Founded in 2014, the Center for Global Health Impact aims to save lives in communities with poor access to healthcare throughout the world. To accomplish this, the Center promotes innovative approaches that bring effective and affordable health solutions to those who need them and in ways they will use them. The Center is based at Southern Methodist University in Dallas, Texas.
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LETTER FROM THE DIRECTOR

In the decades since I graduated from medical school, there have been tremendous advances in global and public health. Global life expectancy has increased by almost eight years, the infant mortality rate has plummeted over 50%, and diseases like AIDS – which once meant certain death – can now be easily prevented or effectively managed. In the last twenty years alone, tens of millions of cases of dangerous diseases like tuberculosis and measles have been averted by a massive global expansion of access to immunization, diagnosis, and treatment.

However, there is much left to do. Every day, tens of thousands of people die from preventable diseases and millions more suffer from them, simply because they do not have access to basic healthcare. The mission of the Center for Global Health Impact is to help close this gap through innovative research on ways to deliver high-quality healthcare to those in need and training others to do the same.

I am honored to share these highlights of the Center’s ongoing work, and I look forward to the many fruitful initiatives we will realize in the years ahead.

ERIC G. BING, MD, PH.D, MBA
DIRECTOR, CENTER FOR GLOBAL HEALTH IMPACT
VIRTUAL REALITY FOR CANCER SURGERY
CERVICAL CANCER IN SUB-SAHARAN AFRICA

Sub-Saharan Africa has the highest age-adjusted incidence of cervical cancer in the world, killing an average of nearly 160 women every day. While most cervical cancers are preventable if detected early, low-income regions like sub-Saharan Africa often lack the surgeons and screening infrastructure they need to combat this cancer.

57,381
ANNUAL DEATHS OF CERVICAL CANCER IN SUB-SAHARAN AFRICA

93,000
ANNUAL NEW CASES OF CERVICAL CANCER IN SUB-SAHARAN AFRICA

80%
SHARE OF CERVICAL CANCERS THAT ARE PREVENTABLE IF DETECTED EARLY
That’s where the Virtual Reality Surgery Simulator project comes in. The project, which uses a simulated operating room environment running on off-the-shelf gaming equipment, is designed to help surgical trainees develop their knowledge of complex surgical procedures. The project is led by an international multidisciplinary team with expertise in cancer surgery, gynecological oncology, global health, instructional design, video game design, and more. To learn more, visit blog.smu.edu/vrss.

Dr. Groesbeck Parham, the lone gynecological oncologist currently practicing in Zambia, tests a virtual reality surgery simulator developed by SMU game designers in collaboration with the Center for Global Health Impact. SMU professors Dr. Tony Cuevas, Boris Fisher, and Dr. Eric G. Bing (L to R) observe.
AN INTERNATIONAL COLLABORATION

Project partners hail from institutions including SMU, the University of North Carolina at Chapel Hill, King’s College London, and the University of Zambia. In addition, exploratory meetings with researchers at the University of Texas Southwestern Medical Center were held in September 2018 and May 2019, regarding the logistics of expanding the project to cover other surgical training procedures.

The VRSS team published papers about the project in *eancermedicalscience* and the *Journal of Global Oncology* in March and May 2019, respectively.

The project is funded by grants from the Wellcome Trust and the Medical Research Council, UK.
In 2018, Zambia had the third highest age-standardized rate of cervical cancer in the world, with an astonishing 66.4 cases per 100,000 women. By contrast, the United States had less than 6.5 cases per 100,000 women. Starting in June 2018, the Center for Global Health Impact team made two trips to the University of Zambia to initiate and expand the Virtual Reality Surgery Simulator project.

In June 2018, the team initiated the first stage of testing the simulator technology, with a simulation of a radical abdominal hysterectomy procedure. Testing of this simulator is ongoing, and results have indicated significant improvement in the efficiency of surgical trainees who use the program.
In February 2019, the Center for Global Health Impact teamed up with SMU to film an episode about VR research on campus for SMU's new web series, *Wired For Good*. Clips from the filming also appeared in promotional films for the new Gerald J. Ford Hall for Research and Innovation, which will house key partners of the Center for Global Health Impact like SMU Guildhall just a few hundred feet from the Center's office.
In September 2018, Dr. Eric G. Bing and Dr. Tony Cuevas presented their virtual reality surgery research at the Digital Transformation and Artificial Intelligence summit in Dallas. The session focused on the future of workplace training through immersive and experiential learning.

In October, Dr. Bing and his research collaborators Dr. Groesbeck Parham (UNC Chapel Hill and University of Zambia) and Dr. Richard Sullivan (King's College London) attended the 2018 meeting of the UICC World Cancer Congress in Kuala Lumpur, Malaysia. At the event, Dr. Bing led a research workshop and delivered presentations on virtual reality research and on cervical cancer outreach and screening. The team members also came together for a joint presentation about health system efficiency for women's cancer screening and early detection. In addition, Dr. Bing participated in a video interview with ecancer Global Foundation.
AN INTERDISCIPLINARY APPROACH

To build new and innovative strategies for solving public health challenges around the world, thinking outside the box is essential. That's why the Center for Global Health Impact prioritizes collaboration across disciplines and continents. The Center's primary projects require the expertise of researchers from fields that typically do not work together, from epidemiologists to game designers and from voiceover artists to oncologists.
The Health Simulations & Virtual Reality research cluster, convened by Dr. Eric G. Bing through the Dedman College Interdisciplinary Institute, connects SMU faculty from a variety of disciplines to work together on creative virtual reality solutions to persistent bottlenecks in medical and surgical training.

BRINGING RESEARCHERS TOGETHER

HEALTH SIMULATIONS & VIRTUAL REALITY RESEARCH CLUSTER

Next page: an attendee at the Digital Transformations and AI Summit at SMU in September 2018 tests a tablet-based learning program during a presentation by Dr. Eric G. Bing and Dr. Tony Cuevas.
In April 2019, a paper developed by Lyle School of Engineering undergraduate students advised by Center for Global Health Impact researchers was published in *Interactive Learning Environments*. The paper, created to fulfill Engaged Learning requirements, explores how machine learning models can be used to predict learner success. The researchers used a machine learning model to evaluate certain physiological measurements of learners (e.g. swipe speed, click duration) as they navigated through a learning module, then used the model to predict the success of the learners on a subsequent test with 87.7% accuracy.
TRAINING EMERGING PUBLIC HEALTH LEADERS IN THE CLASSROOM AND COMMUNITY

Students in Dr. Eric G. Bing's *Creating Impact in Global & Public Health* course develop their leadership skills and work in teams to help community organizations develop strategies to address complex public health challenges. In addition to learning best practices for strategy and effective implementation, students receive team coaching from leaders across the health system.

120+ SMU STUDENTS TRAINED IN CREATING GLOBAL & PUBLIC HEALTH IMPACT SINCE 2015
In April 2019, four teams of SMU students, supported by community coaches, came together for the fifth annual Battle to Save Lives, an interdisciplinary case competition that concludes Dr. Eric G. Bing’s Creating Impact in Global & Public Health course. The teams presented strategies to reduce binge drinking, drunk driving, and tobacco use on college campuses.
The Creating Impact in Global & Public Health course is one of the ways that the Center helps improve public health in the Dallas area. Over the past five years, students have worked with local organizations to reduce depression and increase access to healthcare for Dallasites experiencing homeless, increase the safety of Dallas streets for drivers and pedestrians, and improve health systems efficiency for low-income Dallasites.
As part of an ongoing partnership with Global Health Corps, Center for Global Health Impact director Dr. Eric G. Bing conducted a leadership training for incoming Global Health Corps fellows at Yale University. The training focused on developing strengths in a team context; trainees had the opportunity to test their skills by participating in a group challenge designed to help them increase their impact.

To help stem this shortage of trained medical personnel in low-income countries, the Center has developed low-cost eLearning courseware to train new leaders in cancer diagnosis and treatment. Courses designed by the Center are currently being used for training by Friends of Africa, Inc., a health organization based in Zambia.

The Center worked with leaders from organizations including ACAP Health and the Public Health Institute to help them attain their goals in improving public health. The Center offers customized options such as leadership coaching or strategy development.
RESEARCH IN VIRTUAL REALITY

Research at the Center has demonstrated that training in virtual reality simulations that run on low-cost technology can improve knowledge and skills of surgeons so that they may easily learn to perform surgical procedures in the operating room. With support from the Wellcome Trust and other donors, the Center plans to scale up virtual reality research to reach more providers in lower income countries, and to apply this knowledge to help providers in the United States as well.

FUTURE PROGRAMMING

The sixth annual Creating Impact in Global & Public Health course and case competition are scheduled for the Spring 2020 term.
LEADERSHIP

ERIC G. BING, MD, PH.D, MBA is the founding director of the Institute for Leadership Impact. He is a professor of global health in the Department of Applied Physiology and Wellness in the Simmons School of Education and Human Development and in the Department of Anthropology in Dedman College of Humanities and Sciences at SMU. He is also the founding director of the Center for Global Health Impact, which focuses on creating impact in health. Dr. Bing was the senior fellow and founding director of global health at the George W. Bush Institute from 2011 to 2016, where he initiated worldwide health initiatives including serving as co-leader of the institute’s Pink Ribbon Red Ribbon partnership, an $85 million public-private program designed to combat cervical and breast cancer in Africa and Latin America.

Prior to joining the Bush Institute, Dr. Bing was an endowed professor of global health for nearly 20 years at the Charles Drew University of Medicine and Science in Los Angeles. He has developed and managed global health programs in Africa, Central America and the Caribbean. Dr. Bing has published more than 90 articles and abstracts. He received a medical degree from Harvard Medical School, a Master's of Public Health and a PhD in Epidemiology from UCLA, and an MBA from the Fuqua School of Business at Duke University. In 2013, his book Pharmacy on a Bicycle: Innovative Solutions in Global Health and Poverty was released, and he was a Dallas Morning News finalist for Texan of the Year.

LAUREN SHOOK, MA serves as associate director of the Center for Global Health Impact. She began her career serving students in district roles before transitioning to educational nonprofits where she managed college access programs in rural Texas. She brings experience in project management, grant writing, strategic planning, coaching, and program evaluation. Lauren received her master's in Education Policy & Leadership from Stanford University, where her research focused on system improvements for nontraditional college students. She also earned a graduate certificate in nonprofit management from the Bush School of Public Service and holds a bachelor's degree from Texas A&M University.
GLOBAL HEALTH INTERNS

KAITLYN CONTRERAS CASTRO

YUE MENG

PRICE T. MORGAN

LEI SHI

OSWALDO TORRES

JAY WU

NOT PICTURED: ISABELLA QUINONES
Life expectancy increase was calculated using World Bank data with a 1987 baseline of 64.831 years and a 2017 estimate of 72.383 years. Infant mortality reduction was calculated using World Bank data for infant mortality rate per 1,000 live births with a 1990 baseline (earliest data available) of 64.7 deaths per 1,000 live births and a 2018 estimate of 28.9 deaths per 1,000 live births.

The World Health Organization estimates that roughly 58 million lives were saved through tuberculosis diagnosis and treatment and roughly 23.2 million lives were saved by measles vaccinations between the years of 2000 and 2018.

The World Health Organization estimates that deaths caused by tobacco use alone add up to an average of almost 22,000 per day. (8 million annual deaths / 365.25 days = 21,902.8 average deaths per day)

The World Health Organization affirms that up to 80% of cervical cancers can be prevented if cervical abnormalities are identified at a stage where they can be easily treated. The International Agency for Research on Cancer documented 93,225 annual new cases and 57,381 deaths of cervical cancer in sub-Saharan Africa in 2012. (57,381 annual deaths / 365.25 days = 157.1 average deaths per day)

The International Agency for Research on Cancer's Global Cancer Observatory estimated an age-standardized incidence rate of 66.4 cases of cervical cancer per 100,000 women in Zambia in 2018, behind only Swaziland (75.3) and Malawi (72.9). In its Cancer Statistics Review, the Surveillance, Epidemiology, and End Results (SEER) Program reported an age-adjusted incidence rate of 6.4 cases per 100,000 women in the United States in 2016, the most recent year for which it published data.

The paper, entitled EduAware: using tablet-based navigation gestures to predict learning module performance, was published online on April 30, 2019, by authors Xinyi Ding, Eric C. Larson, Amanda Doyle, Kevin Donahoo, Radika Rajgopal, and Eric G. Bing.
ACKNOWLEDGEMENTS

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