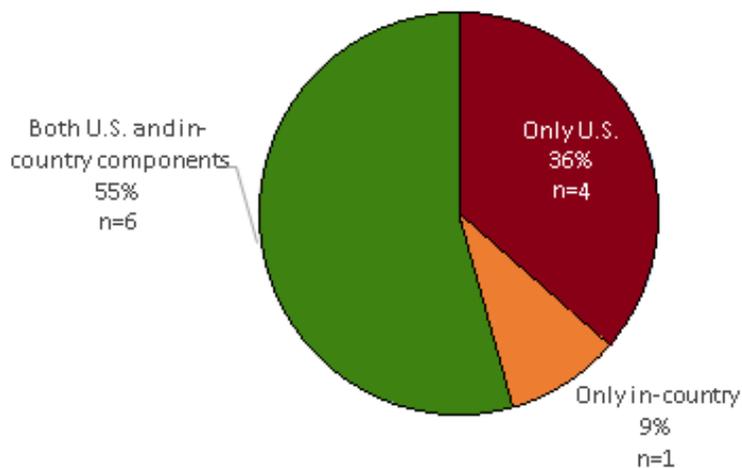
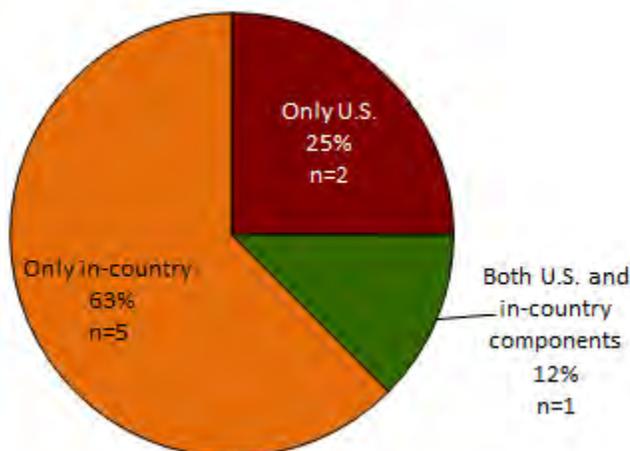


Figure 8B: Short Term Training Locations (n = 8)



#### **4.3.2 Return Home Rate**

The Trauma Program prioritizes building trauma research capacity in LMICs. To this end, the program requires “at least 80 percent of the funding should be spent in the LMIC or directly for training of the LMIC scientists”<sup>7</sup> with the end goal being to create a critical mass of scientists, government officials and health professionals who are experts in the field of trauma research, thereby strengthening the research capacity of the LMIC countries and influencing policy decisions. An analysis of trainee data from the program indicates that all trainees remained in-country, or returned to their country after their training in the U.S. There were a couple of exceptions where trainees went on to pursue doctoral degrees in other countries, but have or intend to return to their home country after their education. Of note, the data on trainees is not 100% complete; some awards reported training tens or hundreds of trainees, but most reports only detail trainees who received long-term trainings (rather than short trainings at symposia or workshops). Reports indicate that trainees remained in careers related to trauma and injury research after their training, but again there is a limitation in the data; no reports mention the contrary. The professional positions of trainees varies from faculty or dean appointments at universities to positions within hospitals or government ministries.

Multiple Trauma trainees attained positions in the LMIC ministries, other government entities, and research institutes. While this is primarily an indicator of professional development, in the long-term these individuals may influence future trauma and injury practice and policy. Two examples of current positions held by trainees include:

- A Croatian trainee is the country’s Injury Prevention Liaison for the Croatian Ministry of Health.
- A Guatemalan trainee obtained a research position at the Guatemalan Ministry of Health at the National Center of Epidemiology.

<sup>7</sup> Fogarty International Collaborative Trauma and Injury Research Training Program (TRAUMA) (D43). Available at: <http://grants.nih.gov/grants/guide/rfa-files/RFA-TW-09-002.html>. Accessed September 16, 2015.

### **4.3.3 Enhanced Institutional Research Capacity**

Beyond supporting individual training, the Trauma Program has also demonstrated an ability to build institutional capacity. Of the 13 Trauma awards, five were able to leverage part of their grant to create centers dedicated to trauma and injury research and training. Several either partnered with government ministries, academic institutions or the WHO to establish these centers. All centers are either in the beginning stages, or the reports did not contain detailed updates about the centers; therefore, major outcomes from the centers cannot be identified at this time. It is also unclear how the centers will be sustained. However, it is anticipated that the two WHO research centers established, in part, through the Trauma Program, will be able to broaden their networks, collaborate with other WHO centers within their respective regions and sustain support from the WHO for future research.

### **4.4 Policy and Program Outcomes**

While there is a growing body of evidence on trauma, much has been written about how advances in research do not always lead to the adaptation of evidence-based practices in real-world settings. The Trauma Program 2010 RFA emphasized the importance of needing a “research training program...to conduct clinical, translational and implementation research on trauma and injury research.” Given this, and in an effort to optimize the impact of their research, many of the Trauma grantees have prioritized translation and implementation in their activities as evidenced below. Specifically, nine of the Trauma grantees directly engaged policy-makers at various levels of government, national and local, either through program activities, research or both. The teams from these nine Trauma awards had varied types of collaborations with policy-makers – some had pre-existing relationships with policy-makers and others engaged policy-makers during the course of their Trauma grant. Throughout the course of their awards, these Trauma grantees engaged policy-makers in workshops, trainings or other meetings. Importantly evidence suggests that six of these Trauma awards directly informed trauma and injury policy or are leading essential research to inform future policies.

Specific examples of various outcomes associated with grantee engagement with policy-makers include:

- Trauma awards in Pakistan and China dedicated grant resources to conduct annual meetings with policy-makers. These meetings served as a high-level national policy forum and were used to develop consensus regarding the future development of trauma and injury research.
- Trainees in Colombia researched the legal blood alcohol levels of other LMICs and proposed policy recommendations to change the current law. This research informed Colombian policy-makers of regional and global blood alcohol laws and efficacy, and in December 2013 a new law set a new stricter blood alcohol content standard for drivers country-wide.
- The Ministry of Health in Kurdistan, Iraq requested assistance from Trauma trainees in Egypt to develop an emergency preparedness and response plan. Health professionals from Kurdistan learned how to assess the current level of emergency relief capabilities and manage disaster situations. Similar trainings were designed for government entities in Afghanistan and Egypt.
- A Trauma award in Guatemala had a wide range of relationships with policy-makers, both national and local, including the Guatemalan Vice President and members of the Guatemalan Congress and Judiciary system. Guatemalan policy-makers have taken an interest in the research conducted under this Trauma award, specifically with national, representative studies of the

geographic prevalence of violence, the long-term effects of the 36-year civil war, violence on and around paydays, and the effects of partner violence on children. These relationships have also provided additional funding for trauma research and training programs in Guatemala such as from the Consejo Nacional de Ciencia y Tecnología, the Guatemalan NIH equivalent.

- A trainee in Colombia led research in Cali, Colombia to study if restrictions on the sales and consumption of alcohol in public places after certain hours would curb violence. Results of the study found an increased risk of homicide on days when the less-restrictive policies were in effect, and this highlights an important example of how scientific evidence might inform policy. A trainee in Mozambique worked closely with the Ministry of Health to develop a comprehensive national trauma data collection system. While the research is ongoing, the hope is that the data will be utilized to inform future policy.

Indeed, Trauma awards have contributed to increased awareness and evidence relevant to policy issues related to injury and trauma control in LMICs. It is to be expected that as the awards, Centers, and programs mature, more examples of evidence-based policy outcomes should follow.

## 5.0 Conclusion

Overall the Trauma Program has been successful in supporting scientific advances that are moving the field forward and building trauma and injury research capacity in LMICs. Trauma grantees have built sustainable partnerships and centers devoted to trauma research that will help to expand the impact of the Trauma Program beyond the five-year timeline of the Trauma grants. As expressed by the grantees in the July 2015 network meeting, some notable opportunities exist that could be considered for future iterations of the Trauma program. First, the program may want to more strongly encourage multi-sector and multi-disciplinary approaches. Evidence suggests that many of the Trauma grantees have utilized the local and national government to optimize the adoption of the scientific advances in the trauma and injury field. While Ministries of Health are important collaborators, there are additional critical stakeholders who can help catalyze use of evidence to inform programs and policy. For example, one grantee working in Guatemala suggested that to enhance their work, they should be focusing more on the Ministry of Finance than Ministry of Health to get their trauma program off the ground. Even beyond government officials, Trauma grantees may want to engage across more disciplines and sectors including media, lawyers, or civil society to enhance utilization of research evidence.

Second, to further support mentorship, the program may want to support an ongoing platform or network of trainees and trainee alumni. A similar model to a mentorship program would be to create a network to help support maturing scientists and keep them connected to a larger group. Grantees have expressed concern that alumni trainees may feel isolated from the larger injury and trauma community once they complete the training. Given this, it is possible that a network that continues to engage them would ensure that scientists trained through the Trauma Program remain a collaborating resource for each other.

There are many known proven interventions for injury prevention. Implementation of these interventions in an international setting requires adapting to unique cultural and societal contexts. However, many Trauma grantees have expressed frustration at how implementation science applications are reviewed at NIH and feel the need to adapt their grant proposals to articulate more basic science objectives instead of

more appropriate implementation science objectives. Working to ensure that NIH grant reviewers have the capacity to effectively review implementation science research is critical, especially in the field of trauma and injury.

Also noteworthy, at a July 2015 meeting held on the NIH Bethesda campus, Trauma grantees expressed interest in being more integrated and coordinated with one another. While most of the grantees in the Trauma Program are aware of what the other grants are doing, consistent annual network meetings would provide an opportunity to share not only the research but lessons learned and best practices. Aside from the July 2015 meeting, the last network meeting on record was 2009. These network meetings would also provide occasions to discuss common elements needed for data registries so that cross-regional analysis in the future could be conducted.

## **Acronyms**

FIC = Fogarty International Center

FOA = Funding Opportunity Announcement

FY = Fiscal Year

IC = Institutes and Centers

LMIC = low- and middle-income country

MeSH = Medical Subject Headings

MFC = Major Foreign Collaborator

NHLBI = National Heart, Lung, and Blood Institute

NIAAA = National Institute on Alcohol Abuse and Alcoholism

NICHD = Eunice Kennedy Shriver National Institute of Child Health and Human Development

NIH = National Institutes of Health

NINDS = National Institute of Neurological Disorders and Stroke

OBSSR = Office of Behavioral and Social Sciences Research

OD = Office of the Director

PA = Program Announcement

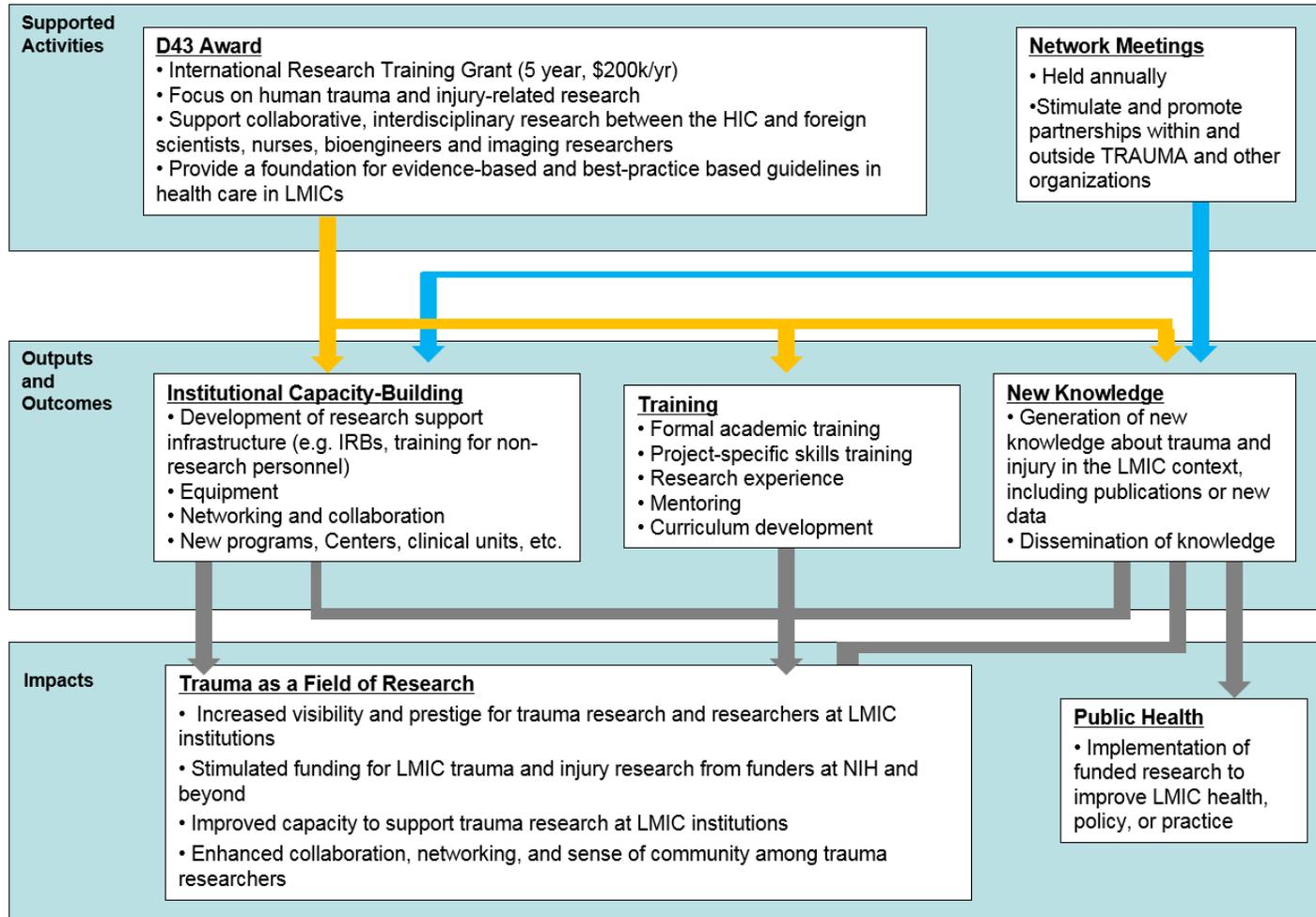
PI = Principal Investigator

RFA = Requests for Applications

USD = US Dollar

# Appendices

## Appendix A: Logic Model



TRAUMA Theory of Action Logic Model  
2/15/2014

## Appendix B: Evaluation Study Questions

<b>A. Program Planning</b>
<b>Program Logic:</b> What are the program goals and objectives? What activities have been supported (including research, training, networking, other)? What are the expected outputs/outcomes/impacts?
<b>Alignment with strategic priorities:</b> Do the program goals align appropriately with the FIC strategic plans (old and new?) and/or with other FIC initiatives? Strategic plans and initiatives elsewhere at NIH?
<b>Program Planning:</b> What was/is the strategic planning process for the program? How were/are the program goals developed? Were alternate mechanisms/models/strategies considered? What role(s) have various stakeholders played?
<b>B. Program Management</b>
<b>Project Selection:</b> Under what institute/center did the review take place? Is the composition of the review panel appropriate to the program? Are the review criteria appropriate and does the panel employ them? Were international issues taken into account? What was the role of the program officer in the selection of the panel/review?
<b>Recruiting Talent:</b> How has the program advertised itself to potential applicants? Have sufficient efforts been made to attract diverse and appropriate talent? What have been the application and success rates?
<b>Institutional Support:</b> Is there evidence that awarded USA and LMIC institutions have provided sufficient support for the program (administrative, other)? Are there significant challenges or barriers?
<b>Networking and Collaboration Outcomes:</b> What have been the networking/career development outcomes of the Informatics program? Is there evidence that supported activities facilitated new or enhanced relationships among investigators? Is there evidence that the informatics program has attracted and/or fostered the development of interdisciplinary collaborations?
<b>Fiscal Accountability:</b> What role does the foreign institution play with accounting under this project? How well are expenses documented? Is the funding reaching the foreign collaborator and the trainees? Is the funding being used to support agreed activities?
<b>C. Partnership Co-Funders</b>
<b>Partners:</b> Which ICs have provided co-funding, and at what levels? Have other partners been involved? Could the effort have succeeded without the partnership? What is the cost/benefit ratio of the partnerships? Has the program established long-term relationships that continue to be productive?
<b>D. Communication</b>
<b>Communication Among Awardees:</b> Are there adequate mechanisms for sharing data and/or best-practices among Informatics awardees/trainees? What are some successful interactions that have been encouraged?
<b>Flexibility:</b> Has the TRAUMA program evolved to address new technologies/interventions/research as they have come up? How are modifications to the initiative implemented? What are the outreach activities? How has the program responded to changing landscapes in the field?
<b>Needs Assessment:</b> Are needs assessments of the community/institution conducted? Do projects align with the needs of the LMIC institution(s)?

**Knowledge dissemination:** What methods and tools does the program use to transmit scientific findings and results? How effective are they? Is the program on the forefront of using new technologies to improve their information transfer capabilities? Does the program present results and findings in the ways useful to the community?

<b>E. Results</b>
<p><b>Training Outcomes:</b> How many and what types of people have been trained by the program? Have former trainees established productive careers (where? home country?)? What do trainees believe they gained from the experience? What were the student theses? What were the backgrounds of the trainees (public health vs. biologists vs. nursing)? What was the distribution of degrees and training levels (PhD, MS, post doc)? Where trainees "embedded" in ongoing research projects at their institutions? If "embedded" in other research did this lead to further collaboration with the research enterprise?</p>
<p><b>Areas of Trauma and Injury:</b> What areas of were covered across the individual projects? (e.g. elder abuse, war, domestic abuse, occupational injury)</p>
<p><b>Lab Areas (ID, NCD) supported by TRAUMA:</b> In what scientific areas were laboratories started? Was this totally lacking or is this supplemental? Do the labs support training? Are they well funded and supported by the institution? What percentage of the time do the grantees conduct research or implementation research vs. administration and other duties?</p>
<p><b>Policy and/or public health impact:</b> Is there evidence of any direct impact of funded activities on policy or public health? Have there been interactions between awardees/projects and policy-makers and/or the general public in developing countries? Is impact local/national/regional/international?</p>
<p><b>Seed Funding Outcomes (LMIC):</b> Is there any evidence that the program has increased awareness of the need for trauma or injury awareness/research within LMIC institutions and communities?</p>
<p><b>Research Outputs/Outcomes:</b> What have been the research outputs and outcomes of the TRAUMA program? Are there "success stories" ? How much of the training was directly applicable to research vs health care delivery?</p>
<p><b>Multiple v. Single Cycle Projects:</b> Was the longer terms support more than the multiple of the single support? Is continuous support worth it?</p>

## **Appendix C: Case Studies**

**Project:** Trauma and Injury Excellence in Education on Research Program (*Colombia*)

**Award Number:** D43 TW007560

**Project Period:** April 1, 2007 - February 29, 2012

**Principal Investigators (PIs):**

Timothy Billiar, MD (2007-2011)

*Professor, University of Pittsburgh, School of Medicine, Department of Surgery; Surgery and Trauma Staff Physician, University of Pittsburgh Medical Center Presbyterian Hospital*

Juan Carlos Puyana, MD (2011-2012)

*Professor, University of Pittsburgh, School of Medicine, Department of Surgery; Trauma Surgeon, and Director of Surgical ICU and Surgical Critical Care Program, University of Pittsburgh Medical Center Presbyterian Hospital*

**Major Foreign Collaborators (MFCs):**

Alberto Garcia, MD

*Professor and Director, Universidad del Valle, Cali, Colombia, Department of Surgery*

Carlos Ordoñez, MD

*Professor of Surgery, Universidad del Valle, Cali, Colombia, Department of Surgery*

**Project Overview:**

This U.S.-Colombia collaboration established the Trauma and Injury Excellence in Education on Research (TrainEER) Program devoted to advancing the training of health care professionals in trauma research across Colombia. Through a combination of short- and long-term training, the TrainEER Program was able to provide individuals with extensive trauma and injury research training, as well as develop sustainable research partnerships with U.S. investigators. The training has resulted in several publications on road injury surveillance, the epidemiology of violence and the effects of alcohol consumption on injury. Additionally, trainees have partnered with Colombia's Center for Research in Violence and Health to raise awareness among health and other professionals in Colombia about the importance of injury and trauma research and to establish linkages with the international injury research community. TrainEER continues to provide a strong base for strengthening Colombia's trauma and injury healthcare capacity at the institutional level.

**Background and Objectives:**

For decades, the University of Pittsburgh Department of Surgery has trained individuals from Latin America through the Pan-American Trauma Society. Building upon this long history of collaboration, the TrainEER Program was designed with the distal vision of creating the infrastructure for advanced training in trauma research across Latin American countries. Yet for the immediate time frame, this TrainEER Program was an international collaboration between the University of Pittsburgh and the Universidad del Valle in Colombia, and focused principally on building the capacity of investigators to conduct human trauma and injury research relevant to the health needs of Colombia.

The magnitude of trauma from injury in Colombia far exceeds the country's research capacity to address this daunting health challenge. Colombia, which has a population of over 40 million people, has been

called the most violent country in the world. Additionally, Colombia has inadequate emergency care systems at hospitals and inequalities in access to emergency response systems at the community level. Because of these issues and the socio-political climate of Colombia, investigators recognized the need to institute an international collaborative trauma and research training program that could provide significant clinical research capacity.

The TrainEER Program was designed to provide individuals with extensive trauma and injury research training through four specific aims: 1) provide formal long-term training at the University of Pittsburgh and Universidad del Valle; 2) further develop and strengthen the Center for Research in Violence and Health (CISALVA) Institute at the Universidad del Valle as a center of excellence in injury control research; 3) facilitate the transition of trainees to positions of responsibility and influence in the region; and 4) develop infrastructure to expand the opportunities to train and support injury research in other countries in Latin America.

**Training and Capacity Building Outcomes and Impacts:**

**Fellowship trainings in the U.S.:** From 2007-2009, two candidates were selected annually to travel to the University of Pittsburgh to complete a Master of Clinical Research or a certificate in Clinical Research. By the end of the program, six fellows completed a long-term training (1-2 years) at the university-based trauma center at the University of Pittsburgh; however, one of the six finished their master’s degree under a different funding mechanism. One of the long-term trainees was afterwards accepted into the University of Pittsburgh’s School of Medicine for the PhD in Translational Science program. He is currently in Colombia completing his dissertation as a final requirement for his PhD degree. Trainees learned the skills necessary to develop research in trauma and injury prevention, and they worked closely with mentors and advisors from at the University of Pittsburgh. The program also provided hands-on research experience whereby trainees developed their own research in Colombia at the Universidad del Valle. The collaboration between health professionals in Colombia and the U.S. has resulted in productive academic interactions, producing informative research that had an immediate impact on the quality of the trauma care offered in Colombia. By 2015 a total of 17 Colombians were trained under long term medium term and short term training activities at the University of Pittsburgh.

**Annual research training workshops and symposiums:** Advanced in-country short-term trainings through annual workshops ensured the program’s reach extended beyond the fellowship training. Over 400 health professionals have been educated in Colombia through five training seminars. Their purpose was to disseminate and raise awareness among healthcare and other professionals in Colombia about the importance of injury and trauma research. The workshops provided intensive coursework on trauma research training over a 2 1/2-day period. In addition, an annual research symposium was organized to provide Colombian health care professionals an opportunity to present their research in disciplines of trauma and trauma care research. The symposium identified a number of health professionals from several regions who had interests in pursuing

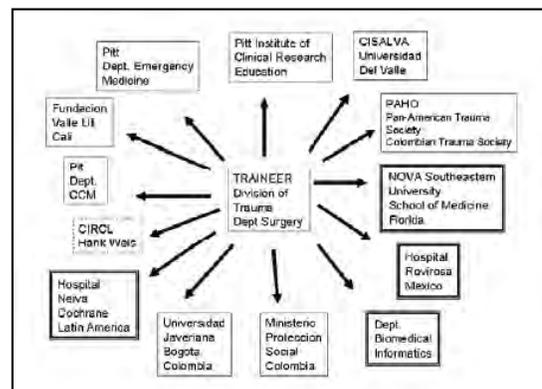


Diagram showing some of the collaborations formed through the TrainEER program

research within their own hospitals and communities. New collaborations were formed between TrainEER and the Universidad Javariana and the Hospital San Ignacio to study the emergency medical response to terrorist attacks in Bogota and the rest of Colombia.

### **Research Outcomes and Impacts:**

Over the course of the program, collaboration between the University of Pittsburgh and the Universidad del Valle has resulted in multiple research projects and educational activities. Upon completion of the training in Pittsburgh, long-term trainees were provided seed grants to conduct research in Colombia.

**Continuing research at the CISALVA Institute at the Universidad del Valle:** Established in 1995, the CISALVA is recognized as one of Colombia's premier research institutions focusing in violence prevention and unintentional injuries. CISALVA is involved in both national and international projects, as well as collaborative efforts, related to violence and health. In collaboration with CISALVA, trainees developed research on road injury surveillance, the epidemiology of violence and the effects of alcohol consumption and injury, among other projects. The purpose was to strengthen the research role of CISALVA in Colombia as well as facilitate the transition of trainees to positions of responsibility and influence in the region, ultimately building the necessary trauma health infrastructure in Colombia. Together with TrainEER program, the institute played a major role in raising awareness among healthcare and other professionals in Colombia about the importance of injury and trauma research, and it was instrumental in establishing linkages with the international injury research community.

The PIs, MFCs and trainees initiated research that generated 17 abstracts and three published manuscripts. Of particular note, the Colombian Neuro-Trauma registry project developed a web-based database to collect data on patients with traumatic brain and spinal cord injuries. This registry project, also partially funded by the Ministry of Health in Colombia, has had a tremendous impact on patients with head and spinal cord injuries in Colombia. Additionally, the TrainEER program gained national recognition within Colombia's national newspaper, *El Tiempo*. In 2008, an editorial article from *El Tiempo* raised public awareness in violence, trauma, and injury prevention, as well as demonstrated the program's successes to foster regional research collaborations.

**New alcohol policy research:** The city of Cali, Colombia implemented alcohol control policies to restrict the sales and consumption of alcohol in public places after certain hours in order to curb violence. However, evidence of the policies actually working was never attained. A former TrainEER trainee completed an ecological study to determine whether the implementation of these alcohol control policies was associated with the incidence of interpersonal violence deaths. Results of the study found an increased risk of homicide on days when the less-restrictive policies were in effect, and it appeared in the *International Journal of Epidemiology*. Authors of the study use this evaluation to highlight the importance of informed scientific evidence rather than political or economic interests when designing policy. In the future, this approach will contribute to the design and evaluation of injury and violence prevention strategies in Colombia.

**Collaborations with SCORE and ABS:** One of the current educational programs of the American Board of Surgery (ABS) in Colombia is the Surgical Council on Resident Education (SCORE). As one

component of its program, SCORE utilizes a video library to teach resident surgeons operative techniques and intra-operative decision-making. Due to the volume of trauma in Colombia, the TrainEER program was able to provide SCORE with real-time video material in operative trauma, capturing key moments and approaches by experienced surgeons. The videos are part of the first trauma video library for educational use, and they have helped augment further international collaborations for resident education.

**Next Steps:**

In 2011, the training program synergized with another FIC-funded training program grant (D43 TW008443, *Enhancing Research Informatics Capacity for Health Information in Colombia (ENRICH)*, 2009-2015, from the “Informatics Training for Global Health (ITGH) program) between the University of Pittsburgh and Colombia. The partnership between these two FIC training programs in Colombia has fostered even greater interactions between clinicians by broadening the focus of trauma-related research training to include biomedical informatics.

FIC is also funding two other projects involving the collaborators. The first will conduct a pilot study in three trauma centers to develop and introduce an algorithm for the care of trauma brain injury patients (R21 TW009332, *Capacity Building for Decompressive Craniotomy in Colombia*, 2012-2016, from the “Brain Disorders in the Developing World: Research Across the Lifespan” program). One of the long-term trainees is the MFC for this grant. The second grant extends research and capacity building efforts until 2017 (R25 TW009714, *eCapacity for Trauma Information Systems and Research Education (ECATIS)*, 2014-2017, from the “Global Health Research and Research Training eCapacity Initiative” program) and builds upon the previous ENRICH grant but this time expanding into Paraguay and Guatemala. Injury-related morbidity and mortality continues to be one of Latin America’s greatest health problems; however, research conducted through the TrainEER Program and the subsequent FIC grants will continue to provide the basis for policies and preventative intervention strategies that will have a long-lasting impact on trauma and injury health care in the region.

**Project:** International Collaborative Alcohol & Injury Research Training Program in Poland

**Award Number:** D43 TW007569

**Project Period:** April 1, 2006 - February 28, 2013

**Principal Investigator (PI):**

Frederic C. Blow, PhD

*Professor, University of Michigan Ann Arbor, Department of Physiology; Director, Addiction Research Center at the University of Michigan*

**Major Foreign Collaborator (MFC):**

Andrzej Zawadzki, MD, PhD

*Assistant Professor, Medical University of Warsaw*

### **Project Overview:**

This Trauma Program grant supported fellowships in the U.S. and Poland, and brought together alcohol and injury professionals from both countries through regular annual workshops. The long-term trainees were, and remain, very productive in terms of publications and new research in Poland with more than 35 publications to date. Drs. Blow and Zawadzki reached a wide audience of Polish research professionals through annual workshops to share research on alcohol injury in Poland.

### **Background and Objectives:**

The groundwork of this collaboration between the University of Michigan (UM) and the Medical University of Warsaw dates back to 2002. Then, UM and other Polish institutions were co-investigating suicidal behavior risk in alcohol-dependent patients, and funded, in part, by a research grant from FIC and the National Institute of Drug Abuse (D43 TW005818, *International Substance Abuse Research Program, 2001-2010*, from the “International Clinical, Operational, and Health Services Research and Training Award” program). In 2006, the Medical University of Warsaw and UM collaborated in this Trauma Program grant, which also incorporated experts from a newly formed consortium of other Polish institutions.

Since the early 2000s, Poland has faced a high and growing level of per capita alcohol consumption and alcohol-related injuries, but has had limited research infrastructure to address these issues. This Trauma grant designed a multitiered research training program to develop the in-country capacity necessary for high-quality injury and trauma research. Trainings, annual workshops and research projects produced a cohort of Polish experts to serve as the core of a nation-wide consortium to address the critical healthcare burden of alcohol consumption in Poland.

### **Training and Capacity Building Outcomes and Impacts:**

This grant supported seven long-term Polish trainees through four- to twelve-month fellowships at UM aimed at developing stronger research capabilities. In addition to statistics and research methods courses, all trainees completed research projects under the mentorship of UM faculty. Two additional Polish trainees completed research trainings in Poland (one at the Medical University of Warsaw, the other a hospital in Lodz) under the guidance of UM faculty by communicating through video teleconferencing and the biannual workshops.

**Increased research capacity at institutions in Poland:** At the start of this grant there were few institutions in Poland with education dedicated to emergency medicine and public health. The Trauma grant helped to build lasting research capacity by strengthening Polish scientists' research skills. Specifically, four of the long-term trainees were from the Medical University of Warsaw, and returned afterwards to conduct more research at the University. The three other long-term trainees were from Polish hospitals connected through the previously mentioned consortium of Polish medical professionals, and they have since continued research at their institutions with the other trainees at the Medical University of Warsaw.

### **Research Outcomes and Impacts:**

Long-term trainees conducted high-quality research in collaboration with UM faculty during the course of their fellowships. In addition, five trainees conducted research projects in-country after returning to Poland. One trainee studied the alcohol and drug abuse rates of adolescents in hospital care in Poland. This questionnaire-based survey collected responses from over 500 subjects, and the results were presented at national conferences and in Polish journals. Another trainee investigated the prevalence of intentional and unintentional injury among alcohol-using, opioid-dependent individuals in Poland. She also investigated the genetic predictors of treatment response and suicide and published her research in *Gene* and *PLoS One*. The other research projects evaluated the rates of violent injuries of emergency room patients in parts of Poland; the relationship between impulsivity and life threatening poisons among alcohol-dependent individuals; and adverse reactions to anesthesia amongst alcohol dependent users.

**Generated new knowledge of alcohol-injury in Poland:** All trainees published their research in international journals, including *Alcohol and Alcoholism*, *Annals of Family Medicine*, *Frontiers in Psychology* and the *Journal of Studies on Alcohol and Drugs*, as well as Polish journals like *Psychiatria Polska*. From 2006-2013, training program participants co-authored 23 publications. In that same time period, trainees authored 36 conference presentations at conferences in Poland, the U.S., Europe and Japan. Since 2013, one or more trainees have co-authored at least 12 publications.

**Information dissemination in Poland:** In order to reach a wide audience of Polish researchers, UM and Medical University of Warsaw organized one- to three-day workshops annually in Poland. These served as a platform to share knowledge about alcohol-related injury prevention research, EMS and trauma services in Poland, psychology, vehicular accidents and public health issues. A mixture of Polish and American scientific scholars also instructed topics including research design and project development. These workshops were attended by physicians, psychologists and students. From 2006-2013, over 200 attendees in total participated in eight workshops. The MFC and trainees made new connections with emergency medicine and public health professionals at each meeting, which expanded their network of professionals in Poland for future collaborations.

### **Next Steps:**

This grant established a strong cohort of Polish researchers who continue to collaborate and publish with their U.S. counterparts. Recent publications have focused on alcohol dependency and other psychiatric disorders, as well as genetic relationships with alcohol dependency. Recently, two of the long-term trainees have co-authored three publications with researchers from 10 other European countries on

alcohol dependency trends in Europe. Trainees and collaborators have formed a productive consortium focused on alcohol and drug trauma and injury in Poland that will support future research endeavors in the field.

**Project:** Injury and Trauma Research Training for Guatemala

**Award Number:** D43 TW008972

**Project Period:** March 1, 2011 - February 28, 2017 (anticipated end date)

**Principal Investigators (PIs):**

Charles C. Branas, PhD (PI)

*Director and Professor of Epidemiology, University of Pennsylvania*

Therese Richmond, PhD (Co-PI)

*Co-Director and Professor of Nursing, University of Pennsylvania*

**Major Foreign Collaborators (MFCs):**

Erwin Calgua, MD

*Co-Director and Professor of Research, Universidad de San Carlos*

Sergio Martinez, MD

*Co-Director and Professor of Orthopaedic Surgery, Universidad de Francisco Marroquín*

**Project Overview:**

The cohort of Guatemalan researchers trained by this Trauma Program grant have specifically informed trauma and injury policy and programs in Guatemala. The collaboration has an established network of government, academic public and private connections at the highest levels in Guatemala, and trainees have integrated themselves into government, academic and healthcare positions in urban and rural Guatemala. This ongoing grant has trained over 40 trainees, both long- and short-term. Guatemalan policy makers (including the Vice President of the country), foundations and other private donors have recognized the program for its achievements and have provided additional financial support for future programs.

**Background and Objectives:**

The University of Pennsylvania's (Penn) presence in Guatemala began over 100 years ago when Penn archaeologists first co-excavated Mayan ruins alongside Guatemalan archaeologists. Over the past decade, this relationship has rapidly grown because of private and U.S. government support, especially FIC. The Guatemala-Penn Partners Program, established in 2004, is a trilateral university partnership amongst Penn, the Universidad de San Carlos de Guatemala (USAC) and the Universidad de Francisco Marroquín (UFM)<sup>8</sup>; the latter two are respectively the leading public and private academic institutions in Guatemala. The Guatemala-Penn Partners Program has linkages with the Vice President of Guatemala, the Guatemalan President's National Trauma Council and the Guatemalan Ministry of Health. When asked, these national leaders have clearly stated that Guatemala's most pressing health challenges are, in order: violence, alcohol disorders and chronic diseases. The Guatemala-Penn Partners program and its focus on trauma and injury prevention have also been mentioned by Guatemalan leadership in multiple

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<sup>8</sup>The University of Pennsylvania Center for Global Health also provides funding support for the Guatemala-Penn Partners program. The CDC-funded Penn Injury Science Center ([www.penninjuryscience.org](http://www.penninjuryscience.org)) in the case of trauma research for which Guatemala FIC trainees are often connected to Center trauma and violence researchers. More complete documentation of the Guatemala-Penn Partners program can be found in "Guatemala & The University of Pennsylvania: Meeting in the Middle":

<https://www.med.upenn.edu/globalhealth/documents/GuatemalaPennMeetingintheMiddle22313ccb.pdf>.

local media reports. The Partners Program also includes a network of Guatemalan collaborators including hospitals and health centers, such as Roosevelt Hospital and Hospitalito Atitlan. Penn faculty, students and staff have contributed to the construction of Hospitalito Atitlan and a new Penn Research Library in the rural Western Highlands of Guatemala.

This Trauma grant mirrors an existing FIC research training program in chronic disease epidemiology (D43TW008317, *Chronic Disease Clinical Epidemiology Training in Guatemala and Peru*, 2010-2016, from the “Millennium Promise Awards: Non-communicable Chronic Diseases Research Training Program”). Through these grants, dozens of Guatemalan scientists, many of whom emerged from modest or impoverished backgrounds, have been educated at Penn and at higher education institutions in Guatemala. Like its predecessor, this grant had already built much of the necessary research capacity for trauma and injury prevention in Guatemala through long- and short-term trainings, as well as specialty workshops taught by its trainees such as in statistical software and trauma data. Trauma and injury prevention research is essential for Guatemala, a country that experienced a 36-year civil war, faces an ongoing violent drug trade and a high level of impunity for violent crimes. This training program has also dedicated funding to research projects addressing important research issues in the country. It is expected that continued scientific capacity building and better research evidence will inform public health policy and practice.

#### **Training and Capacity Building Outcomes and Impacts:**

The training project consists of two major components: the Independent Investigator training, and the Associate Investigator training. The former is a long-term, two-year training in the U.S. and Guatemala with a Penn master’s degree and research and academic components, and the latter is a series of short-term trainings staggered across three years with a Penn training certificate.

**Independent Investigator training:** At present, six trainees have started or completed the two-year training, three having received Penn masters of science in clinical epidemiology degrees. A total of seven trainees are anticipated to complete the training with Penn master’s degrees by 2017: four from USAC and three from UFM. The training is structured so that trainees spend the first year of training at Penn completing rigorous epidemiology and biostatistics coursework, attending seminars on professional development and bioethics, and developing research projects for their second year. The second year is spent in Guatemala executing a research project aimed at addressing important research issues in Guatemala. In addition to the Trauma grant, the Guatemalan Office of the Vice President and Penn have helped financially support these trainings.

**Associate Investigator trainings:** At present, 36 academic clinicians and researchers, mostly from USAC and UFM, have completed the Associate Investigator training and received training certificates from Penn. This six-course training is taught by Penn, USAC and UFM faculty, including the long-term Independent Investigators who participate as teaching assistants. Training topics include introductory courses on biostatistics, clinical trials, data collection and management, epidemiology, medical literature and research ethics. Designed to be less intense than the Independent Investigator training, the Associate Investigator training is completed on a part-time basis, which enables it to reach a larger cohort of researchers in Guatemala. Upon completion, trainees from both programs are expected to work together

on research projects whereby the Associate Investigators assist the Independent Investigators to conduct their research project in Guatemala. One Associate Investigator continued their training in the Independent Investigator program.

**Professional development for the trainees:** The Independent Investigator training provided multiple opportunities for the trainees to develop professionally and expand their network. Two trainees were appointed to junior faculty appointments at USAC upon return to Guatemala. Another trainee received a research position at the Guatemalan Ministry of Health at the National Center of Epidemiology where she has been involved in the validation of the HIV and TB epidemiologic surveillance protocol and the validation of the Ministry's 2013-2014 Guatemalan National Survey of Maternal and Child Health. Some trainees formed linkages with partners (hospitals, health centers, emergency services) in rural Guatemala to work with indigenous Maya on injury, violence and EMS access issues.

One trainee also received the 2011 Lancet Outstanding Research Project of the Year, awarded by the Global Health Education Consortium, for his Independent Investigator research project on the effects of violence and mental health in Guatemala. This acutely impacted the trainee's career, by garnering him a faculty position at USAC upon return to Guatemala, recognition by his peers in Guatemala and around the world, and a publication in a high impact peer-reviewed journal. His research and award garnered the attention of Columbia University, where he has now matriculated into an epidemiology doctorate program, and plans to return to work in Guatemala after he completes his degree next year.

Many Associate Investigators work daily with the Independent Investigators by assisting with data collection, manuscript preparation and writing, and other activities. Multiple Associate Investigators have moved into positions of influence in their home Guatemalan universities or within the Guatemalan government. These positions include Deans of schools and Center Directors. They champion for injury and violence research in their academic settings as well as for the country at large.

**Growing Latin American partnerships in trauma and injury research:** Through the work of this grant, the PI and Guatemalan partners, especially Dr. Sergio Martinez, have participated in the Guatemalan National Commission on Trauma created by the Vice President of Guatemala. The National Commission on Trauma has set forth guidelines for the accreditation of trauma center hospitals in Guatemala for the first time.

Based on a prior Penn connection and Penn's ongoing work in Peru, the PI and MFCs formed a new south-south partnership with the Universidad Peruana Cayetano Heredia (UPCH) in Lima, Peru. UPCH has agreed to advise two Guatemalan researchers, and UPCH faculty participated as instructors at the 2013 Associate Investigator trainings. The UPCH School of Public Health is also a FIC grantee and holds monthly Innovations in Global Health Seminars that attract researchers from across Latin American scientists, including the Independent Investigators from this Trauma program. The seminars are a space for researchers, professors and trainees to share research experiences and collaborate.

Another major connection was established with the University of Rafael Landivar and the Instituto de Nutrición de Centro América y Panamá in Guatemala City (INCAP), and has prompted a research project

studying the link between malnutrition and intimate partner violence. Furthermore, with supplemental funding from FIC, trainees from this Trauma grant have started research at two of the largest HIV clinics in Guatemala to study the relationship between HIV and violence. This study is expected to have major future implications for preventing intimate partner violence.

A final, recent Central American connection has been through the Office of the Costa Rican Ambassador to the US who is a Penn alumnus interested in improving health outcomes in Central America and better connecting his country with the work of the Guatemalan Penn Partners program. Costa Rica has expressed an interest in working with Penn on projects of interest to their home country but also Central America more generally. This prominently includes Guatemala and other more challenged, developing nations in the Northern Triangle of Central America. Two Guatemalan Penn Partners and FIC trainees recently went to Costa Rica as part of a “social impact development” training in which they were expressly shown how to translate their research into sustainable health intervention programs. Both Penn and Costa Rica anticipate offering continued support to these FIC trainees as they develop these projects.

**Sustaining research through new funding:** In just the first few years of this grant, this team secured new support to continue trauma and injury research and similar projects in Guatemala. In 2011, the Elsevier Foundation awarded the Penn Libraries a \$26,000 USD grant for their innovative work on health information delivery in rural Guatemala. Through this award and other support, hospitals and health posts in Guatemala can now access electronic medical information and expertise of Penn physicians in the U.S. through smartphones and tablets. As of 2015, the Hospitalito Atitlan serves as a scientific and medical information resource, including trauma research, for the western highlands region.

The team received a new \$1.1 million four-year grant from FIC and the National Human Genome Research Institute in 2014. This grant (R25 TW009738, *Building Local Capacities in Ethics Training and IRB Review in Guatemala*, 2014-2018, from the “International Research Ethics Education and Curriculum Development Award” program) will build in-country capacity to teach research ethics, responsible conduct of research and establish IRBs at Guatemalan institutions. In addition, the Perelman School of Medicine’s new Center for Global Health (at Penn) commits additional funds each year to the Guatemala-Penn Partners Program, as does USAC with support from the university’s president.

### **Research Outcomes and Impacts:**

It is expected that the prior, current and future trainees will continue their research projects as well as find new applications for their research relevant to Guatemala’s public policy needs. The research projects contribute new knowledge to inform Guatemalan policy and programs. To date, the program has engaged policymakers ranging from the Vice President of Guatemala, members of the Guatemala City Council, to mayors of rural Guatemalan towns. The President of USAC is also an active member of the Guatemalan Congress and can introduce bills for consideration as national law. The USAC Medical School has oversight of every public hospital, health center and post in Guatemala and as such has made numerous introductions and connections for the trainees and faculty of this Trauma program. Faculty and Deans of both the UFM Medical School and Dental School are also connected with numerous Guatemalan policymakers, bankers and other potential donors in Guatemala. Through these connections, the training

program participants have had the opportunity to present its research findings to numerous policymakers and ultimately turn trainings and research into policy.

Thus far, the grant has supported the following research projects:

- A study of the effects of civil war, substance abuse and violence on the mental health of 100 rural Guatemalans: results indicate respondents who witnessed violence during the civil war have higher levels of PTSD, depression and substance abuse. This study was later expanded to a nationwide study including nearly 1,500 Guatemalans in order to better understand the long-term consequences of the civil war. This research received the Lancet Outstanding Global Health Research Project of the Year. This research has been covered in the Guatemalan press and sent to various policymakers in Guatemala.
- A study of the violence following the distributions of salaries on paydays across Guatemala: using national injury data, it was found that violence was not significantly lower on payday, but that violence rates increased on certain days of the week and especially at times when paydays and holidays coincided. The policy implications of this work are clear, with obvious interventions that could be implemented in Guatemala and other developing nations around the world and it is currently under scientific peer-review in *The Lancet Global Health*. After publication, the findings could lead to clearer policies around the management or policing on paydays and at payday locations to curb violence.
- A study of Guatemalan adults who witnessed intimate partner violence as children: this ongoing observational study will examine the potential relationship between violence in childhood and adulthood. Child exposure to intimate partner violence and subsequent violence outcomes among Guatemalan adults is potentially a major burden to the country, and this research will inform laws currently under debate in Guatemala.
- Five additional scientific studies currently in progress include studies on intimate partner violence and HIV in Guatemala; intimate partner violence and dual nutritional burden in rural Guatemala; violence exposure and depression in Guatemalan Mayan life; emergency medical care for trauma in austere medical settings; and urban violent victimization and crime prevention in Guatemala City.

### **Next Steps:**

This grant ends in 2017, but the relationship amongst Penn, USAC and UFM will continue far into the future. USAC and Penn have strengthened university-to-university ties through a memorandum of understanding (MOU) signed in 2013, and the PI and other faculty at Penn received Affiliate Professor appointments at USAC that same year. UFM and Penn have school-to-school MOUs between their medical and dental schools. Also in 2013, the USAC Medical School, the Guatemalan Colegio de Medicos national physician licensing body, and Penn Department of Emergency Medicine are collaborating to establish the first emergency medicine board certification in Guatemala, and Penn faculty are advising this process. The Chair of the Penn Department of Emergency Medicine had visited with Guatemalan colleagues multiple times, and a senior Penn faculty member has received a Fulbright Fellowship to spend one year in Guatemala with the goal of creating the country's first board certification process for emergency medicine as a formal medical specialty.

The remainder of the training program will support the three remaining long-term trainees of the Independent Investigators program and continue to support their research projects. The future direction of the training program will transition the Independent Investigators trainings to the Guatemalan universities, including USAC, UFM, and likely other Guatemalan universities, and the now-trained Independent Investigators will be the instructors of this new program alongside Spanish speaking Penn faculty scientists. Regardless of this change, Penn will remain the lead partner via the Guatemala Penn Partners Program (which is currently seeking official NGO status in Guatemala), and numerous Guatemalans will still attend Penn for portions of their training and master's degrees. Both USAC and UFM have already voiced support of this transition. With support from Penn, USAC has begun its own version of Penn's Associate Investigator training, which are focused on clinical research to continue training for the first cohort of the Associate Investigators' trainings. These changes serve as precursor to a larger, continued scientific training program in Guatemala. Future funding will be sought in support of this "next generation" of scientific trauma and injury research training in Guatemala.

**Project:** China Collaborative Suicide Research Training Program

**Award Number:** D43 TW007273

**Project Period:** July 1, 2005 - June 30, 2010

**Principal Investigator (PI):**

Eric D. Caine, MD

*Professor, University of Rochester School of Medicine, Department of Psychiatry*

**Major Foreign Collaborators (MFCs):**

Huang Yueqin, MD, MPH, PhD

*Professor, Peking University Medical School, Institute of Mental Health,*

Michael Phillips, MD, MPH

*Director, Beijing Hui Long Guan Hospital, Beijing Suicide Research and Prevention Centre*

### **Project Overview:**

In an effort to build research capacity and stimulate funding to improve public health and prevention practices within China's mental health services, collaborators from China and the U.S. created the China Collaborative Suicide Research Training (CCSRT) Program. Thirty advanced-degree trainees completed training. The program focused on promoting awareness and the importance of suicide as a public health challenge in China. It also stressed research and prevention from a multilevel set of perspectives that included both "upstream" (distal) contextual preventive interventions as well as programs focused on suicidal individuals. This Trauma Program grant collaboration amongst the University of Rochester Medical Center, the Institute of Mental Health at the Peking University Medical School, and the Beijing Hui Long Guan Hospital provided a multifaceted approach to develop the necessary research skills for Chinese researchers to become independent investigators. It applied one-to-one mentoring and engagement in a variety of training experiences. As a result of the program, several trainees have leveraged their newly acquired skills to move into leadership positions within their respective institutions, thereby strengthening the research capacity for mental health in China. Additionally, trainees have fostered partnerships within China's public health community, and some are disseminating their research to inform mental health policies and practices.

### **Background and Objectives:**

The CCSRT was an offshoot of a previous FIC-funded grant (D43 TW005814, *China-Rochester Suicide Research Center, 2001-2010*, from the "International Clinical, Operational and Health Services Research Training Award (ICOHRTA)" program). The ICOHRTA grant provided intensive research training to PhD and advanced MD professionals. However, the ICOHRTA grant recognized that it was unable to accommodate individuals who, although having had rich clinical experiences treating suicidal individuals or working in clinical settings, were less prepared to undertake organized, hypothesis-oriented research. CCSRT accommodated these individuals with an in-country training design that linked instruction to the ICOHRTA grant, brought U.S. faculty to China, used many of the same materials from ICOHRTA and fostered local research initiatives that fit the developing skills of the trainees. Together with the ICOHRTA, this Trauma grant intended to create a critical mass of researchers.

### **Training and Capacity Building Outcomes and Impacts:**

The training program, based in China at the two Beijing institutions, was designed to substantially increase the expertise of participants in research methodologies with the ultimate objective of strengthening sustainable research capacity at institutions in China. The multidisciplinary approach brought together participants from all over China with U.S. faculty from the University of Rochester (who had backgrounds varying from clinical research to basic social science research) to offer recurring support. Trainees pursued educational programs that were tailored for their needs, conducted a project supervised by one of the MFCs and completed selected courses in research methods, statistics or epidemiology. Each was expected to prepare a manuscript for publication, and international faculty provided additional support to enhance trainees' skills. The U.S. faculty, who traveled to China for three or four intensive presentation blocks annually, provided in-depth support, mentorship in specific topics and one-to-one research consultations in order to help build the skills needed for trainees to emerge as more independent investigators. Upon submission of the final report, 30 trainees had completed the two-year CCSRT, with several trainees pursuing further opportunities through the ICOHRTA grant or another FIC grant awarded in 2011 (D43 TW009101, *China-Rochester Suicide Research Training (CRSRT)*, 2011-2016, from the "Chronic, Non-Communicable Diseases and Disorders Across the Lifespan: Fogarty International Research Training Award (NCD-LIFESPAN)" program). The CRSRT is a more advanced training with mentoring and engagement in peer-oriented experiences to also develop the skills needed to emerge as independent investigators.

**Building capacity across China's mental health research community:** Early success of the training program was demonstrated through the trainees' abilities to grow within their respective institutions. The first round of CCSRT trainees from the Institute of Mental Health in Beijing were all promoted to Associate Professor. Second-round trainees were appointed to positions such as the Director of the Department of Social Psychiatry at the Tianjin Mental Health Institute; Lecturer in the Community Service of the Shenzhen Polytech College; Director of Department of Community Psychiatry in Guangzhou Psychiatric Hospital; and Associate Clinical Professor at The Seventh Hospital of Hangzhou (Hangzhou Mental Health Center), Zhejiang Province.

**Creating partnerships across China's major health institutions:** The training program was instrumental in developing alliances with several major academic institutions and psychiatry departments in cities across China, including Beijing, Hangzhou, Chengdu, Changsha, Shanghai and Hong Kong. Additionally, the CCSRT sponsored three meetings with the Institute of Mental Health on the development of research infrastructure in China related to mental health, public health and suicide. Participants included leaders from China's major academic psychiatry institutions, the Ministry of Health and, in two instances, the Ministry of Science and Technology. The meetings aimed to develop a consensus regarding the future development of research focusing on China's extraordinary community mental health needs. China needs a public mental health approach that would include areas where the burden of suicide is highest, such as in rural areas, the elderly and persons with serious mental disorders. The PI, MFCs and trainees must continue to foster these relationships, especially in the Chinese government, to create more funding for mental health research in China.

**Training continuation through ICOHRTA and NCD-LIFESPAN program:** Upon finishing the CCSRT, several trainees applied to the training opportunities available from the ICOHRTA grant, and later to the previously mentioned NCD-LIFESPAN (CRSRT training) grant awarded in 2011. Both programs continued their support of collaborative research training to sustainably strengthen research capacity at academic centers in Beijing, Shanghai, Chengdu and Changsha in suicide-related public health.

### **Research Outcomes and Impacts:**

China faces many challenges to develop research infrastructure for mental health, public health and suicide. Because China's Ministry of Health does not provide research capital, funding for mental health research is distributed by the Ministry of Science and Technology, which often prioritizes funding for studies in fundamental genetics and neuroimaging research rather than community mental health. However, explicit commitment by former trainees to improve the treatment of mental health and address suicide as a public health problem has highlighted the impact of improved capacity to support mental health research. Now, several years after the completion of the CCSRT, Chinese stakeholders have begun to attend more specifically to the broader mental health needs of the nation; in particular, to the burdens imposed by common mental disorders and an array of public mental health issues. Before now, there was the tendency to equate mental health services needs almost exclusively with the challenges posed by persons suffering from severe mental disorders. The background and preparation of CCSRT trainees makes them uniquely poised to offer leadership in this new public health era.

**Implementation of new research:** At a meeting in 2013, selected past participants from the CCSRT (the PI, MFCs and trainees alike) were invited together with participants from ICOHRTA and the ongoing NCD-LIFESPAN grants. They discussed new methods of building ties between primary care providers and mental health services in an effort to more effectively deal with mood disorders and other disturbances tied to depression, particularly among the elderly. One of the emerging models of collaborative care, supported initially by an FIC Global Research Initiative Program for New Foreign Investigators (GRIP) grant, involved enhanced training and support for urban primary care settings, with a focus on elders suffering from depression. Data from a clinic-level randomized trial demonstrated robust improvement in study participants in the active arm. This led to a National Institute of Mental Health grant (R01 MH100298, *The Depression Hypertension Coach Study*, 2013-2018, from the "Grand Challenges in Global Mental Health: Integrating Mental Health into Chronic Disease Care Provision in Low- and Middle-Income Countries" program), a primary care, community care and mental health randomized control study to research collaborative care models for elders with depression and hypertension. This study had resounding support from, and is currently collaborating with, institutions from Zhejiang Province where the study is taking place.

### **Next Steps:**

The CCSRT was tightly linked to ICOHRTA (2001-2010), which later became an NCD-LIFESPAN initiative following the change in grant support mechanisms after 2011. The latter program ends in 2016. At the same time, efforts continue in China and in the region with the recent funding from FIC to foster eCapacity development (R25TW010012, *eCapacity Development and Growth in the ASPIRE Network [eC.ASPIRE]*, 2015-2018, from the "Global Health Research and Research Training eCapacity Initiative"

program). Through eC.ASPIRE, four previously trained China fellows (one who began as a CCSRT trainee) spent six weeks this summer in Rochester, NY working with public health and computer scientists to develop skills pertinent to conducting research regarding social epidemiology and “mHealth.” Each trainee is now planning the design and development of a mobile app to promote their ongoing community-level work; most focus on patient-level interactions while one is targeting providers. Next year, all will serve as Mentors-in-Training for a new cohort of trainees who will be selected from regional LMICs. Through these new initiatives, the trainees of this Trauma grant continue to grow their skillsets and also serve as resources for another generation of developing early-career investigators.

**Project:** Neurotrauma Research Training in Latin America (*Argentina*)

**Award Number:** D43 TW007566

**Project Period:** April 1, 2006 - February 28, 2011

**Principal Investigator (PI):**

Nancy A. Carney, PhD

*Associate Professor, Oregon Health and Science University School of Medicine*

**Major Foreign Collaborator (MFC):**

Maria B. Quaglino, PhD

*Professor, National University of Rosario, Argentina; Director, Statistics Department, National University of Rosario School of Statistics*

### **Project Overview:**

The National University of Rosario (UNR) and the Oregon Health and Science University (OHSU) developed long- and short-term trainings for traumatic brain injury professionals in Argentina under the Trauma Program grant that was later extended to other countries in Latin America. Relying on a network of other similar NIH grants in the region, this collaboration was able to leverage connections to create a community of brain injury experts in Latin America. Furthermore, the new research capacity has been sustained through additional NIH research grants that engage the trainees from this training program.

### **Background and Objectives:**

This U.S.-Argentinian training program emerged from a strong relationship dating back to 1996 and has grown into a network of programs throughout Latin America. Dr. Randall Chesnut of Washington State University and Dr. Carlos Rondina of UNR (both also involved in this Trauma grant) started a collegial partnership in 1996, which shortly after expanded to include the PI and MFC for this training program, Drs. Carney and Quaglino. The group received two major research grants prior to this Trauma Program grant to facilitate projects in Argentina. The first project, from 2000-2004, established a trauma brain injury (TBI) registry in Argentina and was funded by the National Institute on Disability and Rehabilitation Research under the U.S. Department of Education. The second research project was funded by FIC to establish TBI resources and guidelines in Argentina (R21 TW006724, *Pediatric Traumatic Brain Injury in Latin America*, 2003-2005, from the "Brain Disorders in The Developing World: Research Across the Lifespan" program). These grants provided much of the foundation for the subsequent Trauma Program grant.

Experience from these previous projects exposed the lack of research capacity related to trauma in Argentina and the rest of Latin America. At that time researchers and physicians in Argentina did not have the capacity to conduct epidemiological studies about brain injuries, collect and track reliable data, nor were they certain that treatment guidelines designed for patients in the U.S. could be applied to country-specific conditions in Latin America. The objective of this training program was to establish a wide network of brain trauma professionals in Argentina and Latin America using a combination of long-term trainings in the U.S. and a series of shorter trainings in Argentina to address critical TBI research issues.

### **Training and Capacity Building Outcomes and Impacts:**

**Master in Clinical Research graduate program:** The long-term training component was designed to produce independent clinical researchers and has supported two trainees in completing the Master in Clinical Research degree from OHSU as well as a thesis research project. While at OHSU, both trainees co-authored a publication in the *Journal of Trauma and Acute Care Surgery* estimating predictors of outcome for patients with severe TBI in Argentina. After returning to Argentina, one of the trainees became a major collaborator on two new FIC grants (see “Research Outcomes and Impacts”), mentored trainees at their three-month rotations at the Hospital de Emergencias Doctor Celmente Alvarez (HECA) in Argentina and developed the one-week clinical research training curriculum (see below). The other trainee is now an instructor at UNR.

**Trauma Research Certificate Program:** This program combined both academic and applied research components. In total, 31 trainees received Certificates in Trauma Research by completing a series of 12 short, intensive courses split into three modules conducted by UNR over one year. Two of the modules were added to the UNR Department of Statistics curriculum, and the entire program will be incorporated into the UNR School of Medicine. This training continues today through HECA’s sponsorship and is led by one of the trainees of the Master in Clinical Research graduate program. Trainees also worked in groups of three to complete research projects. The Public Health Ministry of Argentina supplied funding for the applied curriculum portion of the certificate program. Trainees completed a three-month rotation at HECA, the largest emergency center in Argentina. Trainees shadowed physicians at the hospital and participated in real-time data collection. HECA also hosted 10 trainees from Bolivia, Brazil, Colombia and Ecuador funded by the two subsequent FIC grants for a similar three-month rotation. These trainees now continue working on trauma research in their respective countries.

**New trainings in Latin America:** In collaboration with other ongoing NIH grants, the PI and MFC expanded the short-course curriculum to Bolivia. The University of San Simon Medical School in Cochabamba, Bolivia invited Dr. Carney and Dr. Petroni (PI of another NIH grant in Latin America) to teach courses in trauma research for the newly established 12-month Clinical Research diploma program at San Simon. This Trauma Program grant supported 15 physicians and nurses in Cochabamba to complete this diploma program.

UNR and OHSU participants modified the modules from the short-course programs to develop one-week intensive clinical research courses. The instructors and long-term trainees taught these short-term trainings, called a Curso Intensivo en Investigacion Clinica (Clinical Research Intensive Course), to university and hospital groups in Bolivia and Ecuador, educating a total of 61 short-term trainees. These additional trainings have expanded the reach of the training program and enhanced regional collaboration.

**Equipping local institutions with resources for research:** This Trauma Program grant established a new data center equipped and staffed at HECA. With new web-based data management tools, HECA serves as the data repository for both subsequent NIH research awards. This grant also helped to establish the Centro de Informatica y Investigaciones Clinica (Information Center and Research Clinic) in 2012, a non-profit research institution in Argentina. This Center conducted research for the two additional FIC research grants on trauma injury in Latin America.

### **Research Outcomes and Impacts:**

**New funding for trauma research:** UNR, OSHU and their partners in Latin America received two additional FIC research grants for research in Argentina, Bolivia and Ecuador. The first grant was a study of TBI in adult populations in Bolivia (R01 NS058302, *Traumatic Brain Injury in Latin America: Lifespan Analysis*, 2007-2011, from the “Brain Disorders in The Developing World: Research Across the Lifespan” program). The second was a study of TBI in children in Argentina, Bolivia and Ecuador (R01 HD060570, *Pediatric Traumatic Brain Injury in Latin America*, 2009-2014, from the “Brain Disorders in the Developing World: Research Across the Lifespan” program). Together, both research grants employed 18 former trainees from this grant, and one of the long-term trainees was the MFC.

### **Next Steps:**

After the award ended in 2011, Dr. Chesnut continued to publish with the trainees, as well as Dr. Petroni. Dr. Chesnut also received another FIC-funded grant (R01 NS080648, *Managing Severe TBI Without ICP Monitoring – Guidelines Development and Testing*, 2012-2017, from the “Brain Disorders in the Developing World: Research Across the Lifespan” program) to create guidelines for the treatment of severe TBI in the absence of intracranial pressure monitoring and to test these guidelines; however, the study is formally limited to Bolivia, Colombia, Ecuador and Venezuela. Nevertheless, there may be the opportunity for the Argentinian researchers at UNR and HECA to participate in the research.

**Project:** Strengthening Injury Control Research in Ghana (*and West Africa*)

**Award Number:** D43 TW007267

**Project Period:** June 1, 2005 - February 29, 2016 (anticipated end date)

**Principal Investigators (PIs):**

Charles Mock, MD, MPH, PhD

*Professor of Surgery, University of Washington, Harborview Injury Prevention and Research Center*

Beth Ebel, MD, MPH

*Professor of Pediatrics, University of Washington, Harborview Injury Prevention and Research Center*

**Major Foreign Collaborator (MFC):**

Peter Donkor, MD

*Professor of Surgery, Kwame Nkrumah University of Science and Technology, College of Health and Sciences*

**Project Overview:**

The Strengthening Injury Control Research in Ghana and West African program is a collaboration between Kwame Nkrumah University of Science and Technology (KNUST) in Ghana and the University of Washington's Harborview Injury Prevention and Research Center (HIPRC). Through a mixture of training models, the program trains a range of key stakeholders from several institutions across Ghana. Today, the program has successfully provided multidisciplinary workshops to over 100 participants and has supported nine long-term trainees in developing scientific approaches to injury control, with an additional seven trainees expected to complete the program by 2016. Impacts from the program include new and increased capacity for partnering Ghanaian institutions, including the Building and Roads Research Institute and the National Road Safety Commission. Likewise, the program's research outcomes have successfully informed policy in injury control developed by the Ministry of Health and Transportation, members of Ghana's Parliament and local media. This Trauma Program grant was originally specific to Ghana, but future plans include expanding the program to include neighboring countries in West Africa.

**Background and Objectives:**

The program expands upon a pre-existing injury control research collaboration between the contributing institutions. The founding PI, Dr. Charles Mock, had a long-standing and extensive link with the researchers at KNUST. He spent two years as a senior lecturer of surgery at the university, and contributed to 39 peer-reviewed articles published together with faculty from HIPRC and KNUST prior to the Trauma grant.

Ghana has established itself as an intellectual leader in Africa, yet there are gaps in injury control training and knowledge. By filling these gaps, this training program will contribute to the development of a critical mass of expertise in Ghana who will independently conduct high-quality injury control research. Ghana's role as a leader in Africa will spread this knowledge and training to other countries in the region.

### **Training and Capacity Building Outcomes and Impacts:**

The program was developed to use a mixture of training models (short courses, medium- and long-term trainings) in order to engage a range of key stakeholders and strengthen capacity for effective, evidence-based injury control activities across several institutions in Ghana. These training models all incorporate several core elements that allow trainees to develop an understanding of the scientific approach to injury control. The medium- and long-term trainings have been producing a core of future injury control leaders, while the short courses have assured broad knowledge of basic concepts of injury control are integrated across institutions.

**Short in-country courses:** Two-week multidisciplinary courses and 1-5 day workshops are oriented towards individuals with current or future responsibilities in injury control, and topics are tailored to specific trainee audiences. Participants include clinicians, personnel in the Ministries of Health and Transport, engineers, lawyers and NGO staff. The trainings have led to the initiation of several improvements in injury control in Ghana, such as press reporting of traffic crashes that is more likely to report on and advocate for proven safety measures and strengthened surveillance systems for injury.

**Intermediate (medium-term) training:** The intermediate training is designed for trainees to spend up to three months at UW, working one-on-one with faculty to analyze injury data, write manuscripts and develop future research plans. It also serves as a basis for trainees to establish personal relations with UW faculty members and observe several ongoing injury research projects supported by the university. Medium-term trainees who stay for the full academic term (three months) are encouraged to pursue a formal graduate certificate program in Global Injury Control, providing trainees with greater exposure and formal teaching in injury control.

**Long-term training:** Trainees of the long-term training program obtain master's degrees at either UW or KNUST, with several suitable degree tracks to satisfy each trainee's preferred interests and local needs. To date, 10 long-term trainees have completed the program, nine of which have finished MPH degrees. An additional seven long-term trainees are expected to complete the program by the program's end date in 2016. All long-term trainees trained at UW have returned to Ghana, and all long-term trainees are now actively involved in injury and trauma research.

**Sustaining institutional capacity building with new funding:** As a result of the program, KNUST's capacity for injury control research has increased significantly. Most notably, KNUST was able to garner several major international grants, including two multi-institutional grants from the Bill and Melinda Gates Foundation (\$3 million USD) and the Hewlett Foundation (\$2 million USD), both of which contribute to facilitating research and research capacity in injury care at KNUST.

### **Research Outcomes and Impacts:**

All three training models sought to highlight the high burden of injuries in Ghana and contribute to amassing injury control researchers in Ghana. Outcomes from the research conducted by the trainees has helped advance some of Ghana's key injury control priorities and inform policy changes that have improved injury control. In particular, the research has helped to identify low-cost ways to improve existing injury surveillance systems, identify risk factors for injuries and identify ways to improve trauma

care in pre-hospital, hospital and rehabilitation settings. Many trainees have gained faculty or other leadership positions, and will guide their respective institutions' capacity to conduct injury research.

**Application of learned research skills:** Trainees, leveraging newly learned research skills, are contributing to Ghanaian institutions' injury control strategies, in particular:

- Building and Roads Research Institute (BRRI): This institute conducts research on road safety and maintains the national traffic crash database. Recognizing the need for better data, long-term trainees are using their skills to improve BRRI's capacity to conduct research and to analyze and handle the surveillance data in a more sophisticated manner. The improvements have increased the institute's overall ability to frame road safety research from a public health viewpoint and has enhanced the institute's ability to conduct collaborative interdisciplinary research.
- The National Road Safety Commission (NRSC): This institute conducts campaigns for the promotion of safety through behavioral change. NRSC has recognized the need to monitor the effect of changes in road safety policy. Trainees have helped the institute to identify road crash risk factors as well as to scientifically evaluate the effectiveness of its outreach campaigns. Furthermore, NRSC's connection with this Trauma program has enhanced its potential for collaboration through exposure to high-level government officials and increased its ability to interact with Parliament.

**Impacts on policy and public awareness:** In 2007, the program organized a one-day workshop on reporting of road traffic crashes and road safety for members of the press in Ghana. The purpose was to sensitize the press to better promote road safety through their reporting. As a result of the workshop, a reporter from Ghana's leading newspaper, *The Daily Graphic*, became a collaborator with one of the long-term trainees to apply results of the trainee's research to the reporter's own work. In turn, his articles helped publicize preventable factors and advocate for the public and government to increase road safety.

In 2009, the program organized a workshop on the principles of road safety and trauma care systems tailored for the members of Parliament in Ghana. Twenty members from the health, transport and judiciary committees spent two days discussing legislative and regulatory approaches to road safety and the role of the Ministry of Health in strengthening trauma care. The workshop's success represented an unprecedented opportunity to increase political will for injury control, and identified key legislative priorities for road safety and trauma care. Since the workshop, there has been an increase in governmental interest and commitment to road safety and other aspects of injury control.

### **Next Steps:**

This grant is ongoing and ends in 2016. The Strengthening Injury Control Research in Ghana and West Africa program has been very successful in achieving political support and building constituency for injury control nationwide. The program received influential coverage in the Ghana press, with the high-level exposure garnering interest by neighboring countries. Having established a solid foundation, the training program continues to grow in Ghana. The program has recently focused on expanding to neighboring West African countries. In collaboration with the West African College of Surgeons, workshops on trauma system planning have been conducted annually in other West African countries, including Cote d'Ivoire, Liberia and Togo. The PIs and MFC hope this expansion will result in

strengthened collaborations throughout the region with trainees contributing to growing their country's capacity and policy-relevant research.

**Project:** International Research Training Program in Trauma and Injury Prevention (*Colombia*)

**Award Number:** D43 TW700564

**Project Period:** April 1, 2006 - May 31, 2011

**Principal Investigators (PIs):**

Benjamin C. Amick, PhD (2006-2008)

*Adjunct Associate Professor, University of Texas Health Science Center at Houston; Director, Occupational Injury Prevention Research Doctoral Training Program; Director, Occupational Epidemiology Doctoral Training Program*

Sarah A. Felknor, PhD (2008-2011)

*Assistant Professor, University of Texas Health Science Center at Houston; Associate Director, WHO Collaborating Centre for Occupational Health; Director, Southwest Center for Occupational and Environmental Health*

**Major Foreign Collaborator (MFC):**

Leonardo Quintana, PhD

*Associate Professor, Pontificia Universidad Javeriana, Bogotá, Colombia; Director, Ergonomics Studies Center at Pontificia Universidad Javeriana*

**Project Overview:**

This Trauma Program grant established the Center of Excellence in Injury Prevention and Research (CIPR) at the Pontificia Universidad Javeriana in Colombia (hereafter Javeriana). Through specialized trainings and pilot projects, the program strengthened the capacity for Colombian researchers to survey, prevent, control and evaluate traffic trauma and injury in Colombia. Trainees of this program have leveraged their research to inform trauma and injury prevention policy in Colombia. Not only has CIPR received additional funding from the Colombian government for trauma and injury research as a result of its proven program capabilities, but CIPR was also selected to help develop and evaluate the newly formed national research center for road safety in Colombia.

**Background and Objectives:**

The Southwest Center for Occupational and Environmental Health (SWCOEH) at the University of Texas School of Public Health (UTSPH) and Javeriana started collaborating 10 years prior to this Trauma Program grant. In 1995, SWCOEH and Javeriana received an international training and research grant from FIC and the National Institute of Environmental Health Sciences (D43 TW000644, *International Research Training Program*, 1995-2011, from the “International Training and Research in Environmental and Occupational Health Program”) that spanned over 15 years and expanded to five other Latin American countries. Though this grant was not specific to trauma injury, it served as a foundation for the Trauma Program grant proposal. Dr. Leonardo Quintana was a recipient and the first doctoral graduate of the former FIC grant program, and was pivotal in establishing the first ergonomics and safety research laboratory in Latin America at Javeriana. The research laboratory later expanded its research agenda into transportation safety, thus creating an opportunity for the Trauma Program.

This Trauma grant provided a multifaceted approach to capacity building over the span of five years. Program activities included both a visiting scholars program and pilot research grants for Javeriana students and faculty. The activities emphasized collaborative research projects and targeted short courses

and workshops on prevention and control of occupational and traffic-related injury, program evaluation, and social inequalities. Trainees, who already had a high capacity for safety-related research at Javeriana, focused on developing specialized skillsets, rather than a broad curriculum. The grant also incorporated information dissemination activities to spread awareness and knowledge of trauma caused by road injury.

### **Training and Capacity Building Outcomes and Impacts:**

**Short-term trainings in the U.S.:** All three trainees successfully completed their training, and returned to faculty positions at Javeriana as well as contributing faculty at the CIPR. The short-term training model, each about one semester in duration, allowed for better re-integration of the trainees back into Javeriana and CIPR by reducing the amount of time spent away from their primary work and research responsibilities. Of particular note, one trainee focused her short-term training on intervention mapping in collaboration with UTSPH and the National Institute for Public Health (INSP) in Mexico. Upon return to UTSPH, she undertook a one-year training to further develop her research skills in assessing injury risks, with a particular focus on contractors and temporary workers. Her focused training brought a new skillset in intervention mapping to CIPR.

**Established the Center of Excellence in Injury Prevention and Research (CIPR):** The CIPR was established at Javeriana in the early stages of the training program. All trainees developed their skills at UTSPH in order to become major contributing members at CIPR when they returned from the U.S. The center has addressed the critical need for transportation safety research and intervention in Colombia through research projects and partnerships with the Colombian government. It is expected that this center will continue to build research capacity in traffic injury and trauma research in Colombia.

**Assisted the new Colombian National Observatory of Road Safety (NORS):** After recognizing CIPR's singular capacity for traffic injury and trauma research, the Colombian Ministry of Transportation contracted CIPR to help develop their framework for, and implementation and evaluation of, the Colombian National Observatory of Road Safety (NORS). CIPR provided recommendations for the function and organizational structure of NORS, designed data collection protocols, developed collaborations with municipal governments to test information systems workflows, and analyzed preliminary data. This new connection with NORS was, in part, fostered by the increased research capacity at CIPR. NORS was still in its infancy, and is now an established institution under the Ministry of Transportation.

### **Research Outcomes and Impacts:**

**Generated new knowledge on traffic injury and trauma in Colombia:** This program funded five pilot research projects at Javeriana after two competitive calls for proposals in trauma and injury prevention research. The three trainees, as well as the MFC and other injury and trauma researchers from Javeriana participated as the PI, co-PI, analysts or assistant researchers. These projects presented the opportunity to build new, multidisciplinary collaborations within Javeriana between the industrial engineering and epidemiology faculty and students. Projects included a study of risky pedestrian behavior; a geometric analysis of road design; and software designed to assess the interaction between pedestrian and vehicular behavior. Another research project developed new designs for school buses to improve safety and comfort for children since school buses in Colombia are fashioned for adult features and behaviors. The study also

reviewed the literature and legislation regarding child passenger safety, and studied the accommodations and behavior of the children inside buses with hidden cameras. These results helped develop a 3D simulator to test different types of crashes. This was the first study known to develop culturally appropriate interior design models for school buses.

Four additional projects were funded by other sources from the government or private sources and led by the long-term trainees. One research project, a meta-analysis and literature review comparing blood alcohol content limits in countries, was funded by a Colombian semi-private fund. Trainees also participated in the development of the NORS and the related research. Pilot research projects funded by this Trauma Program grant set the foundation for additional research in Colombia and contributed to the sustainability of the CIPR.

**Information dissemination in Colombia:** CIPR and Javeriana hosted two conferences in 2007 and another in 2009 supported, in part, by this grant, the Colombian government and another NIH grant between the University of Pittsburgh and Universidad del Valle in Colombia (Trauma Program grant D43 TW007560). These conferences provided an opportunity for regional and international collaboration, knowledge sharing and networking, as well as another short, focused training opportunity designed to increase essential public health skills.

**Created networks in Colombia for new research and policy:** Javeriana expanded its collaborations with government, private and other traffic safety stakeholders in Colombia that stimulated more funding for the CIPR. The training program formed an important connection with the Fondo de Prevencion Vial, a fund in Colombia collected from mandatory car insurance that provides money for accident prevention, which ultimately supported two new research projects. Trainees established partnerships with Ministry of Transportation and the Ministry of Social Protection (similar to Health and Labor) in Colombia, and the former was integral to CIPR's support for NORS. After researchers at CIPR conducted a study of alcohol blood content levels in other countries and provided policy recommendations, the Colombian government installed a new law effective December 2013 setting a 0% blood alcohol content standard for drivers country-wide. Researchers are also advising on improved ergonomic design for children's school buses.

**Next Steps:**

This program strengthened the research capabilities of researchers in Colombia while also engaging stakeholders. Javeriana and UTSPH were able to leverage research results from the pilot projects to inform policy-making agencies about traffic and safety improvements in Colombia. The PIs were not available at the time of this evaluation to provide further commentary on the status of CIPR or their collaboration.

**Project:** Injury Prevention Research Training in Egypt and the Middle East

**Award Number:** D43 TW007296

**Project Period:** June 1, 2005 - February 29, 2016 (anticipated end date)

**Principal Investigators (PIs):**

Patricia Dischinger, MD (2005-2006)

*Professor, National Study Center for Trauma and EMS, University of Maryland Baltimore*

Jon Mark Hirshon, MD, MPH (2006-2016)

*Professor, Department of Emergency Medicine and Department of Epidemiology and Preventative Medicine, University of Maryland Baltimore*

**Major Foreign Collaborators (MFCs):**

Maged El-Setouhy, MD

*Professor, Department of Community, Environmental and Occupations Medicine, Ain Shams University School of Medicine, Cairo*

Mohamed El Shinawi, MD

*Associate Professor, Department of Surgery, School of Medicine, Ain Shams University*

**Project Overview:**

The Injury Prevention Research Training (IPRT) in Egypt and the Middle East supported by this Trauma Program grant developed from a long collaboration between the Ain Shams University School of Medicine in Cairo, Egypt (hereafter Ain Shams) and the University of Maryland, Baltimore (UMB) School of Medicine. Through a multifaceted approach, the program trained and mentored Egyptian and other Middle Eastern health professionals in basic and advanced skills in trauma and injury control research. Since 2005, approximately 900 total short- and long-term trainees from across the Middle East have successfully participated in one or more IPRT activities, fostering the growth of a critical mass of researchers focusing on injury prevention research and control in Egypt and the region. As the program has grown, the regional need for research capacity and to collaborate has prompted new partnerships. In its 10th year, the program continues to expand its reach within the Egyptian health community and additional regional partner countries including Sudan and Saudi Arabia.

**Background and Objectives:**

The IPRT in Egypt was built upon an existing collaboration between Ain Shams and UMB. The Division of International Health in Department of Epidemiology and Preventative Medicine at UMB already had, at the start of the Trauma Program grant, a 25-year history collaborating on transdisciplinary research and training projects in Egypt. These collaborative efforts started from federal- and industry-funded research related to infectious diseases such as schistosomiasis and hepatitis C. Recognizing the need to strengthen research capacity in Egypt, this Trauma training program is designed to teach Egyptian health professionals basic and advanced skills in trauma and injury control research. Through a multifaceted approach of short-term trainings and a long-term mentored research training, the program seeks to improve clinical care to traumatized patients and build research capacity for injury prevention and treatment within the Egypt's health institutions. Additionally, an objective of the program is the creation of a WHO Collaborating Centre for injuries and trauma in the Eastern Mediterranean region, which is still in progress.

### **Training and Capacity Building Outcomes and Impacts:**

As of 2015, approximately 900 trainees from countries throughout the Middle East and the WHO Eastern Mediterranean Region, including Afghanistan, Egypt, Iraq, Iran, Oman, Palestine, Saudi Arabia, Sudan, Syria and Yemen have participated in one or more trainings implemented by the IPRT.

**Short course training programs:** This Trauma grant developed two short-course training programs to address different needs within Egypt and the region. The first course, the Sequential Trauma Education ProgramS (STEPS), was created at the request of in-country partners such as the Egyptian Ministry of Health and Population. Since 2005, the STEPS course has trained over 750 individuals. This course trains emergency physicians and surgeons in the clinical care of injured patients, including trauma airway management, shock, abdominal injuries, musculoskeletal injuries, thoracic injuries, burn evaluation and



Photo courtesy of Dr. Jon Mark Hirshon

management, triage and pediatric trauma. Today, STEPS is a stand-alone, didactic program primarily organized and conducted by Egyptian physicians. STEPS courses and similar courses are now required by the Egyptian Board of Emergency Medicine for emergency medicine trainees. The course is also part of the curriculum of the Master and Doctorate of Emergency Medicine being offered at Alexandria University and is now the official trauma training course for the Egyptian Society of Intensive Care and Trauma. The Journal of Surgical Education recently published an article about the impact of the STEPS

program in Egypt. The development of the STEPS program has fostered the growth of key relationships with leaders in emergency medicine and trauma surgery throughout Egypt and the Middle East, such as the African Federation of Emergency Medicine (AFEM) and the Sudanese Federal Ministry of Health. These relationships have led to the creation of AFEM-North (for North Africa) and the agreement to have the AFEM 2016 conference in Cairo.

The second, and key, short-course research training program is a two-week injury epidemiology course designed to provide basic knowledge about injury epidemiology while concurrently identifying potential trainees for an extended program in the U.S. Overall, approximately 150 physicians have been trained in this two-week injury epidemiology course. This course covers basic study design, data management, biostatistics and research ethics. This course has helped develop important relationships with public health officials throughout the Middle East interested in developing injury prevention training and injury research, including the Sudanese Federal Ministry of Health, the Saudi Arabian Board for Community Medicine and physicians from the Iranian Ministry of Health and Medical Education. The course is now offered two or three times a year, and has invited medical personnel interested in injury epidemiology and emergency care throughout the Eastern Mediterranean region, from Morocco to Pakistan, increasing visibility and esteem for trauma research. The injury epidemiology course has been conducted in Medina, Saudi Arabia with funding support from the Saudi Board for Community Medicine, and also at the Public Health Institute in Khartoum, Sudan. An online blended course has been initiated in order to broaden the research of this training program.

**Targeted course to address public health crises in the Middle East:** Prompted by the bombing of Erbil in northern Iraq in May 2005, the Iraqi Kurdish Ministry of Health requested UMD and Ain Shams to develop a week-long course on emergency preparedness and response. Led by Dr. Hirshon, the specially developed International Preparedness and Response Training helped improve trauma research capacity at the Kurdish Health Ministry and established a formal medical emergency response plan. The training was designed to help health professionals in LMICs with supervisory roles assess the current level of emergency relief capabilities and manage disaster situations. Training components included rescue, decontamination, triage, stabilization, evacuation and treatment plans, as well as communications in post-disaster recovery. Additional funding from NIH and the World Bank (the latter through the Iraqi Central Ministry of Health) allowed for additional disaster preparedness training courses for physicians in Afghanistan, Iraq and Egypt.

**Extended training program in the U.S.:** In order to build a more focused and deeper injury research capacity in Egypt and the Eastern Mediterranean Region, the training program established the Long-Term Injury Research Training. As of fall 2014, 35 individuals have completed the Long-Term Research Training. This program starts with an intensive two-month summer at UMB with daily classroom activities related to injury epidemiology and research. In this setting, the trainees receive mentorship and didactic training in clinical research methods, scientific communication and grant writing. These trainees are then expected to conduct injury-related research upon return to their countries of origin under the joint mentorship of American and in-country mentors. The research mentorship extends the training six months or more.

**Professional development of trainees:** The long-term trainees have continued to grow professionally after their trainings, and have pursued successful careers in clinical research focusing on trauma and injury prevention. The majority of the trainees have continued in their academic careers, including four who have been promoted to associate professors in the Department of Surgery at Ain Shams. Three trainees have completed doctorate degrees and three have completed master's degrees in injury-related topics. One trainee now works for WHO Eastern Mediterranean Region Office focused on injuries, and another is the EMS data manager for the Egyptian Ministry of Health. Most of the more recent trainees are completing their advance degrees or have already accepted positions in academic institutions or ministries. Trainees have also presented at international conferences, such as SAFETY 2012 and the African Federation of Emergency Medicine meeting. Thus, this Trauma grant is not only building the necessary cadre of injury control investigators in Egypt and the Middle East, but the trainees also have opportunities beyond the grant to continue in the field.

Additionally, in an effort to improve the culture of research within Ain Shams, and to help identify potential future trainees, Dr. Shinawi (MFC and a former trainee) initiated the Ain Shams Medical Student Research Association (AMSRA). The primary goal of this group is to escalate clinical research education among medical students, enabling them to keep pace with the constantly increasing scientific breakthroughs over the world. Over 150 medical students participate in this organization, which has held multiple lectures and conferences to discuss research over the past 18 months.

**Ongoing establishment of new WHO center:** One of the original objectives of the program was the establishment of a WHO Collaborating Centre for Research and Training on Injury Prevention and Management at Ain Shams. Due to political instability in Egypt, important steps to open the center have been delayed or deferred; yet the team is continuing to meet ongoing requirements for completion and is working on the further development of the required center infrastructure at Ain Shams.

**Research Outcomes and Impacts:**

The long-term research training program has stimulated research funding to help inform health policy and practice related to injury prevention in Egypt and LMICs in the Middle East. So far, the program has generated six peer-reviewed publications, as well as a WHO report about the development of geriatric healthcare by one of the program's trainees. Ongoing research as a result of the training program include:

- Non-operative management of blunt abdominal solid organ trauma: this cohort study explores this narrow trauma topic in adult patients. When the research is completed it will have the potential to impact clinical practice within Egypt and the surrounding regions.
- Substance abuse among injury patients: this study examines the prevalence of substance abuse among injury patients admitted to Ain Shams University Hospitals. When completed, the research will assist in obtaining more descriptive and analytical information to inform policy development.
- Pediatric poisonings: this study, conducted by a toxicologist trainee, evaluated the epidemiology of pediatric poisoning over a five-year period. There is little information regarding poisoning epidemiology in Egypt, so this research will share new, important knowledge. This manuscript has been recently submitted for publication and is under review.

**Next Steps:**

The program has been extended through 2016 in order to continue conducting both short-term training activities through the STEPS courses and the intensive summer injury epidemiology and research courses at UMB. Efforts are underway to further develop the blended injury epidemiology course to include other regional countries and to hold a STEPS course in Khartoum, Sudan. The program has two new publications in 2015, and participants are in the process of finalizing three additional manuscripts. The Department of Community, Environmental and Occupational Medicine at Ain Shams is planning to open a specific unit focused on injury epidemiology and will work with the Department of Surgery to implement a trauma registry. Additionally, Ain Shams is planning the establishment of a new Department of Emergency Medicine. Finally, colleagues at Ain Shams and WHO will continue working to establish the WHO Regional Collaborating Centre.

**Project:** International Collaborative Trauma and Injury Research Training (*Pakistan*)

**Award Number:** D43 TW007292

**Project Period:** March 1, 2006 - March 31, 2016 (anticipated end date)

**Principal Investigators (PIs):**

Ellen J. Mackenzie (2006-2010)

*Professor, John Hopkins University Bloomberg School of Public Health; Director, John Hopkins Center for Injury Research and Policy*

Adnan A. Hyder (2010-2016)

*Professor, John Hopkins University Bloomberg School of Public Health; Director, Johns Hopkins International Injury Research Unit*

**Major Foreign Collaborator (MFC):**

Junaid A. Razzak

*Professor, Aga Khan University Department of Medicine*

**Project Overview:**

This Trauma Program grant has achieved multiple successes in the past decade and has continued despite the hardship of the security situation in Pakistan. Starting as only a long- and short-term training project with fellowships and workshops, the project has grown to include a wide network of public health professionals, new research projects and centers, and has helped inform trauma and injury policy in Pakistan. It has brought together Pakistani policymakers and practitioners to discuss the prevalence of trauma and injury in Pakistan in an effort to decrease the burden of these injuries. During the course of this training program, the main Pakistani collaborating institution on this project, Aga Khan University in Karachi, Pakistan (AKU), was recognized as a WHO Collaborating Center for Emergency Medicine and Trauma Care and will continue to be a leader in the region for trauma and injury research.

**Background and Objectives:**

John Hopkins University (JHU) and AKU first formed a collaboration in 2001 to promote collaborations for research and training in public health. When the Trauma grant was renewed in 2010, the Khyber Medical University in Peshawar, Pakistan (KMU) joined as another in-country collaborator on the grant. The objectives of the training program are to establish a cohort of Pakistani trauma and injury researchers, promote independent trauma and injury research in Pakistan, advise and establish national policies in Pakistan, and establish a center of excellence within Pakistan that will serve as a core for this and future programs.

**Training and Capacity Building Outcomes and Impacts:**

The long- and short-term training programs changed throughout the course of the grant to match the needs of trainees, but have collectively built stronger and deeper networks of health professionals focused on injury and trauma prevention. Long-term training through fellowships at JHU and AKU are establishing a small group of injury and trauma experts, and short-term training in Pakistan is building a critical mass of Pakistani scientists, health care professionals and academics knowledgeable in injury prevention and research. Annual symposia and workshops hosted by JHU, AKU, and KMU engage Pakistani stakeholders to bolster collaboration and opportunities for future research.

**Fellowships at John Hopkins University:** During the original grant (2006-2010), the grant supported five Pakistani trainees for a two-year fellowship that culminated to an MPH or similar diplomas from JHU. The fellowship included courses at JHU in the first year, and independent research in Pakistan in the second year. Four of these trainees are now full-time faculty at AKU as professors or senior instructors to instruct the next generation of Pakistani public health researchers. In 2012, two of the trainees started a bi-monthly lunchtime seminar at AKU that is open to the public and showcases ongoing trauma and injury research in Pakistan, and it provides an opportunity for networking among public health professionals. Approximately 25 people participate in each lunchtime seminar.

**Fellowships at Aga Khan University and Khyber Medical University:** After the grant was renewed (2010-present), the program focused on strengthening in-country higher education; therefore, the fellowship transitioned to Pakistan. As of 2014, there are a total of 18 trainees enrolled in Master programs at KMU (n=8) and AKU (n=10). The long-term training includes courses developed at AKU (with JHU), optional online courses from JHU, two-month advanced training at JHU, webinars and workshops at KMU, and attendance and participation at seminars like the previously mentioned lunchtime seminars.

The long-term trainings have established a cohort of excellent public health professionals, yet there is wavering political will to support trauma and injury prevention research in Pakistan at this time. In order to strengthen the connection between policy and practice, the 2014 cohort includes three trainees who will focus their education and future careers on guiding trauma and injury prevention policy and infrastructure. They are enrolled in the Master of Health Policy and Management, and afterwards they hope to take up positions in the academic and non-governmental sector to work closely with public officials.

**Annual symposia and workshops in Pakistan:** The various short-term training programs are designed to reach a broad audience, and in nearly 10 years they have reached over 4,500 individuals. From 2006-2009, AKU hosted an annual health research symposium that also incorporated pre- and post-symposium workshops to disseminate knowledge to Pakistani public health professionals and students, as well as members of the public. The long-term trainees consistently participated as lecturers and instructors at these events. Allied workshop topics included timely issues such as mass casualty management strategy, disaster risk reduction, pediatric emergency medicine and complex humanitarian emergencies. Through these initial symposia, AKU and JHU made connections with colleagues from KMU, and KMU was successfully integrated into the second Trauma grant.

Since 2012, AKU has hosted several other symposia and workshops with KMU and JHU, and formalized the annual symposium as the “Annual Emergency Medical Conference” (AEMC) in 2012. The AEMC conferences have attracted over 1,000 participants and together hosted tens of pre- and post-conference workshops, many of which were focused on disaster preparedness and pediatric emergency medicine. AEMC is becoming a well-recognized national and regional event in South Asia, and it has allowed AKU to work closely with local actors in the development of the road traffic injury surveillance system in Karachi. Recently, AKU and KMU have opened contacts with colleagues in Bangladesh and Malaysia.

**Established new WHO research center at Aga Khan University:** The first grant supported the growth of the Department of Emergency Medicine at AKU where long-term trainees returned after their fellowships to conduct research and instruct students in trauma and injury research. In 2010, the department was declared a WHO Collaborating Center for Emergency Medicine and Acute Trauma Care. This honor was in recognition of AKU and JHU's contributions promoting emergency medicine, and trauma and injury prevention and research. Because the Center is part of a network of other WHO centers, AKU anticipates that it will be able to broaden its network and collaborate with other centers, especially those in the Middle East and Asia, in the near future.

In addition to hosting workshops, conferences and courses, the Center is participating in research projects led by the long-term trainees. The Center is also providing technical guidance to the Road Traffic Injury Research Center in Karachi by setting up data collection and analysis methods. This work has contributed to the significant focus on road traffic injuries in Karachi by police and civic officials. As of 2014, the Center is testing the second version of the Karachi Trauma Registry to capture important injury-related information, and will be used by the local government in the future.

### **Research Outcomes and Impacts:**

Research projects are a critical component for all the long-term trainees, and all trainees are expected to complete a research project in Pakistan. To date, research conducted under this training program has resulted in over 25 peer-reviewed articles in journals, including *Emergency Medical Journal*, *The Journal of Emergency Medicine* and *Public Health*. Another 13 papers are in preparation and will appear as a special issue of the journal *BMC Emergency Medicine* in 2015. The Department of Emergency Medicine at AKU has also co-authored over 100 papers on other projects during this time.

In 2014, the grant initiated an innovative Small Grant Program to develop interdepartmental collaboration among junior faculty, fellows and masters level students at AKU. Eight winners were selected through a peer-review process by AKU and JHU, and their research is currently underway on numerous injury and trauma topics including pre-hospital airway practice; teaching resources for school injury prevention; and disability assessment in burn injury patients.



Photo courtesy of Dr. Junaid Razzak, Aga Khan University

**The Pakistan National Emergency Department Surveillance Study (Pak-NEDS):** In 2011, grant participants started building the framework for a trauma and injury data collection system, Pak-NEDS, and data was collected from over 250,000 patients coming to seven main emergency departments across Pakistan. This data was recently analyzed and will be featured in the special issue of *BMC Emergency Medicine*. It is anticipated that Pak-NEDS will be a major resource for data on emergency medical services in Pakistan, and the current long-trainees are encouraged to participate in and use Pak-NEDS for

their research. The long-term trainees have already had the opportunity to share this research at international conferences and in journal abstracts.

**Annual national policy forum to engage policy-makers:** The second grant focused more efforts for policymakers and practitioners to join the program. With the support of the then-Director General of the Pakistan Ministry of Health, AKU established a high-level national policy forum on Acute Care of Injury and Trauma for Pakistan (ACT-PAK). To date, there have been three forums in two provinces (Khyber Pakhtunkhwa and Sindh), to engage stakeholders from the Ministry of Health, Ministry of Communications, the major emergency care providers organizations and hospitals in the province, as well as national and international experts. These forums are intended to improve and standardize emergency care and early stage development referral systems in the province. The forums are an opportunity for AKU faculty, including the trainees of this project, to foster collaboration between the public and private sectors and promote health issues for policy-making.

**Sustaining research through new funding and visibility:** The leaders of this Trauma grant have successfully applied for and obtained additional funds from NIH to support trainees who are exploring the relationship between HIV and trauma. This has increased the number of trainees involved in innovative work in a neglected area of health in the country. In addition, supplemental funding from NIH helped launch the previously mentioned Small Grant Program and allowed two members of the Institutional Review Board (IRB) at AKU to receive research ethics trainings at JHU. This support for stronger research ethics systems at AKU was welcomed by the institution. Later, AKU secured several small grants from the WHO to conduct regionally relevant research such as developing a tool for trauma assessment. Most recently, JHU and AKU have applied to non-NIH competitive sources for grants to further research in the area of disaster preparedness and emergency response.

AKU also won a competitive rotational position for the global secretariat of the Road Traffic Injuries Research Network (RTIRN, [www.rtirn.net](http://www.rtirn.net)) early in the grant period. As the secretariat, AKU guided RTIRN for two years and hosted symposiums that attracted researchers from around the world. AKU's role as the RTIRN secretariat and a WHO Collaborating Center have expanded their international trauma and injury network in LMICs as well as HICs.

### **Next Steps:**

This Trauma grant will continue into 2016, and there is still much to do. As of 2015, eight long-term trainees are still working to complete their training and research projects. The WHO Collaborating Center at AKU is seeking a status-renewal from the WHO. AKU continues to conduct regular symposia, conferences and workshops in Pakistan. Multiple publications are underway, in particular the Pak-NEDS study, yet overall the project has produced over 20 publications directly related to the Trauma Program grant. In the remaining year of the grant, there is the potential to see policy and practice changes implemented as a result of the research performed through this grant.

**Project:** Fogarty International Trauma and Injury Research Training Program (*Croatia*)

**Award Number:** D43 TW00726

**Project Period:** April 01, 2005 - March 31, 2016 (anticipated end date)

**Principal Investigators (PIs):**

Corrine Peek-Asa, PhD (2005-2011, 2013-present)

*Professor, University of Iowa, Iowa City, College of Public Health*

Thomas M. Cook, PhD (2011-2013)

*Professor, University of Iowa, Iowa City, College of Public Health*

**Major Foreign Collaborators (MFCs):**

Aida Mujkic, MD, PhD (2005-present)

*Specialist of pediatrics Senior Assistant, Zagreb University, School of Medicine; Croatia*

Razvan Chereches, MD, PhD (2010-present)

*Executive Director, Babes-Bolyai University, Center for Health Policy and Public Health; Cluj-Napoca, Romania*

Predrag Duric, MD, PhD (2010-present)

*Former Head of Department of Epidemiology, University of Novi Sad, Serbia*

Edrisa Sanyang, MPH, PhD (cand.) (2011-present)

*Lecturer and Research Scientist, University of The Gambia*

Nina Jovanovic, MD, MPH (cand.) (2012-present)

*Ophthalmologist, County Hospital Zenica; Zenica, Bosnia and Herzegovina*

**Project Overview:**

The International Collaborative Trauma and Injury Training (ICTIRT) program was originally a collaboration between the University of Iowa and the Stampar School of Public Health, Zagreb University in Croatia to develop a cadre of trauma and injury prevention health science professionals across countries in Central and Eastern Europe. Through a mixture of short-, medium-, and long-term trainings, the ICTIRT program facilitated the development of health professionals trained in assessing, treating, and preventing injury-related morbidity and mortality to conduct research in the field of injury prevention. Many of the trainees have established themselves as leaders in trauma and injury research within their institutions and are influential in developing in-country research capacity. Collaborative partnerships between the training program's investigators and in-country institutions have also resulted in the formation of trauma and injury prevention curricula at several notable institutions. For example, full-credit injury and violence prevention courses have been integrated into public health and medical training programs in Croatia, Romania, Bosnia and Herzegovina, and The Gambia.

**Background and Objectives:**

Since 1995, the University of Iowa's Center for International Rural and Environmental Health has collaborated with Central and Eastern European countries with funding from FIC (D43TW000621, *International Training and Research in Environmental and Occupational Health*, 1995-2012, from the "International Training and Research in Environmental and Occupational Health (ITREOH)" program). The purpose of the program was to develop a mass of environmental health science professionals across countries in Central and Eastern Europe. In addition, the CDC-funded University of Iowa Injury Prevention Research Center provided a cadre of international injury epidemiology experts. The ICTIRT

program is based on the ITREOH program, but with a stronger focus on long-term training to public health professionals. Drawing from previous work in the region, the PI and MFCs established the ICTIRT program in order to build the capacity of investigators at the Stampar School of Public Health in Zagreb, Croatia, facilitate professional development in the field of injury prevention for trainees, and translate results of research into prevention programs developed specifically for Croatia. The program was later expanded with similar trainings in the region as well as The Gambia.

### **Training Outcomes and Impacts:**

The ICTIRT program was composed of three phases: short- and medium-term trainings in the U.S., and long-term trainings both in-country and in the U.S. As of 2015, the ICTIRT program had supported 42 trainees: 24 short-term trainees, 12 medium-term trainees and six long-term trainees. The program has helped train a critical mass of scientists, doctors, nurses and other health professionals in a variety of disciplines necessary to assess, treat and prevent injury-related morbidity and mortality. In addition to the core trainings, the ICTIRT program hosted a number of training activities using distance learning technologies and in-person presentations. Initially, in the first round of the grant, training efforts were primarily focused in Croatia, however upon reapplication of the grant in 2010, the program instead utilized Croatia as a regional resource for extending the reach of the ICTIRT to Bosnia, Romania, Serbia and, in the last year, The Gambia.

**Short-term training:** Short-term training at the University of Iowa provided two- to six-week focused trainings in data analysis, manuscript and grant proposal writing, and peer-review. The program also included a short-term distance learning approach to provide targeted injury training to a larger number of individuals in-country. This allowed the program to geographically expand the reach of the program in a cost-effective manner.

**Medium-term training:** The medium-term training consisted of a five-month training period for trainees to take graduate-level coursework in injury prevention and control at the University of Iowa. In addition to the graduate-level coursework, trainees worked directly with faculty mentors discussing professional development and research interests. The program was responsive to the training and research needs of the collaborating institutions, and it provided opportunities across a number of specialty areas including injury prevention, control and epidemiology. Upon completion of the program, trainees were also expected to conduct an injury-related workshop in their home country, further promoting professional networking and sharing of information and experiences.

**Long-term training:** The long-term training was for those seeking a master's or doctoral degree and other training lasting six months or more. Suitable candidates from the medium-term training were identified to participate in the program and were given the opportunity to develop the full range of skills necessary to support injury and trauma research. Degree opportunities included a Public Health Certificate, Master in Public Health and doctoral degrees.

**Professional development of the trainees:** Upon completion, several trainees have become injury prevention leaders in their country and region, currently serving in leadership roles in their country's health and research institutions. In addition, several former trainees now serve as members of the

program's Training Advisory Committee and as regional mentors to new trainees, which has contributed to the program's sustainability in the future. Other positions and honors include deans, directors, heads of departments and professors at academic and research institutions.

### **Research and Capacity Building Outcomes and Impacts:**

One of the program's major avenues for integrating trainees into trauma research roles is through supporting trainee research projects through small seed grants. The ICTIRT-sponsored projects have had direct connections to the community and have contributed to developing infrastructure in trauma and injury health areas as well as developing regional partnerships.

**Partnerships and collaborations through regional symposiums:** Each year the ICTIRT conducts a regional summer institute symposium to introduce injury prevention to new audiences, and to highlight some of the accomplishments of the trainees. The symposiums help build partnerships and collaborations between regional partners, and have reached over 550 professionals through coordinated activities and initiatives. For example, a collaborative meeting in conjunction with the 2008 ICTIRT Summer Institute symposium ended with a proposal to integrate Romania into the European Trauma Data Bank. As a result, Romania joined the Joint action on Injury Monitoring in Europe (JAMIE) project, administered by Eurosafe: European Association for Injury Prevention and Safety Promotion, and funded through the EU Horizon initiative since 2010, and several publications have resulted from the data collected through the JAMIE project. During the project period, multiple symposia have been held in Bosnia (four), Croatia (three), Romania (five), Serbia (five) and The Gambia (one).

**Building Research Infrastructure:** The ICTIRT program has been successful in building research infrastructure by supporting trainee research projects through small seed grants and assisting in professional scientific development of their collaborating partners. These partner institutions have been successful in leveraging research funding for ongoing projects in-country, and it is anticipated they will continue to build permanent research infrastructure in the years to come.

Examples of research accomplishments include:

- As of 2014, 19 manuscripts have been written as a direct result of ICTIRT activities.
- In Serbia and Bosnia, program training guidelines developed as part of a trainee pilot project have been disseminated to more than 50 hospitals to conduct training in needle-stick injury prevention, and improve healthcare worker safety in these hospitals. Likewise, the program was successful in creating several institutional data collection forms that are now used routinely with trauma patients.
- Trauma system databases have now been implemented in Bosnia, Romania, Serbia and The Gambia. Former trainees were also successful in developing research that established linkages of car crash data to medical outcome data in Serbia. The research outcomes resulted in a long-term partnerships between the traffic enforcement in country and medical communities, and have helped to evaluate injury and trauma impacts in the country.
- In Bosnia, an Eye Injury Registry was established at the Zenica County Hospital, and just within the past few months a similar registry was implemented at the Ophthalmology Department at the Clinical Center at the University of Sarajevo. Data collection is still underway, but several publications are expected within the next one to two years.

- In The Gambia, a road traffic injury database has been implemented at two hospitals. This program has been responsible for forging a new collaboration with the Police Department and for the introduction and use of new data collection forms to collect more specific details regarding road traffic crashes and injuries. Data collections is still underway, but this project also expects to produce several publications in the near future.

The ICTIRT has also been instrumental in building research infrastructure and assisting professional development. Highlights include:

- The University of Babes-Bolyai in Cluj-Napoca has become the first institution in Romania to offer a Bachelor of Science in Public Health. The curriculum was developed by the U.S. PIs and all 17 faculty have at one time been a trainee of the ICTIRT program. Because of the collaboration, injury prevention is also part of their core curriculum.
- A former trainee of the program received a prestigious grant from the Croatian Ministry of Health to study injury prevention and its integration into pediatric and general medicine practices in Croatia. The former trainee has also been recognized by the Minister of Health as the Injury Prevention Liaison for the country.
- A former trainee developed an ophthalmological injury registry at the University of Rijeka in Croatia as the result of her ICTIRT training in 2007. The system is now integrated with the hospital's electronic medical record system and now collects data on all trauma patients. She is currently mentoring ICTIRT trainees in Bosnia to replicate her injury registry there.
- A small pilot project grant in The Gambia which funded an injury registry was leveraged to obtain a larger grant from the Road Traffic Injury Network in the amount of \$25,000 USD.

### **Next Steps:**

The ICTIRT program is fully funded through March of 2016 and will continue to build capacity and research infrastructure within Central and Eastern European countries. In an effort to ensure lasting programmatic impacts, the program has collaboratively worked with institutions to develop sustainable training programs. Injury prevention has been integrated as a central component at the University of Novi Sad, Serbia, and the Stampar School of Public Health in Zagreb, Croatia. The Center for Health Policy and Public Health in Cluj-Napoca, Romania, has created an Injury program led by a former ICTIRT trainee. It is anticipated that the CHPPH will receive funding for two small pilot projects for the 2015-2016 year.

In Serbia, the ICTIRT program collaborates with the Head of the Departments of Epidemiology and Biostatistics at the University of Sarajevo to integrate trauma and injury prevention into the curriculum. The Head of the Department visited the University of Iowa in the fall of 2015 to meet with other injury specialists to gather information for building an injury curriculum in Bosnia.

In The Gambia, a Road Traffic Injury Database has been established to collect trauma and injury data from two regional hospitals, the Edward Francis Small Teaching Hospital and the Serrekunda General Hospital, both in or near the capitol of Banjul. This database was established in 2014 and will continue through 2016.

These partner institutions have been successful in leveraging research funding for ongoing projects in-country, and it is anticipated they will continue to build permanent research infrastructure in the years to come.

**Project:** USA-China Agricultural Injury Research Training Project

**Award Number:** D43 TW007257

**Project Period:** April 1, 2007 - February 29, 2012

**Principal Investigator (PI):**

Loran Stallones, PhD

*Colorado State University, Department of Psychology*

**Major Foreign Collaborator (MFC):**

Zengzhen Wang, MD, PhD

*Professor, Tongji Medical University, China, Department of Preventative Medicine*

### **Project Overview:**

This U.S.-China collaboration received support through the Trauma Program grant to establish a training project devoted to agricultural injury research in rural areas of the People's Republic of China. The project's goal was to increase research capacity on farm-related injuries in China, and to develop sustaining research collaboration between the U.S. and China. The collaboration has produced several publications on advancing injury research in China, as well as developed partnerships with U.S.-based researchers. Additionally, the grant contributed to sustainable research infrastructure by establishing an Institutional Review Board (IRB) at Tongji University and the Southeast University Injury Prevention Research Institute.

### **Background and Objectives:**

The project was a collaborative effort between U.S. investigators from Colorado State's Injury Control Research Center (CSICRC), the Ohio State University's Center for Injury Research and Policy (CIRP) and Chinese investigators from the School of Public Health at Tongji Medical University (hereafter Tongji). Prior to the Trauma Program grant, investigators from both Tongji and the CSICRC had collaborated for five years on research funded by Tongji related to agricultural injury and pesticide poisoning problems among farmers. The prior research project laid the framework to establish a partnership between U.S. and LMIC institutions to construct a comprehensive training program focused around trauma and injury safety.



Photo courtesy of Dr. Huiyan Xiang

The rural setting and lack of emergency care for injuries distinctive of agricultural communities highlights the importance of improving health and safety and need for injury prevention related investments in this sector. Although agricultural injury had been recognized as an important health problem in China, little research has been available on injuries in this population, which is estimated to be roughly 800 million farmers. To address this gap, the overarching goal of the project was to increase capacity in injury research and prevention for farm-related injuries in China, with the long-term goal of establishing

expertise for Chinese trainees to address agricultural injury prevention and develop injury-related research collaborations between China and the U.S.

In order to achieve these goals, the training program included five-day training seminars, web-based distance learning and onsite learning at U.S. research institutions, all focusing on agricultural injury-related research. An additional component of the training included addressing issues of legal, ethical and social implications of trauma and injury research.

### **Training and Capacity Outcomes and Impacts:**

The training program was designed to address three specific aims: 1) provide training to Chinese scholars on issues critical for reducing agricultural injuries; 2) expand collaborative research activities amongst the CICRC, CIRP and investigators at Tongji Medical University; and 3) provide training for and continue development of human subjects research ethics.

**Agricultural injury training courses in China:** Trainees obtained skills in major areas of agricultural injury-related research through a comprehensive five-day training course. As of the 2011, over 100 trainees had completed this annual course. Subject areas included study design, systematic literature review, injury surveillance and data analysis. Trainees also received courses on successful grant writing and publication techniques. In order to attract a pool of highly qualified candidates, training courses were held in different regions across China, specifically focusing on regions with major agricultural production. Within each cohort, up to four trainees were accepted for additional long-term training in the U.S. for more exposure to agricultural research activities.

**Senior scientists training in the U.S.:** Up to four trainees were selected annually from each above-mentioned training course to spend 3-6 months at the CICRC in Colorado or CIRP in Ohio to expand collaborative agricultural injury research activities between faculty in the U.S. and research scientists in China. Although scientists in China are well trained in general public health research methodology, they are generally new to the international injury research community. The U.S.-based training was a catalyst to develop long-standing research collaborations with U.S. senior scientists conducting ongoing research projects at their institutions; thus, for many trainees, this training was the first step in incorporating them into the mainstream international injury research community. As of 2011, seven senior scientists have traveled to the U.S. for this training. As a result, the trainees have become leaders in injury research and prevention in China. Additionally, two former trainees have become editorial members of the international journal, *Injury Prevention*.

**Additional outcomes:** Both the China- and U.S.-based trainings emphasized the importance of human subjects research ethics. The Chinese scientific community has only recently focused on human subject protection when involving human study participants. The trainings devoted extensive time to IRB processes and policies to raise awareness about ethical issues in the conduct of human research.

### **Research Outcomes and Impacts:**

Upon completion of the senior scientists' training in the U.S., trainees were given seed grants to continue their research in China with the anticipation the projects could leverage their connections and training to

secure further funding. The program has resulted in several publications focused on advancing injury research in the Chinese agricultural sector, which have helped to inform policies in China as well as develop partnerships with U.S.-based researchers. In addition, the Office of Epidemiology at the Chinese Center for Disease Control and Prevention now has an established agricultural injury research and prevention program.

**Research Impacts:** By working collaboratively with U.S. faculty members to obtain first-hand knowledge in injury research study design, several of the trainees are now actively working on injury research and injury surveillance in China. For example, under the mentorship of the PI, trainees have completed a research project on injury and safety among children abandoned due to the socio-economic climate in the Hubei Province, and another in alcohol consumption and work-related injuries among farmers in the Heilongjiang Province. Each of these projects have been recognized as important public health problems in China and highlight the need for culturally appropriate interventions that address children's safety and alcohol use among farmers in the agricultural regions. The projects have provided researchers the opportunity to both advance injury research in China and to become independent investigators.

**Enhancing research infrastructure:** As a result of the program, the Southeast University Injury Prevention Research Institute was created in 2010 at the Southeast University in Nanjin, Jiangsu Province. Its mission is to conduct multidisciplinary injury research in road safety and agricultural injuries, and provide occupational safety training. It represents another means to build a highly capable injury research workforce in China. Additionally, leaders of the Tongji School of Public Health were inspired by the program to develop their own IRB. Through the guidance of the training faculty, the IRB now ensures all research conducted at the Tongji adheres to the internationally accepted human subject regulations and policies. The IRB is also registered at the U.S. Office for Human Research Protections.

**Next Steps:**

This Trauma grant established a strong capacity to develop injury research and injury surveillance in China. As of 2015, the Southeast Injury Research Institution has been awarded five external grants. Five graduate students have graduated from the institute and 14 graduate students are currently receiving training. Researchers and students affiliated with the institute published a total of 27 peer-reviewed journal articles.

Several former trainees have successfully competed for National Natural Science Foundation of China grants to conduct injury and trauma research in China. In four of these large research projects, U.S. colleagues have participated in the study design and are advising Chinese scholars to conduct these studies. The future presents many opportunities for Chinese scholars trained by this Trauma grant, and they are expected to make significant contributions to injury prevention and research in China and internationally.

**Project:** International Training in Injury Control Research (*Mozambique*)

**Award Number:** D43 TW007262

**Project Period:** June 1, 2005 - May 31, 2010

**Principal Investigators (PIs):**

David Wright, MD (2005-2009)

*Associate Professor, Emory University School of Medicine, Department of Emergency Medicine*

Scott Sasser, MD (2009-2010)

*Professor, Emory University School of Medicine, Department of Emergency Medicine*

**Major Foreign Collaborator (MFC):**

Otilia Neves, MD

*Coordinator, Trauma and Injury Programs, University of Eduardo Mondlane, Mozambique, School of Medicine*

**Project Overview:**

Emory University (hereafter Emory), the University of Eduardo Mondlane (UEM) in Mozambique, and the University of South Africa (UNISA), collaborated on a capacity-building initiative to create a core group of Mozambican public health researchers and experts in injury prevention and control. Ten researchers participated in a three-year fellowship that incorporated curriculum from each institution. Trainees of the program leveraged their education research to build partnerships with government institutions in Mozambique that have informed injury prevention policy at the highest levels. Their education stimulated injury prevention research and strengthened the health infrastructure in Mozambique. Furthermore, this program established the first research center dedicated to injury control in Mozambique.

**Background and Objectives:**

Built from a preexisting partnership between Emory and UEM that started in 2000, the collaboration sought to establish a training program dedicated to trauma care and injury control research in Mozambique. In the 2001-2005 national strategic plan, the Mozambique Ministry of Health (MOH) reported that traumas, particularly those caused by road traffic crashes, had reached epidemic proportions with trauma emergency room visits rising each year. As a result, the southern African nation recognized the need to support research infrastructure in trauma and injury prevention.

This program supported long-term training in order to support the Mozambican governmental and academic injury initiatives; maximize the international educational experience of Mozambican researchers; and stimulate injury prevention research. Emory faculty collaborated with UEM to create an in-country curriculum at UEM focusing on core public health education and field research experience. The curriculum included supplemental intensive training for one semester at the Rollins School of Public Health at Emory, and additional mentored training at UNISA. The training was tailored to immerse each trainee with hands-on career development experiences designed specifically on violence and injury prevention, injury epidemiology, acute trauma care, and disaster preparedness and response unique to Mozambique. In addition, UNISA, a World Health Organization (WHO) Collaborating Center for Injury Control and Violence Prevention with a well-established injury-training curriculum, provided the

Mozambican trainees with the opportunity to receive mentorship and training from a fellow African nation.

### **Training and Capacity Building Outcomes and Impacts:**

The three-pronged training program curriculum included:

- **Formal academic training UEM:** In collaboration with the UEM School of Medicine in Maputo, trainees obtained the foundation of their training in Epidemiology and Public Health. To ensure a rich training experience, trainees received supplemental high-impact training arranged by Emory faculty.
- **Bridge Fellowship at Emory:** At the end of their first year of training at UEM, the same trainees were invited as Bridge Fellows to the U.S. to network with Emory and Centers for Disease Control (CDC) faculty to develop their research protocols under close Emory faculty guidance.
- **Interval training at UNISA:** Designed to follow the Bridge Fellowship, trainees spent a few months at UNISA working in an injury control center. This portion of the training also fostered regional collaborations with researchers in South Africa.

The training program established a cadre of 10 injury researchers who have returned to Mozambique and are now working in public health, clinical care, academia, public policy at UEM, the private sector, Hospital Center Maputo (HCM), or the WHO in Maputo. At the completion of this three-year training program, all 10 Mozambican clinicians successfully received a Master of Public Health diploma. Six of the trainees had completed and defended their master's thesis, with an additional three more anticipated to complete their master's thesis defense promptly. Additionally, one trainee has continued her education and is currently enrolled in a doctoral degree focused on violence prevention. The training laid the groundwork for future prevention initiatives with colleagues across sub-Saharan Africa.

**Created networks for new partnerships:** All three stages of the training were elemental in fostering lasting, local collaborations with experienced injury prevention and control experts, which continued to expand training, education, and research in sub-Saharan Africa. While at Emory, trainees had the opportunity to meet with potential collaborators at the CDC, the World Bank, the Institute of Medicine, the Pan American Health Organization, WHO and FIC. The program also fostered strategic partnerships in Mozambique. During the course of the program, trainees developed local collaborative efforts with Mozambican Ministries including the MOH, National Institutes of Health, Ministry of Transportation, and Ministry of Interior; the City Council of Maputo; and multiple non-governmental organizations.

Additionally, UNISA continued to mentor trainees of the program by developing in-country courses and providing more opportunities for research training, policy formulation and advocacy. In 2013, UNISA and UEM renewed their institutional partnership by signing a three-year Memorandum of Understanding. The memorandum expanded their partnership beyond the preexisting injury prevention collaborations to include other scientific disciplines, post-graduate trainings and interdisciplinary research. Multiple trainees have participated in joint UEM-UNISA initiatives, such as the Safety and Peace Promotion Research Unit (SAPPRU), a multi-country injury prevention initiative conducting research and collecting data to monitor and prevent violence and injury in South Africa, as well as other African countries.

**New curriculum development:** Because of the successful outcomes from the training program, as of the 2010 report, a Master of Injury degree program is currently under consideration at UEM. Additionally, in 2009 one of the former trainees of the program worked with the CDC in Mozambique and UEM faculty to introduce a new course on injury control for the CDC's two-year field epidemiology training program course in Mozambique. The course was incorporated into UEM's public health curriculum in 2010.

**Established new Injury Control Research Center (ICRC):** Near the end of the grant, UEM established the first national Injury Control Research Center (ICRC) in Mozambique. The ICRC allows academic, governmental, public safety and advocacy groups in the clinical arena to serve as a public resource for research and capacity building, ultimately to support policies and community empowerment in injury prevention and control. The multidisciplinary, multi-sectoral center is poised to play a significant role in injury research with local, regional and international backing, and has the potential to be the focal point for grants and collaborations on injury prevention in the future. The establishment of the ICRC aligns directly with FIC's strategic plan in building and sustaining a local research enterprise where local scientists can independently secure the support needed for their research. After the first networking meeting, the group established the *Kutwanana*: Mozambique Injury Prevention and Safety Promotion Research Unit housed at UEM. It is currently led by former alumni of the training program.

**Mentorship for a young U.S. researcher:** This program leveraged support to obtain a supplemental grant from FIC for a U.S. post-doctoral fellowship to work collaboratively with Emory and UEM faculty. The Fellow used the newly established trauma registry at HCM to examine injury epidemiology and preventable injury deaths. This was the first study of its kind in Mozambique, and it is anticipated that the results from the research will be instrumental in the development of trauma protocols and injury prevention policies by MOH and HCM. The fellow is now an assistant professor at a prominent U.S. university conducting global health research on traffic injury in countries like Argentina, Brazil, Rwanda, Sri Lanka and Tanzania. Her fellowship research served as an opportunity for a young U.S. scientist to gain international research experience and pursue a career in global health. She has subsequently submitted proposals for further FIC grants funding including a career development award focusing on alcohol interventions for injury patients at African emergency departments.

### **Research Outcomes and Impacts:**

Prior to initiation of the grant, there was little formal training in Mozambique on research methodology, research ethics or scientific writing. With a growth of trauma related injuries, particularly those caused by road traffic crashes, the Mozambican MOH recognized injury as a priority issue for the country. This program worked to address this need by launching multiple collaborative research projects, led by trainees, in the area of trauma and injury prevention. The research projects also served as an additional training mechanism. The research projects were carefully crafted to examine burdens of injury in Mozambique and included studies on resources available for victims of domestic violence in Maputo; epidemiology of pediatric injury in Maputo, and the relationship of alcohol and injury; development of a trauma registry and conduct of preventable death; prevalence of HIV in trauma patients; impact of patient transfer on trauma outcomes; knowledge, attitudes, and practices of hospital-based healthcare workers about child maltreatment diagnosis and management; disaster preparedness in the hospitals of Maputo; and knowledge and practices of Maputo drivers regarding road safety practices.

**Informing injury and trauma policy in Mozambique:** As a result of this program, several trainees have successfully partnered to build injury research capacity in Mozambique. For example, a former trainee partnered with the Mozambican MOH and HCM to develop a comprehensive trauma data collection system. The registry serves to provide epidemiologic data to the MOH for policy and prevention activities as well as a data resource. After recognizing the benefits of the program, the MOH began working to incorporate this initiative into countrywide efforts; as of 2014 the trauma registry has expanded to two trauma hospitals in Mozambique. In addition, one of the principal aims of the ICRC was to work in a multidisciplinary manner to formulate policy on injury prevention and control in Maputo. Likewise, former trainees at the ICRC now work with the MOH to develop national strategies on road safety, informing both policy and operations to improve safety in Mozambique.

**Next Steps:**

The collaborations between Emory and the two African universities could not be sustained due to lack of funding. Nevertheless, the continuing relationship between UEM and UNISA represents a strong south-south relationship that is expected to continue into the future. Trainees from this program have continued their research and collaborations with international researchers, in particular with UNISA, as well as other African institutions. Further funding and continued growth of the ICRC is needed to support new initiatives and to maintain the current momentum. At present, Mozambique needs to dedicate additional resources to injury and trauma monitoring and prevention, and for the establishment of a nation-wide trauma registry. Trainees from this program will continue to partner with institutions in the U.S. and southern African to identify future resources for funding, and to potentially collaborate on new research for injury and trauma prevention and control in Mozambique.

**Project:** UCLA-South African Research in Trauma Training Program

**Award Number:** D43 TW007278

**Project Period:** July 1, 2005 - February 29, 2016 (anticipated end date)

**Principal Investigators (PI):**

Gail Wyatt, PhD

*Professor, University of California, Los Angeles; Nueropsychiatric Institute*

**Major Foreign Collaborators (MFCs):**

Leickness Simbayi, PhD

*Executive Director, Social Aspects of HIV/AIDS and Health Research Program, Human Sciences and Research Council*

Mashudu Maselesele, PhD

*Professor and Dean of Faculty of Agriculture, Science and Technology, North-West University*

Dan Stein, PhD

*Professor and Chair, University of Cape Town, Department of Psychiatry and Mental Health*

**Project Overview:**

The Phodiso program is an international collaboration between the University of California, Los Angeles (UCLA) and the South African Research Consortium (SARC), focused on minimizing the negative health and mental health effects of trauma exposures, specifically depression and post-traumatic distress disorder (PTSD), in South Africa. Through the support of this Trauma Program grant, 12 Phodiso program trainees have completed multidisciplinary training focused on the development of knowledge and skills necessary to conduct evidence-based research in biobehavioral studies of trauma and injury prevention. Research outcomes stemming from research supported by this program have helped expose the need for suicide intervention and have informed policies and strategies to address depression and PTSD. Additionally, the program has helped trainees foster collaborations with faculty at UCLA and South African government institutions to develop new research and training programs beyond the scope of Phodiso. Five hundred undergraduates and other faculty have attended workshops on assessing trauma and mental health or they have learned about research outcomes of the Phodiso scholar's findings.

**Background and Objectives:**

Phodiso, means "healing" in the Northern Sotho language native to South Africa. This training program is a continuation of an ongoing parent grant from NIH, the Eban project (U10 MH064404, *HIV/STD Risk Reduction Among African American Couples*, 2002-2010; and R01 MH093230, *Implementing Eban II: An evidence based intervention for serodiscordant couples*, 2012-2017, from the "Dissemination and Implementation Research in Health" program). The original Eban project was randomized-controlled study of couple-based interventions for HIV in the U.S., yet it translated into a model for the Phodiso program. The Phodiso program seeks to increase the number of well-trained South African researchers who are able to conduct biobehavioral studies of trauma and injury prevention and its effects on health and mental health. The training program adapts two components of the Eban project: 1) training scholars on how to assess and evaluate individual, couple and family interactions that can influence the effects of trauma, health and mental health outcomes; and 2) adapting cultural values from tribes and nations in South Africa that promote coping, health promotion, resilience and social support for trauma survivors.

Under Eban, the U.S. and South African researchers had worked collaboratively between 5-13 years, conducting studies that enhance the understanding of the effects of trauma and injury on health and mental health outcomes, specifically PTSD and depressive symptoms in South Africa. In most of the areas selected only marginal prevalence data was available through governmental reports. Thus, South African is in need of understanding the impact of the variety of intentional types of trauma that exist in order to assess their impact on the mental health and productivity of the country.

### **Training and Capacity Building Outcomes and Impacts:**

**The Phodiso Program:** As of 2014, 12 trainees have completed Phodiso Program training. Trainees are selected for a two-year fellowship at UCLA and collaborating institutions in South Africa, and then assigned mentors with expertise in the research issues that the trainee wishes to investigate. Trainees also complete formal coursework at UCLA for three months, also working with a mentor to help refine their research projects for implementation in South Africa. Upon completion, trainees are awarded a Post-Doctoral Certificate in Trauma, Injury Prevention, Health and Mental Health. Trainees continue to collaborate with the ongoing training program once they return to South Africa. Each year, all trainees have the opportunity to present their research at an annual conference.

**Professional development opportunities for trainees:** The Phodiso program has had an important impact on the trainees' career development within their respective institutions. Several trainees have been appointed to professor positions, thus contributing to a critical mass of researchers able to instruct and conduct trauma research at their respective universities. Furthermore, one trainee was able to use her newly acquired research and writing skills to secure two large grants to extend research in a highly underserved area of the country. Nearly all trainees who completed their training have rejoined the program as mentors to new trainees. Additionally, several former trainees were asked to participate in the Trauma, Injury Prevention and Mental Health: International Collaborations conference in Washington, DC in 2014 to disseminate their research findings.

### **Research Outcomes and Impacts:**

**Applying research to health policy and practices:** Trainees' research from the program is having a profound impact on generating new knowledge about the behavior of individuals exposed to traumatic events such as sexual assault, PTSD and spousal abuse in rural areas of South Africa. All of the trainees are poised to develop interventions and to receive additional funding. One study is increasing the attention to suicide within the framework of injury prevention by drawing attention to individuals in South Africa with behavioral health needs and at-risk groups, especially youth. Other research conducted by former trainees of this program focuses on PTSD amongst law enforcement personnel. It has been well-documented that police officers are exposed to many potentially traumatic stressors and their health problems exceed those of the general population, however there has been no previous research conducted in South Africa focusing on multiple exposures to trauma of law enforcement. The trainees' research helps identify such factors in order to inform policymakers and shape intervention programs aimed at law enforcement personnel.

**Generating new knowledge in trauma issues in South Africa:** Together, all trainees have thus far published 22 articles and a book chapter, and they continue to conduct research related to the program's

main objectives after training. Their research, now and in the near future, includes a study of South Africa mothers and infants as they react to domestically violent environments; immigration challenges of Zimbabwean men and women into South Africa; suicide ideation of South African middle school students; the cultural aspects of mental illness due to trauma; evidence-based intervention for South African serodiscordant couples; and injuries and trauma-related substance abuse in emergency room patients. These are all papers depicting the effects of intentional injuries and trauma on PTSD and depression.

**Building capacity with new research funding:** In addition to the research developed as a result of the Phodiso program, several trainees were able to leverage their new-found knowledge to attain additional funding for trauma research. New funding for trauma research will not only help sustain in-country capacity building in South Africa, but it also provide more visibility for the program and enhances collaboration between compatible researchers in the field. Specific examples include:

- Funding from the Department for International Development for 1.59 million rand (approximately \$214,325 USD) to develop a sexual and reproductive health curriculum for nurses in the Limpopo Province.
- Funding for a five-year project from the Atlantic Philanthropies for 18.5 million rand (approximately \$2.5 million USD) to support capacity development in the Nursing Department at the North West University in South Africa.

### **Next Steps:**

The Phodiso program is funded through 2016. Future plans for the program will focus on increasing the number of well-trained researchers in South Africa who can conduct research related to trauma and injury and its effects on health and mental health. Additionally, the program will aim to encourage research that builds upon current evidence to develop culturally relevant trauma and injury prevention programs, as well as enhance the health research infrastructure. The trainees will submit papers for a special issue in *Psychological Trauma: Research, Practice, and Policy*, a journal of the American Psychological Association. They will also present these papers at NIH in Washington, DC in November 2015. This Trauma grant has multiple new opportunities it can pursue after the grant ends. New relationships between faculty at UCLA and North-West University are discussing discuss potential future collaborations as well as cross-training beyond the Phodiso program. The team has presented the Phodiso program to government officials at the South African Ministry of Health (SAMH) and the Nelson Mandela Foundation in Johannesburg, with the goal of incorporating the training as a countrywide program available to aspiring scientists and clinicians. Both the SAMH and the Nelson Mandela Foundation have expressed interest in efforts to develop and find interventions for reducing trauma and injury in the South African Population and have funded national research on violence. The PI and MFCs have also submitted a proposal to FIC for an international grant to train bachelor's and master's students at the University of Cape Town in substance abuse and mental health.