

# AHEAD Podcast 6 – Glucose Monitoring in Adults With Type 2 Diabetes

## Transcript

[Jazzy instrumental intro music]

**[Voiceover] Michael Konstan:** Welcome to the AHEAD Initiative podcast series focused on sharing evidence-based practical strategies to improve diabetes outcomes and advance diabetes health equity. I'm Dr. Michael Konstan from Case Western Reserve University School of Medicine, and I serve as a principal investigator for the Northeast Ohio Quality Improvement Hub, a collaboration of Case Western Reserve University with Northeast Ohio Medical University. The Northeast Ohio QI Hub is funded by the Ohio Department of Medicaid and provides quality improvement infrastructure for primary care clinics in our region. We hope you enjoy today's ahead initiative podcast.

**Andrew Harris:** Welcome to our AHEAD podcast series for the Northeast Ohio Quality Improvement Hub. My name is Dr. Andrew Harris, and I am a primary care physician and director of systems improvement for primary care at the Northeast Ohio Veterans Affairs Healthcare System as well as an assistant professor of medicine at Case Western Reserve University. I am delighted to talk with Dr. Betul Hatipoglu today about glucose monitoring. Dr. Hatipoglu is the center director for diabetes and metabolic care at University Hospitals and professor of medicine at Case Western Reserve University as well as the endocrinology lead for the AHEAD initiative. Thanks for joining us for this discussion.

**Betul Hatipoglu:** I am excited to talk with you today.

**Andrew:** Okay, so let's start our conversation by discussing how we should think about blood glucose monitoring in the larger context of diabetes technology advancements.

**Betul:** This is a great start. Because blood glucose monitoring has advanced and changed very fast the last three four decades. It's really important to briefly look at what the term diabetes technology is really used for as it includes a larger definition than just glucose monitoring devices. This term includes the hardware devices and software that people with diabetes use to assist with self-management. This even includes lifestyle modifications to glucose monitoring and therapy adjustments. It's important to know diabetes technology includes smart pens, patch devices or pumps and blood glucose monitoring or continuous glucose monitoring and has also expanded to include automated insulin delivery systems.

**Andrew:** It really looks like this is an expanding field. Before we discuss continuous glucose monitoring, can you briefly review the evidence for glucose monitoring in adults with type 2 diabetes who are not well controlled?

**Betul:** It's a great question, Andrew. We have major clinical trials of insulin treated people with diabetes that have included blood glucose monitoring as part of interventions to demonstrate the benefit of intensive glycemic management. So, blood glucose monitoring is an integral component of effective therapy for individuals using insulin. Glucose monitoring allows people with diabetes to evaluate their individual responses to therapy and assess whether glycemic goals are being safely achieved.

**Andrew:** You mentioned a benefit for intensive glycemic management. What is the evidence for blood glucose monitoring in adults with type 2 diabetes on only long-acting basal insulin?

**Betul:** Yes, the evidence is insufficient meaning the data is lacking regarding when to prescribe blood glucose monitoring and how often monitoring is needed for insulin treated people with diabetes who do not use intensive insulin therapy such as those with type 2 diabetes taking basal insulin with or without oral agents for example and or non-insulin injectable agents. However, the scarce evidence for those taking basal insulin supports assessing fasting glucose with blood glucose monitor to inform those adjustments to achieve blood glucose targets and to lower hemoglobin A1C levels.

**Andrew:** What about in adults with type 2 diabetes not taking any insulin?

**Betul:** Great question. In people with type 2 diabetes not taking insulin, routine glucose monitoring may be of limited additional clinical benefit. By itself, even when combined with education, this practice has shown limited improvement in outcomes such as A1C lowering. However, for individuals such as those with uncontrolled A1Cs, glucose monitoring can provide insight into the impact of nutrition, physical activity and medication management on glucose levels. Meta-analysis, for example, have suggested that blood glucose monitoring can reduce A1C levels up to 3% at 6 months. Clinically significant number, but the effect was attenuated at 12 months in one analysis. So, reduction in A1C levels were greater in trials with structured blood glucose monitoring data were used to adjust medications. So, if you don't use the information don't expect much effect to the patient care. A1C levels were not changed significantly in these cases without intervention to the information. So, glucose monitoring may also be useful in assessing hypoglycemia. So, it's not only A1C decrease that you need to really pay attention to is about hypoglycemia as well. So, glucose levels during illnesses that you might need information important in these cases or discrepancies between measured A1C and glucose levels. When there is a concern, I think that we need to go back about glucose monitoring.

**Andrew:** Okay. So, to sum up, you're saying that most patients with type 2 diabetes do not need regular glucose monitoring, especially if they are well-controlled and low risk for hypoglycemia.

**Betul:** That is correct. If they are well-controlled, they are low risk for hypoglycemia, then it is not mandatory.

**Andrew:** I think this may be a big relief to many providers and patients since regular glucose monitoring can be burdensome and expensive. I'm curious, when do you recommend blood glucose monitoring to non-insulin users? Do you recommend checking fasting or postprandial glucose or a mixture of both and how often?

**Betul:** This is an excellent question, Dr. Harris. So, usually, as we discussed, anyone who's not controlled, who might have some intercurrent illness, someone that you see A1C is high or low, you cannot make sense of their clinical picture is telling us, then I would say I go ahead and recommend them to start checking their blood sugars. It's usually more helpful if they can check blood sugar at least once during the week before meals and once two hours after a meal. So, I would say check once a day. One day before breakfast, one day before lunch, one day before dinner, one day two hours after breakfast. So, changing the time they are monitoring and giving them option that is maybe just once a day or few times a week that might be enough for you to get what you need as information.

**Andrew:** Okay, that's extremely helpful. Now that we've covered some of the basics of blood glucose monitoring, I want to transition to talking about continuous glucose monitoring. First off, what's the difference between real time continuous glucose monitoring and intermittent continuous glucose monitoring?

**Betul:** We are extremely lucky to have continuous glucose monitors the patient can wear. They use their smartphones or a device called reader and can see their pattern throughout the day without the need for finger stick based on continuous glucose monitor type. Users can monitor glucose in real time or by intermittently scanning a glucose sensor with a reader. So that's the difference between the two. Honestly, the scanning models are older versions. We are seeing them available less commonly. However, some of the previous older studies we have in the literature use this kind as they were the first available. So, it's important to be aware of this subtype where patients had to scan almost activate the device by reading their blood glucose sugars. Scanning needed to be done or still needs to be done at least two to three times a day for the device to provide uninterrupted readings and more you do more is better. I have some patients who are so much obsessed with it that they might do it like 50 times a day. So, you get much better readings with that report with that otherwise the device would go to sleep or stop reading the blood glucose. So, the newest versions continuously feeds the information without need to scan the device and can alert you when glucose is rising too fast or falling rapidly or when glucose hits a high or a low limit. Giving advanced warning to prevent lows or highs for the patient. These glucose readers also include important information that we call time in range that you might be familiar with. This is the amount of time the patient spends with glucose that is within target and ideally we want that to be more than 70%. Through wireless capability, some brands of CGMs connect via Bluetooth to compatible smart devices including phones and insulin pumps. So, this connectivity when paired to a for example hybrid closed loop pump allows the pump to utilize CGM data to adjust or even completely stop insulin delivery based on glucose. This is to me is a miraculous usage of these devices for the safety of our patients.

**Andrew:** Yes, that is that's truly incredible. I'm curious again, when would you use the real time or the intermittent continuous glucose monitors?

**Betul:** So, real time usually requires a smartphone technology, Dr. Harris, we sometimes have to use the intermittent scanning version if patient don't have access to a smartphone. Although the newer versions now provides for some of our patients a reader. So, this might not be the case in the very near future. The data comparing them the real time versus intermittent was done in adults with type 1 diabetes and the primary outcome was a reduction in time spent in hypoglycemia and the continuous one the real time showed greater benefit compared to intermittent one. So honestly, as much as possible, we go for real time monitoring unless you have patients who don't have smartphone technology or you have someone who's very

motivated to scan device several times a day or that they are low risk for hypoglycemia. And your main goal is to know how they are doing with the food, how they are doing with the exercise rather than really managing the hypoglycemic burden.

**Andrew:** What is the evidence for continuous glucose monitoring in adults with type 2 diabetes and when is it indicated?

**Betul:** So, in earlier studies that used intermittent monitoring devices, this have shown minimal A1C improvement in population with type two treated even with intensive insulin therapy. However, it's important to note the use of these devices has been associated with significant reduction in hypoglycemia. So, it's not only about hemoglobin A1C is about safety of our patients. As you know hypoglycemia is a very important outcome and barrier to treatment. In the replace trial for example a significant reduction in time spent in hypoglycemia was noted among 149 adults with type two diabetes using the continuous glucose monitor versus the 75 participants using just intermittent blood glucose checking the finger stick. The difference was around 43% reduction in time below the range between the treatment groups. Additionally, the continuous glucose monitor users had a reduction 54% nighttime hypoglycemia. This is huge huge safety compared to the other group. So, these decreases were sustained throughout the six months follow-up study. So, the use of continuous glucose monitor has also been shown to improve treatment satisfaction within this population and may lead to an improved glycemic status without even increasing the frequency of hypoglycemia. So, there are some retrospective data from VA the veteran affairs population with type 1 and type 2 diabetes treated with insulin that show that the use of continuous glucose monitoring significantly lowered A1C levels and reduce rates of emergency department visits or hospitalizations for hypoglycemia. Now it did not significantly lower overall rates of emergency department visits, hospitalization or hyperglycemia. So, this means that if someone went to the hospital or emergency room for congestive heart failure, they still did but hypoglycemia wasn't the reason for it. Currently evidence-based recommendations suggest the benefit of these devices and recommend that they should be used in type 2 diabetes with basal insulin only or even non-insulin therapies to help manage the medications and prevent hypoglycemia.

**Andrew:** So, what if your patient with type 2 diabetes would benefit from continuous glucose monitoring but doesn't have coverage for continuous glucose monitoring? What are the options for that patient?

**Betul:** This is an excellent question. Although the use of CGM is the preferred method for glucose monitoring in individuals like we discussed about who would benefit such as insulin therapy. Many individuals may not be ready to transition from an old way to this technology. Others may be unable to use CGM due to physical or cognitive limitations or as you mentioned cost can be an issue. So, these individuals would therefore benefit from using the structured blood glucose monitoring that we are used to like with the meters and finger sticks. Even the ability to use this older way sometimes may be limited. If a patient has tremors for example or they had a stroke and they have neurologic deficits or visual impairment is a huge thing for our diabetes individuals with retinopathy for example. So, we did not discuss the professional continuous glucose monitor devices earlier. So, this is a great opportunity for me to mention this here. These are like outpatient holter monitoring or blood pressure monitoring. They are done at the office and brought back to the office or downloaded via cloud and built professionally like EKG or holter interpretation is done. They were widely used when we did not have easy access to personal CGMs in old days, but they are still useful by providing sometimes retrospective

data. This can be retrospective if it's blinded for example patient cannot see real time results. It can be unblinded. There are devices that we use today that patient can see their blood sugars and pattern while wearing it. For analysis, we can use to identify patterns of hypo or hyperglycemia and recommend back to the providers. For example, what we think needs to be done for the patient's care. So, professional CGM can be helpful to evaluate an individual's glucose levels when either they cannot have their personal ones and maybe they prefer blinded analysis or they like to have a shorter experience for example. It can be particularly useful in individuals using agents that can cause hypoglycemia even think about sulfonylurea for example as the data can be used to evaluate periods of hypoglycemia and make medication adjustment if needed. It can also be useful to evaluate periods of hyperglycemia maybe after meals that you can really change the regimen and help the patient.

**Andrew:** So, with all the different methods of monitoring blood glucose, how would you recommend primary care practices put routine glucose monitoring into their practice?

**Betul:** Of course, the practice caregivers will decide the best method for their patients is the CGM or more classic finger stick. I highly recommend training a point person who is knowledgeable on these different technologies to support the practice if the practice does not have access to diabetes educators. Dedicated point staff who is able to educate the patients follow up with them to ensure everything is working and implement treatment changes is key to success. Without implementation of treatment adjustments like we discussed before, these methods won't be fully beneficial.

**Andrew:** So, what are some ways that patients can share glucometer or continuous glucose monitoring data with providers to make changes?

**Betul:** There are different methods of sharing the results. Devices such as Dexcom, Libre 2 or Libre 3 for example, they store the data in a cloud-based website. So anytime providers can access via secure password protected site and see and interpret the data and connect to the patient. Some programs also provides with programs such as Glooko or Tidepool that when you log in you can see all your patients who are wearing different kinds all together. Dexcom Libre 3 for example you can see all the reports and that might be helpful too.

**Andrew:** How many sugars are needed to make changes in regimens for people on insulin? So, for example if you had a patient that had difficulty getting their sugars to you what's the minimum amount of data you could use to make changes in medications?

**Betul:** This is also a very good question. In general, for continuous glucose monitoring data, we really feel 72 hours of good quality data is enough to make any changes. For the finger blood glucose monitoring, 3 days of four times a day blood glucose point results will help to make enough information so we can change the medications.

**Andrew:** And what are some of the key things providers need to do with their patients when starting continuous glucose monitoring?

**Betul:** It's really important to have a pre-CGM work giving patients their options. They really have to buy into it, right? They are the ones who are going to use it. They have to understand. You should really make sure you go over the information with them. Getting the staff educated so that they can educate and start the patient on these tools and providing samples when

feasible is actually great. So, they taste it before they go and invest in it. Also reviewing data for pattern management post CGM is very important in between visits. So having a team member like a PharmD or perhaps a nurse practitioner for example that can support the practice is crucial.

**Andrew:** So, several years ago when I was first learning about continuous glucose monitoring, I was under the impression that they needed to be calibrated against fingerstick glucose. Is that still the case?

**Betul:** Not for the most common ones that we have in the market currently. That's an excellent question. You're absolutely correct. We came from dinosaur ages to what we have today. We did not include one type of continuous glucose monitor which is not very widely used because it's a procedure. You have to place it in office space under the skin called Eversense and that still needs calibration. But the rest of our continuous glucose monitor devices that primary care or endocrinology currently uses, we don't necessarily have to. However, we do recommend the patient if they feel like something is not matching, they are seeing a low sugar, but they are feeling perfectly fine, it's best to check the finger stick and then enter it to the device.

**Andrew:** Okay, thank you. Another question that comes up a lot is a patient, for example, they may or may not be on insulin, but they just don't want to check their blood sugars. They don't like doing finger sticks. They have the impression that it would be easier to have a continuous glucose monitor. Do you think that that's an appropriate way to think about it for some people that don't want to or can't do finger sticks that maybe it's less invasive or is that a misconception?

**Betul:** No, I think first of all a lot of different studies did show the satisfaction is so much higher with these devices. And when you think about our nurses, for example, my nurses who are dealing and living with type 1 diabetes, how inconvenient and indeed maybe even not sanitary to stop and check their blood sugars when they are taking care of patients, for example, or if someone is outside shopping, doing errands, running errands and they have to check their sugars for example and that might not be always very practical. The other part is when they are driving. I find that extremely dangerous not to know your blood sugar before you start driving, especially if you're on insulin, even if it's once a day insulin. And how many of our patients would be willing to do their blood sugars before and after each time they get in front of a wheel? So, I agree with their suggestions and utilizing these devices to improve safety of the patients, safety of the communities as well as making it easier and more sanitary honestly for general public and for themselves.

**Andrew:** That's very helpful. So maybe a different way to think about it as providers is that even though sometimes the evidence might be mixed in terms of your A1C outcomes, there does seem to be a clear and consistent benefit for safety and ease of use for patients. Is that a correct way to think about it?

**Betul:** Absolutely. And as we started to use CGMs more and more in patient care, we realized A1C is just the tip of the iceberg. The story behind it is so much larger and bigger and these devices are giving that to us. What is the highs? What is the lows? When are they happening? When patient is sleeping, what is happening to their blood sugars? These are not going to be seen with hemoglobin A1C.

**Andrew:** Wow. This has truly been a fascinating conversation. I appreciate it so much. I was hoping maybe you could go over some key takeaways for our listeners.

**Betul:** Think about continuous glucose monitor in any patient on insulin. Please, and any patient who's not controlled consider continuous models without the need to scan. If patient has access to smartphone technology, any patient with diabetes is eligible for professional continuous glucose monitor. If you need information to adjust the medications or understand if any hypoglycemia is occurring or help them get motivated, you can easily access it.

**Andrew:** Well, once again, thank you, Dr. Hatipoglu, for talking with me today about glucose monitoring options for adults with type 2 diabetes.

**Betul:** Thank you for having me. I enjoyed our conversation.

**Andrew:** And thank you to our listeners for listening to the AHEAD podcast. Subscribe on your favorite podcast platform so you never miss an episode.

**[Voiceover] Michael:** This concludes today's AHEAD Initiative podcast. To learn more about the Northeast Ohio QI hub, visit [neoqihub.org](http://neoqihub.org). The Northeast Ohio QI hub is part of the regional quality improvement hub project, funded by the Ohio Department of Medicaid, and administered by the Ohio Colleges of Medicine Government Resource Center. Views stated in this podcast are those of the presenters only, and are not to be attributed to the Ohio Department of Medicaid or to the federal Medicaid program.

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