Recent years have brought major advances in the diagnosis and treatment of diabetes as well as a plethora of research data substantiating the importance of tight glucose control. Despite this progress, most people with diabetes do not meet recommended treatment goals. Results from the Diabetes Control and Complications Trial (DCCT) and the Epidemiology of Diabetes Interventions and Complications (EDIC) trial, the premier longitudinal study on patients with type 1 diabetes, indicate that most individuals with type 1 diabetes should be treated as aggressively as possible to achieve recommended hemoglobin A1c targets to prevent complications (Cleary, Dahms, Goldstein, Malone, & Tamborlane, 2001; Nathan & DCCT/EDIC Research Group, 2014).

Currently for patients older than 18 years, the American Diabetes Association (ADA) recommends A1c levels of <7.0% and <7.5% for children and adolescents younger than 18 years. The International Society of Pediatric and Adolescent Diabetes concurrently recommends an A1c goal of <7.5% for individuals younger than 18 years. Results from research done with the type 1 diabetes Exchange Network has shown that in the United States, only 23% of children and adolescents younger than 18 years meet ADA and International Society of Pediatric and Adolescent Diabetes goals and only 14% of 18- to 25-year-old meet the goal of A1c <7.0%. After the age of 25 years, the percentage of U.S. adults achieving target A1c remains low at 30% (Miller et al., 2015).

Similarly, above target control occurs with patients with type 2 diabetes in the United States. The Pediatric Diabetes Consortium Type 2 registry data indicate that hemoglobin A1cs increase significantly with disease duration, with average A1c 9.7% after having diabetes for >4 years (Nambam et al., 2017). Cardiovascular disease is the leading cause of death in individuals with type 2 diabetes. There has been substantial new evidence of preventive therapy to reduce cardiovascular complications for patients with type 2 diabetes, but actual reduction remains disappointing. National Health and Nutrition Health Examination Survey showed that between 1999 and 2010, 78.7% of adults with type 2 diabetes and cardiovascular disease were unable to achieve one or more guidelines recommended goals (Gao, Peterson, & Pagidipati, 2019).

Glycemic control is vital in reducing and preventing the significant morbidity and mortality that accompanies dysglycemia. U.S. data from the Centers for Disease Control indicate that complications from diabetes accounted for 7.2 million hospitalizations in 2014. In terms of health-care burden, the total direct and indirect estimated cost of diagnosed diabetes in the United States in 2017 was $327 billion, increasing 26% since 2012. In 2015, diabetes was the seventh leading cause of death in the United States (ADA, 2013, 2018; Centers for Disease Control and Prevention, 2019). World Health Organization data reveal that the number of individuals with diabetes has increased from 108 million in 1980 to 422 million in 2014. The worldwide occurrence of diabetes among those older than 18 years has gone up from 4.7% in 1980 to 8.5% in 2014. Diabetes incidence is rising more swiftly in middle- and low-income countries and happens to be a major reason for the complications of kidney failure, stroke, heart attacks, and lower limb amputation (World Health Organization, 2018).

While long-term complications encompass cardiovascular and macrovascular complications, short-term complications include the potential for diabetic ketoacidosis (DKA). DKA is a life-threatening complication of untreated or undertreated diabetes. Concerning results from the type 1 diabetes Exchange Registry show that for children enrolled in the registry, the odds ratio of experiencing a DKA event was 13-fold higher in youth with HbA1c levels >9.0% than in those with HbA1c <7.5%. In addition, the rate of DKA was two-fold higher in patients receiving insulin injections versus those on insulin pump therapy, indicating an association with an increased number of missed insulin doses (Campbell et al., 2014; Cengiz et al., 2013).

Glycemic control remains above target in a day and age where modern short- and long-acting insulins are available and diabetes technology is advancing at a rapid rate. In 2016, the Food and Drug Administration

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approved the first-ever hybrid closed-loop system. The hybrid closed-loop system is an insulin pump and continuous glucose monitor that when worn together can automate insulin delivery. With this system, the sensor informs the pump-based algorithm of the sensor glucose level and the glucose trend and insulin is automatically delivered or suspended to account for glucose trends. It should be noted that these systems are termed *hybrid* because the user still needs to announce carbohydrate consumption to the pump in the form of entering grams of carbohydrate into the pump before eating them. Additional insulin pump companies and independent investigators are also currently working on developing other hybrid closed-loop systems that should be available in the coming years.

While research is abundant in providing information regarding the current state of diabetes and its complications as well as the importance of glycemic targets, the fact that most patients do not reach these goals speaks to the extreme importance of further research related to care and education of patients with diabetes. It also highlights the need for concise and efficient ways to assess knowledge deficits regarding diabetes and its care. Clearly, the reasons for suboptimal control in patients with diabetes both in the United States and worldwide are complicated and multifactorial. These reasons range from access to care, knowledge deficits, and the sheer burden of living with a disease that requires thinking and action 24 hours per day. While technology is advancing to provide more automated systems for insulin delivery and continuous glucose monitoring, it is still ultimately up to the patient to have the knowledge base and motivation to wear multiple pieces of technology continuously, count carbohydrates, test blood sugars, and trouble shoot. In situations where patients lack knowledge, motivation, and support, these systems will be ineffective.

To lessen and prevent complications associated with diabetes, patients need to have an astounding amount of knowledge, support, and resources. These things are often at odds with our current health-care system that involves short patient visits focused on acute issues. While the ADA suggests a team approach to care, the reality of this being available is not as common as one would hope. Novel and effective approaches to diabetes screening, education, and treatment are paramount in managing this burdensome condition.

In this special collection on diabetes, you will read about how innovative approaches to patient screening to assess knowledge deficits can be key in efficiently identifying areas where patients need more time and attention. In addition, you will read evidence on how keeping children who are ill, home, and out of the hospital by using a preprescribed regimen is an effective way to improve patients’ quality of life by saving them an emergency room visit as well as saving health-care dollars.

You will also learn about how more research is required to see whether taking vitamin D can potentially impact diabetic foot ulcers and their complications and how quality of life can be impacted by a diabetic foot ulcer. In addition, you will gain insight on mother’s coping with the diagnosis of a newly diagnosed type 1 child in the United Arab Emirates. These articles highlight the importance of further research on all potential tools available to reduce burden related to cost and quality of life.

Finally, while constant research and advances are made with regard to diabetes, it is important to have the time and ability for providers to assess and educate each patient on an individual basis and provide the necessary information so that they can better manage their chronic condition. Diabetes is an all encompassing condition that requires both medical and psychosocial evaluation and individualized care. Working alongside our patients to develop the best treatment plan tailored to their lives and providing holistic care, support and education is paramount to improving glycemic control and quality of life for those with diabetes.

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**References**

American Diabetes Association. (2013). Economic costs of diabetes in the U.S. in 2012. *Diabetes Care*, 36(4), 1033–1046.

American Diabetes Association. (2018). Economic cost of diabetes in the U.S. in 2017. *Diabetes Care*, 41, 917–928.

Campbell, M. S., Schatz, D. A., Chen, V., Wong, J. C., Steck, A., Tamborlane, W. V., Miller, K. M. (2014). A contrast between children and adolescents with excellent and poor control: The T1D Exchange clinic registry experience. *Pediatric Diabetes*, 15(2), 110–117.

Cengiz, E., Xing, D., Wong, J. C., Wolsdorf, J. L., Haymond, M. W., Rewers, A., Miller, K. M. (2013). Severe hypoglycemia and diabetic ketoacidosis among youth with type 1 diabetes in the T1D Exchange clinic registry. *Pediatric Diabetes*, 14, 447–454.

Centers for Disease Control and Prevention. (2019). *Diabetes 2017 report card*. Retrieved from National Center for Chronic Disease Prevention and Health Promotion: https://www.cdc.gov/diabetes/library/reports/congress.html

Cleary, P. A., Dahms, W., Goldstein, D., Malone, J., & Tamborlane, W. V. (2001). Beneficial effects of intensive therapy of diabetes during adolescence: Outcomes
after the conclusion of the Diabetes Control and Complications Trial (DCCT). *Journal of Pediatrics, 139*, 804–812.

Gao, Y., Peterson, E., & Pagidipati, N. (2019). Opportunities for improving use of evidence-based therapy in patients with type 2 diabetes and cardiovascular disease. *Clinical Cardiology, 26*. doi:10.1002/clc.23252

Miller, K. M., Foster, N. C., Beck, R. W., Bergenstal, R. M., DuBose, S. N., DiMeglio, L. A.,…, Tamborlane, W. V. (2015). Current state of type 1 diabetes treatment in the U.S.: Updated data from the T1D Exchange clinic registry. *Diabetes Care, 38*, 971–978.

Nambam, B., Silverstein, J., Cheng, P., Ruedy, K. J., Beck, R. W., Paul Wadwa, R.,…, Thomas, I. H. (2017). A cross-sectional view of the current state of treatment of youth with type 2 diabetes in the USA: Enrollment data from the Pediatric Diabetes Consortium Type 2 Diabetes Registry. *Pediatric Diabetes, 18*(3), 222–229.

Nathan, D. M., & DCCT/EDIC Research Group. (2014). The diabetes control and complications trial/epidemiology of diabetes interventions and complications study at 30 years: Overview. *Diabetes Care, 37*, 9–16.

World Health Organization. (2018). *Diabetes fact sheet*. Retrieved from https://www.who.int/news-room/fact-sheets/detail/diabetes