



PARTNERSHIP FOR GLOBAL HEALTH TECHNOLOGIES



MARCH 2017, ISSUE 5

OUR VISION

The Partnership for Global Health Technologies (PGHT) is a collaboration between medical students from the State University of Zanzibar (SUZA) and Boston University students. PGHT aims to improve the quality of health care in Zanzibar by applying biomedical engineering principles within a public health context. We use an interdisciplinary approach to address the most pressing issues in healthcare delivery in Zanzibar.



The lab team is currently working to design an affordable and robust diagnostic to address pre-eclamptic liver failure. This semester, they focused on testing and validating their assay in the lab.



The public health team examines socio-ecological drivers of public health challenges to ensure adoptability and utilization of proposed technology and anticipate potential obstacles .



The mathematical modeling team uses dynamic health system modeling to model patients' access to quality health commodities, identify bottlenecks and inequities that hinder the system's responsiveness, and build capacity of health delivery. Following submission of our first manuscript on the project, the modeling team is now focusing on modeling how access to material and human resources at Mnazi Mmoja Hospital impacts maternal morbidity and mortality.



The quality control team is examining image processing techniques to distinguish between quality and defective malaria rapid diagnostic tests (RDTs) . This semester, they began using Python to develop techniques for image recognition.

PUBLICATIONS AND PRESENTATIONS

Devika Nadkarni, Sara Gravelyn, Monica Brova, Sarem Rashid, Donovan Guttieres, Randy Yee, Darash Desai, Katie Clifford and Muhammad H. Zaman, (2017), "Modeling Patient Access to Oxytocin in Zanzibar", *BMC Health Services Research*, Submitted.

Devika Nadkarni, Napassorn Lerdsudwichai, Helen Lindsay, Sarem Rashid. "A Point of Care Liver Function Test", Rice 360° 2017 Global Health Design Competition, March 2017, Presentation.

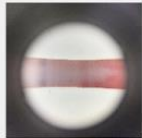


MODELING ACCESS TO HEALTH CARE

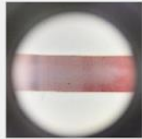


In order to improve care at the maternity ward of Mnazi Mmoja Hospital, we are developing a model based on identified factors that result in inefficient delivery of care: the severity of the patients' conditions, the temporal sensitivity of certain conditions, and the availability of human (medical staff) and material (medicines, equipment) resources. We are constructing a model that uses the patient condition and the condition's severity as the initial input and generates a ratio of patient population mortality as the output. This cumulative output is determined by using a decision tree to follow the maternity ward patients through the hospital's available resources. Through this model, we seek to evaluate the current supply/demand resource ratio at MMH and determine the variables that could improve this ratio closer to 1 while minimizing maternal morbidity and mortality outcomes. Improving this supply/demand ratio will optimize patient flow, provide better care for women, and decrease mortality and morbidity rates of pregnant women.

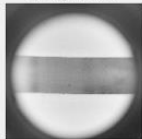
Middle of Test Strip



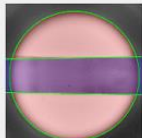
Distorted



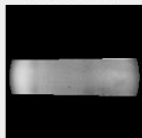
Grayscale



ROI selection



Isolated ROI



QUALITY CONTROL OF MALARIA RAPID DIAGNOSTIC TESTS

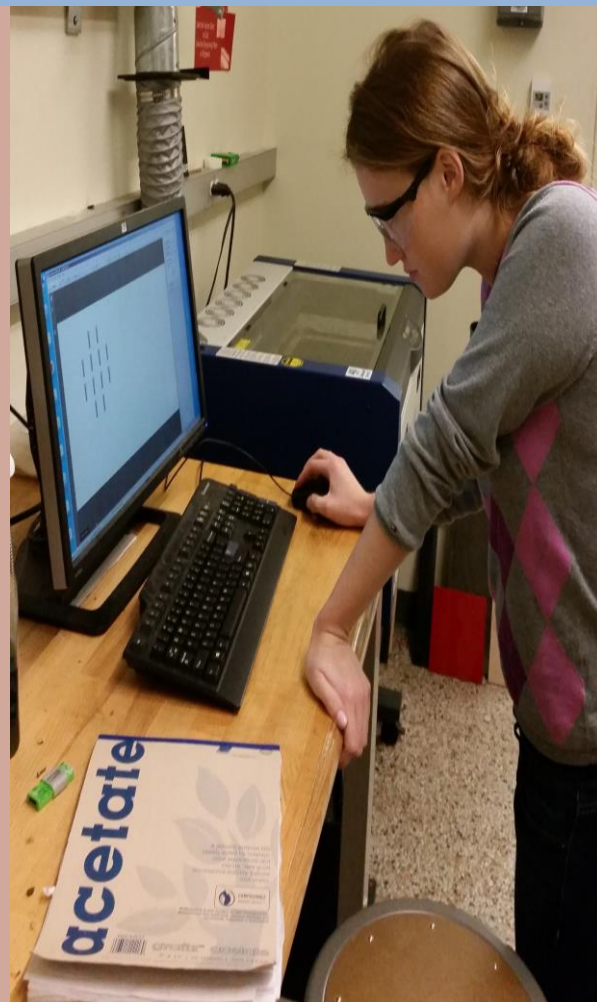


The Quality Control (QC) group is currently working with different imaging modalities to assess the quality of malaria rapid diagnostic tests (mRDTs). Namely, using fluorescence imaging systems, spectrometry, and green-light contrast microscopy, the team will analyze the nitrocellulose and antibody deposits on the mRDT strips. After identifying all regions-of-interests, a quantitative metrics for comparing the images of functional and defective mRDTs at the region-of-interests will be established using data analytic techniques. The QC group will simultaneously develop a robust study protocol that will incorporate a method to validate mRDT results.

MATERNAL HEALTH & LIVER FUNCTION MONITORING



Our team continues to optimize the assay for ALT in an effort to determine appropriate instrumentation for measurement of current generated by the assay. Efforts are focused on fabricating the device components in order to precisely measure ALT concentration. Such efforts include wax printing the reaction zone, constructing electrodes compatible to a glucometer, and integrating the assay reagents into the paper based reaction zone. In conjunction with developing the amperometric assay for quantifying the concentration of ALT, our team is exploring the possibility for similar AST quantification. A result of the two will allow for more precise liver function diagnosis.



STUDENT VOICES

“Working with the Partnership for Global Health Technologies has not only made me a better scientist and engineer, but has helped me develop as a global citizen. Being surrounded by individuals from many different cultural and academic backgrounds has been an invigorating experience. I look forward to continuing to work with the PGHT and to traveling to Zanzibar this summer to meet our partners there. ”

HELEN LINDSAY, BOSTON UNIVERSITY



MESSAGE FROM THE DIRECTOR

Dear Colleagues,

Our work continues to grow, both in Boston and in Zanzibar, thanks to the efforts of the students, the support of our funding agencies and the input and insight from colleagues from around the world. Our research team has made strong progress in all areas of research and the student led efforts have led to a richer understanding of access to care among pregnant mothers in Zanzibar. That manuscript is currently under review. Newer partnerships are also being established on our work in device development and testing of RDTs. Above all, we are thrilled to welcome a new cohort of students who represent diverse interests, backgrounds and rich passion for global health research. This year, for the first time, we will also have students from other institutions including Stanford and Harvard to join our team in Zanzibar. Our hope is that by bringing students from other institutions, our students will get to learn from their peers, the peers will learn from BU students and together, they will foster a strong relationship of collaboration, learning and understanding with our Zanzibari student partners.

As we approach summer, and finalize our research plans for work in Boston and in Zanzibar, we are eager to hear from all of you, about projects, ideas, partnerships or general advice. Our journey, in a world where the need for research, evidence based policy, understanding and tolerance would be incomplete and unimaginable without your support and advice.

We are immensely grateful for all that you do, and all the support that you provide us, and we hope that we can count on your counsel and your ideas to make the world a safer and a more equitable place.

Yours,

Muhammad

MUHAMMAD H. ZAMAN

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