Podcast 49: Diabetes and Aging

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 Dr. Scott Pilla, who will speak with us about diabetes and aging. Dr. Pilla is an assistant professor of medicine in the division of General Internal Medicine at Johns Hopkins. He completed his Doctor of Medicine (MD) degree at Rutgers Robert Wood Johnson Medical School, and his residency at Johns Hopkins Bayview.

He also completed his clinical investigation fellowship in general internal medicine at the Johns Hopkins Hospital. Dr. Pilla is a practicing general internist with research on the management of type 2 diabetes and aging with a focus on individualizing diabetes treatment to account for the preferences and needs of older adults.

Welcome Dr. Pilla.

Scott Pilla, MD, MHS: Great to be here.

RK: We are so glad to have you here. This is a topic, diabetes in older adults, that we know will become increasingly more important as the population ages both in the United States and around the world. I was wondering if you could, first off, talk to us about why it is important to talk about diabetes and aging. What is it that makes this population unique that we need to address today?

SP: That is a great place to start. The first thing I think about is just how common diabetes is in older people. It is up to about one-third of older adults in the United States who have diabetes, so the prevalence of it is very high.

But what makes it both interesting and challenging is how heterogeneous it is, by which I mean how different people with diabetes are, who are aging, and how it impacts their lives differently. One of the things that we are still trying to understand about diabetes and aging is why some people get diabetes as older adults and are able to control it very well, and it doesn't impact their life very much, while other people go on to have a lot of serious complications from diabetes, and it affects them quite dramatically. Those differences are an important place to start and an important thing to understand, both as a doctor treating older adults with diabetes and as a patient.

RK: It is really interesting. A few of the things that you mentioned are the heterogeneity of the population, which I think we'll get to probably later in our discussion. You also mentioned that diabetes is more common in older adults. I wonder if you could maybe share with us some of the epidemiology and maybe give us some insights into why that might be.

SP: Diabetes really is a disease of aging because it gets more and more common the older that you get. It is unusual to have diabetes, type 2 diabetes at least, as a younger person—although we are seeing that because of issues with the obesity epidemic becoming more prevalent, younger people are getting diabetes as well.

But there's something about the physiology of how your body regulates blood sugar: you just lose the ability to keep it under as good control the older that you get. As I was mentioning before, a lot of the time this manifests as a very slow progression from normal blood sugar to mildly elevated blood sugar that we call pre-diabetes to diabetes. This slow process is something that is often picked up by doctors and taken good care of, but occasionally, we get people who progress to diabetes very quickly. We are still trying to understand how that works.

In general, the epidemiology of diabetes is that the older you are, the higher your risk of diabetes. As I mentioned, up to about one third of older people actually have diabetes—this is part of the way that diabetes manifests with age.

RK: Wow, one-third—so one in three older adults. We did not define what we mean by older adults here, but what would you consider it? I know there are multiple ages you could use; when we are talking about these statistics, what is the age that is usually used?

SP: For these statistics, it is usually a cutoff of about age 65. Again, that is a very important point of complexity because we know when you turn 65, your body does not just suddenly change. Someone who is 65 may be very different from someone else who's 65. If you are very active and you have good function and you are keeping up with your health, you can be as healthy as you were back in your fifties. That does not apply to everybody, unfortunately.

RK: I agree it is a nuanced discussion, but commonly it sounds like 65 and over. So one in three adults are living with diabetes over the age of 65. What about pre-diabetes? Is that also more common in the older adult population?

SP: Yeah, it really is as well. We see the whole spectrum of blood sugar get shifted up as you get older. So pre-diabetes is mildly elevated blood sugar. We define it typically based on this measure called the hemoglobin A1C level, which I know all of our diabetes researchers are very familiar with. But for people listening to the podcast who aren't familiar with that level:

5.7 to 6.4 means you have pre-diabetes.

6.5 and higher means you have diabetes.

That level, 5.7 to 6.4, is a very complicated discussion of exactly what that means when older adults go into that pre-diabetes range. The epidemiology of it is that it is extremely common. If we combine diabetes and pre-diabetes together, the majority of older adults have one or the other.

RK: It sounds like if you put pre-diabetes and diabetes together, it is something like three out of four older adults have some form of glucose abnormality. That's huge; that's a high number.

SP: When you think about it that way, it is the minority of people who have normal glucose when they are older.

RK: That's right. We have talked a little bit in the past about insulin resistance, and not to go into too much detail here, but I was just curious: since we do see so much pre-diabetes and diabetes in older adults, with this idea of insulin resistance, is this related to having more insulin resistance as people get older?

SP: I am going to be honest; I don't know exactly how that physiology changes between when younger adults get diabetes and when older adults get diabetes. Generally, when we think about how diabetes develops, the first thing that happens is insulin resistance. The first change you could measure from normal is that the body needs to release more insulin to keep the blood sugar normal. Then as it progresses, the body is not able to release enough insulin to keep up with that resistance, and then the blood sugar starts to rise. That usually occurs over a period of years to decades. But I'm not sure whether that transition happens differently in older people versus younger people.

RK: Yeah, I think with the progression from pre-diabetes to diabetes, there have been various studies suggesting that that progression might be different in older adults; perhaps they can flip back to normal glucose status. I know in some of the work that we have come across that insulin resistance does seem to be more common in older adults, whether that's with inflammation or just the body composition changes and hormonal changes that occur with aging. It is an interesting topic for another time, but there do seem potentially to be physiological reasons, perhaps with aging, why individuals might be more likely to have pre-diabetes or diabetes.

You talked about the age of diagnosis, and I thought it was an important point you made that we are seeing more type 2 diabetes in younger adults, but really diabetes is a disease of aging. That heterogeneity you talked about—the age by which people get diagnosed—is there a difference when people get diagnosed, let's say in midlife versus in older age, in terms of their complication risk? Why the difference? Why the heterogeneity?

SP: There are some important points there. When I'm seeing people with diabetes, I put people into a much higher risk category when they have diabetes at a younger age because, for one, they are going to be living with high blood sugar for much longer. We know the way that blood sugar damages your blood vessels and your heart and your kidneys is—year after year—causing slowly accumulating damage. So when you are diagnosed with diabetes earlier, there is much more time for that to happen, and, at the same time, there is much more of an opportunity to prevent those complications because you have a longer time to intervene. I think the other thing about people who get diabetes at an earlier age is that I do worry. We do see a lot of people who have more severe diabetes related to other severe metabolic problems. Being overweight or obese, having really high cholesterol, or having other things that are related to your metabolic risk and your risk of outcomes like heart disease. If we look epidemiologically, people who get diabetes at an earlier age are much more likely to develop complications of diabetes. Whereas people who get diabetes when they're older, especially those who have pre-diabetes or early stages of diabetes, their risk of complications can be almost as low as people who don't have diabetes. That reflects the physiology that we understand.

RK: That is so interesting and it makes sense that the longer you have the disease, the higher the risk of complications and this just reemphasizes the importance of prevention, which I know we'll talk about later too. Since we are talking about complications, could you talk to us

a little bit about the complications that we see with diabetes and what are some of the unique considerations or other conditions that can occur with diabetes and aging?

SP: When we think about complications of diabetes, think about the different organ systems that high blood sugar can start to damage. We usually break it down into 2 categories. The first is macrovascular, meaning damage to large blood vessels; here we see the large blood vessels are feeding things like the heart muscle. So, you can get the risk of heart disease, heart attacks and heart failure, which is a weakening of the heart muscle. You could also get damage to large blood vessels in the legs, causing decreased blood flow in the legs or feet which sometimes, in severe cases, can result in foot damage and lead to amputations and those very severe complications of diabetes.

Then the other category is microvascular damage; there is damage to small blood vessels. Small blood vessels are in a lot of different places, but the organs that diabetes affects the most often are the eyes where you can get diabetic retinopathy — damage to the retina of the eye from decreased blood flow there, and that in the most severe cases, can lead to blindness. Then we have nephropathy, which is damage to the blood vessels in the kidneys. Again, this usually starts slowly, but if it is untreated it can progress to needing dialysis or end stage renal disease. Then the last is the nerves, the nerves in the body are also fed by small blood vessels. If diabetes starts to affect them it can cause neuropathy, meaning people start having changes in their sensation, usually in their hands or feet; pins and needles. That can also predispose people to having more damage to your hands or feet because of inability to feel when that damage is happening.

Those are the general complications of diabetes and how they arise. You asked about differences between younger people and older people in those complications? When I think about those, I think about what the challenges are that old people face in terms of their physical and cognitive functions. I think diabetes feeds into that because all of those changes that can happen as a result of high blood sugar can interact with the functional changes that are also happening as people get older. If, for example, someone is having difficulty walking because of arthritis and then, on top of that, they get changes in their sensation in their feet because of diabetes, it can worsen their function. We know that diabetes can be a major source of disability in older people. I try and put all of these potential complications of diabetes into the context of what is already happening with aging that is affecting someone's health and function. There are so many different ways that can interact there.

RK: It certainly seems like there are many different things to think about. You mentioned the microvascular and macrovascular complications; the complications we think of for people of any age are heart disease, stroke, eye disease, nerve disease, and kidney disease. It sounds like with a longer duration of disease, people might be more likely without optimal management to have those complications. Are those complications more common in older adults? Is there a higher prevalence of those complications among older adults?

SP: Yes, they are more common in older adults, both with and without diabetes. Your blood vessels aren't as strong as you get older, and they get narrowed from a lot of reasons, like high cholesterol and high blood pressure, and just living with them for decades and decades. However, people with diabetes have, higher rates of these complications. Although, as we talked about earlier, when you get diabetes, especially early diabetes as an older adult, your rates of these complications don't go up by that much. Especially compared to people who

got diabetes when they're younger who really are, at the highest risk of these. So the people who've been, who are older adults who've been living with diabetes already for decades, they are the people who are at the highest risk.

RK: That makes sense—that if they have had the disease for longer periods of time, they would be at greater risk as an older adult. You also mentioned, which I think is an important point for us to talk more about, these other conditions that can occur more commonly in people with diabetes as they age—what might be called geriatric syndromes. I wonder if you could talk a little bit more about those and how common they are in people with diabetes and why it is important to recognize them.

SP: What we call geriatric syndromes are basically issues and health conditions that kind of frequently impact older adults and are common sources of disability in older adults. Diabetes, I would say, affects the vast majority of them (geriatric syndromes) and makes the vast majority of them more likely to happen. Again, every older adult is very different, so which of these syndromes affects different people is variable. Some of the ones that I think of commonly are changes in thinking and cognition—as your brain ages, often people develop decreased memory or dementia—and diabetes does make that more common.

One of the things that I research is hypoglycemia (low blood sugar), and diabetes treatments, which cause low blood sugar, can also make people have issues with their thinking. That can be another way that it is not just the diabetes itself impacting how people think and function as they get older; it is the effects of the treatment.

A lot of the other geriatric syndromes are different ways that the body is no longer functioning at its full capacity and causing limitations in what people can do. I know one area of your research, Dr. Kalyani, is about frailty and loss of physical function and strength as people get older. We could see that definitely impacts diabetes, in that diabetes makes that happen more often. It could also, I think, have a bidirectional effect where frailty makes people be able to exercise less and get around less, and then they are really not able to keep their blood sugar as well controlled because they are not moving as much.

Then another one that I will mention with geriatric syndromes is musculoskeletal issues like arthritis in the hands, where, on one hand, diabetes does not necessarily cause this, but when it happens, it can make people have difficulty taking care of their diabetes because they have difficulty checking their own blood sugar or administering insulin or doing the kind of fine motor skills that are required for a lot of these diabetes self-management efforts.

RK: I think that there are just so many different types of syndromes that are conditions that can occur more commonly in older adults. Part of the challenge is that there are so many of them, and I appreciate that you highlighted perhaps some of the ones that we may be more familiar with or may have a greater impact on day-to-day quality of life for older adults. I think that as people age, something that becomes more and more important is the ability to do tasks at home, to have mobility, to have intact cognition, and to be able to self-manage. I appreciate you going through all those different syndromes.

One of the ones you talked about was cognitive impairment, and I think that we are hearing more and more about that in the general population, but perhaps it would be worth talking about why cognitive impairment and dementia are so important to keep in mind for people with diabetes. What is the connection there?

SP: One question is how does diabetes contribute to cognitive impairment? That is a complicated physiologic question that I think people are still trying to figure out. One of the complexities, as I mentioned, is that diabetes itself can increase your risk rate of developing cognitive impairment, probably through its effects on the blood vessels in the brain, but also having cognitive impairment makes it more difficult to control your diabetes and to treat your diabetes safely. So that is something that we see also very commonly: that people who have cognitive impairment or dementia have more risks from diabetes treatment, like more side effects and more issues with hypoglycemia, or low blood sugar. It can be more difficult to get their blood sugar under control safely. That is one of the reasons why I assess cognitive impairment very frequently in people with diabetes, and I really think about, "Is the treatment that I'm giving them safe, and can they manage it?" When I think about managing it, not just them, but their whole system of care partners and care structure, I know everybody around them who is helping them take care of their diabetes—do they have the support that they need to do it safely?

RK: Yeah, I do think that's where it becomes important, especially for our older adults who may not have that support, whether it be family support or caregiver support, that having some of these geriatric syndromes, particularly cognitive impairment or dementia, can make self-management more difficult. Isn't that true?

SP: Yes, this is so true. There are ways of trying to get around that, but for the most part, it is just going to be altogether more difficult. This is something that people with diabetes and their care partners just struggle with. Unfortunately, there is no great way of making it easier.

RK: You also mentioned muscle loss, or sarcopenia, and this is an area that I have dedicated a lot of time to understanding more. This is something that we see with our older adults as well as in the general population: that they can lose muscle as they age, but in people with diabetes they can lose muscle faster than their counterparts. As you mentioned, the implications on mobility and being able to move around and the other body composition changes that occur with aging as well; people tend to retain more fat tissue, and that might also relate to some more of the insulin resistance we see with aging.

It is complicated with all of these different conditions that we can see, but it is important to recognize because of the impact it can have on self-management and quality of life. Just to summarize some of the other ones, urinary incontinence is something we talk about as well. We will talk a little bit about hypoglycemia in a little bit too. But there are things that can occur more commonly, like frailty, as well in older adults with diabetes.

As an internist yourself, how often do you screen for these syndromes in your older adults with diabetes, or how should someone who might have a loved one who's older with diabetes or might be over the age of 65 themselves find out more if they might be at risk for these geriatric syndromes?

SP: It is a good question, and I think it is something that internists struggle with because there are just so many ways that your body changes as you get older and so many ways that diabetes could impact that. It is hard to know; you obviously cannot ask for every single one in every visit. I think what it comes down to is, as an internist, knowing your patients well, and as a patient, being able to bring issues that develop to your doctor's attention openly. I always encourage patients that if they are having changes that they notice, we should talk

about it early because it might be an effect of diabetes, and it might be something that we could address if we know about it early.

I will mention hypoglycemia again, but one of my studies about hypoglycemia, which is a complication of diabetes treatment, shows that only about a third of people who should be discussing hypoglycemia have actually discussed it in their visit with their doctors. Sometimes people may feel these things are either like a fault of their own or something they maybe do not want to burden their doctor with, but I think it is important to really bring these things up.

In terms of what doctors can do, I think there are certain things that, if caught early, are obviously very important and should be regularly screened for in visits or asked about whether or not the patient brings them up. One of those things is cognitive impairment. We should know when our patients are having changes in their thinking, and there are tools that we can use in clinic to do that efficiently. Then for people who are on these higher-risk medications for diabetes, I think we really should be screening for their side effects to make sure that we understand the risks that the medications are having.

RK: I agree; I think it is important for healthcare providers to keep this at the top of their mind. Also, as an individual who might have diabetes, to be aware that this can happen, to be aware of symptoms, and then to talk to your healthcare provider about whether you should be screened for these conditions.

We talked about hypoglycemia, and I think this is a good place perhaps for us to talk a little bit more about that because it is one of those conditions that can occur as a side effect or complication, or however you want to describe it. But when it does occur in people with diabetes, it can be potentially serious depending on how quickly it is treated and how severe it is. It is worth it for us to talk a little bit more about how we define hypoglycemia and what the symptoms are, if you could share some insights.

SP: Hypoglycemia has pretty specific definitions. The general definition of hypoglycemia is having a blood sugar level that is less than 70 milligrams per deciliter (mg/dL). That would be on a finger-stick reading of blood sugar. If you are less than 70 mg/dL, you are considered to have hypoglycemia, but within that there is really a wide spectrum. We categorize it according to levels.

Level one hypoglycemia is having a blood sugar in the 54 to 70 mg/dL range, which is low, but usually not so low that it can cause really serious harm. But then less than 54 mg/dL, we call level two hypoglycemia, and this is when you know people really can suffer a lot of serious consequences, which we will talk about in a second. Level three hypoglycemia is any low blood sugar level that actually changes your thinking and consciousness and sometimes can wind people up in the emergency room or needing assistance from somebody else. If you need help to manage a hypoglycemic episode, that is considered level three hypoglycemia, the most severe stage.

You mentioned symptoms, and symptoms of hypoglycemia are tricky because they are fairly varied and can occur due to other conditions outside of hypoglycemia. The most common symptoms that people feel are this sense of getting revved up; it is an adrenergic reaction, people can have like rapid heartbeat and sweating, sometimes it comes with headache and anxiety. Those are what we call the adrenergic symptoms of hypoglycemia.

But then as it gets more severe, there is another category called neurocognitive symptoms of hypoglycemia, meaning that it is affecting how you are thinking and feeling.

Those can be symptoms like feeling drowsy or confused or changes in your emotions and acting strange. The most severe, cases could be decreased arousal or coma. That is the natural progression of hypoglycemia symptoms. In that area not everybody experiences the symptoms equally.

People who have had diabetes for a long time or who have a lot of hypoglycemia can get something called impaired hypoglycemia awareness. This means that they do not experience the typical symptoms of hypoglycemia when their blood sugar is low. On one hand that sounds like it could be good because, "Oh, I'm not having as many symptoms," but the problem with that is you do not get the early warning signs. These early symptoms that you have when your blood sugar is just starting to get low, they just sail right through that, and then the first thing that hits them is more severe symptoms. Because they do not have this warning, it could cause really serious hypoglycemia more often.

RK: Thanks so much for going into detail and sharing that really important point, that older adults may not have these early symptoms of hypoglycemia, or low blood glucose, just as part of the process of aging. They might not have that racing heart rate or sweatiness until it becomes more severe. It does behoove us to talk about monitoring for low blood sugar even more for older adults. Would you say that it's even more important in older adults, or what do you tell your patients with diabetes?

SP: I definitely think it is more important, both for the reason you mentioned that some people will not have those early warning symptoms and that we know that the risk of having more severe hypoglycemia goes up as you get older. The thing that we did not mention yet is that most diabetes medications do not cause hypoglycemia, at least by themselves; really, the most risky medication for hypoglycemia is insulin, especially like multiple daily insulin or the rapid-acting insulin that people sometimes need. Then there is another class of medications called sulfonylureas that are an older class of medications but are still very commonly used in older people. They also cause hypoglycemia without needing to be on insulin. The other diabetes medications, if you're just on a medication like metformin or one of the newer medications by themselves, would not be expected to cause any significant hypoglycemia. When we talk about monitoring, it really depends on what your risk is and what medications you're on.

RK: That is a great segue into talking about medications for diabetes and those that might have a higher risk for hypoglycemia versus those that might be relatively safer to use with older adults who have diabetes. I guess one of the questions that I often get, and I think it would be great for you to address, is, "Is insulin safe for older adults with diabetes?" We know that insulin has a side effect of hypoglycemia. We know, unfortunately, that it's one of the reasons that people come to the emergency room. It's one of the top three reasons, in fact, for having hypoglycemia and using insulin. We know that there are safe ways to use it as well. I wonder if you could talk to us about what medications, if any, people who have diabetes and are older should avoid and how safe it is to use medication such as insulin.

SP: Medication selection with aging is a very important topic and very complex. I will say, my general thought about it is, all of these medications have their place, and they may be the right medication for someone in certain circumstances. I try and use the medication that has the lowest risk but the greatest benefit for any particular person. Insulin for older people with type 2 diabetes is often used in two circumstances: one is where they cannot use other medications because of side effects or because of contraindications like low kidney function.

We just do not have a lot of medication options, so insulin can sometimes be the only one that will work. Then insulin is often used when people have had diabetes for a long time and their pancreas just is not making enough insulin on its own anymore. Sometimes insulin is the only way to keep the blood sugar under control at that point. I think insulin has its place and is an important medication for older people. That being said, if those two circumstances are not happening, I try to use insulin as little as possible because I am very aware that it is the most risky medication for an older person to be on, bar none. If you really do not need it, I do not want you to be on it, and I want us to explore other medication choices.

RK: I think it is important that it depends on what it is being used for, and for many individuals with type 2 diabetes, they will need insulin eventually just because they cannot produce any on their own—in that case, we really do not have any other choices. In situations such as you mentioned, where there might be other choices, and increasingly we are seeing other medications used that have lower hypoglycemia risk, those might be preferred for older adults who are more likely to have symptoms of low glucose or not have symptoms of low glucose as well.

In terms of types of insulin that can minimize hypoglycemia, I wonder if you want to talk a little bit about that too. Not all insulin is the same, and we do have options for insulin that can lower that risk too.

SP: Yes, that's true. The most risky forms of insulin are the rapid-acting insulins, especially when people are using them on what is called a sliding scale—they are adjusting their insulin based on numbers. People have to be very careful with giving themselves the right amount of insulin. Sometimes it is hard to estimate exactly how much insulin you need. Sliding scale insulin is the most risky form, but it is also sometimes necessary if you need closer control of your carbohydrate intake.

The longer-acting insulins are less likely to cause hypoglycemia, and now there are newer formulations of these longer-acting insulins that act in the body very slowly and at a very steady state that have the lowest risk of hypoglycemia of any insulins that have come before them. I think that those are definitely options, those ultra-long-acting insulins that are being developed.

That being said, I think as much as the type of insulin, it is having it being dosed appropriately and also being aware of when that dosing needs to be changed. For example, a lot of people get in trouble with insulin when they get sick and they are not eating as well, and they do not know exactly what to do with their insulin because their blood sugar might be high, but their intake is low, and how do we manage that? We all know as you get older, you are more likely to get sick and have things happen—when those things happen, you need to be in close contact with your doctors to know exactly how to manage your insulin so that you do not get into trouble.

RK: It is exciting to have so many newer insulins, those longer-acting insulins, on the market that can reduce hypoglycemia. As you mentioned, those rapid-acting mealtime insulins really are designed to be used when you are eating. If they are not matched appropriately in dose or if you eat less, you could be at greater risk for hypoglycemia, or if you exercise more. All those lifestyle patterns also contribute, as you mentioned, to the risk of hypoglycemia. We

have not yet talked about perhaps another class that we should briefly talk about, sulfonylureas, and their effects on lowering blood glucose. I wonder if you could just briefly talk about what that class is, maybe some common names people would be familiar with, and how those can be used safely in older adults.

SP: Sulfonylureas are oral medications, and the three most common ones have the generic names of glipizide, glyburide, and glimepiride. If you have been on one of those medications, that is a sulfonylurea. I think oftentimes people think of sulfonylureas as fairly benign because they don't cause severe hypoglycemia that often and they work fairly reliably. When people take them, I think they have a very expected effect on lowering your blood sugar.

That being said, I wanted to tell a story about a patient I took care of when I was a resident that had a really bad complication from sulfonylureas that just really stuck with me. This patient was on glyburide, an older woman who had early stages of dementia and was taken care of by her daughter. She developed symptoms of a urinary tract infection and was brought to an urgent care center to get that treated. They, the urgent care, put the patient on Bactrim (trimethoprim/sulfamethoxazole), which is a common antibiotic that we use to treat urinary tract infections. The daughter left the home to do a few errands, and she came back, and she found her mother on the floor unconscious. The Emergency Medical Services (EMS) showed up, and her blood sugar was 40 mg/dl. They brought her to the hospital, and that is when I met her—I did her intake when she came into the hospital. We realized that what happened was that this medication, Bactrim (trimethoprim/sulfamethoxazole), interacts with sulfonylureas and actually causes their dose to be at least three times as high as it would be otherwise. That was enough to cause this person to have profound hypoglycemia, and she was treated quickly, and she recovered somewhat, but she was in the hospital for almost a week and was not back to her baseline by the time she went home. Her thinking was not nearly as good as it was before this happened; it was a very bad thing for this person.

So even though these medications are generally not considered to be that risky, there are certain circumstances where they can be very high risk. These interactions between sulfonylureas and antibiotics are something that I always like to talk about because doctors do not seem to be aware of this, and it is a very common problem.

RK: Thanks for sharing that story. It highlights the importance of educating people who are taking these medications on the risks that can occur, particularly with infection or not eating as much as usual. Also knowing when to reach out to your healthcare provider—when you might need to reduce a dose or stop a dose of medications at higher risk of hypoglycemia. I think that knowing that with these caveats, there are medications in the sulfonylurea class that might be longer acting and reduce the risk of hypoglycemia. Even extended-release versions of these can lower the risk of hypoglycemia. Knowing that they are inexpensive and really effective at lowering A1C means that we do use these, but we should be using these cautiously, especially in those at higher risk of hypoglycemia, as you mentioned.

SP: The patient education part of it is really important because if you prepare people and they know what the risks are and they know when they should be cautious, you can really improve how safe these medications are. As you mentioned, they are still used very commonly because they are effective and are quite cheap. It is not that they do not have a place; they might be the right medication for some people.

RK: So, we have not really talked about A1C or what glucose level people should aim for when they are older; part of that is because of this idea of individualized care. I wonder if you could talk a little bit about what patient-centered or individualized care looks like for older adults with diabetes. What are the A1C targets that are usually recommended for older adults?

SP: When I think about individualized care of diabetes, the first thing I think about is that every aspect of diabetes care should be individualized and should be targeted to what a person needs. One area of individualized care that has had a lot of discussion over the last two decades is: What should your blood sugar goals be? The reason that this is so important is that the lower you push your blood sugar down, the more you can lower complications of diabetes, but you also increase the risks of the medications and the risks of treatment. How to balance those benefits and risks changes as you get older. There is a very nice figure in the American Diabetes Association Standards of Care, which kind of shows how we should select those blood sugar goals for different people and different age ranges.

The general principle is that people who have a better chance to benefit from lower blood sugar should get lower goals, as in more aggressive goals. Then people who have a higher risk of having side effects from medications should have less aggressive goals. It is about balancing those things. Some of the specifics we think about are your age and function. For healthy, older adults who have good function and are generally doing well, we say your blood sugar target should basically be the same as for anyone of any age, which is a blood sugar range of an A1C around 7 to 7.5%.

This is where we set blood sugar targets generally and sometimes even lower targets for people who are very healthy or who have not had diabetes for very long. Then as you get older and have accumulated health problems or decreases in your function or your thinking, you really have less of a chance to benefit from having a lower blood sugar; you have more of a chance to get harmed. So as we mentioned earlier, having dementia, for example, really poses a higher risk of side effects from diabetes medications. For people who are in those categories, the A1C goal could be 8%, or it could be even higher than 8%, depending on where their health and function fall. But the key thing to think about is that doctors should not just set a goal of 7 to 7.5% for everybody. They really should think about "What is the goal that my patient needs, and how risky is it to get there?"

RK: That is really helpful to hear about how the A1C target really can slide or be individualized based on the individual's health function, life expectancy, and other considerations. It sounds like it is a conversation that really needs to be had between the person with diabetes and their healthcare provider to determine what's the best target for them.

We also have not yet talked about technology, and we know that there is a lot of new diabetes technology, which is really exciting. People of any age should be eligible and get coverage for these exciting new technologies. Are there considerations unique to older adults that we should keep in mind?

SP: I think the big new technology that everyone is talking about is continuous glucose monitoring (CGM), and that is what most people are thinking about when they think about diabetes technology. Technology is advancing in a lot of areas of diabetes, especially type 1

diabetes care when people have to be on insulin. Every year there are better automated insulin delivery systems and these smart devices that can match your insulin needs to your carbohydrate intake very closely. When we talk about older people, mainly with type 2 diabetes, continuous glucose monitoring has been gaining use and gaining evidence that it is really helpful.

The people who it is most helpful for are the people who are on insulin because we know that they need closer monitoring of their blood sugar to prevent hypoglycemia. Their blood sugar fluctuates more when they need insulin; being able to capture those fluctuations in real time on a CGM device can show you exactly what is happening in your body and allow you to react more quickly to changes. They also let you and your doctor learn more about what the patterns are in your blood sugar. You can see what you are doing and what makes highs, or when you have a hypoglycemia episode, what precipitated that, and what time of day they are occurring so that you could change your treatment and your strategies so that you could match your insulin to your needs very precisely.

I will mention that CGMs are a pretty complicated technology. They are getting easier and easier to use; most of the time you need to be able to connect a device to a smartphone, be able to navigate apps, and understand the numbers that go along with it. There is definitely a learning curve, and there are definitely technology portions of it that a lot of older people will not be as comfortable with. The devices are getting better and better every year, and they are getting easier to navigate and understand. I think they are becoming more and more accessible to older people.

RK: Yes, and it is so great to have these technologies available. I think there are so many aspects that can make it easier to facilitate day-to-day care, but perhaps for those who have cognitive impairment or physical limitations or dexterity limitations, there are continuous glucose monitors that might be voice activated, for instance, or have big screens that might make it easier for people with those limitations. Overall, it is a really exciting time for people of all ages.

SP: There are monitors that you can have a care partner or someone else have the data go to them too. If someone needs help with managing the data, someone else can be there to do it too.

RK: One aspect that I thought would be important for us to talk about is the role of the caregiver. This would be a great time to talk about that. For an older adult with diabetes, what is the role of the caregiver, and how could they be supportive to the individual with diabetes?

SP: I have seen my older people, especially those who are struggling with issues with cognition or with mobility, having somebody who can come with them to appointments and help in the management of the diabetes can be just so valuable. There is just so much to do and so much to keep track of that I think a lot of older people need help. Having more than one person involved in these management decisions can make everything go smoother and easier. What the roles are varies so much by individual and what they need. I will mention there are very specific ways that caregivers can get involved and help. One that I am very interested in is prevention of hypoglycemia. Hypoglycemia can be a burden to not just the person with diabetes but their caregivers as well, because it can be really stressful, especially

if they are having these severe episodes that find them unconscious or confused and the caregiver has to be the one to address that. One of the ways that can improve the safety is having a caregiver be trained in the use of something called glucagon. Glucagon is a medication that is given either nasally or as a shot that can rapidly reverse hypoglycemia. Having that in the home and having a caregiver know how to use it can be a way of improving safety and taking the power back from these really severe issues that can wind people up in the Emergency Room (ER).

Aside from hypoglycemia and medication management. I think caregivers' roles can be so varied. It could just be about getting people to appointments and helping them navigate the health system, to helping administer their medication safely, and/or helping them keep track of their blood sugar. There can be so many things a caregiver can do. As a doctor, I also think about the fact that caregivers have a lot of burdens on them too. They often have their own health problems and sometimes feel the need to sacrifice their own health to help their partners. I think doctors need to also be aware of what the care partners and caregivers are going through and what they are dealing with and not just say, "Oh, you have to do this and do this," and just keep harping on it. You have to try and make it practical and easy and something that they can accomplish without overburdening themself.

RK: That's so important, what you mentioned about not only the physical support but also the emotional support that caregivers can give. The education that is important for caregivers for hypoglycemia treatment, like you mentioned, is knowing what to do in cases of an emergency. I always enjoy having the caregiver when they come to patient visits. Having a caregiver or a family member who has an active role in the care plan, is just so critical, especially as individuals age and have greater needs. Thank you for going over that.

We have covered a lot today, and I really appreciate you talking about the different ways that an older adult with diabetes may be affected by complications and geriatric syndromes and also the unique considerations that we have to think about in management. Just some parting words that you might have for our audience, for anyone who has, let's say, a parent or a loved one or maybe even themselves who falls into this category of having diabetes in older age and maybe struggling to find a healthcare provider who understands their needs or really to understand why things may not be working for them the way they work for their younger individuals—what would you say to them in terms of things that they can do or next steps?

SP: What I would say about taking care of a relative or loved one with diabetes who is struggling is I would start by thinking and talking amongst yourselves about what the goals for diabetes are and what their priorities are because knowing what you want to get out of the medical visit is extremely important. Telling your doctor that it is extremely important so that you are all on the same page at the start of the visit and that the doctor understands what you are hoping to gain. Priorities are important too because you cannot always address everything in one visit with your doctor. So, you should think, "Okay, what is the most important thing, the most important problem to focus on today?" If you come to your doctor with that in an ordered list, it can be really helpful to set the expectations for the visit and make sure something is accomplished. I would also try and bring in the worries and fears that you or the person with diabetes have so that the doctors know what they're worried about and if there's a way to alleviate that, because I think doctors often don't know when their patients are suffering emotionally or struggling emotionally with the disease. And understanding that can

just really help frame what the doctor can do for you and help them understand you as a person.

I think those three things—talking about goals, setting priorities, and then bringing up your worries and concerns in a visit—will really help things move forward.

RK: Thanks so much, Dr. Pilla, for sharing those last words. Goal setting is so important, especially in the older adult population. I really appreciate you highlighting that and for all of the expertise and clinical insights you shared today—giving some insights on things for older adults with diabetes to be aware of, to ask their healthcare providers more about, and really to be prepared for so that they don't run into issues and can live a long, healthy life with this condition. Thank you so much for being here. We really appreciate it.

SP: Great. Thank you for having me. It's great talking about it.

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.

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

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