

Helping Youngsters Use Diabetes Technology

By Andrew Curry

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Kimberly Driscoll, PhD

When Kimberly Driscoll, PhD, began studying the way children use insulin pumps, the Florida State University College of Medicine pediatric psychologist knew she'd need more than raw data to understand why kids don't always get the most out of the high-tech devices.

So Driscoll pinched a fold of skin on her abdomen, inserted a narrow inch-long flexible cannula just under the skin, and wore the palm-size device for three days (without insulin but with the carb counting pump use requires). "Wearing the pump highlighted a few things for me: This is a really intense, demanding regimen," she says. "There are hundreds of behaviors you have to do on a given day, and you might just get tired of doing those steps over and over."

When it was originally introduced in 1960, the insulin pump was as big as a backpack, and still hailed as a major breakthrough. Today the devices are smaller than a pack of cards. They deliver insulin through an infusion set, which includes a small flexible or metal cannula that patients wear inserted for three days at a time. Pumps are programmed to deliver background insulin and can help calculate mealtime insulin doses (boluses). "It eliminates the need for daily injections and decreases the burden of complicated math," Driscoll says.

Yet Driscoll's research shows that kids between the ages of 10 and 16 often don't use the pumps properly: They skip monitoring, ignore the pump's readouts, or give themselves an insulin bolus

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at the wrong time. “The insulin pump has been a wonderful technological advance in the field, but adolescents are not using it to their optimal benefit,” she says. “We have preliminary data that show children aren’t quite using them correctly.”

To find out why, Driscoll is tapping an unheralded resource: the pumps themselves. Equipped with tiny computers that calculate appropriate insulin dosages based on the carb counts people enter and individual insulin-to-carb ratios, the pumps also contain a wealth of data. Most save months’ worth of information on everything from what time and how much insulin is bolused for each meal to how frequently the infusion set is changed. Over the course of a year, that’s thousands of individual data points.

Relying on the data from the pumps, rather than interviewing kids or asking them to take notes on their daily behaviors, gives diabetes researchers a tremendous advantage. They’re getting objective data, not what psychologists call self-reported, or subjective, information. “Diabetes is one of the few diseases where we can do that, because of the amazing technology,” Driscoll says. “The computerized devices store a wealth of data for anyone with the time and interest to look.”

With the help of an American Diabetes Association grant, Driscoll will collect a year’s worth of data from the insulin pumps of young people from 10 to 16 years old. To understand their insulin pump behaviors prior to the study, she’ll use the three months before participants have their first study visit.

Then, each of the kids in the study will get intensive coaching on how best to use the insulin pump. The sessions will be informed by data on how each child is using his or her pump. Researchers will provide intensive, personalized education, feedback, and problem-solving skills to improve how each participant uses the pump.

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Driscoll suspects that there are a few factors at work. First, daily diabetes management is a tall order for kids, especially given the distractions they face in their early teens. “In adolescence, responsibility shifts away from parents to the child. This might be a premature exchange of responsibility,” Driscoll says, diplomatically.

But another issue may be that kids just aren’t getting enough education on how to use the pumps properly. With just a short training session with a doctor, diabetes educator, or nurse when they’re first prescribed a pump, people “may not remember or recall correctly what they were supposed to be doing in the first place,” Driscoll says.

If the intense data analysis and coaching kids get as part of the study improve their results—as documented by the data stored in the pumps’ memory chips—it’ll be a promising sign. “If our data show that this level of intervention works, it could lead to policy recommendations that would lead to incorporating this into doctors’ appointments,” Driscoll says. “This would be a nice example of integrating a psychologist or social worker into the process,” a step policy makers call “integrated care.”

No matter what, Driscoll says wearing a pump was a valuable experience for her as a researcher. “I wanted to demonstrate to participants I knew sort of what they were going through,” she says. “I was fortunate because after three days I could just take it off.”