

# WORLD RECORDS



Nicholas Wilkie '14 holds a version of the electronic health record for smartphones that he developed for Doctors Without Borders. He is standing in the College's Sullivan Classroom, where he heard the lecture by Bruce Leavitt, M.D.'81 that inspired the project.

**WHEN DOCTORS GO BEYOND BORDERS, THEY LACK THE KIND OF VITAL ASSISTANCE GAINED FROM DETAILED PATIENT HEALTH RECORDS. UVM MEDICAL STUDENT **NICK WILKIE** IS TRYING TO CHANGE THAT SITUATION, ONE SMARTPHONE AT A TIME.**

by **Jenny Blair, M.D.** | photographs by **Raj Chawla**

Imagine you're a physician with a disaster-relief group. You've bounced over bad roads to get to a remote cholera clinic, leaving behind Internet and cell-tower access. As you treat patient after patient, you keep careful medical records. But instead of using paper charts or a laptop, you stand at the bedside and touch the information into your shirt-pocket smartphone, the standard touch-screen-equipped mobile phone with advanced computing ability that is used by millions of people every day. Once in range, your phone (and those of your colleagues at other remote clinics) uploads these records to a central server, where the data may not only benefit your patients in the future, but also help decision-makers monitor the outbreak all over the region.

Thanks in part to UVM medical student Nicholas Wilkie, that scenario may soon be reality. As a volunteer with the humanitarian-aid organization Médecins Sans Frontières (MSF, also known as Doctors Without Borders), Wilkie is developing software that stores cholera patients' medical records on a smartphone. The organization plans to pilot the software in several months. "We're going to have phones on the ground in Africa," says Wilkie, who wants to train in emergency medicine and become a career physician with MSF. If all goes well, the program may be adapted for other diseases, and perhaps shared with other organizations that do disease surveillance.

The third-year student, who is also a veteran programmer, was inspired to write to MSF in June 2011, after hearing Professor of Surgery Bruce Leavitt, M.D.'81 present a Medical Reunion lecture to current students about his experiences with MSF in Nigeria and Sri Lanka. (Leavitt described his Sri Lanka experience in the Spring 2010 issue of *Vermont Medicine*.) In those field hospitals, Leavitt says, the patient's surgical record consisted of handwritten notes in manila folders. "At the end of the day, they'd pile them up in a room in a corner," he recalls.





Nicholas Wilkie '14 with classmates at their White Coat Ceremony.

After the talk, Wilkie asked Leavitt if electronic medical records on portable devices would have been useful in the field. “I said ‘Of course! It’s the wave of the future,’” Leavitt says. “There’s no question that I think there could be benefits.” He agreed to serve as an unofficial advisor to Wilkie.

Thus encouraged, Wilkie set out on some Internet research to find the right person to whom he could propose a project. He eventually found his way to Thang Dao, MSF’s Switzerland-based director of information services. “The way I phrased it in my message was: ‘I want to give doctors something they can use on the go,’” says Wilkie.

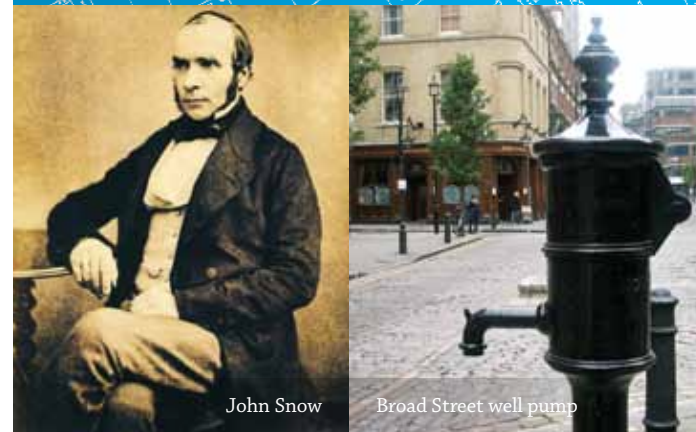
His timing was fortuitous, as MSF was in the process of changing how it manages patient information. For one thing, the organization is switching from simple spreadsheets to a freeware electronic health record (EHR) program called OpenMRS, which can easily be used and adapted by local hospitals. And MSF’s hardware is changing, too. Its field doctors have long relied on laptops running Microsoft Excel, but when Wilkie’s email arrived, the organization had just decided to outfit its doctors with Android smartphones, which are cheaper, lighter, and less power-hungry than full-fledged computers. Thanks to satellites and towers, it’s easier to get them online. They’re powerful enough to run real software. And they’re ubiquitous, or nearly so.

So Dao suggested that Wilkie think about programming for smartphones, and Wilkie got to work. Soon he had written a crucial piece of software, one that gets central computers running OpenMRS and far-flung Androids to talk to each other. “It will send electronic health information in a cogent way to the server and record it the way that we want it to,” Wilkie explains.

Dao was so impressed that he invited the student to meet with him and his colleagues in Geneva. There, they discussed adapting the design for doctors responding to cholera outbreaks. “We are one of the few organizations in the world that can deal on a large scale with cholera epidemics,” said Dao. “What was missing for us was how to collect data quickly, and closest to the sources of contamination — which is to say in the villages.”

“**NICK IS ONE OF THOSE PEOPLE WHO CAN LAUNCH HIMSELF INTO VERY THICK SNOW AND MAKE A TRACK FOR US.**”

—Thang Dao  
Director of Information Services  
Médecins Sans Frontières



## THE MEDICAL DATA TRADITION CONTINUES

When his smartphone electronic health record is put into use by Médecins Sans Frontières (Doctors Without Borders) in Haiti later this year, it will be the latest chapter in the use of scrupulous data collection to help combat the deadly disease of cholera.

Careful plotting of data to eliminate the source of a cholera outbreak has a long history in the medical tradition and, indeed, was a key occurrence in the development of epidemiology, the study of the distribution and patterns of health events.

It is London physician John Snow’s collection of data during the 1854 outbreak of the disease in England’s capital city that is most often cited as the beginning of modern epidemiology. Snow interviewed dozens of cholera victims and their families throughout the London’s Soho district. By carefully plotting information about the daily habits of those who contracted cholera, Snow was able to plausibly argue that its source was one contaminated well on Soho’s Broad Street. The well handle was removed, and the outbreak dwindled. Today, Snow’s map (a detail of which is seen above) is considered by many to be the first great weapon in the war on cholera.



Wilkie demonstrates one of the screens that allows a physician in a remote area to enter patient information with the touch of a finger.

MSF also sent Wilkie to the mHealth conference in Washington, D.C., where he met and received advice from other software experts who work with MSF. “What Nick is doing is only part of a whole re-architecting of the way we’re collecting data in our operations,” said Dao. The pilot of Wilkie’s software will help MSF weigh the feasibility of a large-scale switch from Windows laptops to Android pads and phones. “Nick is one of these people who can launch himself in very thick snow and make a track for us,” says Dao.

Wilkie’s software is built in part on simple concepts or “codes,” says one of his UVM advisors, bioinformaticist Indra Neil Sarkar, Ph.D., M.LIS. (Wilkie is also being advised by Elizabeth Chen, Ph.D., who is associate director of biomedical informatics at UVM’s Center for Clinical and Translational Science.) Though parts of any medical record can be in prose form, other components can be broken down into simple units called codes: date of birth, pregnancy status, and name of village, are just a few examples. Wilkie is well aware that his users will be tired, busy doctors. “I’ve been trying to make this all very simple and error-proof,” he says. Rather than making them enter a birth year, for example, the program allows them to choose one from a sliding menu, which is easier to use on a smartphone interface.

Then, as the phones send records back to decision-makers using MSF’s desktop computers, those codes make it far easier to aggregate the data and search within it for

clues and trends than it would be if the medical information was in narrative form. This helps leaders determine where to send extra doctors or pinpoint where disease outbreaks began. “It’s almost like putting codes together to tell the story of a population,” says Sarkar, adding that much of Wilkie’s task has consisted of trying to figure out which codes will be appropriate in the field on a handheld device. Though using codes in this way is not a new concept in bioinformatics, he says, doing so in this setting is “really quite visionary.”

UVM’s Leavitt is also enthusiastic about the project and plans to discuss it with colleagues at this summer’s MSF USA annual meeting. “For huge epidemics, when you’re in a tent with hundreds of people with cholera, it’s got to be better than having all these stacks of paper,” he said, adding that for surgeons, an EMR could also allow them to store important before-and-after photos of patients’ wounds, which are helpful at follow-up appointments.

Fitting in extensive travel with the ongoing rigors of full-time medical education has not been easy for Wilkie, but professors and administrators at the College of Medicine have gone out of their way to be flexible. He arranged to attend some classes via videoconferencing from Switzerland, while podcasting others and juggling his lab schedule around the Washington, D.C. trip. “Everyone here was so supportive about it,” says Wilkie. And he’s gotten a warm reception from faculty: “Any time I ask somebody to help me, they always go far beyond what I would have ever expected,” he says. “I wouldn’t have been able to do this at many other schools.”

“Nick epitomizes what makes UVM and our medical school so special — that we care about real patients, real diseases, trying to solve the problems irrespective of money. It’s trying to cure illnesses for a basic population,” Sarkar says, adding that UVM graduates are encouraged to serve in rural environments.

All Wilkie’s programming has taken many, many hours, something no medical student has in abundance. Wilkie sometimes feels wistful about all his screen time. That’s when he reminds himself that focusing on the big picture can save lives too. “Despite the fact that I’m sitting by myself at that moment,” he says, “that time gets put into something that will hopefully benefit many more patients than I’m going to see in a long time.”

webXtra

You can see a more detailed demonstration by UVM medical student Nicholas Wilkie of some of the important pieces of his smartphone electronic health record.

Scan the QR code or go to: [uvm.edu/medicine/vtmedicine](http://uvm.edu/medicine/vtmedicine)

