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## Marquard Receives NSF CAREER Grant to Retool Health Information Technology

The problem with health information technology, the computer hardware and software dealing with the storage, sharing, and use of healthcare data for communication and decision-making, is that it is basically very user-unfriendly. This drawback is especially unfortunate because health information technology is viewed by our government as one of the most promising tools for improving the overall quality, safety, efficiency, and cost of our ultra-expensive health delivery system. Now the National Science Foundation (NSF) has given Industrial Engineering Professor Jenna Marquard from the University of Massachusetts Amherst a mandate to help correct this glaring problem.



The NSF has notified Marquard that she has been awarded a prestigious \$400,000 Faculty Early Career Development (CAREER) grant for a research project entitled "Computational Approaches to Model Physicians' and Patients' Interactions with Health Information Technology." Specifically, her project will focus on computerized health information technology designed to improve the health, clinical care, and cost of management for diabetics and patients with high blood pressure. Her research will retool the technology by modeling how doctors and patients interact with these information systems and then engineering more user-friendly computer interfaces for them.

"The government is spending a huge amount of money to encourage the adoption of health information technology," says Marquard. "But there are a lot of scientific studies and circumstantial evidence indicating that, when the systems aren't usable, people reject them."

The federal government, motivated by known inefficiencies in the healthcare system, is spending billions to fund health information initiatives in hopes they will lower future healthcare costs. For example, the Office of the National Coordinator for Health Information Technology estimates that the total health information provisions under the American Recovery and Reinvestment Act of 2009 are approximately \$20-27 billion.

The research objective of Marquard's CAREER project is to model physicians' and patients' cognitive and behavioral interactions with health information technology related to diabetes and hypertension using methods from applied psychology, visualization, and computer science.

Why is Marquard focusing on these two diseases? The costs of chronic disease management are staggering, with annual expenditures on care related to hypertension and diabetes estimated at \$47.4 and \$45.9 billion respectively. If health information systems could save even a fraction of these costs, their benefits would be remarkable.

During her four-year CAREER project, the researcher will assess the quality of physicians' and patients' interactions with approximately five existing commercial health information systems and ultimately design new computer interfaces that improve how physicians and patients interact with health information technology.

"One reason they're not user-friendly is they don't provide the right information at the right time for healthcare providers," explains Marquard. "The computer interfaces aren't practical in

terms of extracting information or making decisions. What's more, the technology isn't fitting into their traditional way of doing things. Beyond the hand-written notes they've always taken on their patients, now they're often working additional hours each day typing that information into the electronic record."

One basic problem is that originally most health information technology was developed as administrative billing systems so hospitals and clinics could accurately record their charges for different services and then track whether they had been paid yet.

"So, for the most part, these systems were not created for clinical purposes," says Marquard. "They were adapted to clinical purposes. In the process, the underlying databases, structures, and designs are usually not appropriate for the clinical purposes they now serve."

The results of her research could be profound and far-reaching. Broad and consistent utilization of the technology, when perfected, will improve healthcare quality, prevent medical errors, reduce health care costs, increase administrative efficiencies, decrease paperwork, and expand access to affordable care.

"We really need effective health information systems," says Marquard, "but we haven't fixed them so we can use them yet." (February 2012)