2016

Compliance with the 2015 American Diabetes Association Screening Guidelines for Diabetes Mellitus Type 2 in Primary Care

Krista L. Johnson
University of Kentucky, kristajohnson31@gmail.com

Compliance with the 2015 American Diabetes Association Screening Guidelines for Diabetes

Mellitus Type 2 in Primary Care

Krista L. Johnson

University of Kentucky

Nancy Kloha DNP, APRN, FNP-BC- Committee Chair/ Faculty Advisor

Judith Daniels PhD, APRN, FNP, PNP- Committee Member

Kathy Wheeler PhD, RN, APRN, FAANP- Clinical Mentor

Table of Contents

List of Figures

Abstract

Purpose: The purpose of this project was to evaluate provider use of hemoglobin (HgA1c) measurement as a method of screening for Type Two Diabetes Mellitus (T2DM) per the 2015 American Diabetes Association screening guidelines in a multidisciplinary primary care clinic in Kentucky.

Methods: A retrospective electronic medical record review was conducted in a large ambulatory care clinic. A master list was compiled of all patients aged 45-89 years who were seen for any reason the first week of November 2015. A total of 127 records that met inclusion criteria were randomly selected. The proportion of patients who were appropriately screened in the past three years with HgA1c measurement was calculated. Data was analyzed using descriptive statistics.

Results: Approximately 60% of all of the patients who met both the age and BMI screening criteria were screened in the past three years using HgA1c. Of those patients who were screened, 3.9% met criteria for the diagnosis of diabetes, and approximately 40% met criteria for the diagnosis of pre-diabetes based on the HgA1c results.

Conclusions: Using only the HgA1c as a method of screening, providers in this clinic appropriately screened 60% of all patients who met the criteria of BMI and age which exceeds the projected compliance rate in the literature.

1

Introduction

Type Two Diabetes Mellitus (T2DM) is a complex chronic illness that can have life-threatening complications. This illness requires a partnership between the healthcare provider and the patient in order to manage the disease and prevent complications. There are several risk factors for diabetes. The two primary risk factors of obesity and age should be used to determine screening for diabetes. The American Diabetes Association (ADA, 2015) provides screening recommendations for diabetes using these two risk factors as indicators. Though a number of options for screening are available to providers, the HgA1c is the most comprehensive, reliable and easy to use screening test. Unfortunately, not all providers are screening based upon risk factors nor are they using the HgA1c to screen. The purpose of this project is to evaluate provider compliance with the 2015 ADA screening guidelines in a multidisciplinary primary care clinic in Kentucky.

Background

Diabetes is the seventh leading cause of death in the United States and affects approximately 23.6 million people. It is estimated 25 percent of Americans have diabetes but are undiagnosed and another 57 million are at increased risk for developing diabetes within a few years (U.S. Department of Health and Human Services [USDHHS], 2015). In 2012 the Centers for Disease Control and Prevention (CDC) noted the age-adjusted rate of adults diagnosed with diabetes in Kentucky has doubled from approximately four percent 1994 to approximately ten percent in 2012, a rate above the national average of nine percent during the same time period. The age-adjusted rate of adults with pre-diabetes in Kentucky of approximately eight percent was above the national average of seven percent as well (CDC, 2012).

There are several complications of diabetes. Per the U.S. Department of Health and Human Services (2015) diabetes can lower life expectancy by 15 years and increase the risk of heart disease two to fourfold. It is the leading cause of lower limb amputation, adult-onset blindness, and kidney failure. These complications may be prevented by early recognition of the disease, lifestyle modifications, and medication management (USDHHS, 2015; ADA, 2015; Chatterjee et al., 2010).

The cost for medical care for patients with diabetes is substantial. In 2007, the financial burden of diabetes medical care was approximately $174 billion in the United States which included disability and premature death (USDHHS, 2015). For Kentucky, the estimated cost of diabetes was over three billion dollars, which included direct and indirect medical costs and reduced productivity in 2015 (KY Department for Medicaid Services, 2015). Associated healthcare costs are expected to increase proportionately with the number of individuals diagnosed with diabetes and prediabetes.

Screening for T2DM leads to earlier diagnosis and interventions to prevent progression of the disease and subsequent complications. Screening for diabetes using HgA1c (Chatterjee et al., 2010) and fasting plasma glucose improves health outcomes (Hanna et al., 2012; The Diabetes Prevention Program Research Group, 2005) and is cost effective (Chatterjee et al., 2010). However, not all practitioners are using the same guidelines for screening (Sarkar, Lopez, Black & Schillinger, 2011; Kuntz et al., 2012; Serrano, Leiferman, & Dauber, 2007). Several respected organizations such as the ADA, Diabetes Prevention Program, US Preventive Services Task Force (USPSTF), American Heart Association, the American College of Physicians, the Endocrine Society, and the Veterans Health Administration, periodically publish recommendations for screening. In 2008, the USPSTF published recommendations for screening

individuals with hypertension as the only risk factor. In contrast, the ADA recommends screening based on multiple risk factors.

Most organizations agree individuals greater than age 40 who are overweight or obese should be screened for T2DM at least every three years (DPP, 2005; Siu, 2015; ADA, 2015). Dall et al. (2014) suggested the use of the ADA screening guidelines detected significantly more individuals with prediabetes and diabetes than the USPSTF guidelines. Such stark inconsistencies in recommendations could lead to missed screening opportunities and delayed diagnoses.

Recently the USPSTF published guidelines recommending screening every three years for all individuals ages 40-70 years who are overweight or obese (Siu, 2015). The ADA (2015) has no age limit for screening but recommends screening individuals 45 years or older who have a BMI of 25 or greater at least every three years. More frequent screening is recommended for individuals who have one or more risk factors including physical inactivity, ethnicity, past medical history, family medical history, and co-morbidities such as hypertension and hyperlipidemia (ADA, 2015).

Testing for diabetes can be done using either HgA1c level, fasting plasma glucose, or 2-hour oral glucose tolerance test (ADA, 2015). The ADA (2015) guidelines state the HgA1c is preferred because of its convenience. It provides a more accurate idea of blood glucose control reflecting the preceding three months. It is not affected by acute factors such as illness, stress, or recent food consumption (ADA, 2015; Degling, Rock, & Rogers, 2011). Levels may be affected by characteristics of the individual including anemia, ethnicity, and age (ADA, 2015)

The diagnosis of diabetes or pre-diabetes can be established on the HgA1c result. Pre-diabetes describes individuals at an increased risk for development of diabetes. It has been

suggested HgA1c values are strong predictors of progression to diabetes. Per the ADA (2015), HgA1c values of 6.5% or greater are consistent with the diagnosis of diabetes. Hemoglobin A1C values of 5.7-6.4% are consistent with the diagnosis of pre-diabetes. Zhang et al. (2010) reported individuals with HgA1c values of 5.5-6.0% had up to a 25% chance and those with values of 6.0-6.5% had up to a 50% chance of developing diabetes within five years.

Purpose

The purpose of this project was to evaluate provider compliance with the 2015 ADA screening guidelines for T2DM using HgA1c measurements in a multidisciplinary primary care clinic in Kentucky. There were four objectives for this project. The primary objective of this study was to determine the proportion of patients 45-89 years of age at high risk for diabetes (BMI ≥ 25) who were screened for diabetes using HgA1c at or within the three years prior to the sampled visit. A second objective was to determine if patients were screened at acute problem visits or health maintenance visits. The third objective was to determine the number of acute and health maintenance visits in the past three years where screening could have been conducted if indicated. Lastly, this study aimed to determine whether or not patients who met screening criteria were screened, using HgA1c, more frequently than every three years.

Methods

Study Design

This study was approved by the Institutional Review Board for Protection of Human Subjects at the University of Kentucky and by the internal research committee at the primary care clinic. A retrospective chart audit was conducted to determine whether patients who met inclusion criteria were screened using HgA1c measurements in the past three years. Patients met inclusion criteria if they were between 45-89 years old, had a BMI ≥25, and were seen the first

week of November 2015. Patients were excluded if they had a previous diagnosis of diabetes mellitus type 1, diabetes mellitus type 2, pre-diabetes, gestational diabetes, impaired glucose tolerance, or impaired fasting glucose

A total of 565 patients over the age of 45 were seen during the study interval. Using the World Health Organization (2008) guide to choosing a sample size, for a population of 565 patients, a sample of 127 patients was recommended for statistical significance. Data collected included patient demographics, credentials of the provider who appropriately ordered a HgA1c screening test, the HgA1c result, the visit type (acute or health maintenance), the number of "missed opportunities", and whether or not the patient was screened more frequently than every three years (see *Appendix A: Data Collection Table*). De-identified data was collected using an electronic data collection form (see Appendix A) and was stored using REDCap®, a secure, password protected web-based application.

After receiving a master list of patients meeting inclusion criteria (age and BMI) who had been seen for an acute or health maintenance visit, every fourth chart was reviewed until the goal sample of 127 patients was met. Acute visits were included because this may be the only opportunity to screen patients who miss health maintenance visits. It is important to note at this clinic, providers practice under a team model. Each patient is assigned to a team consisting of an attending, two resident physicians, and one advanced practice registered nurse. The physicians are assigned as the primary care providers. However, the APRN is a vital part of the health care team, seeing mostly acute sick visits, chronic disease follow-ups, and initial disease specific visits for new patients. This model allows patients to be seen in a timely manner and improves access to care.

Data Analysis

Results from the retrospective electronic medical record review were analyzed using SPSS 22 statistical software. Initially, statistical significance between provider type and screening was anticipated. However, due to the distribution in numbers of the provider types in the sample, this relationship could not be adequately evaluated. Therefore, descriptive statistics including frequencies, means, and percentages were used to evaluate study objectives regarding screening practices.

Results

Of the 595 patients who were seen during the first week of November 2015, 127 patients who met inclusion criteria were systematically selected. This sample had an average age of 59.1 years old, with a range of 45-88 and a standard deviation of 9.6. Sixty-one percent of the sample were females. The average BMI was 30.3 with a range of 25.0-43.6 and a standard deviation of 4.2. Fifty-two percent of the patients in the sample were considered overweight (BMI 25.0-29.9), the remaining individuals were considered obese (BMI $\geq$ 30).

Table 1. *Summary of Diabetes Screening using HgA1c*

Variable	*n* (%)
Were patients who met criteria (N=127) screened?	
Yes	76 (60%)
No	51 (40%)
Visit type of those screened (n=76)	
Health Maintenance	68(90%)
Acute	8(10%)
Were patients screened more than every three years using HgA1c?	
Yes	23(30%)
No	53(70%)
A1c results of those screened (n=76):	
Diabetes (HgA1c $\geq$6.5%)	3(4%)
Pre-diabetes (HgA1c 5.7-6.49%)	30(40%)
Normal (HgA1c <5.7%)	43(56%)

Approximately 60% (n=76) of the patients who met screening criteria were screened using HgA1c measurement. The majority of screening occurred during a health maintenance visit (n=68 or 90%). Of the health maintenance visits, 76% were with a physician. Acute visits only accounted for 10% of the screenings. Of the acute visits, 62% were with an APRN.

Of those that were screened, approximately 40% met the diagnostic criteria of pre-diabetes with HgA1c levels between 5.7 and 6.49%. Of those individuals with prediabetes, 57% were considered obese with a BMI of 30 or greater. There were three patients (4%) that met diagnostic criteria for diabetes with HgA1c levels of 6.5% or greater. Of those patients with diabetes, two thirds were obese.

Approximately 40% (n=51) of the patients who met screening criteria were not screened using HgA1c measurement in the past three years. The individuals not screened had an average of five acute visits and four health maintenance visits within that three-year period. Of those screened, 30% were screened more than once in the last three years.

Discussion

In this setting more than half of patients meeting screening criteria were screened using HgA1c measurements. The proportion of patients screened by this clinic (60%) using HgA1c is higher than estimates in the literature of a 5-50% compliance rate for screening (Koll & Hewitt et al., 2011, Dall et al., 2012). The actual screening rate may be higher since only one of the three recommended screening tests was studied.

Most of the patients were screened during a health maintenance visit which is considered standard practice. The majority of screening tests were ordered by physicians, which aligns with the practice model of this particular clinic, as APRNs are not assigned to patients as primary care providers and screening is not expected at acute visits. Initially there was interest in comparing

screening rates between providers, due to the distribution in this sample, this comparison was not possible. Though the majority of screenings were conducted at health maintenance visits, it may be the case that acute visits are the only screening opportunities for some individuals.

There are several reasons why patients do not come in for health maintenance visits which may include lack of time, resources, insurance, or motivation. Some individuals believe that they do not need to see a health care provider unless they are ill. Others may be unaware of the benefits of regular contact with a health care provider, such as screening, and the risks of not being seen regularly. Therefore, health care providers must capitalize on opportunities when they present themselves. Preventive services, such as screening, at acute problem visits are not ideal. Necessary and important information about why screening is indicated, the type of screening, possible outcomes, and follow up are diluted due to the limited allotted time. Also, patients may not be receptive to recommendations for screening because they are focused on the acute problem that brought them in. Research evaluating patient barriers to health maintenance visits and potential solutions is needed.

Forty percent of the patients who met screening criteria had not been screened with HgA1c measurement in the past three years. The patients who were not screened presented to the clinic for five acute visits and four health maintenance visits, on average, over the past three years. They had an average of eight visits with a physician and one visit with an APRN in the past three years. These findings suggest that physicians had more interaction with the patients who were not screened with HgA1c measurements. However, the provider may have screened the patient using fasting plasma glucose as part of routine laboratory testing.

Approximately 30% of patients who were screened in this study had been screened more than once in the past three years. This specific data was collected at the request of the clinic to

determine whether they were screening patients inappropriately, or more often than the recommended three-year interval. Though the ADA (2015) discouraged screening more than every three years, there may be indications for retesting such as the development of new risk factors or previous testing that indicated increased risk. For instance, if the patient was newly diagnosed with hypertension or hyperlipidemia, screening would be indicated. Also, if a patient presents with symptoms such as blurred vision, frequent urinary tract infections, frequent yeast infections, or numbness or tingling of the extremities, screening for diabetes would be indicated as part of the diagnostic workup. Since this study focused on BMI and age as primary risk factors, it may not be sufficient in determining screening too frequently because other risk factors were not considered.

Pre-diabetes was noted in 40% of the patients screened in this study. This is consistent with the national average of 35-50% of adults having pre-diabetes, validating screening individuals who have risk factors for diabetes (CDC, 2011). Of those patients with prediabetes, only 57% were considered obese. Of the three patients identified as having diabetes, only two thirds had a BMI of 30 or greater. Once individuals are screened appropriately, interventions can be implemented to decrease the progression of pre-diabetes to diabetes.

Limitations

A major limitation of this study was the evaluation of the HgA1c as a screening method. Though 40 percent of patients meeting the inclusion criteria were not screened, it is possible that providers used a fasting glucose test which is part of the metabolic profile typically ordered. However, in the electronic medical record used for this study, it was difficult to determine whether or not the patient was fasting for these routine labs. The HgA1c measurement was the only diabetes screening test evaluated because it is the most accurate and specific to diabetes.

Therefore, this study may not adequately portray overall screening practices or compliance with the screening guidelines.

There were other limitations of this study because of the design. This study did not evaluate screening or rescreening based on risk factors other than age and BMI. Secondly, the original objective to compare screening practices by provider type was not met because the patients were not divided evenly by provider. Also, the practice model of the clinic setting was not conducive to comparisons of providers as APRNs are not assigned as PCPs. Lastly, this study did not get provider input on preferred screening method (i.e. fasting plasma glucose versus HgA1c) which could have explained the individuals who were not screened using HgA1c.

Implications for Practice

Though the ADA has clear definitions of when and how to screen, provider compliance with screening guidelines could use improvement. The ADA (2015) recommends HgA1c as the screening test of choice as it is convenient and unaffected by fasting status. Also, the HgA1c is specific to diabetes. When a provider orders this measurement, they are intentionally looking for the presence of diabetes. Clearly, it appears that it should be the only test recommended to screen for diabetes in the future.

Since the ADA updates recommendations for screening and diagnosing diabetes annually, a formal educational session to review the latest updates may be useful in this and other primary care clinics. It may also be beneficial to educate the public about risk factors for diabetes, the importance of early detection, and available screening methods. Evaluation of current procedures once a patient is diagnosed with diabetes or prediabetes would be helpful in determining appropriate use of evidence-based interventions such as healthy diet, regular physical activity, and weight loss.

Finally, several other quality improvement questions need to be answered and evaluated. The pros, cons, and barriers to screening at acute versus health maintenance visits should be explored. Analysis of rescreening practices and whether they are cost effective would be useful to improve current standards of care. Determining what processes and procedures are in place once a provider receives results of screening tests would be helpful to ensure adequate follow up and timely intervention. Barriers to compliance with screening guidelines and interventions to improve compliance should be assessed as well.

Conclusion

In conclusion, diabetes is a major health issue in the United States which warrants attention by every health provider. Screening for diabetes using an evidence-based protocol, such as one published by the ADA, can lead to early diagnosis of diabetes and pre-diabetes. Identification of individuals at risk for diabetes is essential for early intervention and prevention of progression of the disease and/or complications. Despite provider adherence to the 2015 ADA guidelines at this clinic, was approximately 60% and above national norms of 5-50% for all screening methods, a significant percentage of patients had not been screened. Since early detection and intervention can positively affect quality of life and health outcomes for patients, there is reason to strive for even more improvement.

Appendix A

Data Collection Table

Patient #	Age	BMI reading at this visit	Gender	Was HgA1C ordered since turning 45 (or in the past 3 years)	Age of the patient when HgA1C ordered	Has patient been screened more often than every 3 years?	Acute or HM visit?	Hg A1C result	Provider type when HgA1C ordered	Total number of *acute* visits in the past 3 years when no HgA1c done for diagnosis	Total number of *HM* visits in the past 3 years when no HgA1c done for diagnosis	Number of visits with APRN in the past 3 years when no HgA1c done for diagnosis	Number of visits with MD in the past 3 years when no HgA1c done for diagnosis
1													
2													
3													
4													
5													
6													
7													

References

Centers for Disease Control and Prevention. (2011). *National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011*. Retrieved from http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf

Centers for Disease Control and Prevention. (2012). *National diabetes surveillance system*. Retrieved from http://gis.cdc.gov/grasp/diabetes/DiabetesAtlas.html

Chatterjee, R., Venkat Narayan, K.M., Lipscomb, J., Phillips, L.S. (2010). Screening adults for pre-diabetes and diabetes may be cost-saving. *Diabetes Care, 33*(7), 1484-1490.

Dall, T.M., Narayan, K.M., Gillespie, K.B., Gallo, P.D., Blanchard, T.D., Solcan, M., Grady, M.O. & Quick, W.W. (2014). Detecting type 2 diabetes among asymptomatic adults in the United States: modeling American Diabetes Association versus US Preventive Services Task Force diabetes screening guidelines. *Population Health Metrics, 12*(12). doi:10.1186/1478-7954-12-12

Degling, C., Rock, M., Rogers, W.A. (2012). Testing relationships: ethical arguments for screening for type 2 diabetes mellitus with HbA1C. *Journal of Medical Ethics, 38,* 180-183. Doi:10.1136/medethics-2011-100086

Hanna, F., Geen, J., Issa, B.G., Tahrani, A.A., Fryer, A.A. (2012). Limitations of glycosylated haemoglobin (HbA1c) in diabetes screening. *Practical Diabetes, 29*(1), 29-31.

Kentucky Department for Medicaid Services. (2015). *Kentucky diabetes report.* Retrieved from http://chfs.ky.gov/NR/rdonlyres/7D367886-671C-435E-BCF4-B2A740438699/0/2015DiabetesReportFinal.pdf

Koll, E., & Hewitt, J.B. (2001). Adherence to 1997 diabetes screening guidelines in a large ambulatory clinic. *The Diabetes Educator, 27*(3), 387-392.

Kuntz, S., Johnson, E.L., Blehm, J., & Hosford, C.C. (2012). Use of A1C for screening and

    diagnosis of type 2 diabetes in three rural health care systems. *Clinical Diabetes, 30*(2),

    61-66.

Sarkar, U., Lopez, A., Black, K., & Schillinger, D. (2011). The wrong tool for the job: Diabetes

    public health programs and practice guidelines. *American Journal of Public Health,*

    101(10), 1871-1873.

Serrano, E., Leiferman, J., & Dauber, S. (2007). Self-efficacy and health behaviors toward the

    prevention of diabetes among high risk individuals living in Appalachia. *Journal of*

    Community Health, 32(2), 121-133.

Siu, A.L. (2015). Screening for abnormal blood glucose and type 2 diabetes mellitus: U.S.

    Preventive Services Task Force recommendation statement. *Annals of Internal Medicine,*

    163(11), 861-869.

The American Diabetes Association. (2015). Standards of medical care in diabetes- 2015.

    Diabetes Care, 38(1), S1-S93.

The Diabetes Prevention Program Research Group. (2005). Strategies to identify adults at high

    risk for type 2 diabetes. *Diabetes Care, 28*(1), 138-144.

United States Department of Health and Human Services. (2015). *Healthy people 2020:*

    Diabetes. Retrieved from https://www.healthypeople.gov/2020/topics-

    objectives/topic/diabetes

U.S. Preventive Services Task Force. (2008, May). *Grade definitions*. Retrieved from

    http://www.uspreventiveservicestaskforce.org/uspstf/grades.htm

World Health Organization. (2008). Operations manual for staff at primary care centers: quality

improvement (Ed.1). Retrieved from

http://www.who.int/hiv/pub/imai/om_11_quality_improvement.pdf

Zhang, X., Gregg, E.W., Williamson, D.F., Barker, L.E., Thomas, W., Bullard, K.M, Imperatore,

G., Williams, D.E. & Albright, A.L. (2010). A1c level and future risk of diabetes: a

systematic review. *Diabetes Care, 33*(1), 1665-1673.