

Engineering World Health

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In 2001, Robert Malkin and Mohammad Kiani founded Engineering World Health (EWH) on the simple belief that biomedical engineers can improve healthcare in developing countries. Today, EWH runs several programs aimed at improving healthcare infrastructure and technology in developing countries, including a summer program for engineering students, a program that funds the development of biomedical technologies, and a kit-building program that sends medical devices to resource-poor facilities.



Birth of a notion

I met Dr. Mohammad Kiani in 1993, when we both joined the engineering faculty at the University of Memphis. We had both lived in the developing world, and we both understood what an engineer—especially a biomedical engineer—could contribute to healthcare in resource-poor settings. For years, almost from the first day we met, we discussed this.

We tried unsuccessfully to convince professional societies to take the lead in this effort. By 1999, we realized that we would have to do it ourselves.

Life insurance

In 2000, we met with Dr. Bill Novick, the founder and director of the International Children's Heart Foundation, to talk about how we might contribute to the work he was doing in the developing world. He understood right away how this could work and invited us on a few trips with him that year. Our first trips were to a

pediatric hospital in Managua, Nicaragua, where Bill had been traveling to do surgery on children with heart defects. He would send three or four nurses, a couple of MDs, maybe an intensivist, a surgeon, and a few lay volunteers with the intention of doing 20 or 30 surgeries in a couple weeks. But what would often happen was that, sometimes as early as day one, some piece of equipment would break and they'd have to stop working. We were essentially brought along as insurance.

Finding our focus

On one trip, the heart-lung machine broke down on the first day. Without that piece of equipment, their work was absolutely stopped. It turned out to be a fuse, but that fuse was not—and is still not—available in Nicaragua. I had to figure out how to deal with the problem in the absence of the fuse, but in about 20 minutes I got the machine back up and running.

During that same trip, in the middle of an operation, the surgery lamp caught on fire. The patient's chest was open, so we had to jury-rig a solution immediately. Afterward, I discovered that the problem was the light bulb. The surgery lamp's specialized bulb had been replaced with a regular light bulb from the grocery store. We still see that very problem all over the world.

But many times, nothing went wrong. Plenty of surgeries went just fine. During those times, we'd go around the hospital and fix the rest of their equipment. Very quickly we realized that this was the real need. Fixing the specialized equipment for the doctor who comes in for a few days is great, but what about the equipment the hospital uses on the other 360 days of the year? That became our focus early on.

Projects that matter

We knew that our students could contribute to this effort, and we incorporated Engineering World Health in 2001 so we could involve them. Some of our graduate students got involved that summer, and undergraduate students the next. EWH has nearly doubled in size every year since.

It wasn't long before students were coming home



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For Projects That Matter, these students designed an infant respirator for children born at home. Other student projects include a device to determine if equipment has been adequately sterilized, a low-cost alternative to ECG electrodes, and a device to test the output of oxygen concentrators, among many others.

from our summer program saying, “The hospital has this problem. I think I can solve it.” That was the start of our Projects that Matter program. We started gathering problem statements from our summer students and posting them online. Then students propose solutions, and EWH funds their development.

Powered by creativity

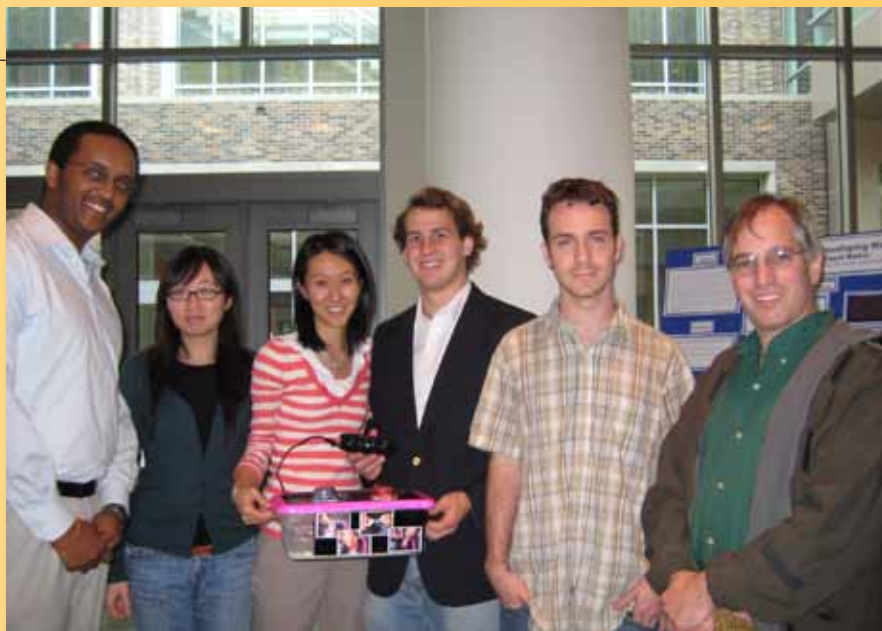
Some EWH students developed a device to treat jaundice. Eighty percent of children in developing countries (and 50 percent of children in the U.S.) are born jaundiced. Most of the time, jaundice clears up by itself in a couple days, but some kids need to be treated with special lamps. Almost every hospital we go to has them, but not the specialized bulbs they require. So they have the treatment device, but not the light bulbs to operate the device—which, by the way, plugs into the wall, and none of the hospitals we go to have electricity 24/7.

Our students developed a device that uses five-year bulbs and runs on a motorcycle battery. If the power is out, you just plug it into the battery.

Specialized solutions

Other students proposed a project to address the transmission of HIV from mother to child. If a mother is HIV-positive and nothing is done during or right after delivery, there is about a 50 percent chance that the child will be HIV-positive. There is a drug, a syrup you put in the baby’s mouth at birth, that cuts the risk in half. But it requires specialized storage conditions. This is a problem for babies not delivered in hospitals—and something like 60 percent of women in Africa, where HIV is a huge problem, deliver at home.

The students developed packaging that allows the mother to take the drug home months before delivery. When she delivers the baby, she just squeezes the syrup into the baby’s mouth. That’s a huge advance, and we’re going to start clinical trials this year.



I think this is where the greatest impact can be: when people take solutions that already exist and adapt them to the specific needs of developing countries.

Changing lives

I just saw a student who worked in a hospital during our Tanzania program last year. She’s a senior and considering working for the CIA, which a lot of engineers do. But she’s thinking about first working in Nigeria for a couple of years on HIV-related problems. I saw another student yesterday who had dropped out of the pre-med track, but after spending two months in a hospital with our program, has changed his mind. He wants to be a doctor so he can practice medicine in Africa. Some summers, half of the students tell me it was a life-changing experience. That’s an educator’s dream.

Why wait?

I hear students say, “When I graduate, I’m going to get a job and make a huge difference in the world.” That’s great, and I hope they do. But there is no reason to wait.

High school students can make a difference. College students can make a difference. And they can do it now.

My secret hope is that students will “get the bug”—that their EWH experience will make them want to spend part of their career, even if it’s two weeks a year, working in a resource-poor area and making a contribution. I hope they’ll want to make a difference in the world—and that they’ll do it now.

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Learn more about Engineering World Health at www.ewh.org.

Middle and high school students can get involved by joining the high school program in Guatemala (see www.gpsa.us) or by building low-cost medical devices through the EWH Kits Program: www.ewh.org/index.php/programs/kits.