INSIGHT

TAPPING INNOVATIVE SOLUTIONS & TECHNOLOGY AT JOHNS HOPKINS MEDICINE

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Telemedicine Startup Connects Patients and Doctors in Rural India

Neha Goel says telemedicine manifests in many ways. "There are many definitions, but it always uses information and communication technologies for diagnoses or treatment," says the Ph.D. candidate in health sciences informatics in the school of medicine.

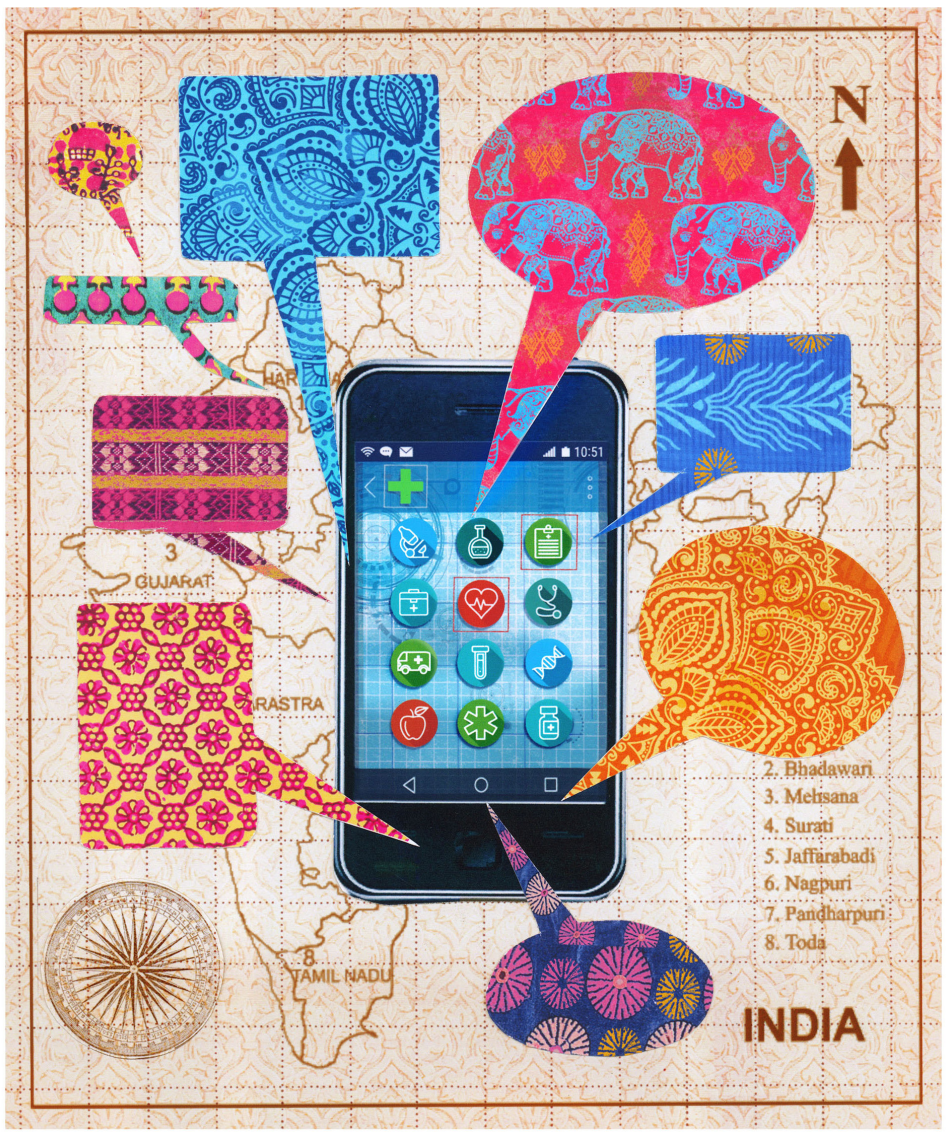
To tailor a telemedicine approach for remote Indian villages where there are no doctors, Goel teamed up with classmates Amal Alam and Emily Eggert. Under the leadership of Soumyadipta Acharya, a research professor in the Center for Bioengineering Innovation and Design, they set up a nonprofit called Intelehealth and built and tested a mobile application for a smartphone or tablet.

"There are very different software needs in India compared to the U.S.," explains Goel. "Often, videoconferencing isn't possible because there isn't enough bandwidth."

They devised an application that prompts a health worker (the equivalent to a nurse's aide) to ask a patient certain questions. Based on the answers, the app presents follow-up questions, and the health worker can check symptoms with a physical exam. The results are then sent to a cloud-based health record system that a remote doctor can review and then use to make recommendations.

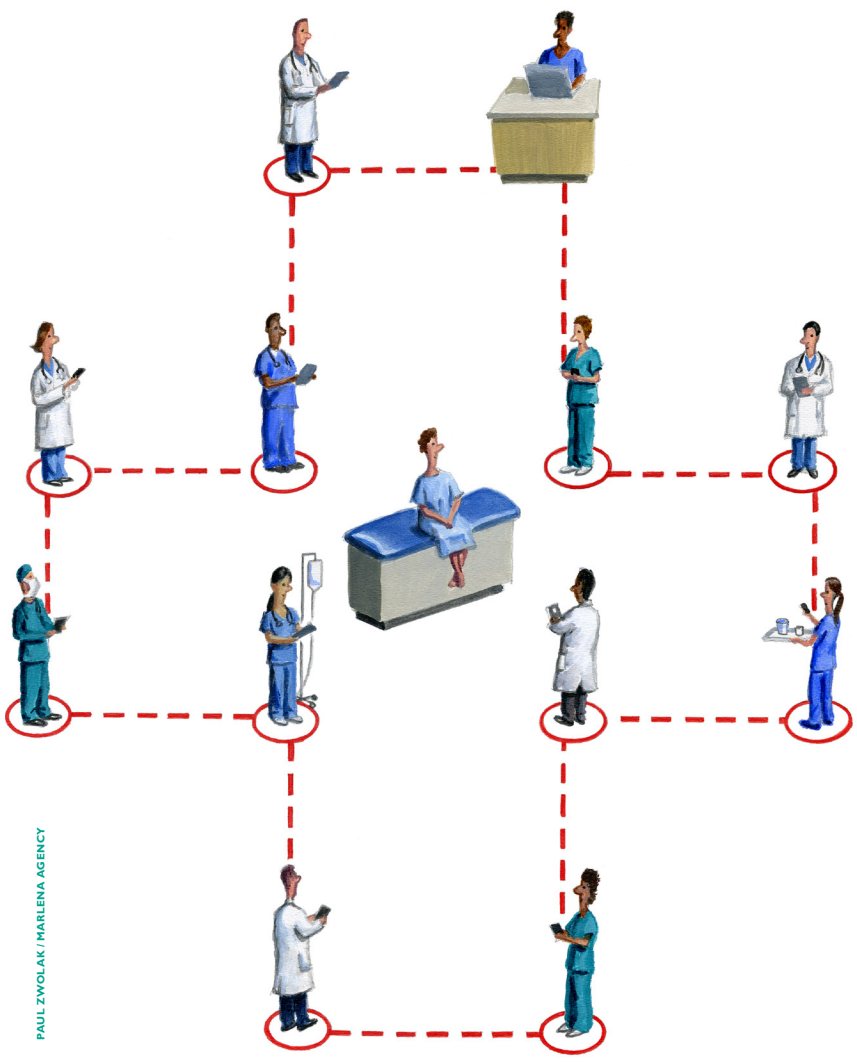
A pilot study showed the interface was easy for the health workers to navigate and the software was reliable. Goel says the remote physicians were comfortable using the system to make a diagnosis, order tests or prescriptions, and make referrals. In one case, an 8-month-old was diagnosed with spina bifida and referred to a hospital for treatment.

The Intelehealth team is excited to participate in the 2016–2017 Johns Hopkins Social Innovation Lab, which provides mentorship to assist new nonprofits in refining their business and technology. In December, the lab received $100,000 from the Baltimore Development Corporation's Innovation Fund to support entrepreneurship.



MARTIN O'NEILL / THREE IN A BOX

WEB EXTRA: Watch a video of Neha Goel explaining Intelehealth by clicking on this article at hopkinsmedicine.org/insight.



PAUL ZWOLAK / MARLENA AGENCY

CORUS Messaging Tool Replaces PING to Enhance Communication

Communication among hospital personnel can be inefficient. Throughout Johns Hopkins Medicine, clinicians are adopting a solution called CORUS, which was built by the Johns Hopkins Technology Innovation Center (TIC), to enable written, text-based conversations and to facilitate secure file sharing between individuals and among groups.

In early 2016, TIC began building CORUS to replace PING, the existing Johns Hopkins-developed web application for clinical communication. Even though PING was a success—it saw 35,000 users each month and sent 10,000 messages a day across the enterprise—it did not allow group conversations. In January 2017, PING users were invited to use CORUS Beta, which will launch officially this spring.

The new patent-pending CORUS features channels, or groups, that allow messages to be sent to every person in the group. It also interfaces with Epic so users can verify the members of a patient's care team and a patient's identifying information to ensure communication is taking place about the correct person. Users can search the conversations in CORUS by department, provider or patient name.

"Each hospital patient likely has people on his or her treatment team who work in disparate disciplines—and who don't know each other by name. CORUS gives the team members a way to identify each other and a place to converse back and forth," says Kelly Lynam Bystry, product development lead at TIC.

Thanks to an improvement in communication among clinicians, CORUS is projected to increase patient safety. The HIPAA-compliant, web-based application also supports file and photo sharing.

CORUS can be used across devices, including smartphones, tablets, pagers and desktop computers. Anyone with a JHED ID on the Johns Hopkins network can log in to CORUS or access it via mobile apps for Android or iOS devices.

TECH/ENVY

A look at innovative developments outside the halls of Johns Hopkins Medicine

Making Tasks Easier

RxUniverse, a service from Mount Sinai Health System, provides a list of digital health tools that have been validated by the health system's App Lab that physicians can recommend to patients. To access the service, clinicians click on the RxUniverse function integrated into electronic health records. From there, they pick links to digital tools to send to a patent's smartphone, such as mobile health apps that work with and without wearables, educational content, and patient satisfaction surveys.

Mobile gaming app Airway EX lets clinicians earn continuing medical education credits by mastering airway procedures. The app incorporates visual effects traditionally used in the gaming and entertainment industries to create scenarios that behave and respond like real patient anatomy. Designed for anesthesiologists, otolaryngologists, critical care specialists, emergency medicine physicians and pulmonologists, players choose an endoscopic device, approach the virtual patient and perform surgery. Scores are based on speed, damage, bleeding, navigation, recall and more.

OD Help is an app that connects people who have overdosed on opioids with those who have naloxone, a drug that can reverse the effects of an overdose. The app is being designed by technology company PwrdBy for individuals to use in conjunction with a wearable monitor that detects overdose symptoms, and for friends and families to report an overdose. When prompted, OD Help will relay a signal to individuals close by who are carrying naloxone or connect to emergency services.

MRI System Improves Outcomes of Bladder Surgery on Children

A risky operation made safer by MRI-guided navigation means children suffering from a serious birth defect have a better chance at becoming continent later in life.

Johns Hopkins pediatric urologists are using technology similar to GPS software to improve the outcome of bladder exstrophy surgery. The complex operation involves reconstructing bladders of children born with the organ outside of their bodies.

"We didn't know if the technology would be accurate because it's never been used with soft tissue in the pelvic floor," says pediatric urologist Heather Di Carlo. To date, the team has used the system in 37 such operations with no complications.

During the operation, surgeons reposition the bladder inside the body. This requires doctors to carefully cut away the tissue holding the bladder outside the abdominal wall, a difficult procedure due to the proximity of major blood vessels and other organs.

It's critical that surgeons cut the right tissue; if they don't, the bladder can reherniate, and additional corrective surgery dramatically increases the likelihood of permanent incontinence. Thanks to the navigation system, the surgeons can better assess which tissue to cut.

To use the navigation system, MRI scans of the patient's pelvis are taken prior to the operation. Those images are uploaded into software that aligns the images with precise landmarks on the child's body, like hip and pubic bones. Using a special pointer, the surgeons can then indicate a specific area on the child's body and see that corresponding visual on an MRI monitor.

Pediatric urologist John Gearhart got the idea after seeing the navigation system used in neurosurgery. The team received FDA approval to study the technology and hopes to publish its work in *The Journal of Urology*.

The researchers also want to use the technology while telementoring surgeons around the world in bladder exstrophy surgery.

Antibiotic Coating Prevents Orthopaedic Joint Infections in Animals

The incidents are rare, but the repercussions can be grave: Every year, about 1 to 2 percent of people undergoing hip and knee replacements in the U.S. end up with surgery-related bacterial infections. In a worst-case scenario, the infection continues for months and the patient requires a new prosthesis.

Now, Johns Hopkins researchers have designed a thin, biodegradable plastic coating for metal implants that can release multiple antibiotics to diminish the chance of such infections.

In studies on mice, dermatologist Lloyd Miller and bioengineer Hai-Quan Mao found that knee joints possessing the special antibiotic-coated implants showed no detectable infection after a strain of staph bacteria was introduced to mimic an infected implant. Meanwhile, most of the mice who had received implants without antibiotics in the coating were found to have abundant bacteria on the surface of the implant and in the infected tissue around the knee joint.

The coating is composed of nanofibers embedded in a thin film, both of which are made of the same materials used in degradable stitches.

Antibiotic-coated implants are not new. In this case, however, the researchers paired fast-acting rifampin with one of several longer-acting broad-spectrum antibiotics to completely eliminate the infection.

Miller says ensuring the coating released each antibiotic at the correct rate proved to be challenging.

"The hardest part of this project was optimizing how to have a dual-component coating that can independently release the right levels of both antibiotics for enhanced efficacy," says Miller. "It's very critical to the enhanced effectiveness of the coating."

JASU HU / MARLENA AGENCY

The team received funding from a Johns Hopkins Institute for Clinical and Translational Research Nexus Award and is planning on additional preclinical testing in animals. The study has been published online in *Proceedings of the National Academy of Sciences*.

WEB EXTRA: See the bioluminescent bacteria from the infected mouse knee joint that did not receive an antibiotic-coated implant by visiting this article at hopkinsmedicine.org/insight.