# Increasing Diabetes Screening in a Primary Care Setting

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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 initiative to increase rates of diabetes screening in a large multisite academic health system in the greater Ann Arbor, MI, area.

## Describe your practice setting and location.

Michigan Medicine (MM) is a large academic medical center located in Ann Arbor, MI. There are 14 primary care sites within the MM system, with six locations in Ann Arbor and eight locations in surrounding communities in southeast Michigan. Approximately 60–70 general internal medicine physicians and 40–50 family medicine physicians provide primary care within the health system, with additional primary care services provided by geriatrics and obstetrics/gynecology clinicians (1). In total, there are ~2.4 million outpatient visits to the health care system each year, including both primary and specialty care services (2).

## Describe the specific quality gap addressed through the initiative.

The American Diabetes Association (ADA) estimates that 7.3 million adults in the United States have undiagnosed diabetes (3). Undiagnosed diabetes can lead to treatment delays and the potential for acute hyperglycemic complications, as well as long-term micro- and macrovascular complications. An additional 88 million adults in the United States have prediabetes, of whom 84% may not realize they have it (4). Identification of prediabetes is important because there are proven lifestyle interventions that can prevent or delay the progression of prediabetes to type 2 diabetes.

The focus of this quality improvement (QI) initiative was to identify and screen patients in primary care who are at risk for prediabetes or diabetes and thereby minimize the number of patients with undiagnosed diabetes. The goal was to have a simple yet large-scale intervention that would have a measurable population-level impact across the health care system. Our intervention involved the use of an alert in the electronic medical record (EMR) system called a best practice advisory (BPA) to notify health care providers (HCPs) of patients who met criteria for diabetes screening.

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

The MM Diabetes Mellitus Quality Improvement Committee was established in 2002 to support diabetes-related clinical operations in the ambulatory care

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setting. As part of this effort, the QI committee regularly monitors the institution's performance on key diabetes-related quality metrics such as glycemic control, monitoring of microvascular complications, and statin use.

A prerequisite to appropriately monitoring diabetes care is to correctly identify which adult patients in the health system have a diagnosis of diabetes. The population of people with diabetes managed by MM endocrinology and/or primary care clinicians has been steadily increasing over time and had risen from 12,141 patients in 2013 to 13,327 patients in 2016. However, we still noted a significant number of patients at MM with risk factors for diabetes who had not had a recent screening test. This situation was first noted anecdotally by the QI team leaders and later confirmed by baseline measurement in December 2016, which found that there were 16,044 patients at MM who were 40–70 years of age and without a current diagnosis of diabetes who had had no A1C or glucose testing in the past 3 years. Hence, there was concern that there could still be patients with unrecognized diabetes in our institution. This discovery prompted further investigation to identify how many of these patients would meet criteria for screening based on current guidelines.

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

We applied the U.S. Preventative Services Task Force (USPSTF) recommendations for type 2 diabetes screening to the MM population to determine the number of patients at our institution who would meet screening criteria. The USPSTF recommends screening patients who are 40–70 years of age with overweight or obesity every 3 years (5). Screening can be performed using an A1C, fasting plasma glucose, or oral glucose tolerance test. The USPSTF guidelines indicate that physicians can consider earlier screening for patients with certain risk factors for diabetes (Supplementary Figure S1). For the purposes of our project, we used just the main criteria, which results in a lower sensitivity but higher specificity compared with the expanded criteria (6). Similarly, use of the ADA criteria (Supplementary Figure S1) would result in more patients being eligible for screening and a higher sensitivity; however, this strategy was not felt to be feasible for our project, as some of the criteria (e.g., physical activity) are not available in the EMR system, and others (e.g., family history or personal history of gestational diabetes) may not be reliably recorded there (7,8). The lower sensitivity of the USPSTF criteria is a limitation of this project (9).

As of 31 December 2016, 109,680 patients aged 40–70 years had been seen at MM in the past 3 years in either primary care, endocrinology, nephrology, or cardiology clinics. Primary care clinics included general medicine, medicine/pediatrics, family medicine, and geriatrics. A total of 10,427 unique patients met USPSTF criteria for screening based on having a BMI $\geq$25 kg/m$^2$, current diagnosis of diabetes, and an absence of A1C or glucose test results in the past 3 years. Of these, 7,303 were seen in primary care, 2,280 in cardiology, 996 in endocrinology, and 48 in nephrology (although some patients were seen in multiple clinics in the 3-year period examined). Patients seen in nephrology were most likely to have had A1C or glucose testing, followed by those seen in endocrinology. Patients seen in a cardiology clinic were least likely to have had A1C or glucose testing.

There was concern about the potential volume of patients who would qualify for screening, so it was important to identify a manageable target population. We also needed to ensure adequate resources and support to manage the influx of new diagnoses. The decision was made to target primary care for the initial screening intervention, with the option to roll out the initiative in specialty clinics later.

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

The initial pilot for the intervention was launched in two primary care clinic locations on 15 November 2017. Data from the pilot were reviewed in February 2018. The intervention was then rolled out in all MM general medicine and family medicine clinics in March 2018. Geriatrics was added in August 2018, and obstetrics/gynecology clinics were added in January 2020. These clinics were selected because both geriatrics and obstetrics/gynecology can provide primary care services within our health system.

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

The MM Diabetes QI Committee is led by one physician representative from general medicine and one physician representative from endocrinology. Both have extensive experience in QI, with the general medicine lead also serving as the associate medical director for the

University of Michigan Medical Group Quality Department and the endocrinology lead also serving as the associate clinical chief of the Division of Metabolism, Endocrinology & Diabetes/Podiatry, as well as the medical director for the Adult Diabetes Education Program. Quality Analytics, a division of the MM Quality Department, played a crucial role by collecting and analyzing the data at all stages of the project, and two members of Quality Analytics serve on the MM Diabetes QI Committee. Representatives of Health Information Technology Services also sit on the committee and provided assistance with the creation of the BPA and its implementation in the EMR system. The committee also includes two additional physicians (one from primary care and one from endocrinology), a pharmacist, a diabetes educator, a registered dietitian, an administrative director, a project manager, and others, as noted in ACKNOWLEDGMENTS.

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

A BPA is an EMR-based point-of-care alert that facilitates patient care aligned with evidence-based practices and institutional initiatives. These alerts can be linked to "smart sets," which allow for laboratory test ordering, referrals, health maintenance documentation, and other resources.

Based on the baseline data described above, we implemented a BPA that would trigger and alert HCPs to screen for diabetes in any patient meeting the following criteria:

1. Age 40–70 years
2. BMI $\geq$25 kg/m$^2$
3. No A1C or blood glucose test in the past 3 years
4. No current diagnosis of diabetes (based on the institution's diabetes registry)

Although the USPSTF recommends A1C or fasting blood glucose testing to satisfy the screening requirement, our EMR system does not identify whether a patient was fasting for a given blood draw. The decision was made to use any glucose measurement to satisfy the requirement. This decision would result in fewer inappropriate BPA activations but might miss screening some patients who had a recent nonfasting glucose measurement. When the BPA triggered, it recommended either a point-of-care or a laboratory A1C test for the initial screening, which would allow screening to occur on the same day as the visit rather than waiting for a fasting laboratory test.

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

To have a successful BPA rollout, we had to consider how this EMR alert would integrate with existing clinic workflows and what action steps would be required by physicians and staff when it triggered. The recommended workflow was for the medical assistant (MA) to review all activated BPAs at the time of rooming. When activated, the BPA was linked to an order set allowing the MA to prepare a pending A1C order, either at the point of care or at the laboratory, based on clinic preference. The physician would review the pending order during the clinic visit and sign it if the patient was agreeable to screening. Before rollout at each clinic location, an e-mail was sent to the clinic leads detailing this workflow, along with EMR screenshots and tip sheets.

It was also important to have appropriate resources available in the event of a positive screen for diabetes or prediabetes. We assessed available resources, which were felt to be adequate for the potential increase in the size of the diabetes population. These resources included:

- Patient education materials, in both electronic and print formats
- Referral to group classes, including a type 2 diabetes education class and a lifestyle change program based on the Diabetes Prevention Program
- Referral to one-on-one nutrition counseling
- Referral to a pharmacist for chronic care management
- Referral to endocrinology for specialized diabetes management

## If you used the "Plan, Do, Study, Act" (PDSA) change model, provide details for one example.

- **Plan.** The BPA alert was initially piloted at a general medicine clinic in Northville, MI, and a family medicine clinic in Chelsea, MI.
- **Do.** The BPA pilot went live on 15 November 2017, and data were analyzed for the period from 21 November 2017 to 15 January 2018.
- **Study.** During the pilot, the BPA activated for 470 unique patients. Of these, 81 had an A1C ordered as part of the BPA "smart" order set. It is possible that more patients had an A1C ordered during their visit; however, only orders that were part of the order set were captured during the pilot period. Of the patients who had an A1C test

ordered via the order set, 34.6% ($n$ = 28) had an A1C in the prediabetes range, and 7.4% ($n$ = 6) had an A1C >6.4%, indicative of diabetes.

- **Act.** Based on these data, it was felt that the BPA had activated in a sufficiently small/targeted population to make it manageable for HCPs, but also resulted in a high enough positive screen rate to justify rolling it out more broadly. The intervention was subsequently rolled out in all MM general medicine and family medicine clinics (in March 2018) and in geriatrics (in August 2018).

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

Before the start of the intervention in December 2016, 7,303 patients seen in primary care in the previous 3 years were eligible for the BPA on the basis of being 40–70 years of age, having a BMI ≥25 kg/m$^2$, and having no current diagnosis of diabetes. As of December 2019, the BPA-eligible population was reduced to 5,377 patients. This reduction occurred despite an increase in the overall patient population ages 40–70 years who were followed by primary care during the same time frame, from 88,138 to 92,865, and a similar increase in the subset of those patients who also had a BMI ≥25 kg/m$^2$ from 63,666 to 67,439.

The BPA activated during an office visit for 6,703 patients between the time it was introduced and December 2019. Of those for whom the BPA activated, 77% ($n$ = 5,181) had subsequent A1C or glucose testing performed, and 927 had either diabetes or prediabetes added to their EMR problem list as a result of the BPA. Supplementary Figure S2 depicts the change in the reportable diabetes population at MM from December 2013 to December 2019.

## What are your next steps?

In January 2020, there was an additional rollout of the BPA in the obstetrics/gynecology clinics. Looking at the total BPA utilization for the first 6 months (through June 2020), there were 2,884 patients for whom the BPA activated, of whom 55% ($n$ = 1,574) had subsequent diabetes screening, and 274 had diabetes or prediabetes added to their EMR problem list.

The lower rate of A1C testing may have been caused, in part, by the coronavirus disease 2019 pandemic and related transition to virtual visits. It is generally easier and faster to obtain laboratory testing for patients who are physically present in the clinic. Depending on the ongoing need for virtual visits, we may need to make further adjustments to accommodate this new and rapidly evolving visit format. Breaking down the screening data based on visit type (in person vs. virtual) may provide further insights to inform these next steps.

Future updates to the USPSTF guidelines may expand the age criteria for screening eligibility, and we anticipate updating the BPA accordingly. We are also considering expanding the BPA screening criteria to add other groups not included in the current version such as women with a history of gestational diabetes or polycystic ovary syndrome and patients with a family history of diabetes.

Finally, this project did not address disparities in diabetes screening rates within our patient population. Identifying any possible disparities in screening rates would be an important future direction to ensure equitable health care delivery.

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

Our results illustrate how an EMR system can be used to change screening behavior on a population level across multiple primary care specialties in a large health system. Key to our success was the ability of the QI committee to bring together clinician leadership, analytic support, and EMR expertise to enact these changes. It was also important to have buy-in from the primary care clinical sites and the individual providers.

By rolling out the intervention first on a pilot basis in a small number of clinics and then more broadly in phases, we were able to see how it could be incorporated into existing workflows and assess its functioning at regular intervals to ensure that the BPA was having the desired result. The pilot data indicated that the BPA was actionable without being overburdensome and allowed us to obtain approval from the physician leads at all the general medicine clinical sites for the broader rollout.

Primary care providers already understand the clinical importance of identifying patients with diabetes, but to get their support, we needed to ensure that the BPA identified a manageable target population and that the recommended action when the BPA triggered (in this case, ordering A1C testing) was something readily achievable in a busy practice environment. Providers

also had access to a robust set of resources to manage patients with a new diagnosis of prediabetes or diabetes, allowing them to respond appropriately to positive screening results. Finally, the intervention selected was low maintenance and thus could be continued over the long term for lasting impact.

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## DUALITY OF INTEREST

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

## AUTHOR CONTRIBUTIONS

J.J.I., M.E.K.F., J.E.Z., M.C.M., C.L.R.D., K.P.S., J.A.W., and A.L.F. all serve on the MM Diabetes QI Committee. J.J.I. drafted the manuscript. M.E.K.F. collected and analyzed data and wrote a poster on which the manuscript was based. J.E.Z. collected and analyzed data. D.W.W. queried the data. C.L.R.D. designed the clinical decision-support BPA used in the project. M.C.M. and K.P.S. reviewed and edited the manuscript. J.A.W. and A.L.F. contributed to the conception and design of the work, interpretation of the data, and critical revision of the manuscript. J.J.I. is the guarantor of this work and as such, had full access to all of the data and takes responsibility for the integrity of data and the accuracy of the report.

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