Students Act as Role Models for Diabetics

Industrial engineering majors Dana Evernden and Noah Duffey both look like pictures of good health. But their key role on an interdisciplinary team of engineering and nursing researchers is to act like 73-year-old diabetics with high blood pressure and eye problems. Their work is helping to develop a new, high-tech tool that will make it a lot easier for diabetics to manage their disease and maintain their health. It's called a "consumer health informatics (CHI) disease management intervention," and its purpose is to give healthcare providers a running score of diabetes patients' glucose and blood-pressure readings, while at the same time giving patients regular doses of TLC. Evernden and Duffey jokingly call themselves guinea pigs, but their purpose is much more significant than that. Their job is to pretend they are diabetics and test how user-friendly the CHI system is.

The intervention system consists of two CHI devices, which in this case means a blood pressure monitor and a glucometer, connected directly to each patient's computer via a USB cord. The idea is for the readings to feed directly into a CHI application (Microsoft HealthVault), which stores all the data online and makes it accessible to medics. Through HealthVault, medical personnel can monitor patients' symptoms and adjust their medications according to standard protocols. In return, patients get continual positive feedback about their progress.

The role that Evernden and Duffey play in this exercise is to figure out what difficulties your average diabetic would encounter with the technology. In fact, the research team has specifically spelled out the expert acting job the two students must do to get "in character."

"You are a 73-year-old Type 2 diabetic with high blood pressure. You are currently taking Glipizide 5mg once a day before breakfast for your diabetes and Lisinopril 10 mg once a day for your high blood pressure. You also have cataracts and have arthritis in your hands. Your primary care physician would like you to take your blood sugar and blood pressure readings daily so that a nurse can change your medication level if your blood sugar or blood pressure levels get too high or too low."

While role-playing, Evernden and Duffey must be so convincing that they reveal all the glitches that a 73-year-old diabetic with high blood pressure, cataracts, and arthritis would encounter while trying to use the new intervention technique.

"We're going though the routine that diabetics would go through to use this system so we can see what challenges they would have," says Evernden. "We even wear gloves while we perform our tasks so we can simulate having arthritis."

The two students each complete specified tasks, record the problems experienced while utilizing the intervention, and log daily time spent on each task. Their work identifies key challenges that

would make it difficult, if not impossible, for diabetic users to complete required tasks. With this information, the research team can re-design and supplement the CHI intervention, making it more closely fit end-users' needs.

"We're supposed to see ourselves as this 73-year-old diabetic with cataracts," says Duffey. "That's a real challenge in itself, trying to see this from somebody else's perspective."

While getting totally immersed in their characters, Evernden and Duffey have identified 49 unique challenges, ranging from the basic (learning to use the blood pressure monitor), to the bureaucratic (creating a HealthVault account), to the technical (entering blood sugar readings into HealthVault).

The medical research has left a lasting impression on both students. Duffey, a senior who will be graduating in May, wants to join the Peace Corps and do medical work in South America and then go into some medical field after that.

"This work definitely pushed me in that direction," he says, "using my industrial engineering skills to improve healthcare for people in need."

Evernden is still a sophomore, so hasn't determined her career goals yet, but she had so much fun being a human guinea pig that she's signed up for a similar study on bariatric (weight loss) surgery patients. So has Duffey.

"If I could make a career out of being a guinea pig," Duffey jokes, "I'd be all for it."

The principal investigators on the diabetes research, entitled Scenario-based User Testing to Guide Consumer Health Informatics Design, are Dr. Jenna Marquand of our Mechanical and Industrial Engineering Department and Teresa Zayas-Caban, Ph.D. of the Agency for Healthcare Research and Quality in Rockville, Maryland. Ph.D. candidate and Hluchyj Fellow Kavita Radhakrishnan of the School of Nursing is also a member of the research team. (April 2009)