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Using an Electronic Health Record Alert System to Screen and Manage Patients with Diabetes Mellitus Type 2 in a Rural Primary Care Setting

Simon Katumu

Introduction

The Centers for Disease Control and Prevention (CDC) estimates that about 30.3 million adult Americans had diabetes in 2015 and this number is rising. It is estimated that one in four people living with Diabetes Mellitus type 2 (DM2) are not aware of their diagnosis and therefore not under any form of treatment (CDC, 2015). DM2 causes significant morbidity and mortality. It was the 7th leading cause of death in 2015 as the primary cause of death in 79,535 people and the secondary cause in 252,806 people. (CDC, 2017). Uncontrolled DM2 results in increased micro and macrovascular complications including retinopathy, neuropathy, nephropathy, metabolic syndrome and atherosclerosis. (Brinkhues & Dukers-Muijers et al. 2018). Retinopathy risk is 61.7% higher in patients with uncontrolled DM2 for at least 10 years and the risk for cardiopathy was increased by 69.0%.

The American Association of Diabetes (ADA) advocates for routine screening with the hemoglobin A1C (HgbA1C) test for early detection and management of DM2 (ADA 2017). The United States preventative services taskforce (USPTF) also recommends DM2 screening for all adults over the age of 40 who are considered overweight or obese (2017). Screening for DM2 should start early in those with multiple risk factors starting at 21 years of age or younger in cases of extreme obesity and should be repeated either yearly or every 3 years depending on the number and/or severity of risk factors. Once diagnosis has been made, hemoglobin A1C (hgbA1C) levels should be checked every 3 months for those who haven't met their treatment goals and every year for those who have met their treatment goals. (Qaseem, Wilt, Kansagara et al., 2018).

This project was designed to increase the rate of screening for at-risk patients and the frequency of testing for those already diagnosed. The setting was a rural primary care clinic in a federally classified

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underserved community with a large population of patients with DM2. Screening at risk patients and re-testing diagnosed patients were major problems at this clinic. An alert system to notify providers when patients were due for hgbA1C testing did not exist. New patients at high risk of DM2 were not being screened routinely and existing patients with DM2 would come for office visits without getting routine hgbA1C testing. Many patients with DM2 were found to have lapses of several months or years without having hgbA1C monitoring.

Literature Review

The ADA recommends screening all adults over the age of 45 at least once every year and all younger patients with major risk factors annually. The following are key risk factors for DM 2; family history especially in a parent or sibling, obesity with a BMI greater than 27 kg/m² or 20% over desired body weight, African American, Hispanic American, Native American, Asian-American or Pacific Islander racial or ethnic background, age over 45, prior history of impaired fasting glucose or impaired glucose test, hyperlipidemia, hypertension and history of gestational diabetes or delivery of a baby weighing over 9 lbs. Pippitt and Gurgle (2016) state that all patients with risk factors should be screened routinely at least every 2 years but if new risk factors such as weight gain occur, then they should be re-screened as soon as those risk factors are noticed. The USPTF also recommends screening all adults aged 40 to 70 who are overweight or obese at least every 3 years. Patients who have more than one risk factor regardless of age should be screened earlier and more frequently.

Arrendale, Cherian & Zineh et al. (2008) found that for best outcomes, patients with DM2 should have their hgbA1Cs tested every 3 months for better management and glycemic control. Shahraz, Pittas & Saadati et al. (2017) also show that frequent testing of hgbA1C levels led to better outcomes overall for patients with DM2. Qaseem, Wilt & Kansagara et al. (2018) state that the recommended hgbA1C goal of treatment in most patients with DM2 is between 7% and 8%. The

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recommended goal is lower than 7% in younger and 8% or higher in older patients or those with life expectancies less than 10 years due to an advanced disease process.

Mann and Lin (2012) developed a clinical tool embedded into EHR systems that significantly increased the communication between healthcare providers and their patients leading to better outcomes. Wright et al. (2012) found that patients who used an electronic reminder system for routine screening tests had significantly better outcomes than those who did not receive reminders.

Project Methods

The goals of this project were to increase hgbA1C screening rates by alerting providers when they saw patients who were at risk of developing DM2 and to increase hgbA1C monitoring at appropriate intervals in patients with existing disease. This project implemented the use of a tool in the clinic's electronic health record system called 'clinical guidelines'. This tool utilizes data that is entered into a patient's chart to determine the specific needs of every patient. For example, if a patient's hgbA1C is noted to be over 7%, then 3 months later, the tool will show that he/she is due for a recheck until a new number is captured. The tool captures data such as a patient's BMI, Family history of diabetes, current or past hgbA1C readings, glucose test results and diagnoses such as obesity, neuropathy and cardiopathy. The project required the accurate input of all relevant clinical data as well as the careful monitoring of the clinical guidelines icon by the providers during every visit to determine when and if any testing was necessary or due. The use of the clinical guideline tool went live on September 3rd, 2018. A proposal to conduct research involving human subjects was submitted and reviewed by the Institutional Review Board (IRB) at Southern Illinois University Edwardsville and found to be exempt from IRB review.

Evaluation

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Clinical data was collected on all patients at the clinic with elevated hgbA1Cs greater than 5.7% mg/dL from May 2018 to November 2018. The data collected from May - July showed numbers prior to the implementation of the project. Data collected from September - November showed numbers after the implementation of the tool into the EHR. No data was collected for the month of August 2018 to avoid any overlap of pre and post implementation numbers. Prior to project implementation, a total of 66 hgbA1Cs were noted to be above 5.7% and 30 of them were 7% and above. Of the 66 readings, 17 (25.8%) were on patients who had not been diagnosed with DM2 previously and 49 were on already diagnosed patients. After implementation, the total number of hgbA1C readings noted to be above 5.7% was 71 with 25 of them being over 7%. This time the number of previously undiagnosed cases was 21 (29.6%) while the number of already diagnosed cases was 50.

There was an increase in the total number of cases tested for hgbA1C improving from 66 to 71 within a similar time frame. The number of cases with hgbA1C readings over 7% decreased from 30 to 25 and the number of newly identified cases also went up from 17 (25.8%) to 21 (29.6%) . These numbers were obtained with the help of the clinic's quality assurance department, which collects and reviews this data. The increase in the number of cases tested for hgbA1C is an indication that the clinical guidelines tool did prompt providers to order more tests which led to improved numbers because higher readings have to be addressed by the providers.

Providers reported that time constraints prohibited them from being able to implement the tool or they either forgot to click on the clinical guidelines icon to determine if a patient was deemed to be at risk for DM2 or was due or overdue for hgbA1C testing or deferred that task to the next visit. For this reason, it is likely that several cases still went undetected. A closer review of patients' reports showed that even after the implementation of the project, there was still a large number of patients who were

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supposed to return for retesting in 3 months but didn't do so. A recommendation for follow up calls was made but a good number of them were unreachable.

Impact on practice

The initial reaction by most of the clinic staff at the introduction of the project was excitement and enthusiasm but the implementation phase proved to be more challenging and the initial enthusiasm was overshadowed by feelings of frustration at the new changes. Many staff members reported that finding the alert added time to the patient visit. This led to some resistance especially since this was not something that was required by company policy. However, over time participation and morale increased. Providers began to 'catch' cases that would have otherwise gone unnoticed which encouraged and motivated them to use the tool more. By the end of project implementation period, many providers had made the tool an everyday component of their practice and planned to use it long-term.

The tool that was implemented in this project is not what was initially planned. The initial plan was for an 'alert' system that would not require clicking an icon but would automatically pop-up whenever a patient met the criteria to notify the provider that the patient needed to be screened or retested for DM2. However, when the IT department and the EHR software developer were notified of the planned project, the quoted price was higher than expected and the organization could not make the investment at the time. The use of the clinical guideline tool was thought of as a way of accomplishing the same goal without the alert system. Acquiring the actual alert system would be more effective and time saving for the clinic leading to better patient outcomes.

Conclusion

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The implementation of this project was instrumental in identifying new cases of DM2 by increasing the rate of screenings for at-risk patients leading to the initiation of treatment and avoidance of possible complications. The reminder system also increased the frequency of monitoring for diagnosed patients every 3 months leading to better management of their medications and better glycemic control. It is recommended that an additional reminder system be implemented to alert staff members when patients are due or overdue for hgbA1C testing and prompt them to make reminder calls to these patients to come in for re-testing.

The project outcomes demonstrate that the reminder system met its goals by increasing the overall number of hgbA1Cs checked, the number of new cases diagnosed and the rate of re-testing for diagnosed patients. Although these goals were met, not all potential cases were diagnosed and some patients still missed their three-month testing after the project implementation. Therefore, it is recommended that the system be made easily accessible and visible for the providers. When providers have to navigate away from the primary screen on the computer to access it, the extra click decreases their likelihood of using it. The elimination of this click is likely to lead to more compliance by providers. Another recommendation is for an expansion of the use of this tool to other community healthcare settings since this is not an isolated issue and its widespread use is likely to lead to more diagnoses and better care and outcomes for patients.

There are numerous tasks and obligations to be completed during office visits but remembering to do something as simple as ordering a blood test could mean the difference between a life-changing diagnosis and a missed opportunity to change a life forever. In today's fast-paced world, small measures such as this simple reminder can go a long way in ensuring that patients with DM2 live long healthy lives.

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