Dear Friends,

For Rice 360° Institute for Global Health, 2016 was a year of inspiring growth, support, and impact. This year, we have focused on providing experiential learning opportunities for Rice students and inspiring young global health leaders. We look back at the year in celebration of our generous donors, our innovative students, our faculty and staff’s commitment, and the collaborative relationships with our many partners - both international and domestic.

In this report, you’ll read in detail about our most exciting points of impact from this past year. We were humbled to open and dedicate a new neonatal ward at the Queen Elizabeth Central Hospital. Responding to growing interest in global health on campus, we proposed a new graduate-level Global Health Certificate program. We strengthened our partnerships in the Rio Grande Valley and sent our first intern to the University of Texas Rio Grande Valley. We also continued our cancer diagnostics program at Barretos Cancer Hospital in Brazil.

We are immensely grateful to you for your involvement and support in doing this work. Together we are helping improve health equity around the world and transforming Rice students into true global citizens and leaders. We enter 2017 (our 11th year!) with a strong intention to engage with the global health community in Houston, transform the way people value and think about health technologies in low-resource areas, and inspire a deep investment in healthcare for all mothers and babies. Thank you for sharing in our success.

Wishing you a happy and healthy 2017,
2016
THE YEAR IN NUMBERS

OUR TOP FIVE ACCOMPLISHMENTS

1. Funded by one of our 6 Saving Lives at Birth grants, our BiliSpec device moved into the final stage of our technology development pipeline.

2. We expanded our Pumani bCPAP device into the Christian Health Association of Malawi, and it is now saving newborn lives in 24 countries.

3. Our student-designed diabetes wound care simulation model was sent to the US-Mexico border, Malawi, Brazil, and Qatar.

4. Our mobile cervical cancer screening clinic in Barretos, Brazil served more patients this year than ever before -- 97 women in total.

5. Of our 17 graduating seniors, 6 were awarded graduate scholarships, 5 earned fellowships, and 5 design teams won awards at design competitions.

PEOPLE

STUDENTS
154

FACULTY
72

STAFF
27

MAIN FUNDING SOURCES

63%
25%
12%

- federal grants and foundation support
- institutional funding
- donations and endowment income

93,000 people in 24 countries have benefited from 215 new technologies designed by 665 Rice students.
Globally, preterm birth is the leading cause of neonatal mortality. Most neonatal medical technologies are designed to function in high-income countries, and are either unavailable or unsuitable for low-resource areas. Rice 360° will end neonatal mortality by developing a suite of technologies essential for newborn care. The devices are designed to be low-cost, rugged, and appropriate for low-resource settings.

FROM IDEA ➔ IMPACT

SCOPE

- Identify unmet clinical need
- Define problem
- Develop clinical partnerships

DESIGN AND VALIDATE

- Explore solution options
- Develop prototype and lab test
- Conduct pilot clinical testing
- Validate prototype

LAUNCH

- Produce at scale
- Launch product

PULSE OXIMETER
A non-invasive measurement of oxygen saturation, allowing a nurse to monitor the blood oxygen and pulse of the baby

NEONATAL TEMPERATURE PROBE
A probe used to detect hypothermia and fever

PHOTOTHERAPY LIGHT
Lights used to treat babies with jaundice; the blue LED light emitted breaks down excess bilirubin, a chemical that causes jaundice

OXYGEN CONCENTRATOR
A device that converts existing room air into oxygen-rich air to help babies with respiratory issues

WARMING BED
A device designed to target neonatal hypothermia; it automatically adjusts its temperature based on the temperature of the baby's body as detected by the neonatal temperature probe

SERUM BILIRUBIN RAPID DIAGNOSTIC
A device used to diagnose jaundice in just a few seconds; Rice 360°'s most recent device to enter the final stage of the development pipeline

GLUCOMETER
A blood glucose measurement device used to detect hypoglycemia or hyperglycemia in neonates

SYRINGE PUMP
An automatic device that can deliver medicinal doses for up to 66 hours without wall electricity

APNEA MONITOR
An apnea monitor and stimulation device with a size-adjustable strap; if a baby doesn't breathe for 15 seconds, a vibration motor is activated to restart breathing; a nurse is alerted if breathing does not resume within 30 seconds

PUMANI bCPAP
Rice 360°'s Pumani bCPAP is a respiratory device to help babies breathe; it is on the approved device list for Doctors Without Borders and is CE marked

Some of our Global Health Fellows working on neonatal technologies

LEAH SHERMAN ’18
RICE UNIVERSITY BIOENGINEERING MAJOR, BLOGGER

June 27, 2016

During a tour of Lilongwe’s main hospital, I found myself in the resuscitation area.

At first, I only saw the radiant warmer with a pair of twins under it. They were wrapped in colorful chitenjes as they waited to be returned to their mother.

However, behind them, I noticed two nurses and a doctor doing compressions on a newborn. I stopped and stared in shock at what I was watching. I saw the newborn, but I wasn’t sure if it was alive.

We left the ward while the team was still working. I don’t know what happened to this baby. I don’t know if it saw the end of its first hour, day, or week. I don’t know if it’s still alive.

Through the rest of the week, I saw many patients in pain and a couple patients pass, but the newborn stuck with me. I wasn’t prepared to see that, but I’m now more motivated than ever to continue working on and producing designs that could help with birth, resuscitation, and the survival of newborns and premature infants.

Later in the week, I was shadowing a prominent physician, Dr. Peter Kazembe, during rounds in the neonatal ward.

At one point, he asked a nurse “Why are these babies getting cold?”

The matron of the ward replied “Almost all have hypothermia; our heaters are not enough. We need more.”

WE NEED MORE.

This statement sums up what we saw in the hospital that week. In the words of Dr. Kazembe, “We have shortages of everything...except patients.” We are here to give them more.

We spent the past week compiling information and are now beginning to work on designing a temperature monitor. We hope this tool can be used to prevent hypothermia from becoming more serious in the neonates.

In a way, we hope this too can be a small part of their more.

“There are doctors around the world that, despite being well-educated and equipped to help others, they can’t do their jobs if they don’t have the technology. Giving doctors the tools they need to help their patients is empowering. The opportunity to combine design with engineering expertise, and even on the ground expertise, has been incredible.”

- Jocelyn Brown ’10
Rice 360º Alumna
Product Manager, Medical Devices
Third Stone Design

Leah’s internship in Malawi changed how she understands global health issues.
For more information on how to support our interns, contact Liz McGuffee at emm7@rice.edu or (713) 348-4491 or Emily Mooney at emm9@rice.edu or (713) 348-4569.
OUR NEWEST AREA OF IMPACT: A NEW PARTNERSHIP IN THE RIO GRANDE VALLEY

PROBLEM: NEONATAL JAUNDICE
Neonatal jaundice may be easy to identify in the United States, but in low-resource areas, proper testing for bilirubin (the blood protein that causes jaundice) is not readily available.

SOLUTION
A bilirubin concentration measuring tool known as the BiliSpec. The device reads a paper strip in seconds, and each test costs less than one cent.

IMPACT STATUS
The BiliSpec is in the final stage of our development pipeline with a prototype heading to trials at Texas Children’s Hospital and Queen Elizabeth Central Hospital.

PROBLEM: CERVICAL CANCER
In low- and middle-income countries where women have no access to PAP smear screenings, including in the Rio Grande Valley, cervical cancer detection is a serious concern.

SOLUTION
A portable, low-cost device that allows clinicians to diagnose cancer and treat women in a single visit. Rather than sending a potentially cancerous sample off to a lab, we bring the microscope directly to the tissue, removing a time-sensitive step for biopsies.

IMPACT STATUS
The high-resolution microendoscope (HRME) has proven effective in clinical trials across the globe. Most recently, the device has been used in a mobile unit that travels throughout the Rio Grande Valley.

PROBLEM: DIABETES
Those with diabetes are at a significant risk of peripheral neuropathy, a lack of sensation in the feet. Meaning, small cuts on the feet can go unnoticed and untreated, leading to infection, ulcers, and possible amputation.

SOLUTION
A team of Rice students, aptly named the Wounder Women, designed an educational simulation system about diabetic wound care. It includes a foot mannequin for demonstration, an educational, mobile-friendly website, and availability in English, Spanish, Chichewa, Portuguese, and Arabic.

IMPACT STATUS
The Wounder Women implemented their system at SMART Hospital and the South Texas Simulation Network at University of Texas Rio Grande Valley.

Team Wounder Women: Emily Huang ’16, Kelly MacKenzie ’16, Hanna Anderson ’16, Malaz Mohamad ’15 and Mariam Hussain ’16

Sonia Parra, a graduate student working in Richards-Kortum’s lab and a med student at Baylor College, is seen testing the high-resolution microendoscope inside her cheek.
We are honored to recognize the following individuals, corporations, and foundations who have supported Rice 360° this past fiscal year.

Your thoughtful support is transforming lives, both domestically and abroad.

Mrs. Kaye Voigt Abikhaled
John Abikhaled, M.D.
Shannon Abikhaled, M.D.
Steven Scott Alley, M.D.
Mr. Hunter H. Armistead
Ms. Kerry O'Neill Armistead
Ms. Tess Bakke
Bank of America Foundation
Mr. James Barry
Mrs. Subha V. Barry
BD
Ms. Sandra Bishnoi
Mr. Oliver Bogler
Ishmeal Earl Bradley, M.D.
Caring Friends, Inc.
Mr. Michael Dittmar
Mrs. Diane Dittmar
Ms. Erin Newman Durant
Mr. Nicholas L. Durant
ExxonMobil Foundation
Ms. Marta Isabel Fonseca
Foster Foundation
Mr. David Kent Gibbs
Barbara Jenkins Gibbs, M.D.
Mr. Edward Earl Graham
H. T. Than Law Group
The Hamill Foundation
Mr. Jim Hargrove, Jr.
Mrs. Linda Hargrove
Mrs. Mary Carrington Hooper
Richard Nelson Hooper, Ph.D.
Mr. Ken W. Janda
Mrs. Tracy Ditttart Janda
Mr. David E. Kirk
Mrs. Laura B. Kirk
Mrs. Judy Rowe Koehl
Michael F. Koehl, M.D.
Mrs. Joni Sue Lane
Neal F. Lane, Ph.D.
President David W. Leebron
Ms. Valerie J. Luessenhop
Mrs. Kelsey Rosbach McCulley
Mckinsey & Company, Inc.
Ms. Joslyn Edelstein Meier
Michael Merson, Ph.D., M.D.
Mr. Andrew Ross Miller
MMC
Maria Oden, Ph.D.
Frederick L. Oswald, Ph.D.
Rebecca Richards-Kortum, Ph.D.
Mr. Bentley Sanford
Mrs. Kytte Sanford
Mr. R. John Stanton, Jr.
Mrs. R. John Stanton, Jr.
Suggs Family Foundation, Inc.
Ms. Amy Elizabeth Sullivan
Ms. Y. Ping Sun
Mr. Guillermo F. Trevino
Mrs. Tammy L. Trevino
Mrs. Debra Ann G. Vickery
Rev. Robert Vickery, Jr.
Mrs. Hilary Ware
Mr. Richard B. Wheeler
Ms. Janet M. Wheeler
Lewis T. Williams, M.D., Ph.D.
Mrs. Mari Hata Williams

"Rice 360° is really an amazing program because of the impact it is creating. Students on campus - and it doesn’t matter whether they’re freshman English majors or aspiring doctors or bioengineers - students from all different disciplines get really, really excited about Rice 360° because they’re impact-driven. They’re results- oriented. They want to see their effort translate into impact, and Rice 360° is the only undergraduate program that gives students a combination of responsibility, real-world problems, and the opportunity to create global health solutions."

- Andrew Miller ’09
Rice 360° Alum
Advisor, 3D Veterans

Visit our website and show your support at www.rice360.rice.edu/donate

For more information on how to support Rice 360°, reach out to Liz McGuffee at emm7@rice.edu or (713) 348-4491 or Emily Mooney at emm9@rice.edu or (713) 348-4569.
OUR MISSION

We innovate for global impact.

We **discover and evaluate** the biological and social factors that give rise to global health inequities.

We **design** scalable solutions to address unmet health needs around the world.

We **educate** multidisciplinary leaders who can solve complex global challenges.

We **partner** with local and international stakeholders to thoughtfully test and implement these innovative solutions.

*We transform students into innovators & ideas into sustainable solutions.*

Dr. Richards-Kortum [and her team] truly understand how every piece fits together and what they have to do to have the kind of impact they want to have.

They have a **LASER FOCUS** and a **WIDE-ANGLE LENS** all at the same time.

**Both are necessary to go from problem diagnosis to CHANGING THE WORLD.**

- Rice University Howard R. Hughes Provost Marie Lynn Miranda

A baby at Queen Elizabeth Central Hospital receiving life-saving oxygen from Rice 360°’s Pumani bCPAP, a low-cost respiratory device for newborns.

---

**RICE 360° INSTITUTE FOR GLOBAL HEALTH**

**CONNECT WITH US!**

Rice 360° Institute for Global Health
170 BioScience Research Collaborative – MS 636
6500 Main Street
Houston, TX 77030

E-mail emm9@rice.edu | Office 713-348-4569 | Fax 713-348-3160 | www.rice360.rice.edu