**Podcast 48: Hospital Management of Diabetes**

**Dr. Rita Kalyani, MD:** Welcome to Diabetes Deconstructed, a podcast for people interested in learning more about diabetes. I'm your host, Dr. Rita Kalyani, at Johns Hopkins. We developed this podcast as a companion to our patient guide to diabetes website. If you want a trusted and easy to understand resource for diabetes or to listen to previous podcasts, please visit hopkinsdiabetesinfo.org.

Today we are thrilled to welcome Mihail, also known as "Misha," Zilbermint, who will speak with us about diabetes technologies in the hospital. Misha is an associate professor of clinical medicine in the division of Endocrinology, Diabetes, and Metabolism at Johns Hopkins University School of Medicine. He is the director of Endocrine Hospitalists at the Johns Hopkins Community Physicians; chief and director of the Division of Endocrinology, Diabetes, and Metabolism at Suburban Hospital in Bethesda; and has pioneered the Endocrine Hospitalist Program at Johns Hopkins Medicine following the completion of his endocrine fellowship at the National Institutes of Health. His commitment to innovation has earned his specialized diabetes team the Johns Hopkins Innovations and Clinical Care Award.

Along with Dr. Zilbermint, we also welcome Jordan Spivak, who is the inpatient diabetes educator at Johns Hopkins, Sibley Memorial Hospital, and Suburban Hospital. Jordan has seven years of experience as a registered dietician with clinical experience at Northwestern Medicine in Chicago and now two and a half years at Johns Hopkins. She most recently graduated with her Masters of Science in Clinical Nutrition from the University of Wisconsin–Madison.

Welcome, Misha and Jordan.

**Mihail Zilbermint, MD:** Thank you.

**Jordan Spivak, RD, LDN:** Thanks for having us.

**RK:** We are so excited to learn from you both today about the use of technology in the hospital setting. This may be something that people don't think too much about, but as technology becomes more and more common to use at home, this becomes increasingly a question that I know I hear from my patients: "What do I do with my continuous glucose monitor or insulin pump in the hospital?" We are looking forward to having you both shed some light on that. I wonder if you could start by telling us: why is it important to discuss the use of technology in the hospital in the first place? How common is it?

**MZ:** Thank you, Rita. First of all, we have to acknowledge that diabetes is extremely common in hospitalized patients; about one in four hospital patients have diabetes. Managing blood sugar in a hospital is absolutely critical to prevent complications, to speed up recovery, and, of course, to improve our outcomes. The diabetes technologies transform diabetes care, but hospitals have been slower to adopt these tools compared to some of our outpatient colleagues.

In 2025, the American Diabetes Association standard of care now supported the continued use of continuous glucose monitors and insulin pumps in the hospital when it's

clinically appropriate. Of course, there is proper training, proper protocols, and confirmatory blood glucose checks.

**JS:** As you mentioned, Rita, so many patients that are hospitalized now are already using these continuous glucose monitors and insulin pumps at home. It really does make sense to explore whether they can be used safely in the hospital with where we're at with technology.

I had a patient just a few days ago with type 1 diabetes that was on a CGM at home and had it removed right on admission. It makes sense to explore whether we can replace the sensor for the patient so that they can continue to be involved in their care and have that autonomy. Then furthermore, have it re-set up for them once they get home.

The pandemic also accelerated a lot of interest in remote glucose monitoring. Having nurses cluster their care in a room and being able to see the patient's blood sugars without even having to go into the room. Now more hospitals are integrating those continuous glucose monitors into inpatient care.

**RK:** That is so interesting to hear you both talk about how much this has become a topic to address. You mentioned, Misha, that it has now entered our clinical practice guidelines, the use of technology in the hospital. I think that really does highlight the importance of the topic that we are talking about today.

Jordan, you mentioned the remote monitoring, and it does seem like the hospital setting would lend itself particularly well to the medical staff or the nursing staff being able to remotely monitor blood glucose metrics or other metrics from the technology patients are using in their hospital room. Exciting possibilities for ways that we can really improve and facilitate optimal patient care. When we talk about technology, what kinds of technology are we talking about? And can these be used safely in the hospital?

**MZ:** We know that, as I mentioned previously, the American Diabetes Association now supports the continued use of personal continuous glucose monitors, or CGMs, and also insulin pumps in the hospitals. But what is important here is we clearly need institutional protocols and point-of-care blood glucose confirmations, like finger sticks for insulin dosing and for hypoglycemia detection.

We know that insulin pumps are little tiny machines which can deliver insulin to a human, mostly to people who have diabetes. We call them automated insulin delivery systems—they can also be continued in the hospital when clinically appropriate, but it really depends on the staff training, availability of supplies, and the patient's ability to manage the device.

That's why here at Johns Hopkins, we spend a lot of time meeting with each other; all of the endocrinologists and the diabetes educators from all of the hospitals in Maryland and DC got together to put together a detailed policy in the training documents for the nursing staff to make sure that everyone knows what to do when the person walks into the hospital with either a continuous glucose monitor or an insulin pump.

**JS:** Just to piggyback off of what Misha said, so in our hospital we do allow patients to use their continuous glucose monitors when they're admitted, as long as the traditional finger sticks are still being done by the nurses per our protocol. The continuous glucose monitors are not yet FDA approved for hospital-initiated use, meaning that hospitals can continue their

personal continuous glucose monitors. We're not putting on continuous glucose monitors and saying we're using them by our hospital policy, but if the patient has one when they're admitted, they can continue to use it. We do educate our nurses on that a lot when they're oriented to the hospital and through my education on the units.

We do have a special program here where we can initiate a continuous glucose monitor at the time of discharge as long as the patient meets the predefined criteria. As long as the patient is alert and oriented, we double-check with their insurance coverage for continuous glucose monitors at the time of discharge. That is really just to set them up for success at that time when they get home and educate their family and things like that.

Hybrid monitoring protocols that combine the continuous glucose monitor readings and then those blood sugar checks done by the nurses is really, I think we are finding that is probably the safest approach.

**MZ:** I totally agree with Jordan. For example, we had a patient a few days ago who approached us saying that there is a clear discrepancy between a glucose reading on his personal monitor, his insulin pump, and the finger stick, which nurses are performing. We told him that sensor glucose levels and blood glucose levels are different; they are almost never identical. They are almost never the same because we are measuring slightly different things. I'm sure you discussed in your previous podcast the difference between blood glucose and sensor glucose levels. But what we do encourage all the time—every time a nurse comes in, if your sensor allows a calibration, which means that the patient has to manually enter the glucose number, we definitely encourage you to do it.

**RK:** Those are some really important points that you both brought up in terms of how we can, in practical terms, integrate technology into the management of a patient with diabetes in the hospital. I thought what you mentioned about nursing education really could not be overemphasized. While the person with diabetes has been using this technology, now that they're in the hospital, it's equally as important for the medical team to be familiar with the technology as well.

So much of what happens—and Jordan, I know you do a lot of it in the hospital—is diabetes education. All the technologies are different; all the continuous glucose monitors are different in terms of their features. It's really important to understand how they're used.

I just wanted to clarify a point that you made as well. It sounds like what you're saying is that when people have continuous glucose monitors and if they're able to continue them per hospital policy in the hospital, these don't substitute for the glucose monitoring that the nursing staff would do. It would be a compliment. Is that right?

**MZ:** That is correct.

**RK:** It's giving additional information that might otherwise be missed—how often would you say, otherwise, people get finger sticks in the hospital?

**MZ:** On average, most of the people get at least five finger sticks in the hospital. Some of them get six finger sticks in the hospital. If patients are very ill and they have to be admitted to the intensive care unit, when we have to get insulin directly for their IV line, sometimes we have to do it every hour. In the future, when CGM will be FDA approved to use in the

hospital setting, I think we are looking forward to the time when we do not have to finger prick patients so often.

**RK:** That's a really important point. What do you see as the benefit of continuing these technologies in the hospital? If we could just touch upon that briefly.

**MZ:** I believe that even though we don't have an FDA approval, per se, to use them for insulin decision-making. But what I have found is that patients who use CGM, for example, patients who use CGM in the hospital, are becoming a little bit more aware of their glucose levels—they're a little bit more aware of trends in their glucose levels.

Let's say someone was admitted for a heart attack and now they're waiting for open heart surgery, and we have to receive medication, which is blood thinners such as heparin, which is mixed in dextrose or sugar. While receiving this medication, their glucose starts trending up, and they can alert them or say, "Hey, I feel that my sugar is trending up. Do you mind double-checking or triple-checking the sugar to make sure that we are trending in the right or wrong direction?" That may alert me as an endocrine hospitalist to maybe order a little bit more insulin or just some of another diabetes medication.

**RK:** That is one of the unique features, isn't it, of the continuous glucose monitors—those trend arrows and the ability to see what direction the sugars are going, which you may not get from just a few data points throughout the day. Also, the ability of the patient to be involved in their care, to really have an understanding of what's going on, and perhaps to give a heads-up for instances that may need to be addressed before they become bigger instances. For those who might be listening that are contemplating, why even consider this if it's a hospital setting that does not yet have a policy? I think that's a particularly important point: even as a complementary monitoring to what's standardly done with the finger pricks, it can have value.

We talked about continuing use of continuous glucose monitors upon admission. I wonder if we wanted to talk a little bit about continuing insulin pumps as well upon admission. Are those technologies that are usually continued in the hospital setting? Is it approved to be continued? What do we know about that?

**MZ:** Yes. If clinically appropriate, and hospitals have proper protocols and staff have appropriate training, then, of course, we have to perform confirmatory blood glucose checks. We are strongly encouraging people to use their insulin pumps in the hospital setting. Sometimes patients may need to stop their insulin pumps, for example, if they're critically ill or if they're intubated and have to be admitted to the critical care unit and we are receiving some medications and vasopressors to keep people alive. Obviously, people cannot monitor their own insulin pump, and in those situations, we sometimes discontinue—temporarily—insulin pump use until patients get better. Also, sometimes we know that devices malfunction or if people run out of their supplies, as insulin pumps have to be changed every couple of days. Also, with CGMs, it depends on the type of CGM you have to update it or change it.

If they don't have any supplies, which is frequently the case because, obviously, nobody comes to the hospital because they know they're going to come to the hospital and spend a week here, right? Something emergent happens; a person gets a stroke, and they're being rushed by EMS or 911 to the hospital. To bring additional pump supplies is not the first

thing on people's minds. What I usually do, for example, is I had a patient who had a foot infection the other day, and he came to the hospital just for a quick checkup; he was not feeling well. He had no idea that he had a severe foot infection, so he did not bring any pump supplies, and his insulin pump was running low. My first question to the person was, "Is there anyone in your family who can bring the supplies?" And he said, “You know what? My wife is going to be here in a few hours. Let me call her. She's going to bring supplies.” In that case, given that his insulin pump still had enough insulin, I allowed him to continue it. But if the answer would be, “You know what? I live alone. There is nobody to bring the insulin pump supplies, and my insulin pump is going to run out in the next few hours,” we would advise him to transition to subcutaneous insulin shots.

**JS:** Yes, and I agree. Just to chime in with Dr. Z, I think the main key here is for the patient to let the staff know early that they have an insulin pump or for the staff to find out as soon as possible from a nursing skin check on admission. Just making sure, because I think, as evidenced by what Dr. Z says, that interdisciplinary teamwork is so important for the nurse to notice the insulin pump on the patient. If the patient isn't alert and oriented to tell the nurse that there's an insulin pump. The nurse finding out on the skin check, letting the doctor know and the doctor consulting from endocrinology to come and get the pump setting. It's that whole interdisciplinary teamwork that can help these patients to safely continue to use their technologies on admission when it's appropriate.

**MZ:** I want to add that in our electronic medical records, which we use here at Johns Hopkins, if doctors document the presence of the insulin pump, let's say in their history or on the problem list, then there is a little line that appears on the left side of the chart that says "insulin pump in place." Every single team member, whether it's a nurse, a consultant doctor, or a patient care technologist, will be alerted that this particular person is using the insulin pump.

**RK:** As we're discussing this, I think one of the things to point out is the differentiation from continuing your medications in the hospital. I don't think there is really ever a situation where we say, "Bring your medicine from home, and we'll let you take it in the hospital." Unless it's really a very specialized drug. But even that is a very rare instance.

What we're talking about is a little atypical, what we're saying is that you have a technology you use at home, but you can continue it in the hospital. Part of the reason that this has become more and more of a topic of discussion is because of how good these technologies are in the outpatient setting in helping patients self-manage their diabetes at home.

What would you say is the greatest push to continue these technologies in the hospital? We talked about them briefly with the CGM. What about the insulin pump? Why not just transition to subcutaneous insulin?

**JS:** I would say because the pumps, especially nowadays with the automated insulin delivery systems, know the patient so well that I think the patient oftentimes needs to receive less insulin overall than they may need if we transition them to our own basal bolus protocols.

**MZ:** I want to share one more observation. I've been volunteering at a camp for children with type 1 diabetes, Camp Possibilities, in Darlington, Maryland, since 2013. Many people who live with type 1 diabetes develop an emotional attachment to their devices, including insulin pumps. It is very important for me as a clinician and a physician to recognize these emotional attachments and preserve this relationship between the person who lives with type 1 diabetes or type 2 diabetes and the use of an insulin pump. Therefore, I strongly encourage people who come to the hospital with their insulin pumps to go above and beyond to secure additional supplies, but I strongly encourage them to continue using the insulin pump in the hospital setting.

**RK:** That's an interesting observation that you shared, Misha, and one that makes a lot of sense. You have something that supported your management; it is working well—why rock the boat? I think that's really what this comes down to, that it's facilitated the management as an outpatient; it has flexibility to change settings if needed in the inpatient setting too. I think, Jordan, you mentioned in a more granular way perhaps what we can do in some instances depending on the patient with subcutaneous insulin and may allow us to give doses that more closely match the need for the patient as well.

**MZ:** Yes. At the same time, some people who live with type 1 diabetes or type 2 diabetes or an insulin pump actually want to take a break—and it's okay. We all know about diabetes fatigue or diabetes burnout. People come to the hospital and say, "You know what? I want to take a break." I had a patient who was on an insulin pump for quite a while, and she said, "I think I would like to be managed on insulin shots. I'm going to stop the insulin pump. I trust you, take care of me," and I think it has to be respected as well.

**RK:** That is exactly true. Thank you for bringing that up. It really is a matter of individual preference, and I think that's what we're talking about here today: allowing the person with diabetes to have the option of continuing the technology if they'd like or taking a break if they'd like—really having that option that best meets the needs of the situation at hand.

We talked briefly about guidelines for diabetes technology use in the hospital. I wonder if there was any other information that you both wanted to share regarding current guidelines for the use of both CGMs and insulin pumps in the hospital, both for type 1 and type 2 diabetes.

**MZ:** We know that the latest research shows the use of continuous glucose monitors in the hospital can improve detection of nighttime hypoglycemia, which is low blood sugar, and can also help reduce recurrent low blood sugars.

The American Diabetes Association 2025 Standard of Care guidelines say that CGMs, or continuous glucose monitors, should be continued in the hospital if clinically appropriate and if blood glucose checks are done for confirmation.

The same thing goes for the insulin pump and automated insulin delivery system, which can be continued as long as the patient can manage them. There are situations where patients cannot manage them—they're not well enough, but there is a family member who is by the bedside who can help them out with some of the management.

But the key to success is not just the person who is feeling comfortable with his or her insulin pump or continuous glucose monitor; it is to have trained personnel, trained nursing

staff, and clear protocols in place that can safely integrate that use of diabetes technology into patient care.

**JS:** Yes, that's exactly right, Misha. One of my goals is to really get into our nursing orientations, which we've already done, and the nurses have a whole hour with me to talk about our insulin protocols. But we've also recently added a section on CGMs, just so that the nurses can get comfortable with knowing what these devices look like, what brands there are, and just getting comfortable with how to manage them—not for the patient, but if the patient has it, just knowing what to do with that CGM.

We want to have these structured policies for continuous glucose monitors and insulin pumps that will help us see better glucose control, do fewer finger sticks, and, of course, have that patient-centered care and satisfaction that we were talking about so that they can keep their devices on.

I think our goal is to have the nurses so comfortable with them that they know, "Oh yeah, this is the policy, this is what we do when we see that type of device." To help the patient as best they can to keep those devices on them, if that's what they desire.

**MZ:** Last year, in 2024, our hospital got a grant from one of the companies where we received 70 sensors, and we trained a group of leader nurses from most of the unit and pharmacists and some of the dieticians as well on how to use the CGM. But what's most important, we did not just train them; we created an opportunity where nurses and pharmacists were able to wear a continuous glucose monitor for a week, 10 days, or 14 days. However long they wanted to wear one, so they can not just understand what it's like to wear a continuous glucose monitor. We can also experience it as well, and I strongly encourage other hospitals around the country to participate in those trainings and hands-on experiences as well.

**JS:** I can say as a person not living with diabetes, I feel like I learned the most about continuous glucose monitors when I wore them. That's when you realize how many alerts go off overnight, and you get a sense of how a person living with diabetes might feel—being woken up during the night, having an alarm go off during your meeting because your blood sugar's low, and all those things that you might not think about just taking someone through a tutorial of how to use them. I think having the nurses wear them and live with them, like Misha said, for 10 days to 2 weeks, you can learn a lot about what someone living with diabetes would go through.

**RK:** If the medical condition allows that this is something that could really benefit the patient, that with the nursing staff. It's interesting to hear about the pilot program you had where the nursing and medical staff were able to wear it themselves so that they too could understand more about this technology.

I'm just curious; part of the hesitation perhaps about continuing these technologies in the hospital may be due to the patient's reason for admission—that it may be unpredictable and that it may lead to challenges in management if the patient's condition is not stable. I'm just curious, what situations, if you could give us examples, might lend themselves well to continuing these technologies in the hospital or, conversely, such as the ICU setting, I would imagine it might be more challenging to continue an insulin pump if someone's intubated. I wonder if you might be able to give a brief insight into situations when these could be considered or not considered.

**MZ:** Most commonly patients ask me, “Can I wear an insulin pump during the surgery?” My answer is I quickly often get a phone call from a pre-op (pre-op stands for preoperative evaluation) department, which consists of excellent nurses who evaluate the patients prior to their scheduled surgeries. My answer for the nursing staff is, “It depends.” If a person with diabetes who is wearing an insulin pump is under anesthesia and unable to self-manage, and the procedure lasts a long time, let's say it's open heart surgery, they should probably discontinue the insulin pump. Remember that the surgical stress and some of the medications that are administered during the big surgery can impact blood sugars in quite unpredictable ways.

Sometimes patients require vasopressors or medication, which supports their blood pressures, and in those cases intravenous insulin, which is the insulin administered directly into their vein, is probably the safest method to provide good glucose control during those procedures. And Jordan, do you want to talk about some of the minor procedures?

**JS:** For a lot of the minor procedures, where patients might be awake or asleep for a short period of time, some hospitals may allow for their insulin pumps to continue to be on them and working. Our hospital is one of those. But we do recommend that patients talk to their surgical team in advance to discuss the options for whatever equipment they might have. I have meetings with our pre-surgical staff all the time just to talk about their pre-op management of the blood sugars, and so it's really best to communicate with them so they can tailor the specific recommendations for the patient based off of the surgery they're going to get.

**RK:** It sounds like it is a discussion between the patient and the team to understand the needs of the surgery, how long the surgery will be, and whether it'll be more beneficial or not as beneficial to continue it during that aspect.

**MZ:** Sometimes surgeons may not have an answer to this because it's really the anesthesiologists who are making the decision whether the insulin pump should be continuing during a particular surgery. Kindly ask the surgeon to connect with the anesthesiologist and quickly discuss it. Of course, if you're admitted to one of the Johns Hopkins Hospitals, there is also, usually, an endocrinologist who is involved in the care. I ask our pre-op team, "Hey, send me a quick message." And if there is a person, and they have a question about whether to continue or not, I'll come and help out.

**RK:** That's an important point. Thank you for bringing it up. It is definitely important to have coordinated care among everyone on the team: the surgeon, the anesthesiologist, the endocrinologist, the primary team, the nursing staff, and, of course, at the center, the patient.

We've talked a lot about people who've been on these technologies before they came into the hospital and continuing them. But what about patients who might have heard of these technologies? Perhaps they hadn't really had a chance to talk about it with their provider, or maybe they just weren't familiar with them. This seems to be an opportunity in the hospital setting to provide education and also to discuss the opportunity or possibility of starting technologies, particularly continuous glucose monitors, I think is what we're talking about here. Insulin pumps might need a more intricate discussion to start as an outpatient, but for those who might want to consider the continuous glucose monitor in the hospital, can this occur? Would it be something that, in your experience, you recommend, and how can we have success for those that do start it in the hospital once they leave?

**MZ:** I want to say absolutely. Whenever possible and whenever I suspect that a person's health insurance is going to cover a continuous glucose monitor, I try to allow people who live with diabetes to at least experience a continuous glucose monitor at the time of discharge. What we do is we participate in the CGM on discharge program where, when we know the patient is ready to be discharged in the next 24 to 48 hours and they fit a particular criteria, what usually happens is I ask the patient, "Hey, would you like to try a continuous glucose monitor? I think it really can help you to control your sugars in outpatient." Then I call Jordan.

**JS:** Yes, that's where I come in, or any diabetes educator. It's a unique opportunity, I think, in that 24 to 48 hours before they go home, for what our hospital does. You can bring in demonstration sensors for the patient to feel and touch and say, "This is what it'll look like when it's on your arm." Then download the app—"Let's set it up. Let's create an account for you." Then once it's downloaded, we can walk them through and say, "This is where your logbook is going to be." You can really do a step-by-step tutorial with them, not only putting their first sensor on for them but then setting up the entire app, which for a lot of patients, once they get home from the hospital, they might not want to do on their own, which is totally understandable—they just got home from a long hospital stay, and they're exhausted. The last thing they probably want to think about is what to do with their new CGM.

Rather than just giving them the box and saying, "Okay, here it is, best of luck. Pick it up at your pharmacy." Really going through that step-by-step process with them and showing them how it works, I think, is beneficial to give the patient that autonomy. I see patients all the time with family members at the bedside who are there to help them, and we can help them set up. With the apps that have been created, the patient has their alerts on, but then the family members also get notified when the patient's blood sugar is low or high. It creates a safer environment for patients, and I think it really just tees them up for success when they leave.

**MZ:** I'll share an anecdote. We had a patient last week who came to the hospital because of nausea and vomiting, and he was found to have a hyperglycemic crisis. We hydrated him. He was feeling better, but because his diabetes was so uncontrolled, we were essentially forced to suggest starting insulin, even though it's not our first-line therapy, but we started insulin. The person was quite anxious; he had never checked his glucose before. I suspected, and I checked his insurance; we ran his insurance, and it sounded like it would be covering the continuous glucose monitors. I called Jordan, and she came and set it up. The patient was very happy, and then a few days later, we were able to schedule him for the diabetes health management training program with an outpatient diabetes educator. She, the outpatient diabetes educator, was already able to download the data from the previous few days and insert it into the chart and shared it with other practitioners in our practice, which was absolutely terrific.

**RK:** That's a wonderful story and highlights the importance of having data in order to make management decisions. As we mentioned before, even the alerts for someone who's at risk for some of these really severe complications, such as hyperosmolar hyperglycemic syndrome or even DKA, to be alerted to high blood glucose numbers before they enter the hospital could have tremendous value. I think it's important to emphasize that we really are talking about giving patients options here. When we talk about the use of technology, some people may prefer not to use the technology.

But we know for those that do choose to use them, particularly those with type 1 diabetes, there has been a lot of evidence to support their potential benefits even in people with type 2 diabetes on insulin and now emerging evidence for people even not on insulin. I think this is an ongoing conversation, but an individualized conversation, as we talked about, might depend on the preferences of the patient and their particular situation.

Moving a little bit now to a separate but related topic, we talked about diabetes technology and really from the perspective of the person living with diabetes or admitted to the hospital. But what about from a population level or a health system level? How can the use of diabetes technology impact quality of care in the hospital setting?

**MZ:** I think it's a wonderful question, and I'm looking forward to learning more as more research comes on this particular topic. The way I envision that is that CMS (which is the Centers for Medicare and Medicaid Services) announced a few years ago that they're going to track severe hyperglycemia, which is high blood sugar (more than 300), and severe insulin-induced hypoglycemia (glucose less than 40) and just keep an eye on that. The hospitals that are not reporting by 2026 are going to be penalized. I suspect that in the next few years hospitals that are really the outliers, hospitals that, let's say, have too much of the severe hyperglycemia, may even be penalized by Medicare for not performing well, and that's where the technology is going to come into place.

Just think about it: if you can get FDA approval for the use of CGMs in the hospital, we can maybe reduce the need for the finger sticks. We can get a more real-time glucose trend. Maybe we'll be able to detect more "silent low blood sugars." Quite often people go to sleep at night with a glucose which is 150, which is normal in a hospital setting. Then we may develop low blood sugar, but unless you check it, nobody knows about it. Some people may have a lot of glucose variability when patients' sugars go up and down, and of course you will never know about this unless you have the trend; you have the data.

Finally, a lot of people think about the quality of care from the perspective of "sugar number this, sugar number that, numbers..." I don't believe that the quality of care lies in an actual number. It's all about improving the patient's comfort and enhancing the patient's experience while they're in the hospital.

**RK:** That's so important, and I think you're absolutely right. It's not just the numbers, the A1C or the sugar number. It's really the quality of the experience, the patient care experience. It sounds like having more data; detecting these otherwise silent or missed episodes of hypoglycemia, that could be asymptomatic, especially in people with longstanding diabetes; this gives us more information in terms of how the interventions we're using in the hospital are impacting the medical care of the person with diabetes. It's an emerging area. I'm sure we'll learn more in the time to come, but one where I think we will see technology marry quite closely with quality of care goals in the hospital.

We talked a little bit about the importance of education, especially for healthcare providers and nursing staff in the hospital, to ensure the safe use of diabetes technologies and also education for patients. I wonder if we could just briefly talk about what we mean when we say "education." Are there certain aspects that Jordan, you especially, I'm imagining, spend your time educating individuals about?

**JS: A**bsolutely. Within the American Diabetes Association and the Association of Diabetes Care and Education Specialists, there's what we call the seven diabetes self-care behaviors, which I think is really what our education focuses on in the hospital. Whether it's monitoring your blood sugar, healthy eating, or medication adjustments, these are all things that someone living with diabetes often experiences changes with when they're in the hospital, especially

medications. If they're admitted and their A1C has gone up since the last time they were seen by a doctor, and now we're changing all their medications and the nurses are busy and the doctors are busy. The educator is there to sit down with the patient and say, “Hey, this is what's going to change once you get home. This is how you're going to give yourself the medication, how many times a week,” all those specific details that can be a lot to manage. As Misha mentioned, diabetes distress is a real thing—I think a lot of patients that we see in the hospital are extremely overwhelmed, whether they're newly diagnosed or they've had diabetes for 20 years.

To get back to the question, I think diabetes education really is focused on so many different areas, but the educator is really there to help break it down and figure out what the patient needs to focus on. Like we talked about before, it's very individualized. A patient might be really comfortable with their nutrition plan and checking their blood sugar with finger sticks, but maybe medication compliance is difficult for them. The educator can focus on those individual facets of diabetes education with them.

**RK:** There's so much that could be potentially covered; it could take a long time. But I think those priority areas, the seven topics that we emphasize in diabetes self-management education and support programs, or DSMES, are particularly valuable.

It's an ongoing process, and it's just the start in the hospital, but it does lay a nice framework for integrating the use of these technologies and making sure everyone feels comfortable and familiar with them.

Just a parting word: we cannot talk about technology for diabetes without talking about the technologies that we use for our patients in general, which are electronic medical records. I know that in the outpatient setting, in the clinic setting, we can often download data from continuous glucose monitors or insulin pumps, for instance, into our electronic medical records. What about in the hospital setting? How straightforward or easy is it in that setting?

**MZ:** That's an amazing question because we are not there yet, but we are working on this. The Johns Hopkins Health System is in the final stages of integrating our electronic medical records with the data that accumulated from the continuous glucose monitor. A provider or a physician would be able to send a quick electronic message through the MyChart app to the person who is wearing a continuous glucose monitor and sign a consent form, and the data will flow into our electronic medical records, but we are not there yet. It's coming, but we are not there yet.

**RK:** How neat would that be, you imagine seeing these screens in the hospital with the vital signs, the cardiac monitor, the oxygen monitor, to see the glucose patterns superimposed or overlaid on that? I think we're just talking about more data, more information, and more ways for us to better understand how the patient's medical condition is evolving and responding to the treatments that we give in the hospital setting. More to come, but very exciting.

**MZ:** My dream would be to have CGM telemetry in our hospital where nurses would just have to have a glance, and we'll have all the patients connected to continuous glucose monitors and to see where the trends are.

**RK:** Wow, wouldn't that be so neat? I can't wait for the future. That sounds so exciting. I just wonder, Misha and Jordan, we've covered so much ground today, and it has been so great to hear about all the different ways that diabetes technology, particularly continuous glucose monitors and insulin pumps, for those who are already wearing them at home, can be safely integrated into the hospital setting. But with the caveat that it depends on the individual, it

depends on the condition, and it depends on the hospital setting and familiarity of the nursing staff. Then also the opportunity to start continuous glucose monitors for the first time for those who may be considered good candidates or are interested in the hospital setting.

For our listeners who may be interested in learning more about how they can continue to use these technologies in the hospital or whether their hospitals even allow this, what would you recommend?

**MZ:** At the time of that admission, when we're coming to the emergency room, please check in to see if they have an endocrinologist on staff who would be able to help out and be consulted. We are always happy to talk to people and help them with diabetes technology.

**RK:** Thank you again Dr. Misha Zilbermint, and Jordan Spivak. It's been such a pleasure to have you both in our podcast, and we truly appreciate all your expertise and input today.

**MZ:** Thank you

**JS:** Thank you.

**RK:** I am Dr. Rita Kalyani, and you've been listening to Diabetes Deconstructed. We developed this podcast as a companion to our Patient Guide to Diabetes website. Our vision is to provide a trusted and reliable resource based on the latest evidence that people affected by diabetes can use to live healthier lives.

For more information, visit hopkinsdiabetesinfo.org.

We love to hear from our listeners. The email address is hopkinsdiabetesinfo@jhmi.edu.

Thanks for listening. Be well and see you next time.