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Evaluating the Delivery of Diabetes-Related Care Among the Asian Population

Lyly Bui
University of Missouri-St. Louis, lbd27@mail.umsl.edu

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Lyly Bui

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Advisory Committee

Alicia Hutchings, PhD, RN, CNE
Chairperson

Natalie Murphy, PhD, APRN, FNP-BC

David Campbell, MD

Abstract

Purpose: This project evaluated current practices for Type 2 diabetes mellitus (T2DM) screening and management among Asian Americans (AAs) presenting to a primary care clinic and determined whether these practices adhered to the American Diabetes Association (ADA)'s 2018 guidelines.

Methods: A retrospective chart review was performed to extract data from clinical case records of AAs who visited the Vietnamese Health Center (VHC) between November 1, 2017 and November 1, 2018. Descriptive statistics were utilized to analyze the data.

Results: Of 173 charts reviewed, 76.3% of AAs had no previous T2DM diagnosis and 23.7% had a previous diagnosis. Among those without a previous T2DM diagnosis, approximately 85% were screened per ADA guidelines and 4.1% of the screenings resulted in a positive finding. Among AAs with a previous T2DM diagnosis, 58.5% received routine hemoglobin A1c monitoring, 2.4% had a comprehensive foot exam, and 7.3% had a dilated eye exam. Annual screening of a lipid profile, serum creatinine, estimated glomerular filtration rate, and urine albumin-to-creatinine ratio (UACR) were performed on 90.2%, 92.7%, 92.7%, and 0% of diabetic AAs, respectively.

Conclusion: This project provided a baseline assessment of T2DM screening and management among AAs, specifically among the Vietnamese population. While a majority were screened per ADA guidelines, gaps in care were identified in the management of diabetic AAs. It is recommended that VHC focus its quality improvement efforts toward increasing the percentage of comprehensive foot exams, referral for dilated eye exams, and UACRs performed annually. Addressing these gaps in care may reduce disparities in health faced by AAs.

Keywords: Asian American, type 2 diabetes mellitus, screening, management

Table of Contents

Evaluating the Delivery of Diabetes-Related Care Among the Asian Population

Diabetes mellitus (DM) is a costly chronic disease that disproportionately affects Asian Americans (AAs) in the U.S. Currently, DM ranks as the 5th leading cause of death among AAs as compared to the 7th leading cause of death among the general U.S. population (Centers for Disease Control and Prevention [CDC], 2017; CDC, 2018). DM is a disease characterized by high levels of serum glucose in the blood, with a majority of cases falling into two main categories: Type 1 or Type 2 (CDC, 2017). In Type 1 diabetes mellitus (T1DM), high levels of serum glucose results from the body making little to no insulin, which subsequently leads to exogenous insulin dependence (CDC, 2017). In Type 2 diabetes mellitus (T2DM), high levels of serum glucose results from the body's inability to secrete enough insulin or to use insulin effectively, also known as insulin resistance (CDC, 2017). Regardless of type, both can lead to health complications such as heart disease, kidney disease, and blindness (CDC, 2017). Although the rate of diagnosed DM among AAs (8%) is only slightly higher than non-Hispanic Whites (7.4%), AAs currently have the highest rate of undiagnosed DM cases among all racial/ethnic groups nationwide (American Diabetes Association [ADA], 2018a; CDC, 2017; Menke, Casagrande, Geiss, & Cowie, 2015). Considering that AAs are the fastest growing racial/ethnic group in the U.S., this has significant health and economic implications (U.S. Census Bureau, 2012).

To help mitigate this public health problem, provider adherence to current DM treatment guidelines is essential. One nationally-recognized organization that publishes current standards of care for DM screening and management is the ADA. Of note, the ADA is the only organization that recommends screening asymptomatic AAs for T2DM

at an ethnic-specific BMI of $\geq$ 23 kg/m^2 (Abid, Ahmad, & Waheed, 2016; WHO Expert Consultation, 2004). For this reason, the ADA guidelines are referenced for this project.

The purpose of this capstone project is to (1) evaluate current practices for T2DM screening and management among AAs presenting to a primary care clinic and (2) determine whether these practices adhere to the ADA's 2018 recommended guidelines. The goal of this project is to obtain baseline data and identify any potential gaps in the delivery of T2DM care. Thus, this project will answer the following questions:

1. In AA patients, aged 18 years or older, who were not previously diagnosed with T2DM at the Vietnamese Health Clinic (VHC) between Nov. 1, 2017 - Nov. 1, 2018:
    a. How many were screened per ADA guidelines?
    b. How many had a positive screen per ADA guidelines?
    c. Of those who screened positive, what was the average body mass index (BMI), age, and sex?
2. In AA patients, aged 18 years or older, who were previously diagnosed with T2DM at VHC between Nov. 1, 2017 - Nov. 1, 2018:
    a. What was the average hemoglobin A1C (HbA1c)?
    b. How many had ADA screening labs [HbA1c every 3-6 months, lipid profile, spot urine albumin-to-creatinine ratio (UACR), serum creatinine, and estimated glomerular filtration rate (eGFR)]?
    c. How many had a documented annual comprehensive eye and foot exam?
    d. What were the number of follow-up visits annually?

Review of the Literature

A comprehensive literature review was conducted to obtain information on how T2DM affects the AA population, how AAs are currently being screened and managed for T2DM, and the current standards of T2DM-related care according to the ADA. Cochrane, CINAHL, and MEDLINE databases were used to search the following terms: *Diabetes, screening, management, guidelines, Asian, BMI, fasting blood glucose,* and *hemoglobin A1c*. The search terms were combined in a variety of phrases with the boolean operators "and" and "or". Search limits were then applied to only include studies that were in the English language, published between 2013-2018, and had full-length availability. Reference lists were also hand-searched to identify studies that may be of potential relevance.

To be included in the review, the studies had to be conducted no earlier than 2013. Any studies involving T2DM in the AA population were considered. Studies were excluded from the review if they were not in the English language or did not have full-length availability. Studies were also excluded if they focused solely on the following: DM in children, T1DM, gestational DM, prediabetes, DM prevention, or management of DM in the acute care setting.

The literature search identified a total of 15,252 studies. After applying the inclusion/exclusion criteria and removing duplicate studies, 56 studies remained and underwent an abstract review. Twenty-nine studies, along with the ADA's 2018 guidelines, were chosen to undergo a full review, as these met the inclusion/exclusion criteria and discussed T2DM in AAs.

Diabetes Risk Among AAs

An extensive literature review showed that AAs have increased susceptibility to developing T2DM. Compared to their non-Hispanic White (NHW) counterparts, AAs have less muscle mass and tend to store greater amounts of visceral fat in their abdominal region at a similar BMI (Jung, Ha, & Kim, 2016; Son et al., 2017). This increased presence of visceral fat, along with having less muscle mass, has been associated with a greater degree of insulin resistance (Jung et al., 2016; Son et al., 2017; Spanakis & Golden, 2013). This may explain why AAs develop T2DM at a lower BMI than NHWs (Araneta et al., 2015; Hsia, Larrivee, Cefalu, & Johnson, 2015; Hsu, Araneta, Kanaya, Chiang, & Fujimoto, 2015; Jih et al., 2014; Jung et al., 2016; Kobayashi, Chan, & Fuller-Thomson, 2018; Stewart, Dang, & Chen, 2016).

One cross-sectional study conducted by Kobayashi et al. (2018) found that approximately 20% of AAs with DM had a BMI between 18.5 and 23 kg/m^2, whereas only 8% of NHWs fell into the same BMI range. Even at a BMI range between 23 and 24.9 kg/m^2, AA subgroups had a higher prevalence of DM than NHWs (Jih et al., 2014). These AA subgroups included those of Vietnamese, Korean, Filipino, and South Asian descent (Jih et al., 2014). Once the BMI range approached the standard cut-off points for being overweight (BMI $\geq$ 25-29.9 kg/m^2) and obese (BMI $\geq$ 30 kg/m^2) in the general population, only Filipinos had a higher prevalence of DM than NHWs (Jih et al., 2014). These findings provide insight as to why AAs face higher rates of undiagnosed DM cases as compared to other racial/ethnic groups. If standard cut-off points for being overweight or obese are used to screen AAs for T2DM, many individuals would be overlooked. Specifically, Araneta et al. (2015) found that screening at a BMI of $\geq$ 25 kg/m^2 would

miss 36% of AAs with T2DM, whereas screening at a BMI of $\geq$ 23 kg/m^2 would miss only 15%.

Heterogeneity Among AA Subgroups

The literature review showed that significant heterogeneity exists among AA subgroups in terms of DM risks and prevalence. Filipinos, for example, have a higher prevalence of being overweight/obese than other AA subgroups, such as their Vietnamese and Chinese counterparts (Jih et al., 2014; Karter et al., 2013). The mean BMI of Filipinos was found to be 26.6 kg/m^2, whereas the mean BMI of Vietnamese and Chinese subgroups was 23.9 kg/m^2 and 24.2 kg/m^2, respectively (Karter et al., 2013). This may explain why Filipinos also have one of the highest prevalence of T2DM among AA subgroups, whereas Vietnamese and Chinese subgroups have one of the lowest prevalence of T2DM (Choi, Liu, Palaniappan, Wang, & Wong, 2013; Jih et al., 2014; Karter et al., 2013; Nguyen, Nguyen, Taylor, Fischer, & Tran, 2015). Specifically, one cross-sectional study found that T2DM prevalence was approximately 16% in Filipino subgroups, 9% in Vietnamese subgroups, 8% in Chinese subgroups, and 7% in NHWs (Karter et al., 2013). This finding shows that Filipinos are at significantly greater risk for developing T2DM as compared to NHWs; however, this increased risk is masked when AA subgroups are combined into one population group (Nguyen et al., 2015).

Age of Diagnosis Among AAs

Findings showed that AAs tend to develop T2DM at a younger age than other racial/ethnic groups. A cross-sectional study conducted by Becerra and Becerra (2015) found that the average age at time of diagnosis for South Asian, Vietnamese, Filipino, and Korean subgroups was approximately 45, 47, 47 and 51 years old, respectively.

Considering that the average age at time of diagnosis for NHWs was approximately 55 years old, this means that AAs may develop T2DM anywhere from four to ten years earlier than NHWs (Becerra & Becerra, 2015). While it remains unclear as to why AAs develop T2DM at a younger age, genetics is suspected to be a major contributing factor (Becerra & Becerra, 2015). AAs, for example, appear to have reduced beta cell function as compared to NHWs—regardless of age, weight, or family history (Saisho, 2014; Staimez et al., 2013). When beta cells do not function as well as they should, less insulin is secreted resulting in higher serum glucose, which further contributes to the development of T2DM (Saisho, 2014).

Diabetic Complications Among AAs

While current literature has not shown that AAs are at increased risk for developing macrovascular complications, such as cardiovascular disease, AAs are at increased risk for developing microvascular complications compared to NHWs (Lopez, Bailey, Rupnow, & Annunziata, 2014; Spanakis & Golden, 2013). Specifically, AAs are more likely to suffer from diabetic kidney disease (DKD) and face high rates of end-stage renal disease (ESRD) (Barrett et al., 2017; Bhalla et al., 2013; Rhee, 2015; Spanakis & Golden, 2013). Between 2000 to 2010, the incidence rate of ESRD among NHWs (aged 30-39 years) dropped by 1%, whereas the incidence rate of ESRD increased by 100% among AAs (Barrett et al., 2017).

Research has shown that while AAs are less likely to develop retinopathy than NHWs (Spanakis & Golden, 2013), AAs are still at increased risk for developing retinopathy. Of note, there is an association between having an earlier onset of T2DM with having an increased prevalence of retinopathy (Unnikrishnan et al., 2017). Since

AAs tend to develop T2DM at a younger age, this means this population remains at increased risk.

Disparities in T2DM Screening and Management Among AAs

Given that AAs are at increased risk for developing T2DM and its associated microvascular complications, early identification and management are essential to slow disease progression and prevent long-term complications. Yet, delivery of T2DM screening and management among this patient population is currently suboptimal. According to a cross-sectional study conducted by Tung, Baig, Huang, Laiteerapong, and Chua (2017), less than half of AAs received the recommended T2DM screening. In terms of racial/ethnic disparities in the quality of T2DM management, AAs were less likely to receive a comprehensive foot examination, dilated eye examination, and routine HbA1c monitoring than their NHW counterparts (Canedo, Miller, Schlundt, Fadden, & Sanderson, 2018). Moreover, despite having higher rates of being insured, AAs were also less likely to receive a foot examination or routine monitoring of their HbA1c by providers as compared to their African American and Hispanic counterparts (Islam et al., 2015). Various barriers have been identified as contributing factors to these disparities in care, such as lack of English proficiency, low level of acculturation and health literacy, differences in cultural beliefs, lack of familiarity of U.S. healthcare system, and poor follow-up of care (Jang et al., 2018; Lee, Rhee, Kim, & Ahluwalia, 2015; Lee, Chae, Jung, Chen, & Juon, 2017; Mirza et al., 2014; Sayampanathan, Cuttilan, & Pearce, 2017). Additional research is still needed to examine how T2DM screening and management differs between AAs and other racial/ethnic groups, as well as between each AA subgroups.

ADA Guidelines

Based on the ADA guidelines, T2DM screening should be performed on asymptomatic AAs with one or more of the following risk factors: individuals who are overweight/obese (overweight: BMI $\geq$ 23–27.4 kg/m^2; obese: BMI $\geq$ 27.5 kg/m^2), have a first degree relative with DM, have a comorbidity of hypertension and/or dyslipidemia, are physically inactive, or have conditions related to insulin resistance (e.g. polycystic ovary syndrome). Once patients are diagnosed with T2DM, the ADA guidelines recommend that providers promote lifestyle modifications and perform routine monitoring of risk factors that contribute to the development of macrovascular and microvascular complications (ADA, 2018b). Monitoring of risk factors include obtaining screening labs and performing a comprehensive eye and foot examination annually. The overall goal for DM management is to achieve a HbA1c of < 7%, if appropriate (ADA, 2018b).

Although there is currently limited evidence as to how effective the ADA management guidelines are in improving patient outcomes and reducing ethnic disparities in the delivery of T2DM-related care, the ADA guidelines have been successful in detecting cases of prediabetes and diabetes in the AA population (Dall et al., 2014).

Summary

A reoccurring theme found while conducting this literature review was that T2DM disproportionately affected AAs. AAs tend to develop T2DM at a lower BMI and a younger age than NHWs. This increased susceptibility to developing T2DM may be attributed to AAs having less muscle mass, greater amounts of visceral fat, and reduced beta cell functioning as compared to NHWs, which in turn contributes to the presence of

insulin resistance and poor insulin secretion (Becerra & Becerra, 2015; Jung et al., 2016; Son et al., 2017; Spanakis & Golden, 2013). It also becomes apparent that significant heterogeneity exists among AA subgroups. Aggregating different AA subgroups into one population may mask the increased risk of developing T2DM in one subgroup (e.g., Filipinos) while exaggerating the risk of T2DM in another (e.g., Vietnamese) (Nguyen et al., 2015).

Gaps remain in the literature regarding how macrovascular and microvascular complications affect AAs living in the U.S. Many studies looking at macrovascular and microvascular complications among Asians were conducted in either Asia or Europe. Other gaps in literature include disparities in T2DM self-management and provider management among AAs. Additional research in this area is needed.

One notable weakness of existing literature is that a majority of the studies were either cross-sectional or cohort studies. Larger clinical trials are necessary. A strength of the existing literature, however, is that the studies included a large sample size of AAs and disaggregated the data to account for existing heterogeneity among the AA subgroups. Consequently, the findings are likely to be representative of this patient population.

Overall, findings from this project will help to improve awareness among nurse practitioners and other healthcare providers regarding the need for appropriate T2DM screening and management among AAs. Lack of awareness among healthcare providers regarding the AAs' increased susceptibility of developing T2DM may result in a delay of early identification and management of T2DM. Making small changes, such as initiating

T2DM screening at an ethnic-appropriate BMI, can help to significantly reduce the number of undiagnosed T2DM cases among AAs.

Project Framework

A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was utilized as a framework for this quality improvement project (Bonnel & Smith, 2017). A SWOT analysis is performed to evaluate an organization's performance by highlighting its current strengths and weaknesses. This analysis can also offer insight as to what external factors may provide opportunities for the organization to grow, as well as what external factors may threaten the organization's success (Verboncu & Condurache, 2016). In turn, this framework was used to identify potential quality improvement projects for the clinic (Bonnel & Smith, 2017).

Methods

Project Design

This capstone project utilized a quality improvement approach involving a retrospective observational design to evaluate current practices for T2DM screening and management of AAs who visited VHC between November 1, 2017 and November 1, 2018. The design of the project aimed to provide baseline data regarding the clinic's adherence to the ADA's 2018 guidelines and insight regarding the current strengths and weaknesses of T2DM screening and management at VHC.

Project Setting

The project took place at a small primary care center that predominately delivers health care services to Vietnamese patients in St. Louis, MO. A majority of patients who visit the clinic are immigrants with limited English proficiency. The clinic is run by two

healthcare providers (e.g., a physician and a nurse practitioner) who see approximately 10 patients total per week. A Catholic nun, who is a leader in the Vietnamese community, is an active member of the clinic and helps to translate, obtain vital signs, and schedule medical appointments for patients.

Project Sample

Convenience sampling was utilized for this project. Those included in the review were individuals of Asian ethnicity who were 18 years or older. Those excluded from the review were those who were younger than 18 years or not of Asian ethnicity.

Procedures

Approval process. Approval to perform a retrospective chart review was granted from VHC in September 2018. This principal investigator (PI) was granted administrative access to the electronic health record and paper charts upon signing the clinic's confidentiality agreement in November 2018. Approval for exempt review was obtained from the University of Missouri-St. Louis's Institutional Review Board in February 2019.

Ethics and human subjects protection. This project involved minimal risk to the subjects. While a potential breach in confidentiality of data could have occurred, the benefits of this project outweighed the risks, as findings from this project may help to improve the delivery of care to AAs and reduce disparities related to T2DM screening and management.

Patient information was de-identified using a numerical format. Each patient chart, for example, was assigned a 5-digit number. The biological sex of patients was coded as "0" for male and "1" for female. Similarly, patients who were not previously

diagnosed with T2DM were coded as "0", whereas those who were previously diagnosed with T2DM were coded as "1". The extracted data was stored in this PI's password-protected computer and then permanently deleted upon completion of the data analysis. The data was not accessible to others.

Data collection and analysis. A retrospective chart review was performed at VHC. Data was extracted from clinical case records of AAs, aged 18 years or older, who visited VHC between November 1, 2017 and November 1, 2018. This PI used a structured instrument that included the following measures: T2DM diagnosis, age, sex, BMI, FBG, two-hour plasma glucose, HbA1c, type of T2DM management received, and the number of follow-up visits that year. Dichotomous variables were coded with 0 and 1. For example, patients who did not have a documented eye or foot exam were coded as "0", whereas those who did have a documented eye or foot exam were coded as "1". To determine whether patients had a previous diagnosis of T2DM, charts were reviewed for the following ICD-10 codes: E11.9 (T2DM without complications), E11.21 (T2DM with diabetic nephropathy), E11.22 (T2DM with diabetic chronic kidney disease), E11.311 (T2DM with unspecified diabetic retinopathy with macular edema), E11.319 (T2DM with unspecified diabetic retinopathy without macular edema), E11.40 (T2DM with diabetic neuropathy, unspecified), and E11.621 (T2DM with foot ulcer). All extracted data were inputted into Excel Version 16.23 and then transferred to Intellectus Statistics for further statistical analysis.

A descriptive statistical analysis was conducted using the Intellectus Statistics software. Categorical variables were described using frequencies and percentages, while continuous variables were described using mean and standard deviation. Once the data

was analyzed and the results were interpreted, findings were reported to the healthcare providers of VHC in hopes of creating potential strategies for improvement of T2DM screening and management.

Results

A total of 178 patients, aged 18 years or older, visited VHC between November 1, 2017 and November 1, 2018. Of the 178 charts reviewed, five charts were excluded from the project due to the absence of information required to determine the patient's eligibility for T2DM screening and/or management. Therefore, a total of 173 charts were utilized for this project.

Descriptive Statistics of All Study Participants

Of the total 173 charts reviewed, 76.3% of AAs were not previously diagnosed with T2DM while 23.7% were previously diagnosed. The majority of patients were found to be female (58.4%). The mean age of the study participants was 57 years old, with ages ranging widely from 20 to 93 years old. The mean BMI was 24.4 kg/m^2, with values ranging from 15.9 to 37.9 kg/m^2 (see Appendix A).

DM Screening of AAs Not Previously Diagnosed with T2DM at VHC

Among the 132 patients not previously diagnosed with T2DM, the majority were female (57.6%) and the average age and BMI were 54 years old and 24.1 kg/m^2, respectively (see Appendix B). Based on the BMI classification for the general population, the majority of AAs (53.0%) were classified as normal weight and only 31.8% of AAs fell into the overweight (BMI 25.0–29.9 kg/m^2) or obese (BMI $\geq$ 30 kg/m^2) categories (see Appendix C). Based on the Asian-specific BMI classification,

however, 50% of AAs fell into the overweight (BMI $\geq$ 23–27.4 kg/m^2) or obese (BMI $\geq$ 27.5 kg/m^2) categories (see Appendix C).

Based on the Asian-specific DM screening criteria recommended by the ADA, 116 out of 132 patients met the screening criteria (see Appendix D). Approximately 85% were screened per the ADA guidelines (see Appendix E), and only 4.1% resulted in a positive finding. Among those who screened positive per ADA guidelines, three were female and one was male. The average BMI was 24.7 kg/m^2, with BMIs ranging from 21.8 to 27.9 kg/m^2. The average age was 58 years old, with ages ranging from 45 to 74 years old (see Appendix F).

DM Management of AAs Previously Diagnosed with T2DM at VHC

Among AAs previously diagnosed with T2DM, the majority were female (61%). The average age of diabetic AAs was 67 years old, with the youngest being 42 years old and the oldest being 87 years old. The average BMI was 25.4 kg/m^2, with BMIs ranging from 17 kg/m^2 to 32 kg/m^2 (see Appendix G). Based on the BMI classification for the general population, almost half of diabetic AAs (48.7%) were normal weight or underweight. Based on the Asian-specific BMI classification, however, only 17% of diabetic AAs were normal weight or underweight, with a majority of AAs (78%) falling into the overweight or obese categories (see Appendix H).

Diabetic AAs visited the clinic an average of 2.4 times that year and had an average HbA1c of 7.1%. In terms of receiving the annual recommended T2DM management, 58.5% received routine HbA1c monitoring, 2.4% had a documented comprehensive foot exam, and 7.3% had a documented dilated eye exam. Annual

screening of lipid profile, serum creatinine, eGFR, and UACR were performed on 90.2%, 92.7%, 92.7%, and 0% of diabetic AAs, respectively (see Appendix G).

Discussion and Recommendations

The purpose of this quality improvement project was to evaluate current practices for T2DM screening and management among AAs presenting to VHC and to determine whether these practices adhere to the ADA's 2018 guidelines. Current literature suggests that AAs face high rates of undiagnosed DM, which likely stems from AAs not receiving T2DM screening when indicated (Tung et al., 2017). Findings from this project, however, demonstrate high T2DM screening rates among AAs. This may be due to the unique practices of VHC in which a comprehensive metabolic panel, which includes an FBG, is obtained annually for all established patients and once for all new patients. A follow-up HbA1c is then obtained for all FBG above 100 mg/dL. Consequently, healthcare providers at VHC are essentially screening all AAs for T2DM, which may explain why this project only identified 4.1% of AAs who screened positive per ADA guidelines.

Providers at VHC may be over-screening their patients with this practice but are likely capturing more AAs with T2DM who fall outside of the ADA's recommended T2DM screening criteria for AAs (e.g., screening at a BMI $\geq$ 23 kg/m^2 and/or at an age of 45 years or older). For instance, VHC is currently providing T2DM management to diabetic patients as young as 42 years old and as small as 17 kg/m^2. On the other hand, findings of the low positive screening rate (4.1%) may also be attributed to Vietnamese subgroups generally having a lower prevalence of T2DM as compared to their other AA

counterparts, such as South Asians and Filipinos (Choi et al., 2013; Jih et al., 2014; Karter et al., 2013; Nguyen et al., 2015).

Among patients who did screen positive, the average BMI was found to be 24.7 kg/m^2, which supports the ADA's recommendation of screening AAs at a BMI of $\geq$ 23, as opposed to a BMI of $\geq$ 25 that is used for the general population. It is important to note, however, that this finding is based on a small sample size (n = 4), which is a limitation of this project. Therefore, this finding may not be generalizable to other AAs.

In contrast to high rates of AAs being screened for T2DM at VHC, the clinic demonstrates low adherence rates to certain recommendations from the ADA's T2DM management guidelines. Specifically, findings from the project demonstrate that a majority of diabetic AAs at VHC are not receiving a UACR, dilated eye exam, or comprehensive foot exam annually. Findings from this project support existing literature in which healthcare providers are not routinely referring diabetic AAs for a dilated eye exam or performing a comprehensive foot exam annually (Canedo et al., 2018; Islam et al., 2015). This may be related to the various barriers in care identified in the literature review, including the lack of English proficiency, differences in cultural beliefs, and/or poor follow-up of care. Another interesting finding that was inadvertently discovered during the data collection process was the number of diabetic AAs with the co-diagnosis of chronic kidney disease (CKD). Approximately 17% of diabetic AAs at VHC had moderate to severe CKD, with one patient requiring a kidney transplant. This finding suggests the need for closer monitoring of renal complications among diabetic AAs, considering that the overall CKD prevalence in the general population is approximately 14% (National Institute of Diabetes and Digestive and Kidney Diseases, 2016).

Implications for Practice

Since obtaining an UACR and performing a comprehensive eye and foot exam annually are important practices for evaluating diabetic patients for microvascular complications, it is recommended that VHC focus its future quality improvement efforts toward improving current delivery of T2DM management among AAs. One recommendation is to integrate a diabetic flow sheet into the clinic's existing electronic health record to ensure such practices are performed annually. This recommendation is a cost-effective and feasible solution for the resource-limited clinic that may potentially improve the delivery of diabetes-related care and reduce healthcare disparities faced by this patient population.

Recommendations for Further Investigation

While this quality improvement project provided a baseline understanding regarding the current delivery of diabetes-related care to Vietnamese patients at VHC, additional projects are needed to explore actual patient outcomes and whether patients are achieving specific T2DM treatment goals that are outlined in the ADA—as opposed to solely looking at whether VHC providers are adhering to the ADA's recommended guidelines. Additional projects are also needed to explore how T2DM screening and management is currently being delivered to other AA subgroups. This PI plans to partner with a nurse researcher for continued exploration of this topic.

Conclusion

Findings from this quality improvement project provided a baseline assessment of the clinic's current delivery of diabetes-related care in the Vietnamese population. Findings support that AAs are affected by T2DM at a lower BMI threshold than the

general population and therefore, use of the ADA guidelines is appropriate in the Asian population. While a majority of AAs were screened for T2DM per the ADA guidelines at VHC, this quality improvement project identified various gaps in the management of diabetic AAs. Thus, it is recommended that VHC focus its future quality improvement efforts toward increasing the percentage of comprehensive foot exams, referral for dilated eye exams, and UACRs performed annually. Addressing these gaps in care may reduce disparities faced by this patient population. Considering that VHC is a small primary care clinic with limited resources, it is imperative to identify interventions that will not only improve the quality of diabetes care for AAs but will also be economically feasible and sustainable for the clinic.

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Appendix A

Description of All Study Participants at VHC

Table 1

Descriptive Characteristics of All Study Participants

Variable	Value
Previous T2DM diagnosis [n (%)]	
No	132 (76.3)
Yes	41 (23.7)
Sex [n (%)]	
Female	101 (58.4)
Male	72 (41.6)
Age, years, (M $\pm$ SD)	57 $\pm$ 17.6
Youngest	20
Oldest	93
BMI, kg/m^2, (M $\pm$ SD)	24.4 $\pm$ 3.5
Lowest BMI	15.9
Highest BMI	37.9

Note. T2DM = Type 2 diabetes mellitus. M = Mean. SD = Standard deviation. BMI = Body mass index.

Appendix B

Description of Study Participants Not Previously Diagnosed with T2DM at VHC

Table 2

Descriptive Characteristics of Study Participants Not Previously Diagnosed with T2DM

Variable	Value
Sex [n (%)]	
Female	76 (57.6)
Male	56 (42.4)
Age, years, (M ± SD)	54 ± 18.1
Youngest	20
Oldest	93
BMI, kg/m^2, (M ± SD)	24.1 ± 3.5
Lowest BMI	15.9
Highest BMI	37.9
Avg. FBG, mg/dL, (M ± SD)	91.3 ± 14.5
Avg. HbA1c, %, (M ± SD)	5.9 ± 0.8
Follow-up HbA1c, %, (M ± SD)	6.7 ± 1.4

Note. T2DM = Type 2 diabetes mellitus. M = Mean. SD = Standard deviation. BMI = Body mass index. Avg. = Average. FBG = Fasting blood glucose. HbA1c = Hemoglobin A1c.

Appendix C

BMI Classification of Study Participants Not Previously Diagnosed with T2DM

Table 3

BMI Classification of Study Participants Not Previously Diagnosed with T2DM

Variable	Value
Asian-specific BMI Classification [n (%)]	
Underweight, < 18.5 kg/m^2	2 (1.5)
Normal weight, 18.5 – 22.9 kg/m^2	46 (34.9)
Overweight, 23 – 27.4 kg/m^2	49 (37.1)
Obese, ≥ 27.5 kg/m^2	17 (12.9)
Missing BMI	18 (13.6)
BMI Classification for General Population [n (%)]	
Underweight, < 18.5 kg/m^2	2 (1.5)
Normal weight, 18.5 – 24.9 kg/m^2	70 (53.0)
Overweight, 25.0 – 29.9 kg/m^2	37 (28.0)
Obese, ≥ 30 kg/m^2	5 (3.8)
Missing BMI	18 (13.6)

Note. Due to rounding, percentages may not equal 100%. T2DM = Type 2 diabetes mellitus. BMI = Body mass index.

Appendix D

Results of T2DM Screening per ADA Guidelines at VHC

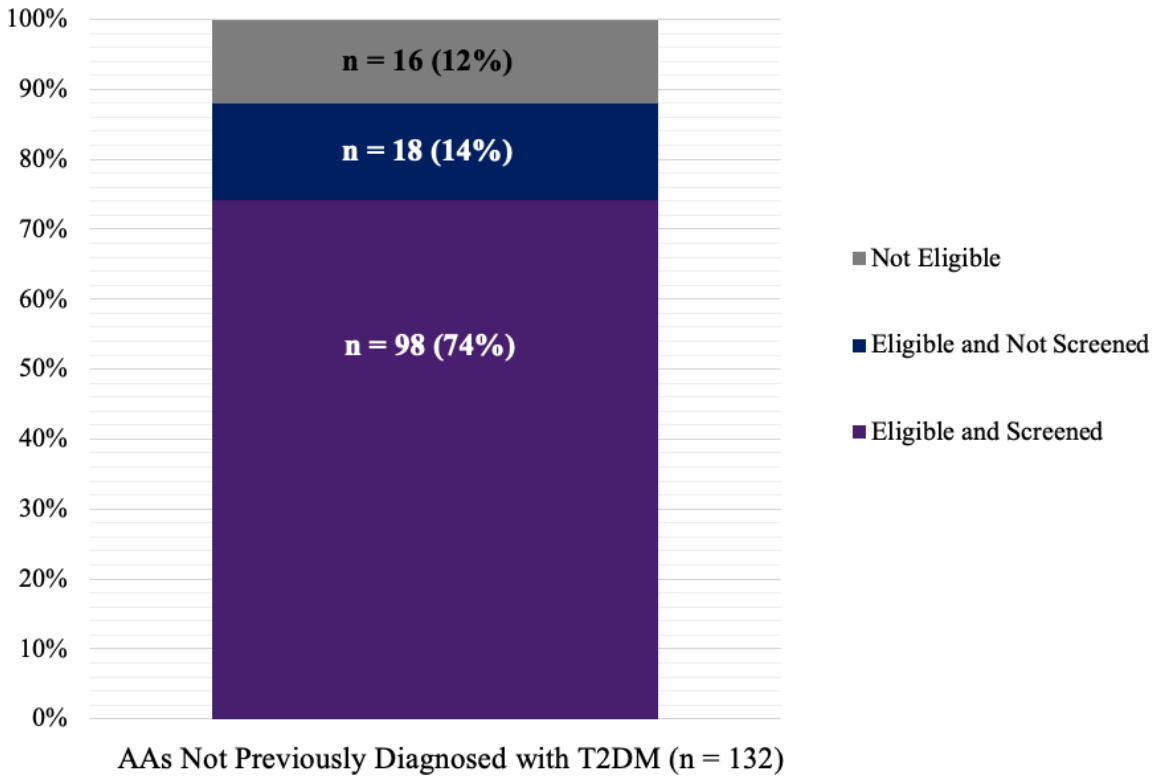

Figure 1. Results of T2DM screening per ADA guidelines

Appendix E

AAs Eligible for T2DM Screening per ADA Guidelines at VHC

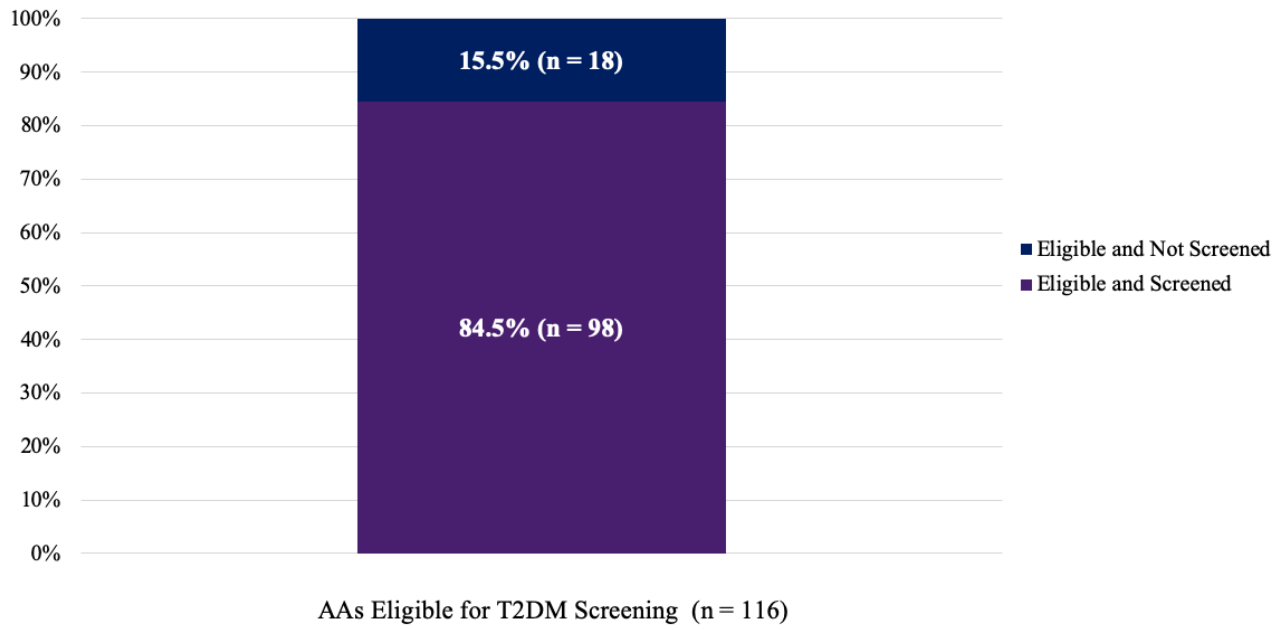

Figure 2. AAs eligible for T2DM screening per ADA guidelines

Appendix F

Description of Study Participants who Screened Positive per ADA Guidelines

Table 4

Descriptive Characteristics of Study Participants who Screened Positive for T2DM

Variable	Value
Sex [n (%)]	
Female	3 (75)
Male	1 (25)
Age, years, (M ± SD)	58 ± 14.3
Youngest	45
Oldest	74
BMI, kg/m^2, (M ± SD)	24.7 ± 3.1
Lowest BMI	21.8
Highest BMI	27.9
Avg. FBG, mg/dL, (M ± SD)	137.8 ± 10.5
Follow-up HbA1c, %, (M ± SD)	7.4 ± 1.1

Note. T2DM = Type 2 diabetes mellitus. M = Mean. SD = Standard deviation. BMI = Body mass index. Avg. = Average. FBG = Fasting blood glucose. HbA1c = Hemoglobin A1c.

Appendix G

Description of Study Participants Previously Diagnosed with T2DM at VHC

Table 5
Descriptive Characteristics of Study Participants Previously Diagnosed with T2DM

Variable	Value
Sex [n (%)]	
Female	25 (61.0)
Male	16 (39.0)
Age, years, (M ± SD)	67 ± 12.2
Youngest	42
Oldest	87
BMI, kg/m^2, (M ± SD)	25.4 ± 3.4
Lowest BMI	17
Highest BMI	32
Avg. HbA1c, %, (M ± SD)	7.1 ± 1.4
Annual Lipid Profile Obtained [n (%)]	
Y	37 (90.2)
N	4 (9.8)
Annual UACR Obtained [n (%)]	
Y	0 (0)
N	41 (100)
Annual Serum Creatinine Obtained [n (%)]	
Y	38 (92.7)
N	3 (7.3)
Annual eGFR Obtained [n (%)]	
Y	38 (92.7)
N	3 (7.3)
HbA1c Obtained Every 3 - 6 months [n (%)]	
Y	24 (58.5)
N	17 (41.5)
Documented Dilated Eye Exam [n (%)]	
Y	3 (7.3)
N	38 (92.7)

Documented Comprehensive Foot Exam [n (%)]	
Y	1 (2.4)
N	40 (97.6)
Number of Follow-up Visits Annually (M ± SD)	2.4 ± 1.0

Note. T2DM = Type 2 diabetes mellitus. M = Mean. SD = Standard deviation. BMI = Body mass index. Avg. = Average. FBG = Fasting blood glucose. HbA1c = Hemoglobin A1c. UACR = Urine albumin-to-creatinine ratio. eGFR = Estimated glomerular filtration rate.

Appendix H

BMI Classification of Study Participants Previously Diagnosed with T2DM

Table 6

BMI Classification of Study Participants Previously Diagnosed with T2DM

Variable	Value
Asian-specific BMI Classification [n (%)]	
Underweight, < 18.5 kg/m^2	1 (2.4)
Normal weight, 18.5 – 22.9 kg/m^2	6 (14.6)
Overweight, 23 – 27.4 kg/m^2	24 (58.5)
Obese, ≥ 27.5 kg/m^2	8 (19.5)
Missing BMI	2 (4.9)
BMI Classification for General Population [n (%)]	
Underweight, < 18.5 kg/m^2	1 (2.4)
Normal weight, 18.5 – 24.9 kg/m^2	19 (46.3)
Overweight, 25.0 – 29.9 kg/m^2	14 (34.2)
Obese, ≥ 30 kg/m^2	5 (12.2)
Missing BMI	2 (4.9)

Note. Due to rounding, percentages may not equal 100%. T2DM = Type 2 diabetes mellitus. BMI = Body mass index.