Personal and Population Health Technologies in Disease Surveillance

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Recent advances in wearable, implantable and ingestible technologies permit unprecedented assessments of various aspects of health and wellness. The ubiquity of smartphones, smart watches and fitness tracking tools has provided vast amounts of digital physiologic and behavioral data. These "phenotypes" of health – prosody of smartphone use, biometric data surrounding health events, geolocation and ambient environment conditions – provide an opportunity for social scientists, engineers and clinicians to advance health interventions antecedent to exacerbations of disease. For example, phenotypes of smartphone use have been correlated with changes in mental health and pain, ingestible sensors measure real-time changes and contexts of medication adherence in various diseases, and biometric data may predict different states of health conditions prior to their clinically apparent manifestation.

The COVID-19 pandemic continues to spur increasing acceptance of digital biomarkers and personal technologies as health management tools. Additionally, technologies that leverage public health infrastructure such as wastewater-based epidemiology and crowdsourced street maps provide novel insights into the effects of disease in communities at the population health level.

The goal of this minitrack is to facilitate multidisciplinary collaboration and exploration of various facets of health technologies and their ability to surveil and predict disease. Last year's minitrack explored the design and implementation challenges as innovative technologies were deployed in clinical settings: virtual windows to enhance the patient experience in the emergency department, wearable sensors to detect alcohol consumption, agent-based modeling to evaluate the cost-savings of poison control centers, and the use of noise-cancelling earbuds to improve sleep quality for healthcare shift workers.

This year's minitrack features four papers that explore innovative technological applications to improve the treatment and detection of disease states.

In our first paper, the authors present a novel augmented reality (AR) training for two emergency medical procedures (bag-valve-mask ventilation and needle decompression of pneumothorax), demonstrating no difference between AR and standard video training in usability and usefulness scores or expert rating of the technique. Our second paper details the development of a novel asynchronous learning module for medical toxicology education that can uniquely be delivered via text-messaging, an intervention that emergency medicine residents and physician assistants at various stages of training find to be easy-to-use and of high educational value. The third paper presents formative qualitative work toward the development of a gamified app to help individuals in Vietnam maintain adherence to antituberculosis therapy. Our fourth paper examines the use of a wearable sensor system to detect stress and craving in individuals with substance use disorder. Finally, we conclude with a discussion regarding the ability to leverage technology to detect and prevent abuse in academic medicine.

We are excited to re-convene in person this year at HICSS-56. We are looking forward to generating fruitful discussions of the featured papers and fostering the development of new ideas for future work.

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