Seeing Clearly: Effects of Initiatives to Improve Diabetic Retinopathy Screening at a Pediatric Center

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IN BRIEF "Quality Improvement Success Stories" are published by the American Diabetes Association in collaboration with the American College of Physicians, Inc. (ACP), 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 initiative to improve retinopathy screening rates at the pediatric diabetes clinic of a large academic teaching hospital in Canada.

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Describe your practice setting and location.

The Hospital for Sick Children is an academic teaching hospital in Toronto, Canada, and provides medical care to patients within the greater Toronto area and beyond. Toronto is one of the most ethnically diverse cities in the world, with 48.6% of the population born outside of Canada. The pediatric diabetes program is staffed by nine staff endocrinologists, trainees (i.e., fellows, residents, and medical students), six diabetes nurse educators, three diabetes dietitian educators, a social worker, a psychologist, a diabetes clinic coordinator, and two front desk clerical staff members. The program follows ~850 children <18 years of age with type 1 or type 2 diabetes.

The hospital uses a hybrid electronic medical record (EMR) system comprising both paper and electronic records. Inpatient documentation and laboratory results, such as those for biochemical screening for diabetes complications and comorbidities, are auto-populated into the EMR system. In contrast, outpatient records and letters from health care professionals outside of the institution are paper records that are scanned manually into the EMR system.

Describe the specific quality gap addressed through the initiative.

Annual diabetic retinopathy screening (DRS) is recommended for at-risk individuals with type 1 diabetes (1). However, literature reports low rates of DRS in pediatric patients (2,3). In our diabetes clinic, DRS involves out-of-hospital assessments by eye care professionals (i.e., ophthalmologists or optometrists). This scenario is unlike that of other recommended diabetes screenings, which are embedded within diabetes clinic visits. Ensuring that screening occurs is one challenge, and another is communication, as the results of DRS assessments must be returned to our clinic by eye care professionals in the form of consultation letters or reports. These reports are then submitted to Health Records to be scanned into the patients' EMR. Anecdotal experiences in our clinic have revealed that communication of DRS results back to our diabetes clinic is often lacking or incomplete.

Studies have indicated that improved communication is needed to provide comprehensive care to patients and better communication is associated with increased adherence to DRS (4).

Thus, there is substantial risk of missed DRS among our patient population, and this quality gap is a modifiable barrier to timely detection and intervention of an important diabetes complication. This quality improvement (QI) initiative aimed to *1*) improve rates of DRS in eligible clinic patients with type 1 diabetes and *2*) increase the number of written communications of DRS results from eye care professionals to the diabetes team.

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

For our first aim, we evaluated the baseline rate of DRS in our program by conducting a one-question survey in clinic. Specifically, we asked the question, "Have you had a diabetic eye exam in the past 12 months?" to eligible patients (i.e., those who were at least 15 years of age and who had had type 1 diabetes for at least 5 years).

Second, to assess the communication of DRS results to our clinic, we conducted a chart audit of eligible patients with type 1 diabetes to determine the percentage of those who had DRS communication in their EMR.

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

Based on patient responses to the question, "Have you had a diabetic eye exam in the past 12 months?" we determined that 78% of eligible patients with type 1 diabetes had had DRS per screening guidelines at baseline. Audit of the charts of eligible patients with type 1 diabetes from the years 2015 and 2016 demonstrated that 6.3 and 6.7%, respectively, had written communication from eye care professionals about their DRS results.

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

This was a 1-year improvement initiative beginning on 1 January 2017 and ending on 31 December 2017.

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 consisted of the Endocrinology Division Head, a staff endocrinologist who acts as the QI lead in the division, two endocrinology fellows, two diabetes nurse educators, and the diabetes clinic coordinator. Endocrinology fellows served as the project leaders. All endocrinology fellows in the division are encouraged to complete a QI project during their training to foster skills for their future clinical practice. Because the fellows are closely involved in the diabetes program and are among the core frontline clinicians in the clinic, they are well positioned to identify quality gaps and to implement QI initiatives that resonate with the practice culture. In addition, one of the two endocrinology trainees who championed this project was completing a Master's degree in QI at the time and was able to put theoretical knowledge into practical use. This provided valuable insight throughout the project.

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

The core team presented the need for change during a weekly diabetes clinic meeting. A root cause analysis using surveys, interviews, and focus groups was conducted with clinic physicians, diabetes educators, and patients/families. A bundle of change interventions was created using these data. A series of Plan, Do, Study, Act (PDSA) cycles was undertaken based on the process and balancing measures that were evaluated throughout the course of the QI intervention. Buy-in from staff at the diabetes clinic was maintained by updates at weekly meetings and at Division QI meetings.

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

PDSA cycles were introduced to trial changes to our process of care delivery. The first PDSA cycle included three interventions: *1*) DRS awareness signage in the clinic (in waiting room posters, information screen notices, and newsletters), *2*) packages given to eligible patients in the clinic (containing a pamphlet on DRS, information about nearby eye care professionals, and a template consultation letter for return to the diabetes clinic), and *3*) same-day walk-in appointments at nearby optometry clinic offered to patients. After it was recognized that there was low utilization of the retinopathy packages, two subsequent PDSA cycles were implemented, including changing the location of DRS packages in the clinic (PDSA Cycle 2) and mailing the DRS package to the homes of eligible patients (PDSA Cycle 3). These PDSA cycles were informed by two process measures: tracking the number of DRS packages given to eligible patients and tracking the rate of utilization of the reserved walk-in optometry appointments.

If you used the PDSA change model, provide details for one example in the following sections.

Plan

For patients with type 1 diabetes who were eligible for DRS, a DRS handout package was provided. DRS packages were placed in the file cabinet in the clinic hallway.

Do

We did this for 1 month.

Study

After 1 month, we counted the number of DRS handout packages that were given to patients (i.e., the total number of packages at the onset of the PDSA cycle minus the total number of packages remaining at the end

of the month) compared to the total number eligible patients seen in the clinic. Only four packages were handed out, whereas there were at least 25 eligible patients seen during that time frame.

Act

Direct observation and staff interviews revealed that the location of the packages in the file cabinet in the clinic hallway was impeding their distribution during busy clinic visits. Therefore, we moved the packages from the hallway into file folders in individual clinic rooms near the physician's desk.

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

For our first aim of increasing the baseline rate of DRS, we were able to demonstrate a sustainable increase in the rate of patient-reported DRS above the baseline rate of 78% in the latter 6 months of our 1-year intervention (Figure S1).

For our second aim, to increase the number of reports from eye care professionals in patients' EMRs, we were able to demonstrate a significant increase in the number of reports during the intervention. Specifically, 16.7% of eligible patients with type 1 diabetes had letters scanned into the hospital EMR during the year of the intervention (2017) compared to 6.3% and 6.7% in 2015 and 2016, respectively (Table S1, P <0.01 vs. baseline). The majority of the additional reports were received after one of the PDSA change cycles—the mailing to patients (14% of reports were received before compared to 86% received after the mailing). None of the eye care professional reports before the mailing of the DRS packages used the template form in the DRS package; however, the majority of reports returned after the mailing (72%) utilized the provided template consultation letter. A balancing measure of self-perceived workload on a 1-to-100 scale showed that the interventions did not negatively affect the diabetes clinic (pre: 75, interquartile range 70–81; post: 75, interquartile range 50–80, P = 0.27).

What are your next steps?

A recent Cochrane review of 66 randomized, controlled trials in type 1 and type 2 diabetes demonstrated only a modest 12% increase in DRS attendance with QI strategies, consistent with our data and indicating how difficult it is to improve this metric (5). Patients at highest risk of diabetic retinopathy, including those with poor glycemic control, who have lower socioeconomic status, or who have diabetes complications such as microalbuminuria, have been demonstrated to be least likely to undergo DRS (3,6). Therefore, it would be important with future interventions to assess whether different QI intervention strategies are needed for subgroups of patients. Same-day onsite DRS has been shown to increase the rate of screening (7). We think this might be an optimal strategy to improve DRS. We were unable to arrange for onsite DRS, but we did implement same-day walk-in appointments at a nearby optometrist. Interestingly, no patients made use of these appointments. An important next step is to understand why patients did not use this option. This information may provide insight into how to incorporate screening more seamlessly into routine diabetes care.

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

We learned through the success of this 12-month QI initiative that it was crucial to involve key stakeholders from the onset because that can lead to applicable change ideas. For projects with longer durations, such as ours, it is also important to maintain buy-in through ongoing engagement of the diabetes team. Engagement can be maintained through frequent review of the project with involved players. In our case, weekly diabetes meetings provided an opportune platform. We were able to update the diabetes team about new PDSA cycles and obtain feedback regarding workflow or issues as they arose. Timely evaluation of process measures led to new PDSA cycles that continually improved the project. The value of ongoing efforts was evident through the apparent trend in higher DRS rates and improved communication from eye care professionals after the third PDSA cycle.

Given that there were numerous research and clinical initiatives occurring simultaneously in the diabetes clinic, it was important to ensure that the number of projects did not lead to an unmanageable workload. One way we formally assessed this concern was through a balancing measure of staff-perceived workload.

It is also important to learn from a project's limitations. A longer follow-up of the outcome measures would have provided more conclusive evidence that the improved DRS rates were sustained. Moreover, our DRS rates were based on patient report, which could be subject to bias. Because DRS is government-funded, an evaluation using administrative health service data may have been more accurate. Many of our patients are enrolled in research studies that include regular eye examinations, which is reflected through our clinic's high baseline DRS rate. Previous studies have demonstrated that increasing and sustaining a higher DRS rate is difficult to achieve, especially when baseline DRS rates are high.

Furthermore, although an 80% patient-reported DRS rate was achieved, the communication from eye care professionals was only at 16%. This finding points out that there is still much room for improvement in communication between the diabetes team and the eye care professionals. Not having an integrated EMR between community health care professionals and the hospital is one barrier to achieving

better communication. Obtaining input from the eye care professionals regarding the challenges related to communication and carrying out a root cause analysis would likely identify other barriers. Such work would be an important aspect of future QI interventions to improve DRS communication rates in the clinic.

Duality of Interest

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

Author Contributions

C.K.L.L. and S.Z. contributed equally to the preparation of this work. M.R.P. and J.H. served as co-supervisors of the project described.

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