Connecting From Afar: Implementation of Remote Data-Sharing for Patients With Type 1 Diabetes on Insulin Pump Therapy

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Quality Improvement Success Stories are published by the American Diabetes Association in collaboration with the American College of Physicians and the National Diabetes Education Program. This series is intended to highlight best practices and strategies from programs and clinics that have successfully improved the quality of care for people with diabetes or related conditions. Each article in the series is reviewed and follows a standard format developed by the editors of *Clinical Diabetes*. The following article describes an effort to improve the remote collection of insulin pump data in an academic center in South Florida.

Describe your practice setting and location.

We are part of the Division of Endocrinology, Diabetes, and Metabolism of the University of Miami Miller School of Medicine, a leading health care institution in South Florida. We are also part of the T1D Exchange Quality Improvement Collaborative (T1DX-QI), a network of 50 diabetes centers (32 pediatric and 18 adult) from different regions across the United States that are committed to sharing the best clinical practices and benchmarking to improve type 1 diabetes care (1). The intervention was conducted in two of the division's adult diabetes clinics, one located on the medical campus at the Diabetes Research Institute and the other located on the University of Miami campus at the Lennar Foundation Medical Center.

Describe the specific quality gap addressed through the initiative.

The coronavirus disease 2019 (COVID-19) pandemic led to a rapid expansion in the use of telemedicine for treating many conditions, including type 1 diabetes. In the T1DX-QI, we reported a rapid adoption of telemedicine during the pandemic (2). We described interventions for and barriers to telemedicine practice in type 1 diabetes care and identified access to technology tools as one of the key drivers of adoption (2).

After the increased adoption of telemedicine in our clinics, we identified a quality gap in accessing insulin pump data remotely. The Tandem t:slim X2 insulin pump was the pump most used by our patients attending the two clinics. As part of the activities supported by the T1DX-QI, we started a quality improvement (QI) project aimed at increasing the percentage of patients with type 1 diabetes using the t:slim X2 insulin pump who were able to share data remotely. Patients have different options for sharing data when they are not in the clinic, but the process requires a good understanding of the manufacturer's online data-sharing platform (t:connect) (Supplementary Figure S1). First, patients need a t:connect account. Then, if their account is not linked to the t:connect health care provider (HCP) portal, they must upload their pump

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data using cables to connect the pump to the computer, generate the report, and send it (e.g., by e-mail) to the clinic. This process is time-consuming, requires patients to take several actions, and, in our experience, is prone to failure. Instead, if patients' t:connect account is linked to the HCP portal, uploaded data are readily available on the platform for HCPs to access. Finally, in the ideal scenario, patients can share data through the t:connect mobile app, which became available in August 2020. In this case, no cables are needed and pump data can be easily accessed remotely at any time on the manufacturer platform, as long as a patient's account is linked to the HCP portal and the t:connect mobile app is open and transferring data. For this project, we sought to increase the percentage of patients with type 1 diabetes using the t:slim X2 insulin pump who were able to share data from a baseline of 40% to 80% in 6 months. The measured primary outcome was the percentage of patients with an established t:connect account linked to the HCP portal, and the secondary outcome was the percentage of patients using the t:connect mobile app.

How did you identify this quality gap? In other words, where did you get your baseline data?

At the end of 2020, with the support of the T1DX-QI, we planned a QI project for improving type 1 diabetes care. A meeting of the stakeholders revealed that, with the start of the pandemic and the adoption of telemedicine, one of the major problems encountered during telemedicine visits was difficulty in remotely accessing insulin pump data. A review of the medical records of current insulin pump users attending the two clinics and the t:connect HCP portal revealed that 59% of our patients were using the t:slim X2 insulin pump, but only a minority of them had an established t:connect account linked to us via the HCP portal and the t:connect mobile app. A lack of this connectivity prevented remote data-sharing for the remainder of these patients.

Summarize the initial data for your practice (before the improvement initiative).

A chart audit of existing t:slim X2 insulin pump users seen in the clinics after August 2020, using the small sample size method (3), revealed that, before starting the project, only 40% (n = 20 [95% CI 20–64%]) of these patients were connected to the HCP portal, and only one had downloaded and paired the t:connect mobile app.

What was the time frame from initiation of your QI initiative to its completion?

This project started at the end of December 2020, when we identified a quality gap in accessing data from patients with type 1 diabetes who were using the t:slim X2 insulin pump. The intervention lasted for 6 months, from January through June 2021. The intervention began in one of the two adult diabetes clinics, and the changes we describe were then replicated in the second clinic. For this project, we used the Plan-Do-Study-Act (PDSA) model (4). Data were collected at the end of each cycle and at the end of the study period. A post-intervention analysis was carried out 1 year after completion of the project.

Describe your core QI team. Who served as project leader, and why was this person selected? Who else served on the team?

The core QI team included an endocrinologist, who served as project leader given his years of experience as both a physician and a researcher and his role as a T1DX-QI principal investigator for the adult diabetes center at the University of Miami; two registered dietitian/certified diabetes care and education specialists; and nurses and medical assistants. The team also included a representative from the T1DX-QI with experience in QI, who met on a regular basis with the team to review progress and discuss strategies to successfully complete the project.

Describe the *structural* changes you made to your practice through this initiative.

We conducted a series of meetings to identify contributing factors, perform a root cause analysis, and discuss potential solutions. Through this process, we developed an affinity diagram (Supplementary Figure S2). From the start of the intervention, we held biweekly meetings to review the results of each PDSA cycle.

Describe the most important changes you made to your *process* of care delivery.

We reached patients remotely, initially by e-mail and then by phone, but the success rate of these approaches was below the set target of 80%. Previously trained staff were then instructed to link patients' t:connect account to the HCP portal at the time of clinic visits. This was a simple and quick-to-complete procedure that could be completed easily after a staff member logged into the portal. However, the process of downloading and

pairing the t:connect mobile app at the time of the clinic visit was accomplished inconsistently because of time constraints. Reaching patients after their clinic visits for this purpose was found to be equally difficult. Therefore, patients who were unable to download and pair the t:connect mobile app at the time of their clinic visit were verbally instructed to do it afterward. In addition, we targeted new t:slim X2 insulin pump users at the time of their initial insulin pump training clinic visit. At this time, patients' t:connect accounts were linked to the HCP portal, and the t:connect mobile app was downloaded and paired.

Provide details for one example of your use of the PDSA model in the following sections.

- **Plan.** Staff was instructed to link patients' t:connect accounts to the HCP portal and to download and pair the t:connect mobile app for patients when these are missing at the clinic visit.
- **Do.** We did this for 2 weeks for all t:slim X2 insulin pump users presenting to the clinic.
- **Study.** After 2 weeks, >80% (9 of 11) of the t:slim X2 insulin pump users not initially present in the HCP portal had their t:connect account linked; however, <10% (1 of 11) had the t:connect mobile app downloaded and paired.
- **Act.** The plan for adding patients to the HCP portal worked well and was further tested.
- **Abandon.** Patients who were unable to download and pair the t:connect mobile app at the time of the clinic visit were instructed to do it afterward, but no additional cycles were performed because of limited resources. Instead, we started another plan by targeting new insulin pump users at the time of their initial insulin pump training clinic visit.

Summarize your final outcome data (at the end of the improvement initiative) and how they compared with your baseline data.

We observed that the percentage of patients using the t:slim X2 insulin pump with an account linked to the HCP portal reached the target of 80% as soon we started to approach patients at the time of the office visit (PDSA cycle 4) and that this improvement lasted until the end of the intervention, 6 months after the start of the project (Supplementary Figure S3). This improvement was not site specific, since it was successfully replicated in the second adult diabetes clinic. Importantly, this improvement was sustained over time. A post-intervention analysis done 1 year later showed that 84% of insulin pump users attending the two clinics were present on the HCP portal.

Approaching patients at the time of their initial insulin pump training visit (PDSA cycle 5) also improved the percentage of patients with the t:connect mobile app downloaded and paired to 83% at the end of the intervention in both clinics. Patients who were unable to download and pair the t:connect mobile app at the time of the clinic visit were instructed to do so afterward. This approach was not tested further because of limited resources, which we recognize as a limitation; however, instructing patients to download and link the app at home also may have contributed to the overall improvement in the percentage of linked patients. In addition, the recently introduced Mobile Bolus, a t:slim X2 pump feature that allows patients to deliver bolus doses via their smartphone and requires the t:connect mobile app, will likely further increase patients' use of the app.

What are your next steps?

We have adopted the described changes in our clinical practice (Supplementary Figure S4), which we believe can be generalizable to other practices. We have shown that this improvement can be sustained over time, but we will continue to monitor by performing ongoing audits (5).

What lessons did you learn through your QI process that you would like to share with others?

The t:slim X2 insulin pump is well equipped for sharing data remotely, but this process requires a good understanding of how the manufacturer's remote connectivity options work. Asking patients to follow complex directions such as the ones required to implement remote connectivity is challenging outside the clinical setting, mostly because of time constraints. For clinical sites with limited resources, involving the insulin pump manufacturer's representatives for patient training and education on this process may represent an additional resource.

We believe that our intervention was successful and long-lasting because the changes were tested in different conditions (i.e., in two clinics with different staff), the necessary infrastructure was widely available, and the target of 80% was rapidly achieved once we identified the correct plan (PDSA cycle 5). Part of what we learned with the t:slim X2 insulin pump would also be

applicable to patients using other insulin pumps with other available connectivity platforms and/or apps.

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DUALITY OF INTEREST

No potential conflicts of interest relevant to this article were reported.

AUTHOR CONTRIBUTIONS

M.G. and L.C. contacted patients, provided insulin pump training, recorded data, and contributed to the discussion. A.M.S. and M.S. provided insulin pump training. O.O. provided guidance, contributed to the discussion, and reviewed and edited the manuscript. N.R. and O.E. contributed to the discussion and reviewed and edited the manuscript. E.B.-M. provided support and reviewed and edited the manuscript. F.V. developed the study and wrote the manuscript. F.V. is the guarantor of this work and, as such, had full access to all the data in the project and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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