Could the future be finger-stick free for diabetics?

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New devices make monitoring blood sugar easier, but needle not eliminated yet.

(HealthDay)—A lot of excitement surrounded the announcement from Apple that its new watch will be able to monitor blood sugar levels. Has Apple figured out a way for folks with diabetes to check their blood sugar without the dreaded finger stick?

Not quite.

The Apple watch, which will be available April 24, will receive information from a continuous glucose monitoring device. These devices rely on sensors inserted—with a needle—under the skin to measure blood sugar levels every five minutes or so.

Information from the sensor is relayed to a small transmitter that sticks on top of the skin, and then to a receiver that displays the current blood sugar information and predicts which direction blood sugar is going, and how quickly. The Apple watch will be able to display the information that's displayed on the receiver.

Such information is vital for people who treat diabetes with insulin, which includes everyone with type 1 diabetes and some people with type 2 diabetes. Insulin is a hormone that's necessary for the body to be able to use the sugars from foods.

But insulin dosing isn't a precise science. The need for insulin often varies greatly throughout the day. Too much insulin can cause dangerously low blood sugars, while too little insulin allows blood sugar levels to rise too high. Over time, this can lead to serious complications.

That's where blood sugar monitoring comes in. It helps people fine-tune their insulin dosing, as well as attempt to control other factors that affect blood sugar levels.

Though the Apple watch builds off already existing technologies, there's definitely a market for it, said Aaron Kowalski, chief mission officer and vice president of research for JDRF (formerly the Juvenile Diabetes Research Foundation). Kowalski is a type 1 diabetic himself.

"I know most people don't wear watches anymore, but I'm a runner. And for me, the ability to easily look at my number in the middle of a run is a positive," he said. "It's a pain to have to pull out the receiver to look at the number.

"The big advance is the Bluetooth-enabled sensing. I think most of the uptake will be in avoiding stigma. You can check discreetly. Not having to carry around an extra device is cool," Kowalski added.

Mobile technology a godsend for parents with diabetic child

The new technology also makes it possible for parents and others to help remotely manage diabetes. For example, parents can check on their child while he or she is at school.

The need for such a device is so clear, Kowalski said, that some parents with technical backgrounds had already figured out how to use cloud computing to send information from a continuous glucose monitoring system to the cloud and then to a Bluetooth-enabled watch. This is called the Nightscout project.

Continuous glucose monitoring system manufacturer Dexcom recently introduced a similar system called Share that allows people to share blood sugar data with up to five people on an iPhone. Again, the benefit is to allow a parent or someone else to assist or supervise in diabetes management.

Richard Macdonald's 8-year-old daughter has type 1 diabetes and the family recently started using the Share system.

"[Our daughter] is most happy about two things. First, she doesn't need to do finger pricks as often as before we got the [continuous glucose monitoring system]. And second, she likes the Share because we don't need to disturb her play to ask her what her glucose reading is, because we can see it for ourselves on our phones," said Macdonald, of Encitas, Calif.

San Diego-based Dexcom is one of two continuous glucose monitor manufacturers currently in the United States. The other is Medtronic, based in Northridge, Calif. Dexcom is the company partnering with

Apple.

"The watch builds on the Share technology. People look at their receivers as many as 50 to 60 times a day, on average. The Apple watch will provide discretion and ease for looking at that information," said Jorge Valdez, chief technical officer at Dexcom.

Later this year, Dexcom also expects to have a newer, smaller version of their continuous glucose monitoring system that will send information to an iPhone app instead of a receiver, eliminating the need to carry an extra device. Valdez said Dexcom expects to have the same capability for Android phones soon after.

While these products will make it easier to monitor blood sugar levels, they haven't yet eliminated the need for finger sticks to check blood sugar levels. Right now, people still need to check their blood sugar with a drop of blood, and they have to manually enter that number into the continuous glucose monitoring system. This is called calibration. And of course, the sensor itself must be injected under the skin.

Valdez said newer versions of the Dexcom continuous glucose monitoring system will require fewer finger sticks, but there are no viable alternatives for the under-the-skin sensor at the moment.

Kowalski noted that another continuous glucose monitoring system called the Libre, made by Illinois-based Abbott Labs, is approved for use in Europe and doesn't require finger sticks. However, this device doesn't automatically send information to a receiver. The user has to wave the receiver over the device to request a blood sugar reading, Kowalski said.

What about other options for people who don't want to use—or can't afford—continuous glucose monitoring systems? Some insurers, including Medicare, balk at paying for such technology, Kowalski

explained.

A number of research groups are trying to come up with ways to monitor blood sugar levels without the need for a traditional finger stick. All are in experimental stages, but the possibilities include:

- **A contact lens.** This project, funded by Google, would use human tears to measure blood sugar levels. Other companies, such as the Dutch company NovioSense, are also working on contact lenses to sense blood sugar levels.
- **A breathalyzer.** This device would measure the levels of acetone in the breath, which rises when blood sugar goes up, according to the researchers from Western New England University.
- **A saliva test.** Researchers at Brown University and other groups are working on a way to accurately test blood sugar levels from saliva, using a special enzyme.
- **A tattoo.** Special ink would refract infrared light back through the skin to a monitor that could translate those readings into blood glucose levels. One such device is being investigated at MIT.

More information: Learn more about checking your blood sugar from JDRF.