



Annual Report: 2022

Website: www.LFRinternational.org
Email: info@LFRinternational.org

Table of Contents:

Letter from our Founders: 3

About LFR International: 4

Research Programs: 4

This Year at a Glance: 5

Program Updates: 6

Division of Trauma Care 6

Division of Obstetric Care 6

Division of Psychosocial Research 7

Fellowship in Prehospital Innovation 8

Additional Clinical Research 9

Special Acknowledgements: 10



Letter from our Founders:

Dear Friends,

What an incredible year 2022 has been. With resumed post-pandemic travel and a larger-than-ever directorship team, this year has been filled with innovative research, educational content development, program maturation, and of course, training hundreds more lay first responders. We are excited to share these updates with you, as we work together to improve the provision of prehospital emergency care around the world.

We are proud to report that we are beginning to see our efforts compound. After over seven years of research on prehospital emergency care in resource-limited settings, our team has now published 14 peer-reviewed academic articles detailing our efforts to innovate in the prehospital care space across eight countries on four continents. We have been privileged to share the outcomes of our work with academic and service-minded groups from around the world, including the United Nations Road Safety Fund, American College of Surgeons, and the African Federation of Emergency Medicine. Just this December, we welcomed our fifth annual class of LFR Fellows in Prehospital Innovation, selecting five future leaders to join the sixteen fellows before them. And within the coming months, we will cross the threshold of 6,000 first responders trained in collaboration with our program partners.

In addition, we have begun offering refresher training services to our trainees, building upon our prior research revealing a six-month timeline for ideal follow-up for program sustainability. We have recently completed the development of our massive open online course, which will be released mid 2023 and will be made available to everyone, completely free of charge. And, with the generous support of our partner institutions and donors, we are working to apply innovative technology to our program offerings such as mobile dispatch applications, low-cost simulation tools, and point of care instructional devices.

We would like to take this opportunity once again to thank each and every one of you reading this letter for your incredible support. In the wake of the COVID-19 pandemic, the past two years have not been easy. But it is with your undying support of our work and our mission that we have been able to continue to grow and thrive. We cannot wait to see what 2023 has in store.

Warmly,



Peter G. Delaney
Executive Director



Zachary J. Eisner
Operations Director

About LFR International:

LFR International is a 501(c)(3) non-profit organization that develops and implements community-based emergency medical services (EMS) in resource-limited environments. By empowering community members through training to become **Lay First Responders**, **LFR International** facilitates the sustainable development of EMS infrastructure in a research-informed, systematic progression of levels toward professional emergency medical services.

\$200,000+

Invested in EMS



5,743

Responders



Eight

Project Countries



LFR has conducted work in eight international program sites: Uganda, Guatemala, Chad, Sierra Leone, Kenya, Nigeria, the Philippines, and Uganda, in addition to our programming in the United States. We partner with federal and local governments, research universities, and like-minded NGOs to assess areas for EMS capacity building and train additional first responders. In total, LFR has trained almost 6,000 first responders and 200 trainers.

Research Programs:

LFR International prides itself on combining cost-effective humanitarian aid with high-quality research to inform evidence-based decision making in our program sites. To date, we are the leading publisher by volume of peer-reviewed articles on the topic of bystander lay first responder program development globally, with research output rivaling that of well-established academic labs. Our research efforts operate spanning three divisions under the LFR International umbrella:

Division of Trauma Care

To improve prehospital and hospital trauma care in resource-limited environments by training and supporting prehospital and hospital-based providers.



Division of Psychosocial Research

To provide high-quality monitoring, evaluation, and interventions to understand and better support first responders in the field and in their community.



Division of Obstetric Care

To increase the chances of survival for both mothers and infants in the prehospital setting of resource-limited environments.



This Year at a Glance:

Trained, Equipped, and Deployed

350 first responders in Nigeria
 225 first responders in Uganda
 30 first responder trainers in Nigeria
 12 first responder trainers in Uganda

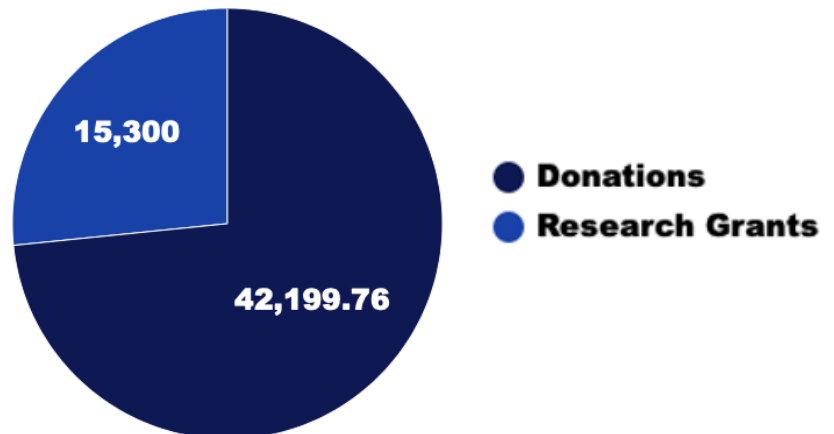
Supported and Empowered

6 Fellows in Prehospital Innovation
 5,200 previously trained responders
 5 key partner institutions
 10 volunteer staff members

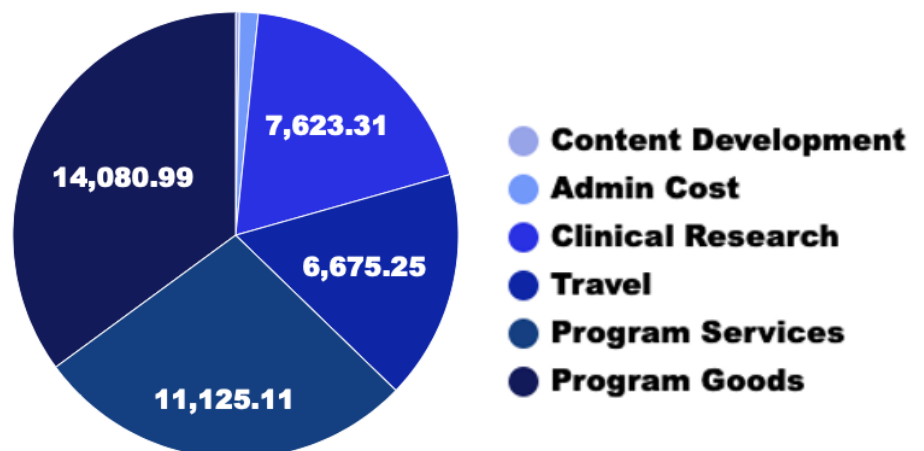
In addition to our mission training first responders, LFR...

...co-founded the Global Prehospital Consortium.
 ...selected five new Fellows in Prehospital Innovation.
 ...joined the Global Alliance of NGOs for Road Safety.
 ...published 6 manuscripts in peer reviewed journals.
 ...produced a massive open online course on first aid.

Income:



Spending:



Program Updates:

Division of Trauma Care

2022 was a year of growth and change for trauma care at LFR. In July of 2022, Dr. Nathanael Smith joined our team as the *Director of Trauma Care*. The goals of the Division of Trauma Care were formalized as development of curriculum, implementation of curriculum, and evaluation and refinement of curriculum with the ultimate mission of providing the best training and support to our LFRs.

Over the course of the year, we trained a total of 575 Level 1 first responders in Nigeria and Uganda. In the latter half of 2022, we focused on evaluating our Level 1 curriculum, looking for areas of improvement overall as well as considering ways to tailor it for each region we have a program. And we are moving into 2023 with refresher trainings for these cohorts— with a focus not just on providing additional training but hearing from our LFRs exactly how we can improve upon our pre-existing curriculum.



During our discussions with local experts and partners, we have repeatedly heard of the need for an expanded curriculum covering obstetric emergencies— we are partnering with the division of Obstetric Care to develop the Level 2 curriculum that will address this need. We are partnering with local experts in Nigeria to evaluate both pre-hospital and in-hospital emergency care in Lagos, a city where we are currently running a pilot program, and Ibadan, a city which we are considering an expansion.

In Kakamega, Kenya, we are working with faculty at Masinde Muliro University of Science and Technology to tailor our Level 1 curriculum to the emergencies encountered in that locale. Understanding the value of technology as a tool, both for training and for care delivery, our division is supporting the launch of an online version of the Level 1 curriculum as well as development of a smartphone app for training and dispatch of LFRs. As we begin a new year, the trauma division is committed to finding the best way to train and support LFRs to take care of patients that otherwise would have limited, if any, access to emergency care.

Division of Obstetric Care

This year was especially notable for the first expansion of LFR International operations beyond basic trauma care. In addition to continuing to develop our trauma care programming, we piloted our new curricula in advanced medical and obstetric care.

The latter, pioneered by *Director of Obstetric Care*, Amber Batra, covered emergency interventions that may occur in pregnant people throughout all three trimesters. The two-day training course included learning about various causes of vaginal bleeding and how to address them, how and when to determine a woman is in labor and if delivery is imminent, and how to handle complications with delivery such as a nuchal cord. Trainees were also instructed on emergency care such as infant CPR.

This novel curriculum was piloted to trainers of trainers (TOTs) in Mukono, Uganda, and their feedback was collected as part of our curriculum revision process. We partnered with Vision for Trauma Care in Africa to create practical scenarios for evaluation and ensure our participants had gained adequate understanding of how our educational content.

Currently, the Division of Obstetric Care is working to incorporate partner feedback into curriculum revisions and plans to complete a comprehensive literature review on prehospital obstetric care in low-and middle-income countries by mid 2023. The team hopes to leverage findings from this review to determine best practices for integration of obstetric care programs into LFR's previously existing first responder systems.



Division of Psychosocial Research

The Division of Psychosocial Research team has been working to build both a robust team and research program with two primary objectives: identifying and understanding the needs of lay first responders around the globe and creating effective interventions to promote their psychosocial well-being.

This year, under director Max Klapow MPhil, the division began re-outfitting the LFR program model with new measures to capture data to understand the psychosocial and mental health risk factors for LFRs. Our goal is to, if needed, create an intervention to protect LFRs against future risks of psychopathology, especially traumatization, due to emergency response.

Additionally, the team began a project to better understand how responders behave after their training. We have just concluded Phase 1 of this project, identifying a “super-responder effect,” where, across 3 cohorts, 25% of responders accounted for over 90% of responses. Now, we are working to understand the characteristics that may predispose someone to be a super-responder. This work is critical to policy development, as our findings suggest the current WHO recommendation that training 1% of a population as LFRs is sufficient for adequate emergency catchment may not be a resource-conscious approach. We have since designed and deployed a battery of psychological assessments to conduct longitudinal research identifying the characteristics of responders across all deployment sites. We piloted this tool in Nigeria and are currently analyzing the baseline data. We have also received approval to conduct a retrospective study with the tool in Sierra Leone for already trained responders. This project will allow us to compile the first ever dataset of the psychosocial characteristics of LFRs in resource-limited, low-income settings and provide essential insights to the organization’s monitoring and evaluation capacity.

We expect to have data back by end of Summer 2023 and begin data analysis shortly after. Our objective is to not only publish the first-ever characterizations of the psychosocial features of LFRs, but use these findings to recommend policies to policymakers, especially the World Health Organization, to ensure that as LFR systems scale, our responders are adequately supported and protected.

Fellowship in Prehospital Innovation

This year, under the leadership of Fellowship Director Haleigh Pine, we recruited our largest fellowship group to date. Six accomplished and motivated students implemented interdisciplinary projects, assisted in a large-scale randomized clinical trial, and received \$14,400 in fellowship funding.

Fellows Nicholas Agostin and Amal Hamed developed a contextually adapted dispatch protocol for resource-limited settings based on the Medical Priority Dispatch System utilized in the US. They partnered with Trek Medics International to employ their cloud-based dispatching technology in Sierra Leone and designed a study to assess the efficacy of this protocol. They received a Summer Undergraduate Research Award from Washington University in St. Louis for their project and presented at the school's research symposium in December.

Kaitlyn Sallee and Charlene Pobe designed a sidecar stretcher to attach to a motorcycle that allows for supine transport when medically indicated. They developed computer-aided design (CAD) drawings, discussed prototyping and choosing materials with engineering professors, and planned a study to test their design. By working with our team in Uganda to ascertain driver preferences, feasibility, and likelihood of implementation, they adapted the prototype to best suit local needs of taxi drivers. They also received a Summer Undergraduate Research Award from Washington University in St. Louis for their project and presented at the school's research symposium in December.

Amber Batra and Kyrillos Ayoub employed their Emergency Medical Technician knowledge in creating an advanced curriculum and when implementing the course in Mukono, Uganda this past July. Kyrillos' medical curriculum included patient assessment and how to recognize and treat cardiac, neurological, respiratory, and gastrointestinal emergencies. Amber's obstetric curriculum discussed anatomy, vocabulary, signs of labor and normal delivery, preterm complications, abnormal deliveries and how to transport a pregnant woman. The curriculum received favorable and encouraging reactions from our local trainers and Amber and Kyrillos are currently working on incorporating constructive feedback to improve the pilot curriculum.

All the fellows were involved in a large-scale randomized controlled trial measuring the effectiveness of three instructional interventions for pre-hospital cervical spinal immobilization by laypeople. Between February and April, 265 students from Washington University in St. Louis participated in two encounters of the clinical trial. The fellows enjoyed receiving hands-on research experience and being involved in quantitative and qualitative data collection.



From June to July, Amber and Kyrillos traveled to Mukono, Uganda along with our fellowship director to implement our basic trauma course in collaboration with Vision for Trauma in Africa, a local nonprofit. Over four weeks, they trained 12 local trainers and 225 motorcycle taxi drivers in first aid and trauma care and provided a first aid kit and reflective vest to each trainee. Through writing about their daily experiences on our website's blog, they reflected on professional and personal growth and gratitude for the opportunity to improve prehospital care in a community.

Additional Clinical Research

Lay First Responder Dispatch:

We recently conducted a simulation-based study of a novel mobile application/SMS text-message-based EMD platform (Beacon) for LFR prehospital coordination in Sierra Leone. To simulate emergencies, randomly selected highly active LFR participants were assessed by response time and skill performance under direct observation with a checklist using standardized patient actors. Across 50 simulations launched over 3 months along 10 kilometers of Sierra Leonean highway, findings suggest the EMD system was an effective means of coordinating rapid LFR dispatch in a resource-limited setting, with a median total response interval (notification to arrival) of 5 minutes 39 seconds (IQR:0:03:51, 0:09:18) and median first aid skill checklist completion of 89% (IQR: 78%, 90%).

We are conducting a follow-up study with a new tool (SnooCODE), which is not reliant upon formal addresses and can function without cellular connection for navigation. In May, we will study SnooCODE by recruiting two highly active cohorts of non-dispatch enabled LFRs from the LFR program launched in Bombali District, Sierra Leone, to apply a simulation-based approach to study response times and quality of care provided, as well as conduct focus groups on LFR receptiveness, tool ease-of-use, and appropriateness. Our objective as a proof of concept demonstrating feasibility is to inform future EMD system development to facilitate efficient LFR dispatch in resource-limited settings and expand emergency care access.

Point of Care Instruction:

Traumatic spinal cord injury (TSCI) contributes most to years-lived-disabled resulting from road traffic injuries (RTIs), the greatest contributor to the global injury burden disproportionately affecting low- and middle-income countries (LMICs). Without robust emergency medical services in LMICs, trained layperson bystanders must respond to RTIs to provide early cervical spinal immobilization. While training layperson first responders is the gold standard, point-of-care (POC) instruction for c-spine immobilization for layperson bystanders may address scalability challenges associated with in-person training and longitudinal knowledge decay that reduces return on investment, however, POC instructional effectiveness for c-spine immobilization was unknown. Therefore, we conducted a four-arm randomized controlled trial to measure comparative effectiveness of POC instruction and in-person training for c-collar application by laypeople, with participants randomized to either 1- or 2-month follow-up encounters. 240 participants were enrolled, with correct c-collar application at 1-/2-month follow-ups demonstrating POC audio instructions outperformed in-person training, suggesting a

scalable means of providing prehospital cervical immobilization by laypeople in resource-limited settings.

Given the success of the trial, we are repeating it with tourniquets to evaluate if laypeople equipped with tourniquets can successfully apply them to a mannequin with POC instructions, with major ramifications for resource-limited settings.

Special Acknowledgements:

Without the incredible support of our team, partners, and donors, none of this would be possible. Thank you to all those who took the time to work with us, to our program collaborators around the globe, and most importantly, to our first responders and trainers who volunteer their time to serve the healthcare needs of their communities. Again, none of this is possible without you and we are incredibly grateful.

Board Members:

Peter Delaney
Kym Eisner
Zachary Eisner
Avi Felman
Dr. Josh Klapow
Dr. Gregory Polites
Dr. Jenna Rubenstein
Dr. Patrick Turay

Visionary Donors:

Kirkland & Ellis, LLP
Avi Felman

Partner Institutions:



Center for Global Surgery



KIRKLAND & ELLIS

