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Drug monitoring information improves regimen adherence, researchers say

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Most people want to take mediations as prescribed, even if they sometimes need a little help remembering. For them, an automated system that monitors drug taking and provides feedback after the fact may be more useful than one that nags people when it is time to take a pill, researchers at Carnegie Mellon University say.

In a 10-month study of such a system in the homes of older adults with chronic health problems, the researchers found that adherence to a medication regimen improved when people had ready access to a digital display of their medication-taking record. These people were more likely to take the correct medication promptly and at the same time of day than people who didn't receive the ongoing feedback.

What's important is that people feel that they are in control of their medication habits and that they obtain information that enables them to make improvements if necessary, said Anind Dey, associate professor in CMU's Human-Computer Interaction Institute (HCII). He and his co-author, Matthew Lee of Philips Research North America, will present their findings on April 30 at the CHI Conference on Human Factors in Computing Systems in Toronto.

Other systems have been developed that prompt patients when it is time to take their medications. But they can interfere with other routines, do nothing to reinforce an individual's initiative and may undermine a person's sense of autonomy.

"The people in our study were pretty confident in their ability to take medications as prescribed," Dey said. "They'd say, 'Oh, we're doing fine, we're doing fine.' Those aren't the sort of people who want to be told by a computer when to take a pill. But when they are shown instances where their medication routine falls short, they are motivated to improve."

This study involved 12 people in a Pittsburgh apartment building for low-income, older adults, who agreed to use a pillbox equipped with a sensor to register when they took each medication. These people had multiple chronic conditions, such as diabetes, arthritis and high blood pressure.

For the first two months, the medication-taking performance of each subject was recorded. Then half were given a tablet computer that provided a continually updated display of their medication-taking activities, while the other half were given no additional feedback. The feedback group improved their adherence rate from 95 percent to 98 percent. They also improved the promptness of pill taking from 75 percent to 91 percent, increased the correctness of what they took from 95 percent to 99 percent and significantly reduced variation from day to day in the time when they took their medications. The group that received no feedback saw no improvement in those measures.

Dey said the improvements dissipated when the feedback was removed, suggesting that continuous monitoring and feedback would be beneficial. "But we're not sure what the frequency of that feedback should be," he added. "Is once a week or once a month enough? I do worry about people becoming blind to this—that the display becomes just another thing on the wall that you ignore."

The study was performed as part of a larger project for Carnegie Mellon's Quality of Life Technology Center called dwellSense, in which Dey and Lee, then a Ph.D. student in HCII, deployed devices that monitored such activities as making coffee and using a telephone, as well

as taking pills, in residences. The idea was to look for subtle changes in habits that might provide early signs that a person's physical or mental capabilities were deteriorating.

Dey said the pillbox monitor can help an observer notice problems that the individuals might not. "I know when I go visit my parents, I can see when they haven't taken a pill," Dey said. "But I can't see if they're confused about what day of the week it is, and that they have opened multiple pillbox doors on the way to opening the correct one."

Provided by Carnegie Mellon University

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