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Hahn School of Nursing and Health Science

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by
Christine Rieger

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Pre Diabetes Screening in Primary Care

Abstract

The purpose of this evidence based practice (EBP) project was to evaluate an electronic medical record (EMR) based American Diabetes Association pre diabetes screening protocol in a primary care setting. Pre diabetes is an under screened condition that can result in a diagnosis of diabetes mellitus and the risk is 56% lower for those who had returned to normal glucose regulation versus those who consistently had pre diabetes. Patients with a body mass index (BMI) greater than 25 were flagged in the EMR at intake. Providers assessed for a previous HbA1C within the last year, if a HbA1c had been ordered an EMR reminder was placed for annual screening. If a HbA1c had not been ordered, an order was placed for a HbA1C and an EMR reminder was placed in the chart for annual screening. Eighty patients were flagged for screening and 21% were screened with a HbA1C at the time of the visit which was not an improvement over previous months screening rates. Of the patients who had labs ordered at the visit for other reasons, 55% had an HbA1c added onto visit related blood work. Of the labs returned, 43% of the patients were found to be pre diabetic. Utilizing the EMR to identify patients at risk for pre diabetes allows for consistency across providers in a clinic and for program sustainability. There was still a substantial missed opportunity to screen for pre diabetes which results in a potential \$863,100 annually in diabetes related costs.

Key Words: Pre diabetes screening, preventative medicine, primary care screening

Introduction

Diabetes mellitus is a growing health concern in the United States, it remained the seventh leading cause of death in the United States in 2010 (American Diabetes Association [ADA], 2015b). Complications of diabetes mellitus include hypertension, stroke, heart attack, blindness and kidney disease and costs \$176 billion in direct medical costs each year (ADA, 2015b). Pre diabetes is a condition where the blood glucose levels are above normal but do not meet the criteria for a diabetes mellitus diagnosis; many of these patients will develop diabetes mellitus in the future without proper intervention. Reducing the impact of diabetes mellitus through early recognition and treatment of pre diabetes will reduce to overall cost of diabetes mellitus to the healthcare system and improve patient outcomes.

Problem Existence

Pre diabetes is an under screened condition that can lead to a diagnosis of diabetes mellitus if left unaddressed. Of those with pre diabetes, 15-30% of people diagnosed with pre diabetes will develop type 2 diabetes mellitus within five years (Centers for Disease Control and Prevention [CDC], 2014a). Nationally 86 million adults have pre diabetes with almost 78 million of those undiagnosed (Centers for Disease Control and Prevention [CDC], 2014b). Nine out of ten of those with pre diabetes are unaware of their condition which puts them at risk for developing type 2 diabetes mellitus and the complications associated with that disease (CDC, 2014b). In those people with pre diabetes, losing weight and being more active can cut their risk of developing type 2

diabetes in half (CDC, 2014b). Diabetes mellitus development risk is 56% lower for those who had returned to normal glucose regulation versus those who consistently had pre diabetes (Perreault et al., 2012). Identifying those with pre diabetes is an essential step towards preventing the development of diabetes mellitus and the complications associated with the disease.

Screening for pre diabetes is an underutilized resource in primary care, Medicare offers free screening services but these are only used about 11.7% of the time (NovoNorodisk, 2010). While there is no data reflecting the screening practices for pre diabetes, an analysis by the CDC found less than 5% of patients were receiving diabetes care according to the American Diabetes Association guidelines (National Committee for Quality Assurance [NCQA], 2006).

The five criteria that define optimal conditions for screening for any disorder are as follows: the disorder is an important public problem, an early asymptomatic stage exists, there is a suitable screening test, an accepted treatment is available and early treatment in the asymptomatic stage improves long term outcomes (McCulloch & Hayward, 2014). As stated previously, diabetes mellitus is a substantial public problem that is only increasing over time which addresses the first of the five criteria. Pre diabetes is the asymptomatic stage of diabetes mellitus and there are several screening tests that exist including glycated hemoglobin A1C, fasting blood glucose or a two hour post glucose challenge and while there is debated about the optimal screening test all three can detect pre diabetes which addresses the second and third criteria (McCulloch & Hayward, 2014). The concordance between the fasting blood glucose and OGTT tests is imperfect, as is the concordance between A1C and either glucose-based test (ADA,

2015a). The National Health and Nutrition Examination Survey (NHANES) data indicates that an A1C cut point of 6.5% identifies one-third fewer cases of undiagnosed diabetes than a fasting glucose cut point of 126 mg/dL (ADA, 2015a). The ADA recommends using the HbA1C as the test of choice for screening despite the lower sensitivity of A1C at the designated cut point due to the test's ease of use and facilitation of more widespread testing (ADA, 2015a). While there is limited evidence to the long term benefits of pre diabetes treatment, there are well established evidence to the reduction in kidney, cardiac, ophthalmic and microvascular damage with the reduction in blood glucose of patients with diabetes (McCulloch & Hayward, 2014). As discussed previously, the well-established treatment for pre diabetes through diet and exercise can reduce the progression of the disease into diabetes by almost 60% with a return to normal blood glucose levels which addresses the fourth criteria (Perreault et al., 2012). Based on the criteria listed above, screening for pre diabetes meets most of the five criteria except for the direct evidence that intervention in the pre diabetes stage prevents complications however, there is substantial evidence that glycemic control prevents complications in diabetes mellitus and it can be reasonably assumed the results can be generalized to pre diabetes.

Setting

The clinic setting for this EBP was a private practice located in Southern California providing primary care services across the life span at two separate locations. The project was implemented at one site and staff was trained via two separate sessions as well as a power point presentation emailed to staff prior to the start date. There were four providers in the clinic, two physicians, one physician assistant and one nurse

practitioner. In 2015, 879 patients qualified for screening and 593 were screened which left 70% of patients unscreened for pre diabetes.

Project Plan Process

The evidence-based program screened patients according to the 2015 American Diabetes Association protocol which states that asymptomatic adults with a BMI greater than 25 and one of the following risk factors should be screened; physical inactivity, first degree relative with diabetes, high risk race (African American, Latino, Native American, Asian American or Pacific Islander), women who delivered a baby weighing > 9lbs or diagnosed with gestational diabetes, hypertension (blood pressure greater than or equal to 140/90) HDL cholesterol less than 35 mg/dL or triglyceride greater than 250 mg/dL, women with polycystic ovarian disease, hgA1C greater than 5.7%, other clinical diagnosis associated with insulin resistance, a history of CVD, or routine screening starting at 45 years old (ADA, 2015a). Patients with a body mass index (BMI) greater than 25 were flagged in the EMR at intake by the medical assistant (MA) who initiated a screening questionnaire in the provider note to assess for pre diabetes with a reminder the patient qualified for screening. Providers looked in the lab results for a previous HbA1C within the last year: if a HbA1C had been ordered, a reminder was placed for annual screening and if a HbA1C was not present, a lab or point of care test was ordered and a reminder to screen was placed in the chart.

There is literature to support screening for pre diabetes based on BMI and based on waist circumference. Clinical evidence has shown a greater association with the risk of diabetes with central obesity and there is research that shows waist circumference has a greater predictability for central obesity (Vazquez, Duval, Jacobs, & Silventoinen,

2007). A meta-analysis of 32 studies showed a pooled relative risk ratios of 1.87 for the incidence of diabetes for BMI as well as waist circumference which shows both these methods have similar predictive ability for diabetes (Vazquez et al., 2007). Another study reviewed 17 prospective and 35 cross sectional studies and found both BMI and waist circumference measurement had an association for predicting diabetes and there was not enough research on waist circumference measurement to say it is a better predictor than BMI based on key methodological issues that affected the ability to draw clear conclusions (Qiao & Nyamdorj, 2010). There is a high sensitivity for the waist circumference that may be preferred to increase awareness of the disease in the public, there is not a high specificity in diagnostic criteria which is necessary for clinical practice (World Health Organization [WHO], 2008). Currently, most national organizations base their diabetes screening protocols on BMI and have not included the waist circumference measurement in the protocol (American Diabetes Association [ADA], 2015a). The evidence as well as national screening protocols support screening based on BMI over screening based on waist circumference measurement.

The United States Preventative Task Force (USPTF) recommends screening for pre diabetes and is currently changing their screening recommendation from patients with an elevated blood pressure (greater than 135/80 mmHg) to any patients who are at risk for developing diabetes (US Preventative Services Task Force [USPSTF], 2008). There is strong evidence from multiple long term studies that intervention during the pre-diabetes stage can lead to a significant reduction, 36% to 58%, in diabetes incidence in over 3-5 years (NCQA, 2006). There are limitations to the current body of literature

since there are no prospective studies that directly investigate the reduction in complications of diabetes due to early intervention in the pre diabetes stage.

Project Outcomes

Over a 4-week intervention period, 80 patients qualified for pre diabetes screening. The population focused on during this EBP were adult patients with BMI greater than 25 without diabetes mellitus ICD-10 codes on the problem list or current diabetic medications (insulin or metformin), non-OB or pregnancy related visits, with no HbA1c ordered within one year. Of the 80 patients who fit screening criteria: 80 charts were flagged for screening by the MA, 17 patients had a HbA1C ordered, 22 chart alerts were created (Table 1). Of the 31 patients who had blood work ordered at the time of the visit, 17 had a HbA1C added to visit related blood work. An MA driven process was 100% successful in flagging patients who qualified for screening. Of the flagged patients, 21% were screened with a HbA1C at the time of the visit which was not an improvement over previous months screening rates. Of the patients who had labs ordered at the visit for other reasons, 55% had an HbA1c added onto visit related blood work. There were substantial missed opportunities (63 patients) to screen for pre diabetes in the at risk population. Eight weeks post intervention, of the 7 lab results that were returned 3 were found to be pre diabetic (HbA1c 5.6-6.3) and 4 were within normal range.

There were substantial missed opportunities for screening patients, follow through with lab results and reminders for future screening. During the 4-week intervention period, 78% of patients that qualified for HbA1c screening were missed and at two months post intervention, just 7 of the 17 (41%) HbA1c labs ordered were available for review in the chart. 27% of the charts had alerts created for annual screening and more

chart alerts were created than HbA1c ordered. Overall, the screening rates did not increase substantially when compared to the previous 6 months screening rates (Table 2), however when screening rates were narrowed to those who obtained blood work at the visit the screening rates increased to 53%.

There were several areas that were very successful in identifying patients who qualify for screening. An MA driven screening program was successful in flagging the patients who meet the criteria, 100% of patients who needed screening had their chart flagged by the MA at intake. Of the seven HbA1c results that were obtained, 43% of the patients fell into the pre diabetic range and were asymptomatic at the time of screening.

Implications for Practice

Cost to the clinic to implement this screening was minimal since the protocol was worked into the existing EMR without paying for upgrades to the existing system. The program was built into the EMR system through alerts created by the provider which allows sustainability and consistent screening across providers in the clinic. Flexibility of the system for changes should be considered when purchasing an EMR system for private practice, there were many work arounds that occurred to avoid out of pocket costs to the clinic for system upgrades that resulted in additional steps to the screening protocol. Ideally, diagnosis linked labs and screening reminders would streamline the screening process but was not an available function on the EMR. Diagnosis linked labs would remove the provider generated orders and result in a “standing” HbA1C created annually that would allow for captured screening when labs whether are ordered for annual exams or an episodic visit.

Follow through on lab results is necessary to accurately screen patients, of the 17 HbA1c lab test ordered only 41% of patients had results at 2 months out. The primary care office had point of care testing for HbA1c available but it was not utilized during the intervention. The use of POC testing could increase the number of patients screened and allow for immediate discussion of results as well as referrals for education. The use of POC testing for screening could also increase revenue for the clinic at \$23 per test the clinic missed \$1840 in revenue during the 4-week period of the intervention.

The annual cost of diabetes to the individual patient is \$13,700 (ADA, 2015a). The cost of missing 63 pre diabetic patients would result in a potential \$863,100 annually in diabetes related costs. Through screening for pre diabetes and patient education on lifestyle changes a real impact can be made on reduction of diabetes mellitus rates as well as the cost of diabetes to the healthcare system.

Conclusions

The evidence for pre diabetes screening is well documented in the literature and is recommended by the American Diabetes association however can be difficult to consistently implement in the primary care setting. The use of the EMR to facilitate screening can provide consistency across providers and increase screening rates in the clinic. Consideration for screening programs should be included in the selection of an EMR system prior to purchase and should include the ability to link diagnosis with lab or screening reminders. The use of a POC HbA1c testing if available to the clinic should also be considered when screening for pre diabetes, it allows for immediate feedback and education resources.

Table 1

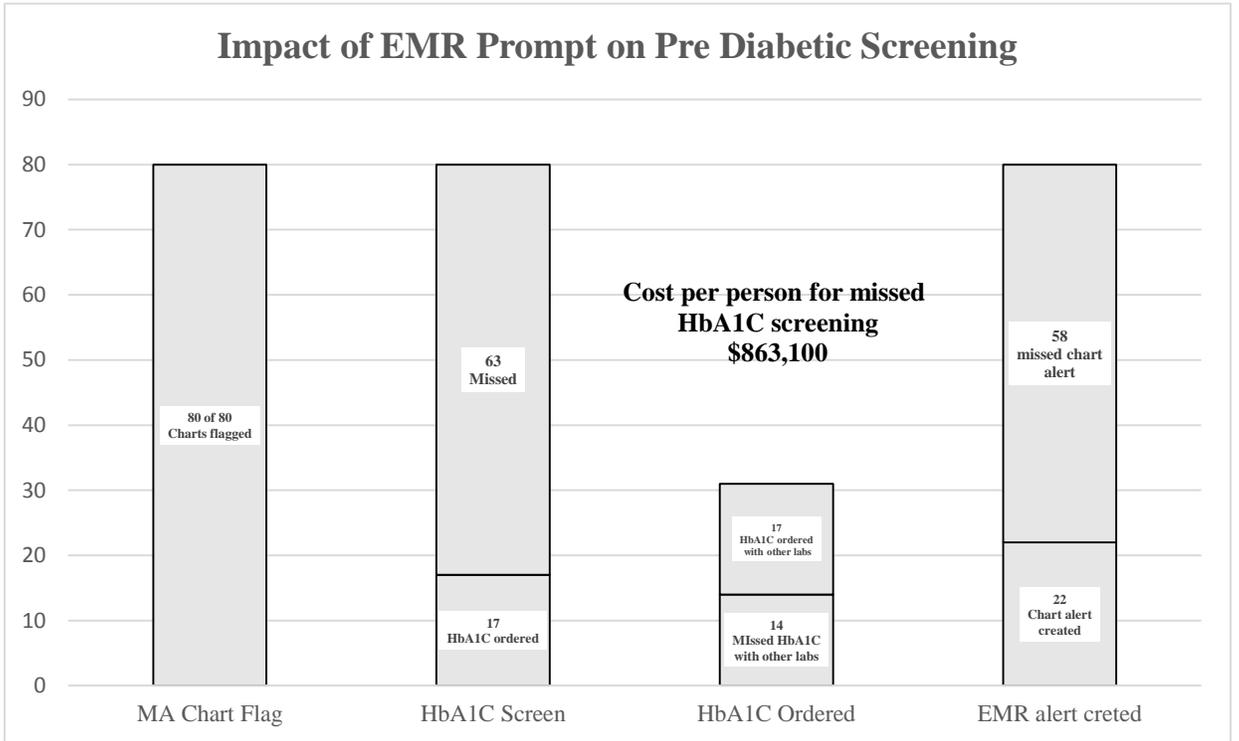
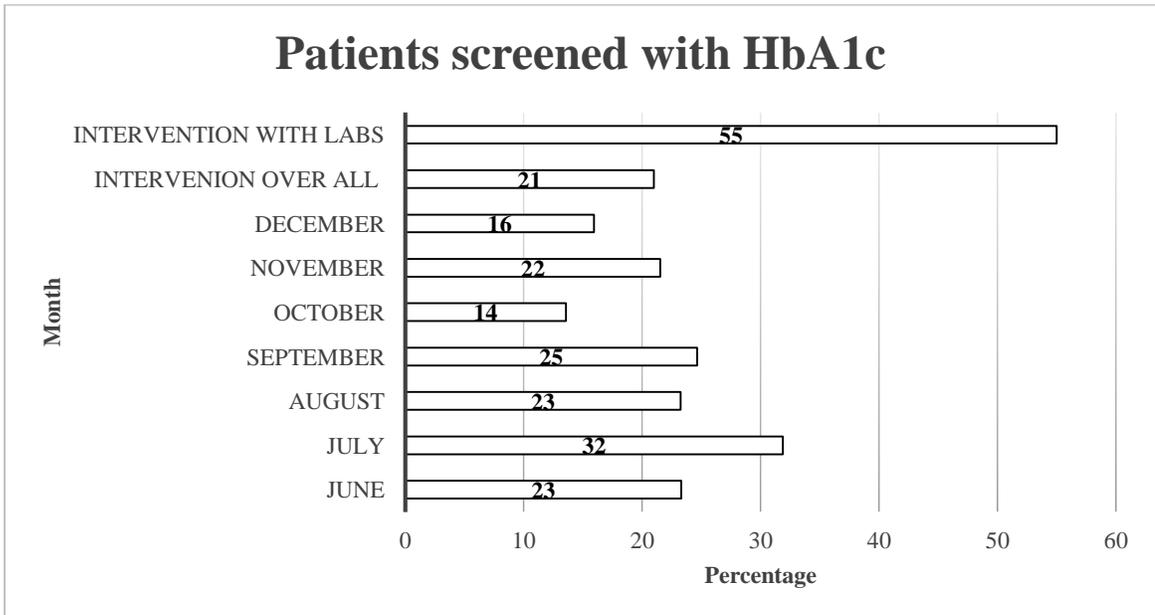


Table 2



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