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360° VIEW

News from Rice 360°: Institute for Global Health

the power and **impact** of innovation

Making strides: Day One Project and The Nursery of the Future

FIRST DEGREE

Dear Friends,

For Rice 360˚, the coming months are some of our busiest and most exciting. Our Rice students will travel to Brazil and Malawi to demonstrate the technologies that have been under development for the past year. In many instances, the work is life changing and we invite you to share their experiences by reading the student summer blogs (more info at right).

At the beginning of May, Rice 360˚ hosted Global Lens, Local Focus, a symposium that addressed questions about technologies for the low-resource communities in the United States. The projects outlined for future collaboration were inspiring. You can read more about the conference on our website.

As always, let us know if you are coming to Houston. We can never fit all our news into these eight pages and would love to have you visit us and discover the work of Rice 360˚ in person.

Warmly,
Rebecca

Rebecca Richards-Kortum
Director, Rice 360°:
Institute for Global Health
Stanley C. Moore Professor of Bioengineering

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Measures of success: owls beyond borders

Since 2007, Rice global health students have participated in summer internships to learn first hand about health care and to help implement technologies and educational programs. See below for information on this summer's interns, pictured with Rice 360° faculty.

Each student will chronicle the summer journey online. To follow the summer adventures, visit Owls Beyond Borders at http://owlsbeyondborders.rice.edu.

Viewpoint: notes from our graduates

The measuring cup

As a medical student at Johns Hopkins University School of Medicine in Baltimore, Maryland, Nicky Mehtani '11 volunteered at a nonprofit organization whose mission was to facilitate the complex process of attaining and sustaining access to health care. In an article she wrote, Nicky examined the ups and downs, the frustrations and ultimately, "whether our efforts at the clinic were meaningful" through her work with Ms. Watson, a patient who was in her care.

On a particularly dispiriting day at the clinic, she wondered what she had to show for her many hours of concentrated service and whether her dedication would measure up to the standards of current medical practice. She found her answer on her trip back to the hospital.

"As I walked back to the bus stop from the clinic on a bitterly cold night, I ran into Ms. Watson. As we embraced, I saw tears in her eyes. 'I just voted for the first time in my life,' she whispered, showing me the American flag sticker on her sweatshirt. 'It feels good taking control of my life!' I could feel the warmth pouring back into my face, my fingers, and my toes. "Maybe there are some things we just can't measure."

Nicky graduated from the Rice global health technologies program in May 2011. She is now finishing up medical school at Johns Hopkins.

In the shoes of others

Danielle Brown '12 credits the global health minor with eroding barriers that limit a person's ability to see a need and get involved in the solution.

Further, Danielle says that "while a fix may not be fast, it surely can be far-reaching." She speaks of compassion and empowerment, saying that Rice 360º equips students with the skills necessary to not just see the problems, but to see their roles in the solutions.

With summers spent here in Houston, as well as in Lesotho, Africa and rural villages in Peru, Danielle returns to the theme of walking in the shoes of others and asking questions time and again. In a teaching program in Lesotho, the lesson was that each of us must find our specific role in improving a community.

"The program taught me how to think and how to do it independently. Now, when I see a problem in the hospital or a group of children who need help, I don't ignore the problem or look away – I start an effort to fix the problem."

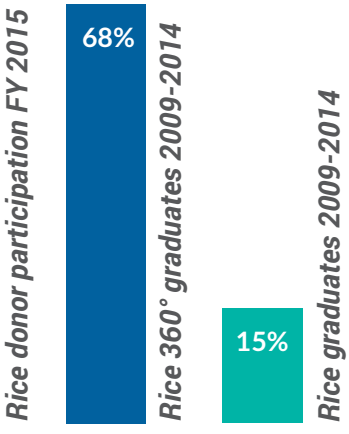
Danielle ends with a challenge: "Wherever you go, seek out globally minded individuals like yourselves. Seek out groups to enable and inspire you to use your skills to change the world."

Danielle graduated from Rice in 2012, with a global health technologies minor and a degree in biochemistry. She is now completing her studies at Baylor College of Medicine.

360° Loyal

Thank You!

68% of Rice 360° global health technologies graduates from the classes of 2009-2014 donated to Rice's annual fund as compared to 15% of their peer graduates from other programs.



From the center

day one project brings the power of innovation to the youngest lives

The world's most vulnerable patients

Each year, more than three million babies die within their first month of life. Ninety-nine percent of these infant deaths occur in the developing world. Many of the deaths could be prevented if hospitals in low-income countries had access to low-cost technologies to combat the most common causes of infant mortality.

Beginnings: The Day One Project

The Day One Project began with a surprise when in May of 2013, Rice University bioengineering professors Dr. Rebecca Richards-Kortum and Dr. Maria Oden were named as joint recipients of the prestigious $100,000 Lemelson-MIT Award for Global Innovation.

Without hesitation, the professors used the funds to initiate the Day One Project, a two-pronged program designed to establish a neonatal unit to provide needed care to the world's most vulnerable patients while also serving as an innovation hub for affordable, high-performance technologies. The ultimate goal: to improve neonatal care in low-resource settings throughout the world.

Incubating The Nursery of the Future

Queen Elizabeth Central Hospital (QECH) in Blantyre, Malawi is where the vision is becoming a reality. With the money from the Lemelson Foundation plus donations from organizations and individuals, construction of a building to house the neonatal nursery began in early 2015. Now nearing completion, the facility will provide the tools and training for health-care professionals and offer a model for Day One nurseries that could be established at low-resource hospitals throughout the world.

The impact of Day One technologies

One of the leading causes of global infant mortality is respiratorydistress syndrome, which causes difficult and rapid breathing and often leads to death. In modern hospitals, a continuous positive airway pressure (CPAP) device assists breathing and delivers higher quantities of oxygen. While lifesaving, the $6,000 price tag per CPAP puts the device out of reach for low-resource hospitals.

Tackling the problem, a team of Rice students in the global health technologies capstone course set out to make a more affordable, easy-to-use model and invented a bubble CPAP system, which costs approximately $400. "It is simple to put together, easy to use and easy to repair," says Jocelyn Brown '09, a Rice graduate who worked on the CPAP design and led the first wave of implementation at QECH in Malawi.

Sustainability through training

"New technologies sometimes fail because no one understands the usefulness, and consequently, devices are set aside," says Mary Kate (MK) Quinn '11, who as CPAP research project manager for Rice 360˚ in Malawi is guiding the roll-out at QECH and the 28 other hospitals in the country. "Now, with the training program and implementation and mentoring, CPAP has become a vital part of everyday care in the Malawi hospitals.

"Its function is clear and it's easy to use. And, most of all, use of the CPAP correlates directly with survival. Health-care professionals – and parents – can see the benefit."

A life of its own

While MK admits to the challenges faced, she says that the acceptance of the CPAP device as a vital tool in neonatal care has been "strikingly quick."

A Malawian baby on a CPAP and her mother.

One of the biggest boosts to acceptance and use is the training program designed by MK and her associates. Training, which she says, began with just a few nurses, now is part of the nursing school curriculum in Malawi. "Now when nurses graduate, the CPAP is an essential tool. They know how to use it and they know it is reliable and indispensable in care. This factor is truly the biggest boost to sustainability of the CPAP," says MK.

Today, there are teams of CPAP-trained professionals going to the district hospitals training their colleagues. Use of the CPAP is spreading throughout the region. "Our goal is to make use of the CPAP sustainable, and as its benefit is realized, that is happening. CPAP is starting to get a life of its own," she continues.

The power of hope and determination

With almost 1,000 babies impacted by CPAP since its introduction in 2012, the work continues. "Queen Elizabeth Central Hospital in Blantyre is an extraordinary place that is committed to caring for the world's most vulnerable patients. Working with the physicians and health-care professionals, we continue to realize how innovations can dramatically improve neonatal health," says Rachna Khare, program manager for Rice 360º.

"The Day One Project is turning the tide on newborn mortality in Malawi and it is showing us that with affordable, high-performance technologies such as the CPAP we can significantly impact the future of health care in countries throughout the globe."

MK Quinn trains nurses and technicians at QECH on use of the CPAP.

For the degree: projects in global health technologies

Rice 360˚ collaborates with a number of departments to offer students a minor in global health technologies. Following are projects assigned to multidisciplinary teams of students, mentored by interdisciplinary faculty members. Students work together over two semesters to develop solutions to international health challenges.

Integrated Low-Cost Biopsy Forceps. The goal is to design, build and test a low-cost biopsy forceps that can be integrated with the high-resolution microendoscope (HRME) designed at Rice to ensure that abnormal areas visualized with the microscope can be immediately biopsied. [See 360˚ VIEW, Issue No. 6/Winter 2015]

Flow Splitter team testing their device.

Low-Cost Flow Splitter. The goal is to design, build and test a low-cost flow splitter for an oxygen concentrator that can split flow in five directions, providing treatment for multiple neonates and infants. [See pages 4 and 5, this issue.]

CPAP Heating System. The goal is to design a low-cost heating system to work in combination with Rice 360˚'s existing bubble CPAP technology and safely heat the air delivered to infants and neonates.

CPAP Heating System team at work in the OEDK.

Photos by Piper Madland

Teledermatology for Early Detection of Skin Cancer. The goal is to develop an easy-to-use, low-cost and universal accessory that improves color balance and focus at 10 cm. The accessory will work in conjunction with a phone camera that has at least one megapixel resolution.

Respiratory Rate Timer. The goal is to create an easy-to-use, low-cost, consistent and accurate device that allows breaths to be easily recognized and counted, thereby facilitating a clear pneumonia diagnosis in children under five.

ChemoSeal v2. The goal is to improve the ease of manufacturing the ChemoSeal designed by a Rice student team in 2013-14 by refining its design. ChemoSeal is a device that delivers chemotherapy agents in a manner that prevents health-care workers in low- and middle-income countries from being exposed to hazardous drugs.

HIV Viral Load Determination: Sample Preparation. The goal is to design a method of preparation of purified blood RNA samples by determining how much sample preparation is needed. The method must be feasible to implement at point of care, cost fewer than $5 per test and be able to be administered in less than one hour.

Circling back: elizabeth nesbit-spiegel '11

Elizabeth Nesbit Spiegel's path to Rice University began in Malawi.

In 2006, Z, as Elizabeth is known, was a junior in high school in Waterford, Virginia and becoming a doctor was on her radar. On a whim, she and her mother, a physical therapist, emailed a small hospital in Malawi to ask if they could come for the summer to help. Six months later, the reply was: "Yes, come."

Photo courtesy of Z Nesbit

Elizabeth, Josh and Casey Nesbit with friends in Malawi.

After that summer, Z knew she wanted a college that drew a parallel with her dream and when she discovered the global health technologies program, she knew Rice University was for her.

Now Dr. Nesbit-Spiegel, having completed medical school at the University of California, San Francisco and continuing on as a resident in pediatrics, credits her Rice 360º years with compelling her to contribute to the creation of a better world.

"The science of medicine is easily learned in the classroom, but the arts of problem solving, critical thinking and teamwork take an irreplaceable experience – such as the global health (BTB) program offers – to learn," she says.

Both Z and her mother Casey Nesbit, who is an assistant professor teaching physical therapy at The University of The Pacific in Stockton, California, speak of the importance of the professors at Rice. "Dr. Rebecca Richards-Kortum and Dr. Maria Oden have brilliant minds, but it is their hearts that make them phenomenal mentors. They have a gift of understanding the hearts of the people they have chosen to serve and to apply that to the heart of their work and mentorship," says Z.

"I have had the privilege of watching Rebecca and Maria work with their students in Malawi," says Casey. "As professors, they are role models for me, they offer so much energy, such optimism – always encouraging their students to find the positive solution. They have a way of guiding students to solving problems at a very specific level, encouraging them to solve problems that seem insurmountable by breaking tasks into small achievable steps."

The engagement in Malawi includes other family members as well. Z's brother Josh Nesbit piloted his company Medic Mobil at St. Gabriel's Hospital in Namitete, Malawi. Casey returns every summer to teach physical therapy to students in the Malawi capital, Blantyre.

As Z begins her residency, her heart and mind carry the lessons she learned in Malawi and her years at Rice 360º.

Rice 360º global health technologies graduates such as Z are making important changes in health-care delivery. Contact Liz McGuffee at lizmcguffee@rice.edu or (713) 348-4491 to share a story.

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Help make **day one** of a baby's life a day of celebration and survival

Photo by Anne Marie Leone

Johanna Lamb, Shepherd School Masters of Music '04, discovered the Day One Project in the alumni magazine, and went to read more about Rice 360° online. "After looking at the website, especially with the fresh eyes of what an American NICU looks like, I am impressed with the goals of the project and the work of the students and faculty," says Ms. Lamb, parent to two 30-week premature babies, a son born in 2011 and daughter in 2014.

Join Johanna and contribute to the work of Rice 360˚ and Day One Project. Donations of all sizes can make a difference. For example, a $25 gift provides sterile medical supplies for one baby's treatment and a $500 gift will provide one CPAP device plus supplies for six months.

Every gift is appreciated. To learn how you can help, contact Liz McGuffee at lizmcguffee@rice.edu or (713) 348-4491. Or donate online at www.rice360.rice.edu/donationform.

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