

Smartphone app supports those struggling with opioids

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Emily Lindemer and her team created the "Hey, Charlie" app for recovering addicts. As users go about their day, if they approach a place they have signified as risk-related, the app sends a notification: "Hey, I know you're near a risky area. You can do this." Credit: Lillie Paquette

In the spring of 2016, while Emily Lindemer was working toward her

Ph.D. at MIT, she was also struggling with something closer to home: watching someone she knew well fall in and out of recovery from opioid addiction.

Like many people in recovery, Lindemer's friend had his ups and downs. There were promising periods of sobriety followed by relapses into old habits. As the months went by, Lindemer began to see patterns.

For example, when he lost his driver's license—a common occurrence for people struggling with substance abuse who have run-ins with police—he had to call his friends to give him rides to work. If the friends he called for a lift were also people he used drugs with, Lindemer says, he'd relapse within a week.

"His relapses were predictable almost to a T, just based on the people he was associating with—who he was talking to, calling, texting, and hanging out with," she says.

This realization turned out to be an inspiration. What if, she thought, there was a way to provide gentle moments of pause to people struggling with substance-abuse disorders. And what if those reminders could come through a smartphone application that monitors users' contacts, location, and behaviors—and, using the information it gathers, offers encouragement when they are communicating with risky people or when they're near a trigger area?

Lindemer, then a Ph.D. student in the Harvard-MIT Health Sciences and Technology program, formed a team, which started thinking through the basics of what would become an app called "Hey, Charlie." She knew of dozens of existing apps to help people in recovery. Some, like "MySoberLife," offer simple lifestyle tracking services. Others, like "reSET," are prescription-only and share patients' responses to questionnaires with doctors. But none addressed the primary trigger

Lindemer saw for relapses: social contacts.

Lindemer and her team participated in MIT Hacking Medicine, a worldwide event in which people have a short time to come up with solutions to health care-related problems. They emerged from that experience with sharper ideas, and with a clear sense that they would need funding and more advice. So Lindemer applied to the MIT Sandbox Innovation Fund, a program that provides seed funding for students' ideas. The team received \$25,000 and was connected to mentors with relevant experience. Lindemer and her team streamlined the application and designed a business model, and recently they ran a successful usability pilot.

The "Hey, Charlie" app works on several levels. When someone downloads it, it prompts them to enter general information about a few of their contacts, including questions that might prove helpful on the road to recovery, for example: "How often does this person express doubt about your ability to continue your recovery process?"

"They are objective questions, not subjective, and they aren't stigmatizing," Lindemer says. "They do not ask the person in recovery to incriminate anybody. We try to figure out things like, is this a person that even knows that you are struggling with [substance abuse](#) disorder? Is this a person who contributes to stress levels in your life? Or is this the type of person who encourages your sobriety?"

The app also asks new users for a unique set of spatial information. Where are the areas of their city or region that could be triggers for users—locations where they bought drugs, or where their friends who use drugs are living? The app's users identify a particular point and then drag a wider circle depending on the size of the area. As they users go about their day, if they approach a place they have identified as risk-related, the app sends a notification: "Hey, I know you're near a risky

area. You can do this."

Even when users aren't engaged with the app, "Hey, Charlie" collects data on their activity and interactions—very, very securely, says Lindemer.

"Anything that gets sent into the cloud for 'Hey, Charlie' is encrypted," she says. "What we get is anonymized communication data. So we might know this user is talking to five unique risky people, but we have no idea who those risky people are, what their phone numbers are, or anything. It's not the specific people and places that are necessarily important. It is the volume of communication with people that are helpful versus unhelpful."

Christopher Shanaha, the director of "Hey, Charlie's" recent usability pilot at Boston Medical Center and Mattapan Community Center says the app's nudges can help patients stay engaged with their recovery when they're outside of the clinic.

"As clinicians we only see patients in the clinic 15 or 20 minutes a week, and yet patients have to live 24 hours a day and deal with their addictions all of the time," Shanahan says. "This is one small way to support our patients in those interim time periods."

During the pilot, which tracked 24 people using the app over the course of the month, Shanahan says he was surprised at how enthusiastic the responses were—users felt positively toward the app and indicated they would use it again in the future.

Michael Barros, an advisor on "Hey, Charlie's" user interface who has been in recovery for heroin addiction, told Lindemer that many treatment facilities are run using old methods that are often ineffective.

"One of the most interesting thing about 'Hey, Charlie' is having Ph.D.s like Emily working to bring some science into a part of medicine that is still running on pen, paper, and hunches about what worked for people in the past," Barros says. "The data that can be collected with an app like 'Hey, Charlie' is badly needed."

More information: For more information, see heycharlie.org/heycharlie-app/

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