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Evaluating the Rapid Rise of T1D in Children Amid the COVID-19 Pandemic

Dr. Wysham:
Recent data has shown that the incidence of type 1 diabetes in children has grown since the start of the COVID-19 pandemic. The reason why is still unclear. However, emerging research may give us a little more insight into these rising rates, and that research is the focus of today's program.

Welcome to *Diabetes Discourse* on ReachMD. I'm Dr. Carol Wysham, and joining me today to explore incidence rates of new-onset type 1 diabetes in children during the COVID-19 pandemic is Dr. Jane Kim, a pediatric endocrinologist at Rady Children's Hospital in San Diego. She's also an professor in the Division of Pediatric Endocrinology at UC San Diego School of Medicine.

Dr. Kim, thanks for being here today.

Dr. Kim:
Thank you so much for having me. I appreciate the opportunity to speak with you.

Dr. Wysham:
Oh, sure. Well, let's start by setting the stage, Dr. Kim. How has the incidence rate of new-onset type 1 diabetes changed during the COVID-19 pandemic?

Dr. Kim:
Yeah, that obviously is the big question at hand, and so I'm just going to give you a few sentences of background. So, as you mentioned, I am a pediatric endocrinologist at Rady Children's. We are the pediatric medical center for the University of California-San Diego, and we are the only children's hospital in our region of Southern California and to my knowledge the largest children's hospital in California, so we serve a very large community, and my colleagues and I noticed an appreciable increase in the number of children admitted to our hospital for newly diagnosed diabetes following the onset of the pandemic.

So there has been other evidence. There was a paper looking at incidence rates of type 1 diabetes published by a group in Germany last month, and they looked at a national registry of type 1 diabetes cases in Germany—it's a multicenter study, and they also found an increased rate of type 1 diabetes patients, following the onset of the pandemic, so a conclusion similar to ours.

Dr. Wysham:
Well, with that in mind, let's look at your research. What were you and your colleagues looking to evaluate?

Dr. Kim:
Yeah, so, because we're the only children's hospital in our region of Southern California, we really have an advantage in being able to capture almost all new cases of type 1 diabetes in our area. So, as you know, type 1 diabetes is caused by autoimmune-mediated destruction of beta cells in the pancreas, so by the time children are symptomatic with their diabetes, they require insulin. And at our center, all of these children are admitted for insulin initiation and diabetes education.

I would just like to acknowledge some of my colleagues. The first is Dr. Beth Gottesman, who is a pediatric endocrinologist at Rady Children's, who was really instrumental in much of the work that we're going to discuss. And also, I'd just like to acknowledge the amazing team of providers, doctors, nurses, dietitians, medical assistants, educators that I work with at Rady Children's.

My colleagues and I noted increases in both type 1 and type 2 diabetes, but for this report that we published recently in JAMA Pediatrics, we really focused on type 1 diabetes. Part of the reason is because it really wasn't clear what the changes were in type 1

diabetes incidence. There were several papers early on, so really, just looking at the first two to four months following the pandemic onset that either found no change in type 1 diabetes incidence, and one from the UK that did show an increase, so the data was mixed.

And it's quite challenging sometimes to look at incidence rates in type 1 diabetes for different reasons. One of them is that type 1 diabetes has seasonal variation in the timing of its presentation, so typically, we see a larger winter peak and a smaller summer peak, so it's really not helpful to look at only a few months of data. You really need to examine several months of data to determine trends. Another factor is that type 1 diabetes is increasing globally every year by about 3 percent, so it's important to determine whether the rate of increase that you see is actually above that background rate.

Dr. Wysham:
Well, that's all very interesting. So, can you tell us a bit more about your study's methodology and your data that you analyzed?

Dr. Kim:
Yeah. So, we looked at a six-year period by performing a cross-sectional review of our electronic medical record system. So we were specifically looking for children with new-onset diabetes at our hospital and at the rates of diabetes for the five years prior to the pandemic, and then we also looked at some of the characteristics of these children to determine whether they were different prior to COVID and then after COVID.

In terms of the inclusion criteria, we counted every child younger than 19 years of age admitted to our hospital with a diagnosis of new diabetes using standard ADA criteria for the diagnosis of diabetes, and then specifically for the diagnosis of type 1 diabetes, the child had to have at least one positive islet antibody indicating autoimmunity. And then we also wanted to measure the disease severity at the time of their presentation, and so we really looked at two measures there. One was by identifying children who required an insulin drip, meaning that they had diabetic ketoacidosis, and then secondly by identifying which children required admission to our pediatric ICU. So, in our hospital, most children who have DK actually go to our regular medical floor. They go to a bed that we call monitored care with a nurse who's trained to manage a drip, an insulin drip, and they don't go to the ICU unless they have altered mental status, meaning that we have concerns for significant or progressive cerebral edema, or brain swelling, or for very severe biochemical abnormalities—so again, you know, a measure of disease severity.

So I did mention that there is seasonal variation in terms of when diabetes presents, and so, to account for this, we had a statistician conduct an ARIMA analysis, so this was to determine what the forecasted number of cases would be during the pandemic and then to determine if our numbers actually exceeded that forecast. And I do want to mention that it's always important to use caution in analyzing your electronic record. It obviously depends on people—we're all fallible, who are hopefully entering and coding information accurately. So, to ensure the quality of our dataset, we had a pediatric endocrinologist, either myself or, Dr. Gottesman, who's the principal author on our report last month, to review all the cases that we identified to ensure that all of our diagnostic and other criteria were correctly met.

Dr. Wysham:
Oh, that's very interesting. So, for those of you just tuning in, you're listening to *Diabetes Discourse* on ReachMD. I'm Dr. Carol Wysham, and today I'm speaking with Dr. Jane Kim about new-onset type 1 diabetes in pediatrics during the COVID-19 pandemic.

So let's turn our attention to the results, Dr. Kim. Can you share some of your key findings on new-onset type 1 diabetes during this time frame?

Dr. Kim:
So, when we looked at the year prior to COVID and then we looked at the 12 months following what we determined, you know, the onset of the COVID pandemic, we found a 57 percent increase in the number of children with type 1 diabetes admitted to our hospital compared to the prior year, so quite a large increase. We also saw an increase in the percentage of children who had presented with diabetic ketoacidosis, and this is a phenomenon that had been described by others previously. In our group, there were about 49 percent of children who presented with DKA compared to about 41 percent prior to the pandemic.

And then I mentioned that there was another paper, from a group in Germany looking at increased incidence rates of type 1 diabetes, in their population. So, we actually had very similar subject characteristics to them. The average age of the child at presentation was about 9.5. Their average A1c at the time of presentation was about 11.5. And then, their BMIz score was about 0.4 standard deviations below the mean. And for us, these characteristics did not change when you compared the groups before or after the onset of the pandemic.

Dr. Wysham:
So, what was the relationship between the timing of the onset of diabetes and COVID diagnosis, or were you able to determine that?

Dr. Kim:

Yeah, that's really a key question, and honestly, we don't have a good answer for that. So, essentially, you know, the question is there a direct effect of COVID infection with the onset of type 1 diabetes, and I can certainly give you some ideas that we have in terms of how COVID may manifest in children with diabetes. Having said that though, only 2 percent of the children had documented COVID infection at the time that their diabetes symptoms occurred and they were admitted to our hospital. You know, a big limitation of our study is that we did not measure COVID antibodies for routine care. So, as you well know, in children, particularly younger children, COVID infection may be mildly symptomatic or have no symptoms at all, so we are really not in a position to answer whether preceding COVID infection was related to the onset of their diabetes.

Dr. Wysham:
Oh, that's very insightful information. So, before we close, Dr. Kim, do you have any final takeaways that you'd like to share with our audience?

Dr. Kim:
Yeah, so I just want to iterate clearly that we don't know yet if COVID is causative for diabetes in children. I think that this is such an important question to answer, and many families have been asking, but I have to say that I don't know what factors are responsible. Unfortunately, I can't advise about specific measures that might be protective for diabetes. We also don't know if this pattern of increased cases will persist, and certainly, we're looking at this question now to see what the effect, for example, the Delta and Omicron surges have had with our case rate at Rady Children's. But I do think that, you know, families should be aware of the symptoms of diabetes, so these include, you know, increased thirst, urination, unexpected weight loss. And Just as a general guide, I do obviously want families to focus on healthy, lifestyle and approaches to maintain and preserve their mental health. So, there are many questions still to address and hopefully we'll have more answers as this unfolds.

Dr. Wysham:
Great. Well, that's a great note to end as we come to the close of today's program. I'd like to thank my guest, Dr. Jane Kim, for sharing her perspective on her data related to new-onset type 1 diabetes during the COVID-19 pandemic. Dr. Kim, thank you so much for joining us today.

Dr. Kim:
Thank you as well. I appreciate having the opportunity to speak with you.

Dr. Wysham:
For ReachMD, I'm Dr. Carol Wysham. To access this episode and others from our series, visit reachmd.com/diabetesdiscourse, where you can be Part of the Knowledge. Thanks for listening.