CGM Initiation Soon After Type 1 Diabetes Diagnosis Results in Sustained CGM Use and Wear Time

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The majority of youth with type 1 diabetes are above hemoglobin A1c (HbA_{1c}) targets. Continuous glucose monitoring (CGM) has been shown to improve clinical outcomes and use early in the course of diabetes has the potential to improve glycemic outcomes and improve quality of life.

In our clinic, youth with new-onset type 1 diabetes were offered the opportunity to start on CGM (Dexcom G6) soon after diabetes diagnosis. Ongoing CGM coverage was subsequently applied for through the patient's insurance. Following CGM initiation, youth had a 1-week follow-up with a nurse practitioner. Per clinic standard of care, youth were seen again at 1 month post-diagnosis and every 3 months thereafter. We prospectively collected data on HbA_{1c}, continued CGM use, days of CGM wear, method of viewing CGM data, time in range (TIR), and time in hypoglycemia. Institutional review board approval was obtained for the prospective data collection.

From July 2018 to April 2019, we approached 44 youth with newly diagnosed type 1 diabetes to initiate CGM. Forty-one youth (at onset: mean age 9.7 ± 4.1 years, 56% male, 90% with private insurance, 41% non-Hispanic white, HbA_{1c} 12.2 ± 1.8% [110 mmol/mol]) were started on CGM at a mean of 9.0 ± 8.8 days post–diabetes diagnosis (Table 1). Three adolescent youth declined CGM, stating they did not want to wear a device.

Of those on CGM, the most recent visit occurred at a mean of 94.1 ± 64.3 days post–CGM initiation and the youth had a mean HbA_{1c} of 7.2 ± 1.0% (55 mmol/mol). At that time, 38 of 41 youth continued on CGM. Among those on CGM, the TIR (70–180 mg/dL) was 69.6 ± 18.9% with minimal time in hypoglycemia (<70 mg/dL) 3.4 ± 3.9% and a mean CGM wear time of 13.2 ± 2.3 days over the 2 weeks prior to the visit. Two of the three who stopped using CGM were publicly insured and did not receive ongoing insurance coverage. The third patient discontinued CGM use since he no longer wanted to wear a device on his body.

Our data indicate that CGM initiation in the new-onset period is feasible and well accepted by youth and their families in response to a team effort around CGM education and glucose targets. More long-term follow-up is needed to determine whether early CGM use coupled with modified diabetes education can improve diabetes outcomes. Given the increased amount of information provided to youth and caregivers by CGM, further work needs to be conducted to understand the psychosocial impact of early CGM initiation.

A recent study has shown that an individual's long-term glycemic track is set by 5 years post–diabetes diagnosis (1). We have previously shown that HbA_{1c} rises between 5 and 6 months post–diabetes diagnosis and plateaus at 12–18 months in our clinic (2). Taken together, these studies suggest that interventions early in the course of diabetes can have long-term impact on glycemic outcomes. Previous studies with initiation of CGM early in the course of diabetes demonstrated improved glycemic control (3) and decreased hypoglycemia (4). Since newer-generation CGM systems do not require calibration, are approved for insulin dosing decisions, and provide glucose information continuously as well as the rate and direction of glucose change, they are superior alternatives to self-monitored blood glucose. Introducing CGM devices early in the course of diabetes in conjunction with education around glucose targets has the potential to improve glycemic outcomes early in the course of diabetes and may translate to improved long-term outcomes.

Real-world reports such as this complement research study data to inform guidelines such as the Diabetes Technology chapter in the American Diabetes Association's *Standards of Medical Care in Diabetes—2019* (5), which are used by insurers to make decisions on coverage for

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Table 1—Baseline and follow-up characteristics of individuals initiated on CGM in the first month of diabetes diagnosis (*n* = 41)

Age at onset, years	9.7 ± 4.1
Sex	
Male	23 (56)
Female	18 (44)
Insurance type	
Public	4 (10)
Private	37 (90)
Race	
Non-Hispanic white	17 (41)
Hispanic	4 (10)
Asian and Pacific Islander	5 (12)
Alaskan Native or American Native	0 (0)
Other	5 (12)
Unknown	10 (24)
Primary language	
English	38 (93)
Spanish	2 (5)
Other	1 (2)
Diabetic ketoacidosis at onset	20 (49)
Outpatient education	20 (49)
Education at Stanford	37 (90)
HbA_{1c} at onset, % (mmol/mol)	12.2 ± 1.8 (110)
Days to CGM start	9.0 ± 8.8
Days to most recent visit	94.1 + 64.3
Continuing to use CGM	38 (93)
Days worn over the last 2 weeks (*n* = 27)*	13.2 + 2.3
Mean HbA_{1c} (*n* = 32)†, % (mmol/mol)	7.2 + 1.0 (55)
TIR (*n* = 38)	69.6 + 18.9
Time in hypoglycemia (*n* = 38)	3.4 + 3.9
Time in hyperglycemia (*n* = 38)	26.7 + 18.9

Data are *n* (%) or mean ± SD. *Data were based only on patients with a scanned report in the medical record or with the data available in the Clarity portal. †Most recent visit for six youth was within the first month of diagnosis.

CGM. Transition from self-monitored blood glucose to CGM mirrors the historic advancement from urine to blood glucose testing. More data are required on new-generation CGM systems to accelerate patient access to these superior glucose monitoring technologies.

One limitation of this study was that it was conducted at a single site with limited follow-up. We restricted our new-onset CGM program to youth with private insurance due to inconsistent insurance coverage by public insurance. Fortunately, we have recently obtained funding to study new-onset CGM initiation in publicly insured children, and future reports will describe early CGM initiation in these children with type 1 diabetes with the goal of advocating for earlier and easier CGM approval for publicly insured youth. Such data are needed to develop the evidence base for early and universal access to CGM for all people with type 1 diabetes.

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