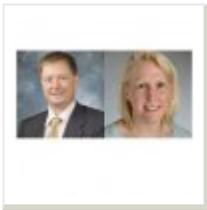


# Innovative Interventions for Children with Type 1 Diabetes

How can technology improve adherence and control for children and their families dealing with type 1 diabetes?

Mark Clements, MD, PhD, Endocrinologist and Associate Professor of Pediatrics, University of Missouri-Kansas City School of Medicine, and Susana Patton, PhD, Psychologist and Professor of Pediatrics, University of Kansas Medical School, are working in partnership on three unique collaborative projects funded by the National Institutes of Health which are utilizing technology to investigate innovative approaches to adherence and control of type 1 diabetes in young children.

Join us to learn more about this collaborative research and preliminary results.



Featured Speaker:

**Mark Clements, MD, PhD & Susana Patton, PhD, CDE**

Mark Clements, MD, PhD, Pediatric Endocrinologist at Children's Mercy Kansas City specializes in glucose variability, diabetes care technology and chronic complications in diabetes. Dr. Clements is an AAP fellow and received his medical degree and PhD in Developmental Neuroscience from the Washington University Medical School in St. Louis, Mo. He completed his Pediatric Endocrinology fellowship at Children's Mercy Kansas City. Dr. Clements brings a passion for data analytics and insights to his pediatric endocrinology practice at Children's Mercy and is known as a passionate innovator for the children he treats.

**[Learn more about Mark Clements, MD, PhD](#)**

**<https://www.childrensmercy.org/profiles/mark-a-clements>** Susana Patton, PhD, CDE, is a licensed Pediatric Psychologist and Professor of Pediatrics in the University of Kansas Medical School. Dr. Patton is a Fellow of the American Psychological Association and received her PhD from MCP Hahnemann University. She completed a NIH-funded postdoctoral research fellowship at Cincinnati Children's Hospital. She has clinical and research interests in the promotion of health and the prevention of disease-related complications through diet, a healthy lifestyle, and improved adherence to medical treatment for children living with chronic illness. The core of her work centers on children with type 1 diabetes mellitus and she is conducting both treatment outcome and descriptive studies.

**[Learn more about Susana Patton, PhD, CDE](#)**

**<http://www.kumc.edu/school-of-medicine/pediatrics/faculty/susana-patton.html>**

Transcription:

Dr. Michael Smith (Host): Our topic today is innovative interventions for children with type 1 diabetes. I have two guests today. I have Dr. Mark Clements, he is a pediatric endocrinologist at children's Mercy

Kansas City and Dr. Susana Patton, she is a pediatric psychologist and professor of pediatrics at the University of Kansas Medical School. Welcome to the show. Dr. Clements, let's start with you. Let's just run through what are some of those common challenges that we face when we're trying to treat and control type 1 diabetes and what are the opportunities then with some of the new technologies?

Dr. Mark Clements, MD, Ph.D. (Guest): Type 1 diabetes is a really unique disease among pediatric diseases because the youth and their families are faced with feeling generally well most days, but being told that they have to engage in quite a few self-care behaviors that other kids their age and in their school grade don't have to engage in. It's really difficult when you feel pretty well to be told that you have to check your blood glucose six to ten times a day and have to inject insulin or push some buttons on your insulin pump multiple times a day and you have to count all the carbohydrates in your food. I read a study once that suggested that there were well over 40 distinct self-care behaviors that people have to engage in with type 1 diabetes. The other problem that we face is that our diabetes education right now is really one size fits all. We know that families who are caring for a three-year-old face different unique developmental challenges compared to families who have a 13-year-old, for instance, or boys versus girls. We really see a number of opportunities to try to reach outside of our clinic and help improve self-care behaviors in the home and also to create a set of diabetes interventions that are more tailored to the unique issues that families face.

Dr. Smith: Dr. Patton, that's brought with them this collaboration between the University of Kansas School of Medicine and Children's Mercy Kansas City. Why don't you tell us a little bit about that collaboration and what are the goals?

Dr. Susana Patton, Ph.D., CDR (Guest): I think there is this opportunity for a natural collaboration specifically between myself and Dr. Clements. We both had an interest in diabetes technologies and in particular how families are using different diabetes devices in their daily management. We both had an interest in glucose variability and how that impacts daily functioning as well as long-term outcomes. I have particular expertise in terms of the behavior management and since so much of diabetes involves helping families learn and adhere to a fairly difficult self-care regimen, there's a lot of questions and a lot of ways that we might be able to intervene to help support these new self-care behaviors and help families to maintain those self-care behaviors. Dr. Clements has the expertise and the knowledge about how diabetes is changing not just what the current picture of treatment is, but what's the treatment going to be six months to a year down the line, so we can also be thinking about how to begin to continue to innovate in our research as well as innovate in the treatments that we provide to families.

Dr. Smith: Dr. Clements, how many projects are actually involved in this collaboration?

Dr. Clements: On the surface, I would say three, but I think that Susana and I actually have more than 10 projects together if you count all the small health outcomes projects that we're doing to try to gain foundational knowledge that will drive future intervention development.

Dr. Smith: If it's easier to talk about these projects in the groups of three that you mentioned, go through the first one that you guys are working on.

Dr. Clements: I'll describe the "tackle type 1 diabetes" project. "Tackle type 1 diabetes" came out of some insights that Susana and I gained in looking at Children's Mercy own health outcomes data in the

diabetes center and we found a signal that suggested that school-aged children are experiencing a deterioration in their blood sugar control during the first two years after their diagnosis. This was a little bit surprising to us because we know that as the honeymoon period of type 1 diabetes wears off, all youth will experience an increased need for insulin and that as children become adolescents and go through puberty that they'll experience an increased need for insulin, but we couldn't explain a unique finding that we found in five to ten-year-olds that showed a deterioration. We started to hypothesize that the children taking over some aspects of their self-care each day, checking their own blood glucose, injecting their own insulin, might provide an explanation. We decided to collect foundational data by looking at some detailed information about the parent and the children, how they think, how they behave and how that relates to their engagement with their therapy over the first two years and how both of those relate to their blood sugar control over time.

Dr. Smith: In that project when you look at that age group, five to ten years and we see this deterioration there, are you linking this more back to compliance or is there something psychologic going on?

Dr. Clements: Even further back actually, we're linking it to things like parent depression, parent stress, children executive functioning, how the child cognitively processes information. Dr. Patton is really the expert in this area and type 1 diabetes and is recognized worldwide for her work in this. I think the goal is to take this information, find those factors that predict deterioration and blood sugar control, and then develop specific interventions that try to change those behaviors.

Dr. Smith: Dr. Patton, would you like to share with us another one of the projects that you're working on?

Dr. Patton: Another project that we have that's underway is a project that is all telemedicine-based, video-based telemedicine, so we are delivering video-based either through a tablet, a phone or the computer interventions to families in their homes and it's also focused on working with parents of young kids, so these would be kids who are between the ages of one and six years old and they have type 1 diabetes. What we're working on is helping families to reduce their fear of hypoglycemia. In the larger literature, one of the things that we have, Dr. Clements and I have consistently measured as a potential barrier to good glycemic control especially in our younger kids is parents' fear of hypoglycemia, the fear that their child will have a little blood sugar that could be very severe, that could cause other health complications, and because their child is so little, the child may not be able to recognize the symptoms, the child may not be able to communicate those symptoms as well to their parents, and so the parents also have that fear that they might miss all the signs and symptoms. What happens is that families then run their child's blood sugar a little bit higher because if your blood sugar is a little bit higher, then it reduces your risk. We're working with families with this telemedicine intervention to help and reduce their fear and help them think about other more proactive or better management strategies, other strategies to manage their child's blood glucose without having to resort to running it high or perhaps undertreating their child's blood glucose.

Dr. Smith: Obviously, there's a lot of projects going on and this is a much larger collaboration than even I originally thought. What I'd like to do maybe is back this up a little bit and start with you, Dr. Clements. What would you like physicians, practitioners and even family members and kids to know about these new innovative interventions for type 1 diabetes?

Dr. Clements: I think a lot of the work that Susana and I are doing together recognizes that patients and families really only spend about 0.03% of their waking lives in clinic with us and it's really difficult to imagine we can have a big impact on their behaviors in caring for diabetes at home if we rely only on those contacts in clinic four times a year. If we really want to have an impact, we really need digital health strategies and health system interventions that help us to reach out to families between clinic visits and give them feedback on how they're doing and make suggestions for how they can improve care at home based on the specific behaviors and habits we're seeing from outside of the clinic. I think that's the message for healthcare providers. We've really arrived at an age where digital health isn't a luxury; it's a necessity. For families, I would say that we can't sit in our offices and dream up these interventions without them, so several of our projects are really gaining insights from talking to parents and children themselves about what they would like to see in diabetes care. I think it really speaks to a new partnership that is necessary between the healthcare system and patients and their families to drive innovation in healthcare in the future.

Dr. Smith: Dr. Patton, what would you like people to know?

Dr. Patton: I think I'd like them to keep in mind that while we focus on and try really hard to help all of our patients with type 1 diabetes achieve a good HB1C, which is our measure of glycemic control, there are larger and related goals that we also have to keep in mind; making sure that we're doing a good job assessing for fear of hypoglycemia or other anxiety for parents or for patients, making sure we're doing a good job of assessing for depression or depressive symptoms for parents and for kids, identifying problems of conflict that could be interfering with daily behaviors. I think there are many things that we could be doing in our clinics that will also help to support the ultimate goal of helping these kids these be safe and healthy and have good glycemic control.

Dr. Smith: Obviously you guys are doing some very important work and I want to thank you for doing that and thanks for coming on the show today. You're listening to Transformational Pediatrics with Children's Mercy Kansas City. For more information, go to [childrensmercy.org](http://childrensmercy.org). That's [childrensmercy.org](http://childrensmercy.org). I'm Dr. Mike Smith. Thanks for listening.

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