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TEAM ———+  
**femr**

Real data - Real people

# Annual Report

July 2015-July 2016



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## INTRODUCTIONS

### *From the Co-founders*

#### Sarah D. Draugelis



After the atrocities of World War II, the United Nations wrote the *Universal Declaration of Human Rights*; a document that lists the fundamental rights that all people deserve, not because of any worldly accomplishment, but simply because of their existence. Article 25 describes everyone's right to medical care. However, what clinicians and anyone privy to watching the progression of an illness might argue is that no one could possibly enjoy any of the other rights listed in the 30 articles if they don't have their health.

What makes global health work so intriguing is that many of the diseases that people fall victim to are preventable. Perhaps this is why more clinicians and students are participating in global health efforts each year, many of which are in the form of week-long clinics in remote areas. Though they are well-intentioned, little is known about the long-term impact that these clinics have, which is cause for some debate about the ethics of this work. On the one hand, volunteer clinics show empathy, often in the face of severe poverty, and can provide care in hard-to-reach geographic locations. On the other hand, these groups often work outside the local health infrastructure and are unable to provide follow-up care. Regardless, there should be no unregulated and under-researched mode of healthcare delivery. Since we have created a way to efficiently collect data within temporary clinics, Team fEMR has continued to work diligently over the past year to ensure that there is a record of these temporary clinics so that we may analyze, research, and improve upon their work, bridging gaps in communication between foreign volunteers and local health systems. Let us not sacrifice continuity for advancement, and let us continue to provide much-needed care to those with limited access, honoring the universal right to health care. Thank you for your continued support!



#### Kevin D. Zurek

The way people around the world process and use data is being transformed by open source software. Collecting data has become commonplace in a world that increasingly communicates through a large series of zeros and ones. So commonplace that we often do not consciously think about it. Every year, teams of clinicians and students set up temporary medical clinics in environments where resources are so limited that data collection has traditionally been extremely difficult. fEMR has finally made it possible for these transient teams to digitally collect data.

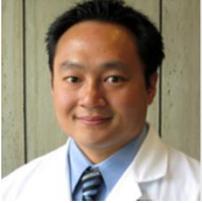
Many people have heard of the term “big data,” but the amount of dedication and work necessary to run the complex algorithms that turn data into meaningful action is often overlooked. Every day I am fortunate enough to be part of a team at Ford Motor Company that is leveraging data. We are truly on the cutting edge of being able to better serve the needs of customers. I am also more excited than ever to be part of the evolving community of volunteers that is Team fEMR. We are continuing to change the current paradigm of healthcare by providing volunteer medical teams the tools necessary to provide the best care possible. I want to thank everyone who has volunteered and contributed to Team fEMR as this is truly a community effort.

## Erik C. Brown, M.D., Ph.D.



As a current resident in neurological surgery, working long hours and making personal sacrifices for patients and the learning of a craft, I sometimes think of patients whom I've encountered in Haiti and other developing countries and wonder, 'who is tirelessly working to care for them?' My yearly volunteer work at the nonprofit hospital, OSAPO, in Haiti demonstrates for me that institutions do exist to offer such basic services to these populations; e.g. a generalist on call 24 hours a day. Despite the importance of their work and the great successes in public health that places like OSAPO have achieved, the reach of these organizations is often limited and funding sometimes scarce. Indeed, there is also a lack of specialist services; for example, neurological surgeons and psychiatrists are virtually nowhere to be found. Foreign medical teams that travel to developing countries often have specialists on board and the information they are able to gather can be critical for the local health care system. fEMR, as a data collection tool linking such teams, creates the opportunity for transient medical teams to expand and even enhance the local healthcare network. With fEMR, it may become possible not only for transient teams to refer patients to each other, but also to local healthcare institutions; these local healthcare institutions may be able to refer patients to these teams as well, such as when specialist care not typically available is part of the team. Opportunities such as this cannot be created without secure data collection and sharing, the very reason why fEMR exists. I remain as passionate as ever about Team fEMR, and I want to thank all of those participating for their help and support! Together we can give to those who give us so much.

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## *Contributors*

Ken Dunlap- Lead Developer

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## DEVELOPMENT

*Current Release:* fEMR 2.2.2

*Code:* <https://github.com/FEMR/femr>

*Contact:* <http://teamfemr.org/slack.html>

fEMR is actively developed and maintained by a team of dedicated students and volunteers. Starting at Wayne State University in Detroit, MI over 4 years ago, we have partnered with universities across the U.S. to include fEMR in the curriculum of Computer Science students. Each semester a mix of graduate and undergraduate students are assigned software change requests to complete. We have refined our approach to introducing a complex software project in an academic setting and we are always looking for new opportunities.

*“Several contributors to the fEMR code are students in my Software Engineering classes. These classes require practical experience with software projects. With my TAs, we select a handful of the best students for this work. It provides them with a great practical experience of real-life software development and it gives them the satisfaction of doing a practical work. The students who participate in this project are invariably enthusiastic about it and are willing to spend the extra effort that, compared to the rest of the class, fEMR requires. Their talent guarantees that they contribute quality code to the fEMR code base. “*

-Dr. Václav Rajlich, Professor of Computer Science, Wayne State University, Detroit, MI

*“The UTD students working on fEMR in the class showed a level of enthusiasm higher compared to the times when they worked on other assignments. It certainly gave their assignments an increased level of importance. Unfortunately, that has not translated in many of them contributing to the project after the class. We are working on that and hopefully it will change in the current and future semesters, as more students get involved.”*

-Dr. Andrian Marcus, Associate Professor of Computer Science, University of Texas at Dallas, Richardson, TX

*“fEMR is a friendly environment for first time open source contributors due to its reasonable size, responsive programming team, communication channels and documentation. It also integrates the humanitarian aspect into software development, and students are very enthusiastic to see some of their changes being adopted into a system that actually helps people in need. Scientific studies have shown that humanitarian open source systems are a great way to get students involved with their projects, and fEMR has definitely achieved that in my classes. I hope this collaboration will last for a long time, as the students benefit greatly from it.”*

-Dr. Sonia Haiduc, Assistant Professor of Computer Science, Florida State University, Tallahassee, FL

Thank you to those who have contributed to fEMR's design and implementation.

<https://github.com/FEMR/femr/blob/master/CONTRIBUTORS.md>



## Executive Summary

After years of development, our free and open-source electronic medical records system, fEMR, was successfully used in a clinic in June 2014 by a team of clinicians associated with the University of Tennessee, who were volunteering for a little over a week in Haiti. Since that first successful launch, hundreds of clinicians have used our system, recording data on thousands of patients: An impressive feat, considering most only host a clinic for a few days each year. The EMR software itself has over 70,000 lines of code, and has been expanded by a growing group of talented and devoted developers from around the United States. One medical team reported a patient that has returned to their semi-annual clinic four times, each time bringing with her the original fEMR identification number. The use of fEMR in their clinic has therefore allowed for a level of continuity in care that is novel to many in this region.

Besides ensuring quality deployments of fEMR in remote locations, we have spent the last year creating a record of these volunteer medical efforts. About 40% of UK medical school students in one survey spent their elective in a developing country [1], and in 2015, about 31% of US medical students participated in a global health experience [2]. It is estimated that well over \$250 million dollars are spent by the US alone each year on these types of clinics [3]. With such a tremendous amount of time and resources spent delivering free medical care in low-resource settings, there needs to be more assessment and organization to this work. In the 2012 Annual Medical Debate between Cambridge and Oxford Universities, it was concluded that medical trainees should participate in foreign medical aid so long as there is “a central record of elective participants from all sending institutions” which “could facilitate discussions from previous participants, forming a platform on which to introduce the social and cultural context of each trip and to discuss lessons learned” [4]. As a result, we have compiled a database of program information, detailing where medical schools from around the globe send short-term medical relief trips [Figure 1]. This database of program information, uniquely tied to a repository of data about patients at those clinic sites, will serve as a platform for coordination and collaboration between transient medical volunteers and local institutions.

The next step is to begin thorough analysis. In his 2013 annual letter, Bill Gates asked an important question: “Why does measurement matter?” Rather than simply delivering foreign aid, we now have the tools to consider whether or not our aid is making a measurable impact: Are people healthier because of our presence? Are we boosting the local economy or detracting from it? Are we developing a dependency on foreign health aid rather than augmenting what is already there? Are medical students working beyond their level of training in these low-resource settings? By measuring the work of foreign medical aid, we can help answer these questions, and also better understand underlying causes of disease states, realize cost savings, implement a level of continuity in healthcare delivery that has not been feasible in the past, and perhaps realize earlier detection of epidemics.

Team fEMR’s mission lies at the intersection of technology, research, medicine, and philanthropy, and would not be possible without a community of contributors. Answering the call to measure the care that we provide during transient medical efforts will do more than connect teams, it will enhance the good that we do and leave patients safer and healthier.

**[Institution Name]**  
**Initiated:**  
**Total number of matriculants per class:**  
**Medical school student class involvement (M1, M2, M3, M4):**  
**Other participating professional schools:**  
**Total participants in global health outreach per year:**  
**Locations visited [City/Village, Country]:**  
**Month(s) of travel:**  
**NGO/Partner organizations:**  
**Faculty and staffing:**  
**Application process:**  
**Program Elements:**  
**Financial Support:**  
**Faculty Time Allotted:**  
**Administrative Support:**  
**Contact Information:**  
**Recent papers:**

Figure 1: Survey completed by US, Canadian, and European medical schools. This database of program information will be available at

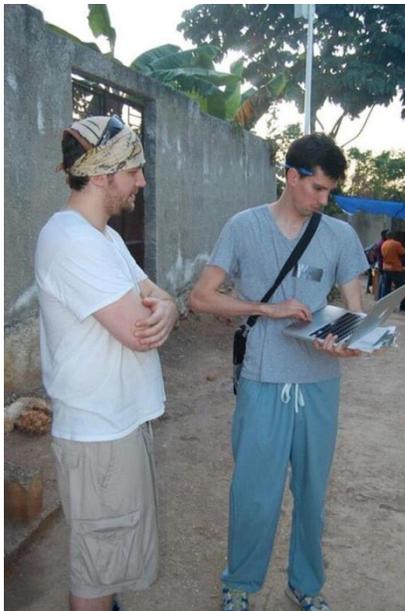


Figure 3: fEMR in Haiti.



Figure 2: fEMR in use in Ecuador.

## BUDGET

Team fEMR was granted tax-exempt status in February of 2016. We have since been awarded two seed grants, which covered the cost of new networking equipment to help us meet the demands for deploying fEMR. Private donations have helped us cover nominal overhead costs as we continue to scale up, and, with sufficient funding for the necessary infrastructure, the system is ready to be expanded to support large data storage. Tax-deductible donations can be made at [teamfemr.org](http://teamfemr.org). Our 2015 tax form 990 will be made available on [teamfemr.org](http://teamfemr.org) in Fall 2016.

THANK YOU TO OUR SPONSORS!



[www.awesomewithoutborders.org](http://www.awesomewithoutborders.org)



[thepollinationproject.org](http://thepollinationproject.org)

## VISION



In 1999 the United States sent a humanitarian medical aid mission to the island of East Timor after a political crisis left the country in turmoil. There were thousands of hours of meetings in preparation and the elaborate, four hour planning presentation was 72 PowerPoint slides in length. Yet this medical mission was just for three days (many are over a week long), saw about a thousand patients, and spent only \$30,000 in medical supplies. While the ‘complex planning process was largely influenced by the military nature of the mission’ [5], the emphasis is that any successful medical aid requires a deep understanding of the patient population

*“The delivery of medical assistance to the population of East Timor was one of the easier tasks performed during the operation... Research into the needs of the population were the most challenging elements from a medical perspective.”*

and cultural context prior to departure. fEMR software and our program database platform may be used to facilitate this understanding. In 2011, we did not set out to create an electronic medical records system, but rather, we saw the system as a way to open dialogue to improve a rather unregulated sector of healthcare delivery. fEMR is now beginning to fill the gap between transient medical teams and also the gap between those teams and the local healthcare system. Our goals in the next year include moving to a HIPAA-compliant cloud-based server, to hire a full-time

staff, to continue to help those who use our system to analyze their data and send it to local institutions when possible, and importantly, establish our platform for research, coordination, and improvement of short-term medical relief trips.



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fEMR networking equipment at clinic site in Haiti.