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## A Look at Emerging Research on T2D & COVID-19 Severity

Dr. Wysham:

Are we able to predict when patients with type 2 diabetes are infected with COVID-19 severely enough to require hospitalization? Many factors need to be considered, and emerging data from a recent study may tell us exactly what those factors are and what we need to know about them.

Welcome to *Diabetes Discourse* on ReachMD. I'm Dr. Carol Wysham, and joining me today to share data from their research study on the impact of glycemic levels and common medications on COVID-19 severity in patients with type 2 diabetes is Dr. Deepak Vashishth and Mr. Bowen Wang. Dr. Vashishth is a Professor of Biomedical Engineering at Rensselaer Polytechnic Institute and the Director of the Center for Biotechnology and Interdisciplinary Studies. Dr. Vashishth, thanks for being here today.

Dr. Vashishth:

Thank you for having me.

Dr. Wysham:

And Mr. Wang is a PhD student at Rensselaer Polytechnic Institute studying biomedical engineering, and he's a member of Dr. Vashishth's research group. Mr. Wang, thanks for joining us.

Mr. Wang:

Thanks for the invitation.

Dr. Wysham:

So, let's start with some background here. Dr. Vashishth, what led you and your research group to focus on COVID-19 severity in type 2 diabetes?

Dr. Vashishth:

We got interested in looking at the relationship diabetes may have with COVID for a number of reasons. First, the pandemic was all around us, and we wanted to see as biomedical researchers what we could do to address it. Secondly, we are not a typical medical institution. We are a technological university where we emphasize interdisciplinary approaches to particularly medical problems, and we thought that we could bring a new and unique angle to human health in this particular case. Can we look at the data which is available to us, particularly from diabetics, and we wanted to understand why diabetics are particularly at higher risk for ICU use, and these were the two aspects which motivated us and regarding to the study.

Dr. Wysham:

And, Mr. Wang, let's talk about how you got involved in this project. From your vantage point as a student, what got you interested in studying COVID-19 severity in patients with type 2 diabetes?

Mr. Wang:

First of all, there is an urgency across the entire world that we need to figure out the severity in the COVID-19 patients. The second reason is that my research interest is related to type 2 diabetes, so I want to see if there's any interactions between the two diseases and what's the outcome.

Dr. Wysham:

And staying with you for another moment, Mr. Wang, can you describe the study design and what your research team set out to find?

Mr. Wang:

So the research we're conducting are based on the insurance data and electronic health record data from OptumLabs Data Warehouse, and we conducted our retrospective cohort study, and we looked at individuals with type 2 diabetes and COVID-19 and analyzed their two- to three- year HbA1c average and their medication use during the period when they have the COVID-19 and to see how that related to the risk of intensive care related to COVID-19.

Dr. Wysham:

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 researchers, Dr. Deepak Vashishth and Mr. Bowen Wang, about COVID-19 severity in patients with type 2 diabetes.

Now that we've gotten some background on this study, let's turn our attention to the results. Mr. Wang, can you share some of your key findings with us?

Mr. Wang:

Sure, no problem. So here, the major finding we have is that the risk of intensive care related to COVID-19 is significantly associated with two- to three-year longitudinal HbA1c. So if the patient has poor glycemic control over the two years, meaning that HbA1c is larger than 9 percent, their risk is about 48 percent higher than people who maintain relatively adequate glycemic control where the HbA1c is between 6 percent and 9 percent. We also looked at different medications. We found out that the combined use of metformin and insulin and the use of corticosteroids are significantly correlated with a reduction of intensive care risk with people with type 2 diabetes. We also found out that there are several comorbidities that are significantly correlated with the intensive care risk, including hypertension, nephropathy and obesity. However, we didn't find that the antihypertensive medications have any relationship with the COVID-19-related outcomes.

Dr. Wysham:

Turning to you, Dr. Vashishth, can you tell us about the impact of two- to three-year longitudinal glycemic control on the severity of COVID-19 in patients with type 2 diabetes?

Dr. Vashishth:

So there I'll take you to a little bit into the value of HbA1c. So, as a lot of your listeners would know, that HbA1c is a reflection of glycemic control or how well you control your blood sugar over a period of three months. So, when we start talking about an average of HbA1c, in a funny way you're talking about average of, of average measurements. And the reason why this may be relevant comes from a very fundamental biochemical process which we study, in my group called nonenzymatic glycation, which is a diffusion-based process by which sugar modifies proteins. And if you remember high school chemistry, this reaction, which is a diffusion-based reaction, is dependent upon the concentration and time, so the amount of sugar which goes to modify a protein is a function of these two variables.

So we ask that a person who has a good control over her or his blood sugar over a period versus an individual who doesn't; does it actually affect the homeostasis and turnover of tissues in the body? And my research group is looking at several other tissues, particularly bone, that how lack of glycemic control over a period may affect bone propensity to fracture. So we said that this is a pretty systemic effect, and can we then look at other tissues. And particularly, if you look at COVID patients who are particularly susceptible to issues originating from breathing and lung, could it be that nonenzymatic glycation and modification of tissues in the respiratory system could prevent the elastic recoiling capacity of lungs and other function and make these individuals more susceptible? If this were true, then we should pick up a relationship over an extended period of glycemic control, i.e. looking at HbA1c not as a single value but over a period of one year, two year, three year, four year, and we looked at over this entire period and found that the two-year period was the one which was predicting the risk in a reasonable time frame very accurately and extending it beyond two years did not make a difference.

Dr. Wysham:

I think that's really interesting because there are so many people who look at a single A1c and try to predict risk for any particular outcome, and it's very different from the perspective that you're giving where it's the long-term effects that may make more of a difference, so I think that is really interesting.

So, before we close, can we look towards a future, and perhaps, can you evaluate the possibility that this study might impact the way that we manage patients with type 2 diabetes?

Dr. Vashishth:

Yeah, this is a very good question and one we've been thinking about as well. So, you know, lack of glycemic control have come out in this dataset, this paper to be very significant predictor. It is a very easy and simple measure, which can be done in patients. It, however, requires a medical history because you're talking about two- to three-year average of a patient. And how do we manage and make this

data available to physicians is going to determine how effective this and other approaches can be to predict some of the severity.

I think one of the key points is that, you know, in case of diabetes, it particularly affects underrepresented minorities, and certain populations, and the question is are we providing them with equitable healthcare? Are we getting access to all their information to make sure that we identify the reasons why this disease is more predominant in certain groups? And once we do that, then we will come to a solution. So, how do you take all the existing technology datasets and put them all at an arm's length to a physician so she can look at a patient and get a lot more information to make better decisions? That's what it boils down to.

Dr. Wysham:

That's very interesting. I don't disagree with you, that we need to be able to get more information in front of us to help make decisions about patient care.

Well, with those forward-looking thoughts in mind, I want to thank my guests, Dr. Deepak Vashishth and Mr. Bowen Wang, for sharing their thoughts on predicting COVID-19 severity in patients with type 2 diabetes. It was great to have you both on the program today.

Mr. Wang:

Thank you very much. I'm really glad to share this research.

Dr. Vashishth:

It's been a pleasure talking with you. Thank you.

Dr. Wysham:

For ReachMD, I'm Dr. Carol Wysham. To access this episode and others from our series, visit [ReachMD.com/Diabetes-Discourse](https://ReachMD.com/Diabetes-Discourse), where you can Be Part of the Knowledge. Thanks for listening.