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Glycemic control in Brazilian youth with type 1 diabetes

Rayzel Shulman,[1] Mark R. Palmert,[2] Denis Daneman[3]

The study entitled "Clinical and laboratory profile of pediatric and adolescent patients with type 1 diabetes," by Jose et al.,[1] published in this journal, adds to the growing body of literature from around the world documenting persistent suboptimal glycemic control among youth with type 1 diabetes mellitus (T1DM).[2-4] The Diabetes Control and Complications Trial (DCCT) and the Epidemiology of Diabetes Interventions and Complications (EDIC)[5] have demonstrated without reservation that improved glycemic control can delay the onset and/or slow the progression of the long-term complications of T1DM.[6,7] In light of these results, researchers have been evaluating why better glycemic control among youth with T1DM is so difficult to achieve and maintain.

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Glycemic control in youth with T1DM is dependent on a multitude of factors that influence their lives from their societal, community, institutional, interpersonal, and intrapersonal environments.[8] Using this framework, we try to understand why the cohort described by Jose et al. has a mean glycosylated hemoglobin (HbA_{1c}) higher (10.0%) than that of the center with the highest mean HbA_{1c} (9.2%), reported by the Hvidoere Study Group in 2007. This is an international study that examined over 2,000 youth with T1DM followed at 21 diabetes centers.[2]

From a global point of view, childhood T1DM is a growing problem, with the incidence increasing worldwide at a rate of ~ 3% per year.[9] Incidence rates differ across the globe, with some of the lowest rates in South and Central America and the highest in Scandinavia. In 2007, the incident rate in Brazil was estimated to be 7.7 per 100,000 children per year.[9] Rates of diabetic ketoacidosis at the time of diagnosis of T1DM vary inversely with the regional incidence of T1DM.[10] It is possible that a similar relationship exists with glycemic control based on the idea that increased patient volume leads to improved outcomes. This is an hypothesis worth pursuing.

Outcomes of childhood T1DM are influenced by the overall health of the population. Poorer glycemic control in this cohort of youth from Brazil may reflect a disparity in overall health status rather than just specifically in diabetes care. According to the United Nations, the predicted life expectancy at birth in 2007 in Brazil was 72.2 years. Life expectancy is an indicator of the overall health of a population: Brazil ranks 95th out of 182 United Nation member states.[11] The authors comment that the patients studied were from cities in one of the most developed states in the country and that economic and social issues continue to be a challenge.

The structure of the healthcare system and access to resources no doubt influence health outcomes among youth with T1DM. We do not presume to have expertise in the structure and function of the Brazilian healthcare system. However, according to this study, the State provides NPH insulin, syringes, and glucose monitoring strips, but not short- or long-acting insulin analogues, pens, or pumps. Although evidence has not shown a correlation between insulin regimen and glycemic control,[2] this may be a contributing factor in this case, since in the current study, 64/239 patients (27%) were on NPH only and 28/239 (12%) were on a once daily injection regimen. Neither of these

1. MD. Research Fellow, Division of Endocrinology, Department of Pediatrics, The Hospital for Sick Children, University of Toronto, Toronto, ON, Canada.
2. MD, PhD. Head, Division of Endocrinology, Department of Pediatrics, The Hospital for Sick Children, University of Toronto, Toronto, ON, Canada.
3. MB, BCh, FRCPC. Chair, Department of Pediatrics, University of Toronto, Toronto, ON, Canada. Pediatrician-in-Chief, The Hospital for Sick Children, Toronto, ON, Canada. R. S. McLaughlin Foundation, Chair on Pediatrics.

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regimens allows physiologic mimicry of endogenous insulin secretion. Youth on such regimens would be expected to have worse glycemic control compared to those on any other regimen. Even amongst those who could afford to be on a premixed insulin regimen, glycemic control was poor (10.5%) compared to published results for those on a twice daily premixed insulin regimen (8.6%).[2]

Gale explored reasons for persistent poor metabolic control among youth with T1DM, acknowledging the challenges faced by healthcare teams and suggesting that "more resources will be needed before current limitations can be overcome."[12] Low spending may provide part of the explanation for 61.1% of youth with T1DM in Brazil having HbA_{1c} values > 9.0%. Mean health expenditure per person with diabetes in Brazil was relatively low, at USD 312 in 2007.[9] However, despite having the highest mean health expenditure per person with diabetes (USD 6,231 in 2007),[9] 17% of youth with T1DM in the USA are reported to have HbA_{1c} values ≥ 9.5%.[3]

Institutional factors such as staffing, structure, and the process of delivering diabetes care have not been shown to be associated with HbA_{1c}.[2-4] The three Brazilian centers described in the current study do not appear to be dissimilar to those included in the Hvidoere study. It is possible that the laboratory assay used to measure HbA_{1c} in this study is different compared to those used in other studies that compare HbA_{1c} among pediatric diabetes centers. However, the reference range, 4.6-6.5%, is similar to those used in other studies (5.0-6.5[4] and 4.4-6.3%[2]), and any difference between HbA_{1c} assays is unlikely to be a major contributing factor to between-center differences.

Demographic factors such as older age, female sex, longer duration of diabetes,[2] and individual factors such as marital status of parents and the number of clinic visits in the previous year[13] have all been associated with poorer glycemic control. In order to allow for a fair comparison of HbA_{1c} levels of this Brazilian cohort to that of others described in the literature, adjustment for such confounding variables should be made.

The goals of better access to care and improved health outcomes for youth with T1DM remain as beacons, but the path to achieve them remains unclear. Targets for childhood diabetes care were set by the International Society for Pediatric and Adolescent Diabetes (ISPAD) in the Declaration of Kos in 1993 to be achieved by the year 2000.[14] Despite the significant progress that has been made toward the achievement of these goals, glycemic control in children with T1DM remains suboptimal, thus putting them at risk for the development of long-term complications.

Research investments in costly technological advances such as insulin pumps and continuous glucose monitoring systems have, so far, failed to demonstrate that they are the panacea for blood glucose management. Accepting this current reality and continuing to seek answers to important health service research questions about the access, cost, and quality of care provided to youth with T1DM may lead to future progress. By profiling characteristics of their patient population, Jose et al. have taken the first steps in studying these problems in the Brazilian context. Barring the development of paradigm-shifting new approaches to therapy for people with T1DM, finding elusive answers to the questions posed in this study remain the best hope for improving the health of youth with T1DM.

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Correspondence:
Denis Daneman
The Hospital for Sick Children,
555 University Avenue
M5G 1X8 - Toronto, Ontario - Canada
E-mail: denis.daneman@sickkids.ca