Early Type 2 Diabetes Mellitus Identification Through Screening and Healthcare Provider Education Among Overweight and Obese Adults in a Rural Primary Care Setting

Christine Crisostomo

Touro University, Nevada

In partial fulfillment of the requirements for the Doctor of Nursing Practice

DNP Project Chair: Dr. Samantha Peckham, DNP, MSN, APRN, AGACNP-BC, FNP-BC, ENP-C

DNP Project Team Members(s): Academic Mentor: Lorie Hacker, DNP, MSNed, NP-C, CNE

Date of Submission: June 16, 2021

Abstract

Objectives: This project aims to implement early American Diabetes Association (ADA) diabetes screening protocol. This project also aims to educate the nurses and physicians about ADA's early diabetes screening guidelines at the practice site, evaluate improvement in knowledge using a pre and post early diabetes screening knowledge survey, with a goal of 90% correct answer out of 10 survey questions, and increase to 100% the medical staff's compliance to early diabetes screening of obese and overweight patients.

Introduction: Obesity is considered to be a crucial risk factor for various diseases such as musculoskeletal disorders, cardiovascular diseases, and diabetes. The inflammation and increased levels of fatty acids can lead to insulin resistance, which in turn can result in the development of type 2 diabetes mellitus. Early screening and detection of diabetes is crucial in avoiding organ complications brought about by the metabolic disturbances associated with diabetes.

Methods: A quality improvement–pre/posttest design was used, participated in by 21 medical staff at a private primary care/urgent care clinic in Bakersfield, California. Prediabetes screening knowledge was administered prior to the education session. Post education session, another knowledge test was administered. Compliance data was obtained through post chart audits. Paired t-test was used to compare the pre-and post-survey score while descriptive statistics was used to analyse the compliance post-intervention.

Results: All of 21 participants got a score of 9 out of 10 questions (90%) or 10 out 10 questions (100%). Out of the 21 participants, 86% scored a 10. Meanwhile, 14% of the participants scored a 9. On average, the knowledge test scores post education session ($M = 9.86$, $SD = 0.36$) was higher than pre-education knowledge test scores ($M = 7.05$, $SD = 1.39$). There is an improvement of 2.81 with a 95% confidence interval ranging from 2.19 to 3.43 was statistically significant, $t(20) = -9.44$, $p = .000$ (two-tailed). The p-value of less than .05 indicates that the increase was statistically

significant. Meanwhile, 100% compliance to the use of ADA risk test on all 61 charts audited post education session was observed.

Conclusions: The project results validated the efficacy of staff education in improving knowledge and compliance with early diabetes screening guidelines. It also showed that medical staff with increased awareness of early diabetes screening are more likely to consistently utilize the ADA risk test and provide the appropriate treatment.

Keywords: diabetes, early diabetes screening, provider education

Early Type 2 Diabetes Mellitus Identification Through Screening and Healthcare Provider Education Among Overweight and Obese Adults in a Rural Primary Care Setting

The World Health Organization (WHO) characterized overweight and obesity among adults as having a body mass index (BMI) that is equal to or greater than 25 (overweight) and having a BMI that is either equal to or greater than 30 (obese) (WHO, 2021). WHO also reported that in 2016, there were over 1.9 billion adults who were overweight. Out of these 1.9 billion adults, it was estimated that over 650 million were considered obese (WHO, 2021). In 2018, the prevalence of obesity in the United States reached 42.4%, an 11.90% increase from a 30.5% prevalence rate in 2000 (Centers for Disease Control and Prevention [CDC], 2021).

Increased BMI is considered to be a crucial risk factor for various diseases such as musculoskeletal disorders (e.g. osteoarthritis), cardiovascular diseases (e.g. heart disease and stroke), and diabetes (WHO, 2021). According to Wondmkun (2020), obesity affects insulin resistance by increasing inflammation and levels of fatty acids in the body. The inflammation and increased levels of fatty acids can lead to insulin resistance, which in turn can result in the development of type 2 diabetes mellitus (T2DM) (Wondmkun, 2020). T2DM is considered as the most common type of diabetes, accounting for about 90% of the 34.2 million diabetic cases in the U.S. (CDC, 2020; Goyal & Jialal, 2021).

Studies have shown that obesity and being overweight can increase the likelihood of developing T2DM. In a retrospective cohort study by Regmi et al., (2020), results showed that the incidence rate of T2DM in overweight and obese population is high. Similar findings were also reported from a large-scale cohort study by Gupta and Bansal (2020) in which their study demonstrated the greater likelihood of being both prediabetic and diabetic among individuals who are overweight and obese compared to the individuals of normal weight. On this note, both studies recommended the need for early screening, detection, and treatment of T2DM (Gupta & Bansal, 2020; Regmi et al. 2020).

Nurses play a crucial role in leading initiatives to manage and prevent chronic diseases (Nikitara et al., 2019). Nurses have intimate knowledge of patient populations that they are working with. Because of this knowledge, they are in the best position to provide early screening and education of chronic diseases such as diabetes (Challinor et al., 2016). According to Trimm et al. (2020), early screening and detection of diabetes is crucial because they help avoid organ complications brought about by the metabolic disturbances associated with diabetes. Early treatment, education, and intervention (such as medication and lifestyle modification) can be provided to help prevent the progression of the disease (Trimm et al., 2020).

Considering the association between obesity and the development of diabetes, it is crucial to implement a sustainable initiative that will help prevent the development of diabetes among at-risk populations (Gupta & Bansal, 2020; Regmi et al., 2020). Implementing an early screening protocol and educating the responsible medical staff and providers can help prevent the development of T2DM and its corresponding complications among obese and overweight population (Esquives et al., 2021; Ravangard et al., 2017).

Background

Obesity plays a large role in T2DM (Boles et al., 2017). The pathophysiology connecting obesity and diabetes is chiefly attributed to two factors: insulin resistance and insulin deficiency (Verma & Hussein, 2017). Wondmkun (2020) explains that among obese individuals, the presence of increased amounts of glycerol, non-esterified fatty acids, pro-inflammatory cytokines, and hormones, could facilitate the development of insulin resistance. Insulin resistance then results in the development of T2DM (Wondmkun, 2020).

According to WHO (2021), since 1975, the statistics for worldwide obesity has increased by threefold. In 2016, it was estimated that around 39% of adults were overweight, with 13% of these, being obese. The prevalence of obesity has also increased significantly from 30.5% in 1999 to

42.4% in 2018 (ADA, 2018c).

Meanwhile, the CDC (2020) reports that about over 34 million or 1 in 10 Americans have diabetes, and approximately 90-95% of them have T2DM. Historically, T2DM usually develops among people who are older than 45 years, however, more young adults, teens and children are also developing T2DM (CDC, 2020).

Due to their prevalence, obesity and diabetes have emerged as enormous public health concerns in the U.S. due to their physical and economic impacts (Bhupathiraju & Hu, 2016). Obesity can increase the risk for cardiovascular diseases, gastrointestinal complications, diabetes, and cancer (Ansari et al., 2020). Meanwhile, diabetes leads to complications such as neuropathy, nephropathy, cardiovascular diseases, cerebral vascular diseases, and retinal disorders or retinopathy (ADA, n.d.). The associated costs of obesity and diabetes are also high. Obese individuals spend on average 42% more for healthcare when compared to normal-weight individuals (Bhupathiraju & Hu, 2016). Meanwhile, individuals with diagnosed diabetes, have an average medical expenditure that is approximately 2.3 times higher than individuals without diabetes (ADA, 2018a). Obesity and increased body mass index are strongly associated with changes in the physiological function of adipose tissue, which in turn, can result in inflammatory mediators release, altered secretion of adipocytokines, chronic inflammation, and insulin resistance (Amin et al., 2019).

T2DM, is usually asymptomatic and is not easily detected unless random blood glucose is measured (Simmons & Zgibor, 2017). The onset of T2DM can be gradual with only mild or minimal symptoms, during the early stages. Only when blood glucose levels increase significantly that people start to feel symptoms like increased thirst and excessive urination (Timm et al., 2020). Other palpable symptoms of T2DM include fatigue, unintended weight loss, blurred vision, and slow healing wounds or sores (ADA, 2018b). Due to the long asymptomatic period before T2DM can be detected, WHO (n.d.) recommends early detection of T2DM to provide early treatment and

improve the quality of life of people who are at risk for this disease. The United States Preventive Services Task Force (USPSTF) also recommends screening for prediabetes and T2DM among adults who are overweight or obese, ages 35 to 70 years (USPSTF, 2021). Similarly, the American Diabetes Association (ADA) also recommends that there must be diabetes screening for all patients at three-year intervals starting at age 45, particularly for those who are obese or overweight (ADA, 2018b).

Despite the apparent association between obesity and T2DM and the recommendation for early screening, reports cited from the Journal of the American Board of Family Medicine showed that diabetes screening rate in the U.S. is only at 15% (Happel, 2019). The low screening rate creates a pressing need to educate medical staff and health care providers about the importance of early screening and compliance. More importantly, the low diabetes screening rate and high prevalence also call for the implementation of an early screening protocol among high-risk populations such as people who are overweight and obese.

Problem Identification

T2DM is often left undiagnosed due to lack of symptoms during the earlier stages. On this note, early detection is crucial to avoid severe organ complications as a result of metabolic disturbances that are related to diabetes (Timm et al., 2020). Early abnormal blood glucose screening can help prevent the progression of T2DM among people who are at risk of having the disease (ADA, 2018b). Health care providers must have the necessary foundational knowledge to conduct early screening, identification, and treatment of T2DM (Nikitara et al., 2019).

Studies have shown that early identification and treatment can help reduce the prevalence of the T2DM and related complications such as diabetic kidney disease and diabetic neuropathy (Sanz-Corbalán et al., 2018; Thornton Snider et al., 2019). Currently, the project site does not conduct early diabetes screening among high-risk overweight and obese patients. This DNP project aims to

educate medical staff and health care providers about the importance of early screening for T2DM according to the recommendations of WHO, USPSTF and ADA. One of the main outcomes is to improve medical staff and health care providers' screening compliancy and in the process, also improve early identification and treatment of T2DM among obese and overweight population between 40 to 70 years.

Project Question

The project question guiding this initiative is: will education of healthcare providers and medical staff on early diabetes screening according to the ADA testing guidelines for prediabetes and T2DM and implementation of an early screening protocol, improve screening compliancy leading to early identification of T2DM in the overweight and obese population?

Population: Medical staff and primary care providers.

Intervention: Education of the medical staff and health care providers about the T2DM disease process, the importance of early screening, identification, and treatment of T2DM and how to properly conduct early screening procedures.

Comparison: Compliance rates will be compared post implementation of the protocol.

Outcome: The primary outcome is increased protocol compliance rate among medical staff and primary care providers. The secondary outcome is an increase in early identification and treatment of prediabetes/diabetes among the obese/overweight population.

Time: The project will run for four weeks.

Search Methods

An electronic database search was conducted using PubMed, CINAHL, Embase, Medline, and the Jay Sexter Library to gather studies about the impact of early diabetes screening and staff education. Using the key components of the project question, the following keywords were used for

the search: early screening; diabetes; type 2 diabetes; obesity; overweight; staff education; and early detection. Boolean operators such as "or" and "and" were used to make the search more specific.

Inclusion criteria were studies published in the last five years, studies with early diabetes screening as variables, studies that had staff education as one of their interventions, and studies with participants who were either prediabetic, diabetic, or at risk of diabetes. For the literature search to be comprehensive, study designs included randomized controlled trials, quasi-experimental studies, systematic reviews, meta-analysis, cohort studies, and prospective studies. All diabetes-related outcome measures, such as blood glucose level, hemoglobin A1c (HbA1c), and fasting blood glucose levels, were also considered. Exclusion criteria included those studies that were published in other languages, studies that did not include early diabetes screening as a variable, and studies with participants who were not diabetic, prediabetic, or at risk for diabetes.

The literature search generated a total of 338 articles, including clinical trials, randomized controlled trials, cohort studies, meta-analysis, and systematic reviews. The initial assessment was conducted by reviewing the study titles and abstracts and checking them against the inclusion criteria. Those that failed to meet the inclusion criteria were eliminated. Twenty articles were left for data extraction, literature review, and synthesis.

Review Synthesis

As defined by Melnyk and Fineout-Overholt (2015), the Hierarchy of Evidence was used to assess the quality and level of evidence obtained from the studies. The hierarchy has seven levels of evidence, with Level I as the highest and Level VII as the lowest (Melnyk & Fineout-Overholt, 2015). Systematic reviews or meta-analyses of random controlled trials are considered studies with the highest level of evidence (Bluhm, 2016). Level II includes evidence presented by randomized

control trials. Level III evidence is controlled trials that are not randomized (Melnyk & Fineout-Overholt, 2015). Level IV evidence is case-control and cohort studies. Level V is evidence from systematic reviews of descriptive and qualitative studies (Bluhm, 2016). Level VI includes evidence from qualitative studies or single descriptive or qualitative studies, while Level VII is evidence from expert reports (Melnyk & Fineout-Overholt, 2015).

Overall, the studies used in this literature review provided significant evidence to support the project. Twenty percent of the studies reviewed were systematic reviews, placing them at Level I in the hierarchy of evidence. Another 20% of the studies reviewed were non-randomized trials, placing them at Level III in the hierarchy of evidence. The remaining 60% of the studies reviewed were cohort studies and considered to be at Level IV. A cohort study design enabled the researchers to assess and follow a specific population group over time to observe if they will develop the disease after exposure to intervention (Barrett & Noble, 2019).

Impact Statement

Four significant themes emerged from the review of the studies that were collected during the database search. The first theme discusses the importance of early screening. The second theme showcases how early screening can help reduce complications and help patients control the disease. The third theme is staff education and an effective practical approach to educating the medical staff. The fourth theme discussed the perceived barriers that may occur once the project is implemented.

Early Screening for Type 2 Diabetes Mellitus

People with Type 2 Diabetes Mellitus or T2DM are usually asymptomatic and are not easily diagnosed unless their blood glucose is purposely measured (Simmons & Zgibor, 2017). The beginning of T2DM can happen gradually with only minimal symptoms. When blood glucose levels increase significantly, people only start to feel symptoms such as increased thirst, frequent urination, blurred vision, fatigue, unintended weight loss, and slow healing of wounds (ADA,

2018b; Timm et al., 2020). Due to the long asymptomatic period before T2DM can be detected, WHO (n.d.) recommends early screening of T2DM to provide early treatment and prevent complications.

Importance of Early T2DM Screening

The early screening for T2DM seeks to detect the early presence of the disease and provide the needed treatment to prevent its progression and further development. The assumption is that there will be a long-term benefit for early identification in the disease process (CDC, 2021; Pippitt et al., 2016). There are several ways to conduct early T2DM screening. They can be done by fasting blood sugar, oral glucose tolerance testing, and random plasma sugar (Vasavada & Taub, 2021).

Findings from early screening can give health care providers an idea of what can happen if high-risk individuals are not screened earlier. Following the guidance of ADA, a retrospective cohort study on obese women (BMI ≥30 kg/m2) by Ravangard et al. (2017) revealed that obese women with early screening were more likely to have hypertension and neonates admitted to the Neonatal Intensive Care Unit (NICU) and were more likely to require treatment with insulin. These findings help health care providers who deal with high-risk individuals, such as those who are obese, understand the importance of conducting early screening for them.

Findings from a cohort study by Selvin et al. (2018) among the participants of the Atherosclerosis Risk in Communities (ARIC) also showed that patients with undiagnosed diabetes have poorer health outcomes. Following the guidance of ADA, this study used fasting glucose (≥7.0 mmol/L [≥126 mg/dL]) and HbA1c (≥6.5%) to screen its participants. Findings revealed that confirmed undiagnosed diabetes was significantly associated with cardiovascular and kidney disease and mortality (Selvin et al., 2018). The results from this study also gave health care providers insight into the possible complications that high-risk individuals might encounter if their diabetes is not diagnosed earlier.

Screening Among High-Risk Individuals

The propensity to develop T2DM varies among different population groups (CDC, 2021). Certain groups are more at risk compared to other groups. The groups that are more likely to develop T2DM are called high-risk individuals. These are people who are obese, with first-degree relatives who have diabetes, certain ethnicities, and women with gestational diabetes (Hill-Briggs et al., 2021).

A cohort study by Schnurr et al. (2020) showed that obese people are more likely to develop T2DM. The study was conducted on 4,729 individuals who developed T2DM during a fourteen-year follow-up. The results showed an association between obesity (BMI ≥ 30 kg/m2) and a higher risk of T2DM regardless of genetic predisposition. Even the obese participants with favorable lifestyle and low genetic risk score (GSR), obesity was still associated with a >8-fold risk of T2DM compared with normal-weight individuals in the same lifestyle and GSR stratum (Schnurr et al., 2020).

Individuals with first-degree relatives with diabetes are also considered high-risk for T2DM (Vasavada & Taub, 2021). A cross-sectional study was conducted by Aman et al. (2018) to compare the risk of metabolic syndrome, metabolic profile, and insulin resistance among non-diabetic male adolescents with one or both parents with T2DM. Results of the study showed metabolic abnormalities among participants whose parents had a history of T2DM. Aman et al. (2018) were able to observe these abnormalities in the participants' waist circumference, fasting insulin, triglyceride, fasting plasma glucose, and HOMA-IR (p=0.000) (Aman et al., 2018).

Certain ethnicities are also considered high-risk for T2DM (Zhu et al., 2019). A cross-sectional study was conducted by Cheng et al. (2019) to determine the prevalence of T2DM among adults aged 20 years or older by significant race/ethnicity groups. The study included 7,575 adults. The study showed that T2DM prevalence was 22.1% for Hispanics, 20.4% for non-Hispanic black,

19.1% for non-Hispanic Asian groups, and 12.1% among non-Hispanic whites (Cheng et al., 2019).

Women with gestational diabetes or who have delivered a child that weighed more than 9 lbs. are also considered high-risk individuals for diabetes (Vasavada & Taub, 2021). A systematic review of studies published up to October 2019 was conducted by Dennison et al. (2021) to estimate the development of T2DM among women with previous gestational diabetes (GDM). Results from the review revealed that women who had GDM had a relative T2DM risk of 8.3 (6.5–10.6) (Dennison et al., 2021).

American Diabetes Association Guidelines for Early Screening

The American Diabetes Association (ADA) recommends that early and opportunistic screening be performed on adults of any age with a body mass index of ≥ 25 kg/m2. The ADA (2021) guidelines for diabetes screening recommends that beginning at age 45, the general population should be screened at 3-year intervals. ADA based this recommendation on the rationale that there is minimal likelihood of a person developing any diabetes complications to a severe degree within three years of having negative screening results (ADA, 2021).

The ADA (2021) recommends the fasting plasma glucose (FPG) and the 75-g oral glucose tolerance test (OGTT) as the most appropriate tests for diabetes screening. However, ADA (2021) highlights that the FPG test is preferred in clinical settings because it is faster and easier to perform, less expensive, and more convenient to patients (ADA, 2021). A literature review of clinical trials was conducted by Tayek et al. (2018) to determine the importance of FPG in the management of T2DM. Their findings showed that the use of FPG to help patients monitor their T2DM was easier to teach and obtain. FPG test was more efficient and provided patients an easy home monitor to keep track of their blood sugar levels (Tayek et al., 2018).

The hemoglobin A1c (HbA1c) test is also considered a valuable tool for the diagnosis of diabetes. The ADA (2021) recommends that the HbA1c test must be performed according to a

method that is approved by the National Glycohemoglobin Standardization Program (NGSP) and standardized according to the Diabetes Control and Complications Trial (DCCT). The diagnostic threshold for HbA1c is greater than 6.5% (48 mmol/mol) (Kaur et al., 2020).

Sitasuwan and Lertwattanarak (2020) conducted a single-center, cross-sectional study among patients with impaired fasting plasma glucose (IFG). Results from the study showed that HbA1c was more effective compared to FPG in predicting the presence of T2DM among participants with IFG (Sitasuwan & Lertwattanarak, 2020). Meanwhile, a diagnostic study by Kim et al. (2019) to determine the accuracy of HbA1c as a screening tool for asymptomatic children and adolescents with obesity. The results showed that the HbA1c criterion of greater than 6.5% was sufficient to detect T2DM among children and adolescents with obesity or asymptomatic glucosuria (Kim et al., 2019).

The Efficacy of Early Screening

A growing number of studies show early screening was either able to prevent the onset of T2DM, minimize complications and enable patients to control their illness better (Plladino et al., 2020; Simmons et al., 2017; Sinclair & Schwartz, 2019; Olafsdottir et al., 2016; Feldman et al., 2016; Barry et al., 2017). Cardiovascular disease (CVD) remains the leading cause of morbidity and mortality among individuals with T2DM (Einarson et al., 2018). The mortality rate is doubled when T2DM manifestations are combined with CVD manifestations such as myocardial infarction or stroke (Schmidt, 2019).

In a cohort study by Palladino et al. (2020) among 348,987 participants aged 40–74 years, results showed that those who participated in the large-scale diabetes screening program had lower cardiovascular risk scores at follow-up. Improved management of blood glucose and cardiovascular risk factors were also observed. The study participants had lower mean fasting plasma glucose at 0.2 mmol/L, and their cardiovascular risk score at follow-up is also 0.9% lower. A non-randomized

trial by Simmons et al. (2017) also showed that diabetes screening and cardiovascular risk assessment were associated with a significantly reduced risk in all-cause mortality and CVD events.

Diabetic retinopathy is blood vessel damage in the retina that happens due to diabetes (ADA, 2021). Diabetic retinopathy is a potentially blinding complication of diabetes mellitus that can significantly affect a person's quality of life (Sinclair & Schwartz, 2019). In a cohort study by Olafsdottir et al. (2016) of 256 diabetic patients, results showed that for those with screening-detected diabetes, the severity of retinopathy and its prevalence were significantly lower compared to those whose diabetes was diagnosed through conventional care. A cohort study by Feldman et al., (2017) also revealed that compared to patients with clinically detected diabetes, those with screen-detected diabetes and diagnosed earlier had better outcomes about retinopathy and CVD, renal disease all-cause mortality.

According to ADA (2018b), one of the benefits of early screening and detection is a prompt treatment that lessens the burden of diabetes. A systematic review by Barry et al. (2017) of studies about the impact of early diabetes screening showed that interventions among patients diagnosed through screening as having prediabetes were more effective in delaying or preventing the onset of T2DM among study participants. A cohort study by Vos et al. (2020) also revealed that patients with screen-detected T2DM had less need for insulin after ten years. HbA1c values were lower ten years after screen detection with a mean of 50.1 mmol/mol (6.7%) (Vos et al., 2020).

Education of Staff

The Journal of the American Board of Family Medicine showed diabetes screening rate in the U.S. is only at 15% (Happel, 2019). The low screening rate creates a pressing need to educate medical staff and health care providers about the importance of early screening and compliance. Tseng et al. (2017) survey on 140 primary care providers (PCPs) revealed gaps in knowledge regarding diagnosing prediabetes. Only 6% of PCPs were able to identify the risk factors that

should prompt prediabetes screening correctly. Only 17% of the surveyed PCPs accurately identified the laboratory parameters used to diagnose prediabetes based on fasting glucose and HbA1c (Tseng et al., 2017).

Chubbs (2017) conducted a quality improvement project and implemented an education program to improve PCP's adherence to the Canadian Diabetes Association clinical practice guideline for chronic kidney disease. The project showed that the educational intervention enhanced provider confidence and knowledge in screening for renal disease among diabetic patients. The average number of diabetic patients screened resulted in a net increase of 31.5% (Chubbs, 2017). The education program started with a pre-project questionnaire to assess the level of knowledge of the most recent clinical practice guideline and their confidence in incorporating the recommendations. Afterward, an educational intervention was conducted. The education program was made up of a thorough review of the clinical practice guideline for screening and an assessment of the proper management of the disease. The presentation was also supplemented with a provider toolkit which contained print resources for quick reference. A post-intervention questionnaire was again administered to evaluate a change in knowledge and confidence to implement the new guidelines (Chubbs, 2017).

Barriers

Implementation of a process change can be met with some opposition (Busetto et al., 2018). Change in the workflow would mean needing to learn new things (Bank et al., 2018). There are two perceived barriers to this project; resistance to change and time constraints.

Resistance to Change

Amarantou et al. (2018) developed a conceptual framework to identify the factors affecting resistance to change (RTC) in health care organizations. Findings from the study suggested that personality traits, job security, employee-management relationship, and employee participation in

the decision-making process influence a person's RTC (Amarantou et al., 2018). Tappen et al. (2017) implemented a quality improvement program and identified the barriers to implementing the program. Magnitude and complexity of the change were among the top barriers to the implementation of change and considered the main drivers of RTC (Tappen et al., 2017).

Time Constraints

Lack of time is another anticipated barrier during the implementation of this project (Paci et al., 2021). The medical staff might feel that the educational program and early screening requirements will be time-consuming activities. The notion that the new guidelines are inefficient can lead to feelings of resentment (Busetto et al., 2018). The staff might not comply with the screening guidelines.

The implementation of evidence-based guidelines into practice is often considered as a change in the process. A qualitative study exploring nurses' beliefs, knowledge, and reception of evidence-based practice (EBP) showed that lack of time was the top barrier to the implementation of EBP (Mallion and Brooke, 2016). A systematic review of reported experiences by long-term care staff also highlighted time constraints as one of the leading barriers to the implementation of EBP (McArthur et al., 2021).

Making sure that everyone is made aware of the need can help get their buy-in and cooperation. As indicated in Kurt Lewin's change theory, one of the phases in the change process is called "unfreezing," or creating the need for a change (Deborah, 2018). Proper education and in-depth explanation can help the medical staff understand why a difference needs to happen.

Suboptimal Care at the Project Site

The healthcare at the practice site does not include regular, early screening of high-risk patients for diabetes. Patients who are showing clinical symptoms are the ones who are screened. There is also no ongoing staff education about the importance and benefits of early diabetes

screening. This practice is not widely promoted in the project practice site.

There are many various reasons for the suboptimal efforts in preventing T2DM. An electronic survey among family physicians conducted by Mainous et al. (2016) showed several perceived barriers to diabetes prevention. These include the inability to sustain patient motivation, the patient's ability to maintain a modified lifestyle, and lack of time to educate the patient (Mainous et al., 2016). Meanwhile, a qualitative study revealed that lack of knowledge of both the condition and the need for screening as key barriers to screening for diabetic retinopathy (Piyasena et al., 2019).

The proposed staff education at the project site can help address the possible barriers to diabetes prevention. Understanding the importance of early diabetes screening is crucial. Educating the medical staff about the benefits of early screening can help increase their compliance with the diabetes screening guidelines. Knowledge of the effects of early diagnosis can also encourage the medical staff to be more proactive in helping patients overcome their barriers to diabetes prevention.

Addressing the Problem with Current Evidence

Early diabetes screening among high-risk individuals can lead to early detection, early treatment, and better management and control of the disease (Plladino et al., 2020; Simmons et al., 2017; Sinclair & Schwartz, 2019; Olafsdottir et al., 2016; Feldman et al., 2016; Barry et al., 2017). The ADA guidelines strongly suggest that high-risk individuals should be screened routinely for diabetes, given its asymptomatic nature, especially during the onset of the disease (ADA, 2020). Currently, the practice site does not have early diabetes screening for high-risk individuals. Educating the staff about the proper screening process and the importance of early detection can help improve compliance to testing (Chubbs, 2017). This improvement can also translate to better patient outcomes, particularly among patients who are at risk for T2DM.

Project Aims

The project aims to establish a preventative method for detecting the development of T2DM among obese and overweight patients at an early stage. Due to T2DM asymptomatic nature, WHO (n.d.) recommends early detection of T2DM to provide early treatment and improve the quality of life of people who are at risk for this disease. The project also aims to increase knowledge about early diabetes screening for patients who are obese and overweight, among the medical staff. Health care providers must have the necessary foundational knowledge to be able to determine the need for early screening, identification, and treatment of T2DM (Nikitara et al., 2019). The identification of T2DM at an early stage can facilitate early diabetes treatment and prevent further complications brought about by the disease.

Project Objectives

In the timeframe of this DNP Project, the host site will:

1. Implement early American Diabetes Association (ADA) diabetes screening protocol.
2. Educate the nurses and physicians about ADA's early diabetes screening guidelines at the practice site.
3. Evaluate improvement in knowledge using a pre and post early diabetes screening knowledge survey, with a goal of 90% correct answer out of 10 survey questions.
4. Increase to 100% the medical staff's compliance to early diabetes screening of obese and overweight patients.

Theoretical Framework

Kurt Lewin's Change Theory will provide the framework for motivating the acceptance of staff education about early diabetes screening on high-risk obese and overweight patients (see Appendix A). Lewin's theory focuses on changing behaviors through a three-step process: unfreezing, moving, and refreezing (Hussain et al., 2018). Lewin's theory indicates that specific

forces influence individuals or groups to keep or change the status (Wojciechowski et al., 2016). Health care providers commonly use Lewin's change theory in various hospital settings to facilitate quality improvement projects that transform care and improve patient outcomes (Udod & Wagner, 2018).

Historical Development of the Theory

Kurt Lewin was a social psychologist who was born in Germany in 1890 (Burns, 2020). Lewin had an Orthodox Jewish education (Burnes & Bargal, 2017). Lewin completed a doctoral degree in philosophy and psychology at Berlin University and penned a dissertation entitled 'The Psychic Activity: On Interrupting the Process of the Will and the Fundamental Laws of Association (Burns, 2020). During World War I, Lewin served in the military and was also appointed as a researcher and later became a professor of philosophy and psychology at the Psychological Institute of Berlin University (Burnes & Bargal, 2017). During this period, Lewin conducted a series of psychological experiments on motivation, needs, tension states, and learning, considered fundamental empirical studies in the psychological literature (Burnes & Bargal, 2017).

After World War II, Lewin published the journal "Human Relations" which was founded on his earlier papers entitled "Frontiers in Group Dynamics" (Burnes & Bargal, 2017). In this article, Lewin characterized social change as a change in the force fields. This became the foundation of his Change Theory (Burnes & Bargal, 2017). Lewin went on to propose a three-step model of change in his article titled "Changing as Three Steps: Unfreezing, Moving, and Freezing." This model has become one of the most influential approaches to organizational change (Burnes, 2020).

Force Field Analysis

Lewin's force field analysis proposes that change is facilitated by certain factors that act upon the force field and that behavior in an institutional setting is a dynamic balance of opposing forces (Rosca, 2020). Lewin's force field analysis indicates that social situations must balance these

opposing forces (Wojciechowski et al., 2016). The analysis also suggests an imbalance in the force fields when a new force or change is added (Rosca, 2020). Lewin's force field analysis was later expanded by John R. P. French and adapted to industrial and organizational settings (Burnes & Bargal, 2017).

Early Change Theory

Lewin described the change as a three-stage process in his earlier change model (Wojciechowski et al., 2016). This process was later identified as unfreeze–change–refreeze and regarded as the primary approach for change management (Cummings et al., 2016). Lewin's three-stage process has been the dominant theory in change management over the past fifty years (Burnes & Bargal, 2017). Currently, Lewin's three-step process has been deemed the foundational model for facilitating organizational change (Cummings et al., 2016).

Use of Lewin's Theory in Nursing

Lewin's Change Theory has been underscored throughout the nursing literature as a guiding framework in transforming care delivery (Wojciechowski et al., 2016). The use of Lewin's Change Theory has supported nurses during multiple transitions to various health technologies (Wojciechowski et al., 2016). Lewin's theory guided health care providers as they implement and adopt new systems and technologies to continuously improve the quality of patient care (Udod & Wagner, 2018). In recent years, Lewin's theory has been used to guide the implementation of health information technologies such as electronic health records and the bar code medication administration (Gumapac, 2021; Hansen et al., 2019; Wojciechowski et al., 2016).

Lewin's Change Theory

Lewin's change theory proposes that restraining and driving forces influence the actions of individuals and groups of individuals (Wojciechowski et al., 2016). These forces can prevent change from happening (Rosca, 2020). The tension between these two forces is what maintains

equilibrium (Hussain et al., 2018). Changing this equilibrium would require organizations to implement planned change activities and apply his three-step model : unfreezing, change, and refreezing (Udod & Wagner, 2018).

Concepts of the Theory

The change theory has three major concepts (Udod & Wagner, 2018). These are called restraining forces, driving forces, and equilibrium (Wojciechowski et al., 2016). Driving forces are forces that cause change (Rosca, 2020). These forces make change happen by pushing a person toward the desired direction (Hussain et al., 2020). Driving forces can disrupt the equilibrium and shift it towards change (Wojciechowski et al., 2016). On the other hand, restraining forces pertain to forces that oppose the driving forces (Rosca, 2020). They hamper change by pushing people to go in the opposite direction (Hussain et al., 2018). Equilibrium pertains to a balanced state wherein there is equal tension between these two driving forces (Wojciechowski et al., 2016).

Restraining forces. Restraining forces are the forces that seek to keep the status quo. These forces inhibit the implementation of change (Rosca, 2020). Restraining forces oppose the change and can cause people to resist change (Wojciechowski et al., 2016). Lewin's model suggests that restraining forces pull the people or the system away from change and back to the status quo (Hussein et al., 2018). For change to transpire, the resisting forces must be weakened (Wojciechowski et al., 2016).

Driving forces. The driving forces are the forces that push the people or the group towards the new state (Rosca, 2020). The driving force aims to achieve new equilibrium by overpowering the status quo (Hussein et al., 2018). Lewin proposes that when the driving forces are stronger, they can cause the current equilibrium to shift and change (Rosca, 2020). However, for change to occur, the driving forces must be strengthened (Wojciechowski et al., 2016).

Equilibrium. Equilibrium is described as a state of balance in which both restraining and

driving forces are at equal tension (Wojciechowski et al., 2016). When change is introduced, the equilibrium shifts based on which form is strong. The equilibrium can move toward change if the driving force is stronger, or if the resisting force has a greater pull, it can go back to the status quo (Rosca, 2020). The agents of change must then work on supporting the driving forces to be strong enough to overcome the restraining forces (Hussain et al., 2018).

Three Step-Model

Lewin suggests that changing people's behavior would mean breaking a well-established social habit (Hussain et al., 2018). These social habits were referred to as inner resistance to change (Burnes & Bargal, 2017). To break or unfreeze this resistance to change, Lewin proposes a three step-model (Burnes, 2020). The steps are: unfreezing, moving, and refreezing (Wojciechowski et al., 2016).

Unfreezing. Unfreezing is the first stage in the three step-model (Burnes, 2020). This step pertains to searching for the most appropriate method to help people let go of the old habits and help them overcome resistance to change (Cummings et al., 2016). When an organization has been in place for a long time, certain habits become routine and are considered natural (Udon & Wagner, 2018). For example, people may continue to perform tasks that are no longer relevant by force of habit (Cummings et al., 2016). They might also learn to do things in a certain way without considering newer methods that might be more effective and efficient (Cummings et al., 2016).

In summary, the step of unfreezing pertains to people becoming aware of their current status, understanding why their ways may no longer be working and why a change must happen (Udon & Wagner, 2018). This step requires people to reassess their current processes and practices. This step prepares them for the upcoming change (Udon & Wagner, 2018). During this step, the existing status quo is broken to create a new equilibrium (Cummings et al., 2016).

Changing. The second stage is when thoughts, feelings, and behavior change (Cummings et

al., 2016). This stage is also regarded as the transition stage or the actual implementation of the change in a process or system (Udon & Wagner, 2018). This stage is where people begin to adopt and accept the new way of doing things (Cummings et al., 2016). During this stage, the people have been unfrozen from the old status quo (Hussein et al., 2018). Effective communication and careful planning are essential components of this stage (Cummings et al., 2016).

Refreezing. The last stage in the change theory is refreezing. During this stage, the new habit is established as the new norm (Cummings et al., 2016). The third stage ensures that the implemented change will be sustained over time (Hussein et al., 2018). Successful implementation of change creates a new state of equilibrium that is expected to have a higher level of performance (Cummings et a., 2016). During this stage, people transition from the stage of change into a more stable state of equilibrium (Burnes, 2020). During refreezing, people learn to internalize and accept the change that occurred (Wojciechowski et al., 2016). They begin to accept the new ways of things as part of their lives (Cummings et al., 2016). Some ways to sustain and reinforce new behaviors include rewards, recognition, positive reinforcements, and supporting policies (Hussein et al., 2018).

Application to Practice

Lewin's change theory has been widely applied in various health settings to facilitate change in health care processes and systems (Cummings et al., 2016). Change theory can guide how interventions should be delivered and when to capitalize on the population's current level of change readiness (Stacy et al., 2021). Using this theory as a framework can effectively implement change (Abd El-Shafy et al., 2019; Barra & Singh, 2018).

A collaborative care model developed by Abd El-Shafy et al., (2019) used Lewin's 3-Step Model to guide change to optimize care of injured patients. The results showed that implementing Lewin's 3-Step Model nonsurgical admission rate was reduced to only 3% (Abd El-Shafy et al.,

2019). Lewin's theory was also used as a framework in an educational intervention conducted to establish the efficacy of an obesity sensitivity program on nursing students' attitudes toward obese clients (Barra & Singh, 2018). The study showed that a significant positive change in weight prejudices after obesity education intervention (Barra & Singh, 2018).

Application to the Project

In this project, Lewin's change theory concepts will be used to develop the staff education material about early diabetes screening. The theory will serve as a guide to facilitate change in behavior among the practice site's medical staff regarding early diabetes screening (Wojciechowski et al., 2016). The concepts of Lewin's theory will help the person implementing the project address possible resistance to change (Cummings et al., 2016). Additionally, the framework will ensure that the intervention implemented is aligned with Lewin's concept of unfreeze-change-refreeze (Wojciechowski et al., 2016).

Unfreezing

Currently, the staff at the practice site are not performing advanced diabetes screening for obese and overweight patients. Unfreezing this practice will require extensive staff education to break down the long-standing practice of not proactively testing (Udon & Wagner, 2018). During staff education, there will be discussions about the importance and the need for early diabetes screening. This will help promote awareness and break down any inner resistance to change (Wojciechowski et al., 2016). This will also prepare the medical staff for the upcoming change in the workflow and diabetes screening process at the practice site (Udon & Wagner, 2018).

Change

During the change stage, the medical staff at the practice site will be required to apply what they have learned about ADA's diabetes early screening guidelines. This means that all obese and overweight patients with BMI of 30.0 and above and 25.0-29.9, respectively, will be screened

accordingly (CDC, 2021). Through the early screening process, the medical staff will be able to identify patients with prediabetes or those with the presence of HbA1c of 5.7–6.4% (39–47 mmol/mol). Once identified, the patients will be provided with diabetes self-management education (DSME) and medication if necessary (ADA, 2021; Rusdiana et al., 2018). The treatment plan will be put in place to prevent the patients from going beyond the diabetes threshold, which is HbA1c of ≥6.5% (48 mmol/mol) (ADA, 2021).

Refreeze

After implementation, the refreezing stage will be adopted through post-intervention monitoring and random audits to ensure compliance with the new process and that all obese patients are given early diabetes screening. This approach is expected to integrate the new process into the medical staff's daily diabetes screening workflow (Cummings et al., 2016). Through regular monitoring, it is expected that the medical staff will eventually be able to sustain the new habit of conducting early diabetes screening on obese and overweight patients (Wojciechowski et al., 2016). The management at the practice site shall enforce necessary corrective actions to medical staff who will not comply with the implemented diabetes advance screening protocol.

Identifying the Project Setting

This quality improvement project will be implemented in a private primary care/urgent care clinic located in Bakersfield, California. Bakersfield is located in Kern County, with a population of over 403,000 made up of 67% White and 50% Hispanic or Latino (United States Census Bureau, 2020). According to the 2015-2017 Community Health Assessment report by the Kern County Public Health Services Department (2017), Kern County's diabetes mortality rate was at 35.1% and ranked worst in California for diabetes deaths. The target clinic employs a physician, a nurse practitioner, a clinic manager, technicians, and medical assistants, who provide medical services to patients with chronic diseases such as diabetes. The clinic caters to 40 to 60 patients per day and

about 300 patients per week. Annually, the clinic sees over 15,000 patients. About 40% of the patients in the clinic have diabetes. Minor surgeries, trigger points injections, inoculations, and prenatal care are also services provided in this clinic. The clinic utilizes a web-based electronic health record system (EHR) which is Practice Fusion. This system has features for e-prescribing, patient management, billing, and scheduling.

Population of Interest

The direct participants in this quality improvement project will be the medical assistants and physician in direct contact with obese or overweight patients or those with a body mass index (BMI) of 30 and above (WHO, 2021). Health care providers are included if they have direct interaction with patients. Only the physician and medical assistants with direct interactions with obese patients will be included in the education session. The physician's essential duties are performing physical exams and diagnosing and treating injuries and illnesses (Lyu et al., 2019). Medical assistants were included in the participant pool because they are the ones who take down medical histories, perform and interpret diagnostic tests, and recommend a plan of treatment. This is because they directly interact with the patients (Sheridan, 2018). Meanwhile, since the direct target population is medical staff involved in providing direct patient care, nursing administration and technicians are excluded. All types of employment status (full time, part time, per diem, and locums) will be included, as long as they have direct interaction with the patients. Also, there will be no exclusion imposed on the language spoken by the participating medical staff.

The indirect participants in this quality improvement project are the patients in the clinic. To be included, patients must be obese or overweight with a body mass index (BMI) of 30 and above (WHO, 2021). The patients must also be 18 years and older. Since the screening is focused on early diabetes screening, only obese patients who are not yet diagnosed with diabetes are included.

Patients who are already diagnosed to be prediabetic or diabetic will be excluded. Patients who are already taking or have taken medications for diabetes will also be excluded.

Stakeholders

This quality improvement project will have three key stakeholders. They are the medical staff, including the physician, nurse practitioner, medical assistants, the obese/overweight patients, and clinic management. The medical staff make up the direct population and are the ones who will receive the education on early diabetes screening. Health care providers play a crucial role in the early detection of diabetes (Challinor et al., 2016). Given their direct encounters with patients and clinical expertise, they are best able to identify the presence of early diabetes among their patients (Kandula et al., 20108). The decisions made by health care providers about whom to screen for T2DM can have significant health implications. For example, suppose they fail to perceive risk factors for T2DM accurately. In that case, they may not be able to identify at-risk patients, which can lead to delay in identifying and treating the disease (Hafez et al., 2017). Hence, increasing the knowledge of health care providers about early diabetes screening can make them realize the importance of early diagnosis and encourage them to improve early diabetes screening compliance (Nikitara et al., 2019).

The obese/overweight patients are the indirect population in this project. They are the ones who will be subjected to early diabetes screening and benefit from early detection and timely treatment. Obesity and increased body mass index are strongly associated with changes in adipose tissue's physiological function, causing chronic inflammation and insulin resistance (Amin et al., 2019). Studies have shown that obese people are more likely to develop T2DM than normal-weight individuals (Malone & Hansen, 2019; Schnurr et al., 2020). Early diagnosis can lead to early treatment and prevention of complications brought about by T2DM (Timm et al., 2020).

The clinic management, composed of the clinic owner and clinic manager, also plays an essential role in the success of this project. These stakeholders will be responsible for providing permission, logistic support, and needed budget sources. The clinic also stands to benefit from the cost-savings brought about by the early detection and diagnosis of T2DM. Generally, the clinic is small with a maximum of only 10 staff working at full capacity. This makes it challenging to accommodate patients in a timely manner. Considering the high volume of diabetic patients that come to the clinic on a daily basis, early detection may lead to more effective diabetes management and eventually, reduced consultations (Pippitt et al., 2016). This can result to more manageable patient volume. Meanwhile, verbal permission to complete the project has been secured from the owner of the clinic. A written agreement has also been obtained, authorizing the project to be completed at the project site (Appendix F). No affiliation agreement is required.

Intervention/Project Timeline

The pre-implementation phase will happen a week before the planned education session. The participants will be informed of the date, time, and venue for the education session. This is expected to give them enough time to make necessary adjustments to their schedule. The pre-diabetes type 2 early screening knowledge survey will be administered before the two-hour education session. Similarly, a pre-intervention chart audit will also be performed during the pre-implementation phase. The intervention, a two-hour education session about ADA's early diabetes screening guidelines and protocols, will be conducted the first day of the first week of the project timeline. Right after the educational session, a post-test will be administered to the participants to check for an increase in knowledge and retention.

From weeks 1 to week 4, the participating medical staff is expected to conduct early diabetes screening according to the new guidelines discussed during the education session. During

this time, the project lead will be randomly checking in on the medical staff to answer any questions or clarifications they might have about the early screening guidelines.

The post-implementation phase will take place on week 5. A post chart audit will be conducted to check for compliance with the early screening guidelines. All data from -post-tests and post audits will be collated and entered in the Statistical Package for the Social Sciences (SPSS) analysis software.

Tools

American Diabetes Association Risk Test

The ADA prediabetes risk test (Appendix B) is a 60-second T2DM risk test developed by the ADA to help patients determine if they need diabetes screening (Aldayel et al., 2021). This tool is available for free online, and no permission is needed for implementation (ADA, 2020). The test has nine questions. These are questions about the patient's age, gender, race, height, weight, family diagnosis of diabetes, a diagnosis with gestational diabetes (for women), patient diagnosis with high blood pressure, and if the patient is physically active (ADA, 2020). The ADA risk test is highly sensitive and specific for determining the disease through the demographics answers provided by the patients and/or participants (ADA, 2020). ADA Prediabetes Risk Test sensitivity was 78.9%, specificity was 82%, positive predictive valueswere 32%, and negative predictive value was 76%. Youden's index was 60.9%, and the AUC was 0.6% (Aldayel et al., 2021). The ADA risk test includes specific characteristics that made a person more likely than average to have undiagnosed T2DM (ADA, 2020). A score of five or higher means an individual may be at risk for T2DM, and a blood test must be conducted to determine a diagnosis (ADA, 2020).

Pre-Post Early Diabetes Screening Knowledge Test

The pre-and post-test (Appendix C) will be developed by the project lead and administered

to the participants in a paper format. This is a 10-question, multiple-item survey that will test the participant's clinical knowledge about factors crucial for early diabetes screening. These are questions about the right age for testing, the required BMI for testing in the general population, the required BMI for testing Asians, yearly testing, women with GDM, age of testing for elderly, frequency of testing, testing on children, mode of testing, and familiarity with the ADA risk test. The project lead will seek expert consultation and validation with the project mentor, project team, and project site management. The survey will also go through the content validity assessment using the Content Validity Index (CVI). This process will help determine if a particular tool or instrument has the appropriate sample of items for the construct being measured (Yusoff, 2019). All items in the survey will be discussed during the education session. A score of at least 90% is required to pass the test. Participants with non-passing scores will be given feedback and will be asked to retake the test.

Early Diabetes Screening Education Presentation

The project lead will develop an educational presentation in a PowerPoint format (Appendix D). This will be presented to the medical staff at the project site. Before presenting the educational tool, the project lead will seek expert consultation and approval of the project mentor and project site management. The PowerPoint material will contain facts and information about the factors that put patients at high risk for diabetes, the factors that will merit early testing, and the appropriate diabetes testing method that must be used. A discussion on how the risk tool will be incorporated into the existing workflow will also be discussed. The material will also discuss how the medical staff can use and navigate the ADA risk test online. A printed version of the PowerPoint presentation will be given to the participants as a handout.

Chart Audit Tool

The chart audit tool (Appendix E) will be a simple checklist that the project lead will develop to check for compliance with the diabetes early screening. The project lead will seek expert consultation and validation with the project mentor and site management. The tool will be in a table format. The checklist will be used to verify patient information entered in the EHR. This will include variables age, race, sex, height, weight, family history of diabetes, blood pressure, whether the patient has already been tested for diabetes, and if the ADA prediabetes risk tool has been utilized. The patients' names will be coded using numbers and initials to maintain confidentiality.

SPSS Software

The Statistical Package for the Social Sciences (SPSS) analysis software will be used to analyze the data collected -post-intervention. SPSS Statistics is a software package used for logical statistical analysis. This software is developed by IBM for data management and is commercially available for purchase (Abu-Bader, 2021). SPSS is one of the widely used statistical analysis tools due to its ability to utilize data from almost any type of file and run them for analysis. SPSS is also capable of generating charts, tabulated reports, plots of distributions and trends, descriptive statistics as well as conducting complex statistical analyses (Pallant, 2020).

Study Interventions/Data Collection

The pre-diabetes type 2 early screening knowledge survey will be administered before the education session. Right after the education session, a post-education knowledge survey will be administered to the participants to check for improvement and retention. The completed surveys will be scored right after the test. By doing so, the participants will be able to receive real-time feedback about their incorrect answers, should they have any. The scores from the pre and post-education knowledge survey will all be recorded in an Excel score sheet for tracking. This file will be password protected to ensure that information is kept confidential. The hard copies will be kept in a locked filing cabinet at the project site.

This is a crucial step in the project as it will help measure medical staff knowledge that they need to meet the project's aim which is to establish a preventative method for detecting the development of T2DM among obese and overweight patients at an early stage. Due to T2DM asymptomatic nature, WHO (n.d.) recommends early detection of T2DM to provide early treatment and improve the quality of life of people who are at risk for this disease. The data collected from the post-education survey will also help meet another project aim which is to increase knowledge about early diabetes screening for patients who are obese and overweight, among the medical staff. Health care providers must have the necessary foundational knowledge to be able to determine the need for early screening, identification, and treatment of T2DM (Nikitara et al., 2019). The identification of T2DM at an early stage can also help facilitate early diabetes treatment and prevent further complications brought by the disease (WHO, n.d.).

Compliance with early diabetes screening and the number of patients screened for diabetes will be collected weekly, from weeks 1 to 4 during the implementation phase. A chart audit tool will be used when reviewing the charts. The data obtained from the chart audits will help meet the project's objective of 100% medical staff compliance to early diabetes screening of obese and overweight patients. Currently, the staff is not using a tool to guide them when screening for diabetes. Similar to the knowledge survey data, the data collected from the chart audits will be stored in a password protected Excel spreadsheet, which will then be transposed into a Statistical Package for Social Sciences (SPSS) software for comparative analysis of pre- and post-implementation of the early diabetes screening education

Participant names will be coded to avoid direct identification. Substituting codes for participant identifiers can help protect their information and help maintain privacy. The participants' names will be coded using their initials and birth date. Hence, if participant John Doe's birthdate is March 20th, 1983, his participant ID code will be JD03201983.

Ethics/Human Subjects Protection

The early diabetes screening education and its application will be a practice change to the workflow at the project site. Since this is a quality improvement project, it is mandatory for everyone who met the criteria wil to join the training. The project lead will invite the MAs and MD to the education session through email. The expectation is for all medical staff who met the criteria in the clinic to join the education session. However, this will not be considered mandatory or as a condition of employment. The intervention also possesses no potential risks to the providers and the patients. The educational training session will help enhance medical staff knowledge about early diabetes screening and introduce an efficient and effective tool in diagnosing early diabetes (ADA, 2020). No monetary compensation will be provided to the participants.

The Institutional Review Board (IRB) determination form was completed and submitted for review by the project team to comply with Touro University Nevada's policy. Since the implementation is a quality improvement project and does not involve human subjects or direct patient care activities, the project is exempted from IRB review at the university level and the project site. All files related to this project will be password protected to avoid unauthorized access. To ensure confidentiality and protection of the medical staff's information, no direct identifying data will be collected. Instead, their names will be coded using a specific format. The data will then be destroyed three years after project completion.

Measures/Plan for Analysis

The Statistical Package for the Social Sciences (SPSS) analysis software will be used to analyze the data collected from the knowledge surveys and chart audits. SPSS Statistics is a software package used for logical statistical analysis. This software is developed by IBM for data

management and is commercially available for purchase (Abu-Bader, 2021). To ensure the relevance and accuracy of the statistical analyses used, a statistician will also be consulted.

A paired t-test will be used to compare the pre-and post-survey scores. The use of this statistical analysis method is based on four main assumptions which are: the dependent variable must be continuous, the observations are independent of one another, the dependent variable is approximately normally distributed, and the dependent variable will not contain any outliers (Pallant, 2020). Paired t-test was selected for this project because it will be able to show the difference between the pre and post-intervention knowledge levels of the participants.

To analyze the compliance post-intervention, descriptive statistics will be used. This statistical method was deemed appropriate since there was no tool used before the intervention. This method will help quantify and describe the basic characteristics of the data set obtained during the chart audit (Pallant, 2020). The use of descriptive data is based on the assumptions that the project will have categorical data and that the data will have a normal distribution (Pallant, 2020).

Analysis of Results

The quality improvement DNP project's objectives include implementing an early American Diabetes Association (ADA) diabetes screening protocol and educating the nurses and physicians about ADA's early diabetes screening guidelines at the practice site. In addition, the project also seeks to evaluate improvement in knowledge using a pre and post early diabetes screening knowledge survey, with a goal of 90% correct answer out of 10 survey questions. Lastly, it is also this project's objective to increase to 100% the medical staff's compliance to early diabetes screening of obese and overweight patients.

The project was implemented in a in a private primary care/urgent care clinic located in Bakersfield, California. The participants received a one-time diabetes early screening education

session. The outcomes of interest were diabetes early screening knowledge and compliance to early diabetes screening as evidenced by the use of ADA risk test tool.

Participants in the Education Session

A total of 21 medical staff participated in the education session. The participants in the education session were composed of MAs and FNPs. Eighty-one percent of the participants were MAs while, 19% were FNPs. These were the clinic's medical staff with direct contact with obese or overweight patients or those with a body mass index (BMI) of 30 and above (WHO, 2021).

Table 1

Number of Medical Staff Who Joined the Education Session

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MA	17	81.0	81.0	81.0
	FNP	4	19.0	19.0	100.0
	Total	21	100.0	100.0	

Table 1 shows the number and percentage of medical staff who joined the education session.

Knowledge Pre- and Post-Test Scores

A pre and post early diabetes screening knowledge test was used to assess the medical staff's knowledge. The tool was developed by the project lead and reviewed by subject matter experts. The pre-post education knowledge was compared while the frequency or use of the ADA risk test tool on at risk patients was determined.

A paired t-test was used to compare the pre-and post-survey scores. The use of this test is based on four main assumptions which are: the dependent variable must be continuous, the observations are independent of one another, the dependent variable is approximately normally distributed, and the dependent variable will not contain any outliers (Pallant, 2020).

The medical staff completed a ten-item questionnaire about their knowledge of early diabetes screening after attending a short education session. A paired-samples t-test was conducted to evaluate the impact of the education intervention on the medical staff's scores on the diabetes early screening test. The possible score range is 0 to 10, with higher scores indicating improvement in knowledge.

Table 2 shows that all of 21 participants got a score of 9 out of 10 questions (90%) or 10 out 10 questions (100%). Out of the 21 participants, 86% scored a 10. Meanwhile, 14% of the participants scored a 9.

Table 2

Number of Participants Who Met the Passing Score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9.00	3	14.3	14.3	14.3
	10.00	18	85.7	85.7	100.0
	Total	21	100.0	100.0	

Table three shows the mean scores pre and post education session. There were a total of 21 medical staff who took the pre and post education knowledge test. On average, the knowledge test scores post education session (M = 9.86, SD = 0.36) was higher than pre-education knowledge test scores (M = 7.05, SD = 1.39).

Table 3

Paired Samples Statistics on the Pre- and Post-Early Diabetes Screening Knowledge Test Scores

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Post	9.8571	21	.35857	.07825
	Pre	7.0476	21	1.39557	.30454

Table four shows that the improvement of 2.81 with a 95% confidence interval ranging from 2.19 to 3.43 was statistically significant, t (20) = -9.44, p = .000 (two-tailed). The p-value of less than .05 indicates that the increase was statistically significant.

Table 4

Statistical Significance in the Pre- and Post-Test Scores

		Paired Differences							Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	
Pair 1	Post - Pre	2.80952	1.36452	.29776	2.18840	3.43064	9.435	20	.000

Chart Audit

To determine the compliance post-intervention, descriptive statistics was used. This statistical method was deemed most appropriate because there was no screening tool used prior the intervention. The use of descriptive data is based on the assumptions that the project will have categorical data and that the data will have a normal distribution (Pallant, 2020).

Figure one shows the number of patient charts reviewed by age. Majority (32.79%) of the patients screened were aged 56 to 65 years old. This was followed by patients aged 46 to 55 years old. Patients with the least number of charts audited were those aged 18 to 25 years old.

Figure 1

Age of Patients Whose Charts were Audited

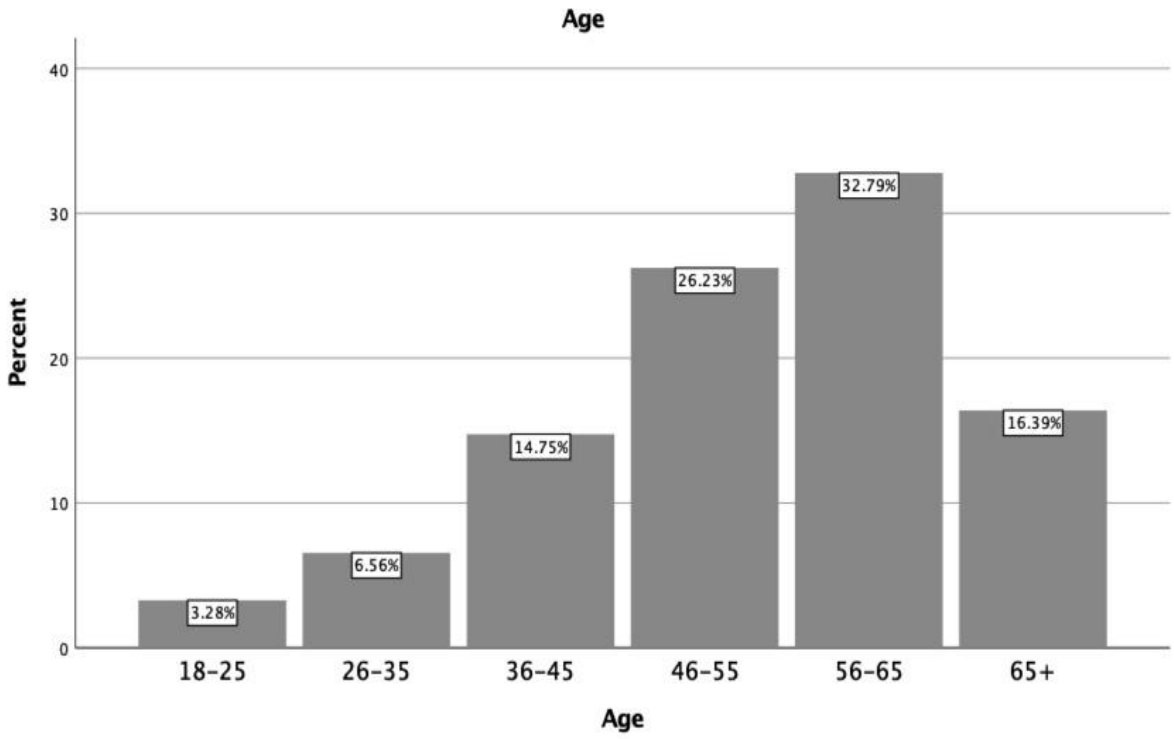


Figure two shows the number of patient charts reviewed by race. Majority (94.33%) of the patients screened are Hispanics. White patients only made up 3.38% of the audited charts. Similarly, Asian Americans were screened at 3.28%.

Figure 2

Race of Patients Whose Charts were Audited

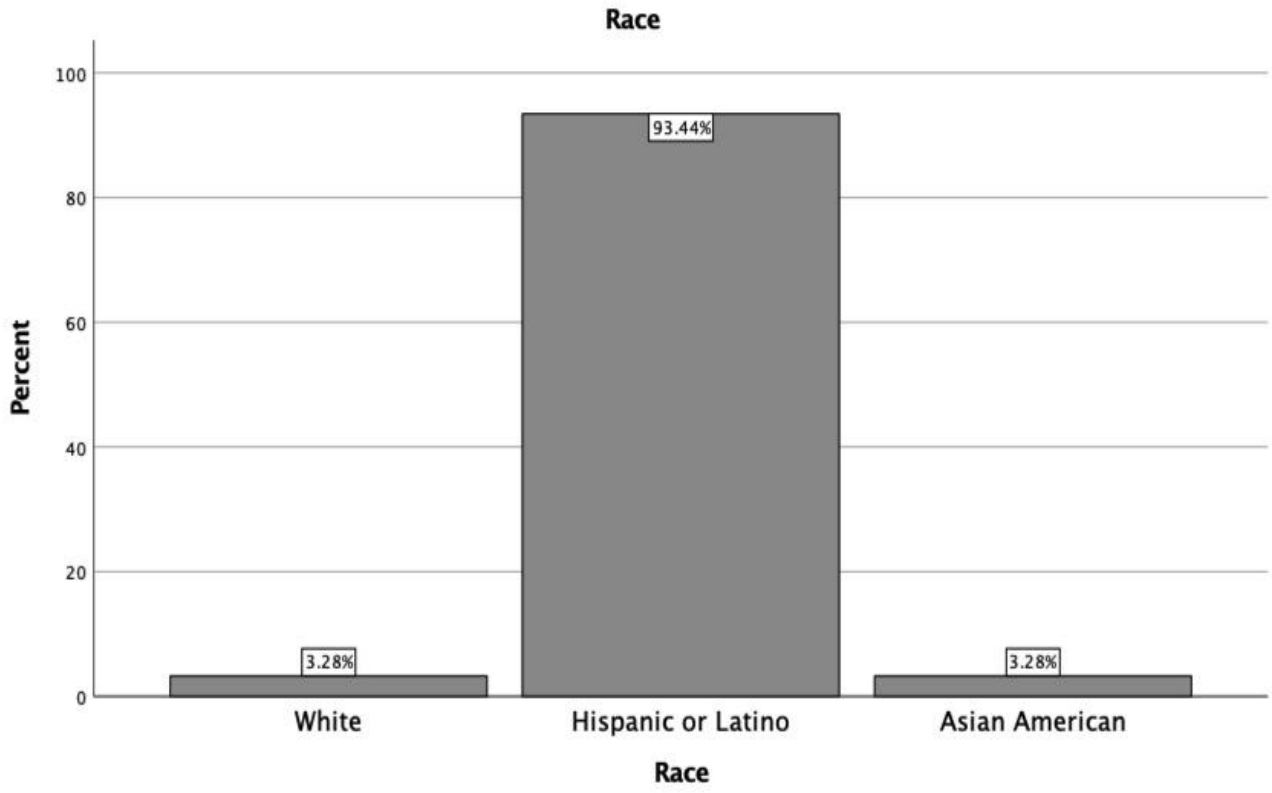


Table five shows 100% compliance to the use of ADA risk test on all 61 charts audited post education session.

Table 5

Use of ADA Risk Test on Obese Patients

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	61	100.0	100.0	100.0

Discussion of Findings

The results post-implementation of the project's intervention showed that it was able to meet all of its objectives. These include implementing an early ADA diabetes screening protocol and educating the nurses and physicians about ADA's early diabetes screening guidelines at the practice site. In addition, the project also aims to evaluate improvement in knowledge using a pre and post early diabetes screening knowledge survey, with a goal of 90% correct answers out of 10 survey questions. Lastly, it is also this project's objective to increase to 100% the medical staff's compliance with early diabetes screening of obese and overweight patients.

The ADA diabetes screening protocol and education sessions were successfully implemented among all medical staff who are assisting diabetic patients at the practice site. Results from the analysis of pre and post-knowledge test scores showed an improvement in knowledge on early diabetes screening of 2.81 with a 95% confidence interval, $t(20) = -9.44$, $p = .000$ (two-tailed), post-education session. This finding supports the results from an earlier study by Chubbs (2017) showing that staff education was effective in increasing knowledge of health care providers. In a quality improvement project, an education program was implemented to improve PCP's adherence to the Canadian Diabetes Association clinical practice guideline for chronic kidney disease. The project showed that the educational intervention enhanced provider confidence and knowledge in screening for renal disease among diabetic patients. The average number of diabetic patients screened resulted in a net increase of 31.5% (Chubbs, 2017).

The compliance audit post-intervention showed 100% compliance with the use of the ADA risk test on all 61 charts audited. This validated the findings from a systematic review by Martos-Cabrera et al., (2019) to analyze the effectiveness of different hand hygiene educational methods in their compliance and adherence over time. Results showed that strategies such as reminder sounds, videos, audiovisual media, and practical simulations, improved handwashing compliance among nurses. Adherence overtime increased by up to 60% (Martos-Cabrera et al., 2019). The education session included practice scenarios in which health care providers went through simulations and were asked to assess fictional patients using the ADA risk test. This activity helped them apply the concepts they have learned in real-life scenarios.

This quality improvement project proposed to answer the question will education of healthcare providers and medical staff on early diabetes screening according to the ADA testing guidelines for prediabetes and T2DM and the implementation of an early screening protocol, improve screening compliance leading to early identification of T2DM in the overweight and obese population? The findings from the data analysis demonstrated a statistically significant improvement in knowledge as well compliance with early diabetes screening among the medical staff dealing with diabetic patients at the practice site.

Significance/Implications

The evidence produced from this project provided significant results to the nursing practice. It has implications for the patients getting an early diagnosis and treatment for their diabetes. This project has implications for health care providers concerning improving their knowledge to accurately identify patients who are at risk of diabetes. The project's results showed that the knowledge test scores post-education session ($M = 9.86$, $SD = 0.36$) were higher than the pre-education knowledge test scores ($M = 7.05$, $SD = 1.39$). This provided additional evidence regarding the efficacy of staff education in improving health care providers' knowledge and

compliance to clinical protocols. In addition, it gives health care providers an effective and sustainable alternative that they could implement to support patients with diabetes.

The improvement in knowledge (2.81 with a 95% confidence interval, p = .000) and compliance (100%) also had financial implications. The results were shared with the clinic owner, manager project, and the medical staff. The importance of improving compliance to the diabetes screening protocol improves patient outcomes and also minimizes the health care cost of diabetes treatment. Diabetes is one of the most expensive chronic conditions in the United States. For every $4 in US health care costs, a dollar is spent on caring for people with diabetes. This brings the total to around $237 billion spent each year on direct medical costs (CDC, 2022). The reduction in the number of patients being treated for diabetes, due to early detection and treatment, can help reduce health care spending on this disease.

In conclusion, staff education is an effective intervention that can improve the medical staff's knowledge and compliance with early diabetes screening. The favorable results have notable implications both on patients and health care providers. Patients can receive early diagnosis and treatment for diabetes while health care providers are able to detect the early risks for diabetes among their patients. In addition, the improvement in medical staff knowledge and compliance with early diabetes screening also have financial implications attributed to the reduction in the number of patients being treated for diabetes.

Limitations

Project Design

A quality improvement project is defined as a systematic, data-guided, and evidence-based process designed to improve the quality of care, patient outcomes, services, and services (Jones et al., 2019). This design, however, limited the option to have a control group. Controlling an experiment is crucial because it helps ensure that the observed results are not just products of

random events (Torday & Baluška, 2019). By isolating the effect of an independent variable, the control group can help establish the cause-and-effect relationship (Bernerth et al., 2018).

Data Recruitment

The small sample size was one of the data recruitment limitations. Only a total of 21 out of 31 medical staff attended the educational session and completed the pre-and post-tests. Small sample size can compromise and reduce its statistical power to detect changes (Abu-Bader, 2021). Having a larger sample size can provide greater precision and power (Pallant, 2020).

Collection Methods

The short time period allotted for the implementation of the project limited the number of charts that were audited. The project was implemented for a total of five weeks, with the fifth week being used for data analysis. Extending the implementation period could have helped determine the long-term effectiveness of the intervention. In addition, the longer timeframe would also result in more chart audits and larger sample size for compliance data.

Data Analysis

Data analysis was limited by the lack of pre-intervention data for screening compliance. The project lead was only able to collect baseline data for knowledge improvement. However, since there was no screening tool used prior the implementation of the project, there was no pre-intervention compliance data. Because of this, descriptive statistics were used to analyze the compliance data obtained from chart audits. Having compliance data before and after intervention would have made it possible to conduct a t-test (if normal) or a Mann-Whitney test (if non-normal) (Pallant, 2020).

Dissemination

The target population for dissemination is Touro University Nevada, the medical staff, and the clinical management team. An oral and PowerPoint presentation will be provided and delivered

to the DNP project chair, the DNP project members, the DNP faculty, and the DNP students. Upon completion of the project manuscript, a poster presentation will also be conducted at the project site with all the stakeholders. The presentation will include the results from the knowledge test and the compliance audit. In addition, the project lead also intends to disseminate the findings to other primary care clinics within the area in order for the project to reach a bigger audience. As a member of California Association for Nurse Practitioners, the project results have a potential avenue to be dissiminated through its vast network of nurse practitioners. The results of this evidence-based project will also be shared with the DNP project repository for other DNP students and graduates to use.

Project Sustainability

Periodical audits and retraining sessions can help guarantee the project's sustainability. A monthly compliance audit of the charts will be conducted by the clinic manager to ensure that the medical staff is still performing the early diabetes screening on obese patients. A retraining session will also be conducted annually to refresh the medical staff on the guidelines for early diabetes screening and to keep them up to date on other updates regarding diabetes screening. The clinic's owner has granted permission to make these activities a staple at the clinic.

Conclusion

The implementation of an early diabetes screening education and ADA risk tool resulted in an increase in knowledge and compliance among the medical staff at the practice site. This project was accomplished by finding the best available evidence to support the proposed intervention and collaborating with the stakeholders at the practice site. The findings from this project validated the efficacy of staff education in improving knowledge and compliance with early diabetes screening guidelines (Chubbs, 2017). They also highlighted the importance of early diagnosis, and treatment of diabetes in order to improve the quality of life of the affected patients as well as reduce

complications (Timm et al., 2020). Medical staff with increased awareness of early diabetes screening are more likely to consistently utilize the ADA risk test and provide the appropriate treatment, leading to an overall improvement in patient care and health outcomes (Kandula et al., 2018).

References

Abd El-Shafy, I., Zapke, J., Sargeant, D., Prince, J. M., & Christopherson, N. A. (2019). Decreased pediatric trauma length of stay and improved disposition with implementation of Lewin's change model. *Journal of Trauma Nursing| JTN*, *26*(2), 84-88.https://doi.org/ 10.1097/JTN.0000000000000426

Abu-Bader, S. H. (2021). *Using statistical methods in social science research: With a complete SPSS guide.* Oxford University Press, USA.

Aman, A. M., Rasyid, H., Bakri, S., & Patellongi, I. J. (2018). The association between parents' history of Type 2 diabetes with metabolic syndrome component and insulin resista ance in non-diabetic young adult male. *Acta Med. Indones. J. Intern. Med*, *50*(4), 309-313. https://core.ac.uk/download/pdf/276527639.pdf

Amarantou, V., Kazakopoulou, S., Chatzoudes, D., & Chatzoglou, P. (2018). Resistance to change: an empirical investigation of its antecedents. *Journal of Organizational Change Management*, *31* (2), 426-450. https://doi.org/10.1108/JOCM-05-2017-0196.

American Diabetes Association (ADA). (2018a). *Economic costs of diabetes in the U.S. in 2017.* https://care.diabetesjournals.org/content/early/2018/03/20/dci18-0007.

American Diabetes Association (ADA). (2018b). *Standards of medical care in diabetes-2018.* http://diabetesed.net/wp-content/uploads/2017/12/2018-ADA-Standards-of-Care.pdf.

American Diabetes Association (ADA). (2018c). *Statistics about diabetes.* https://www.diabetes.org/resources/statistics/statistics-about-diabetes.

American Diabetes Association (ADA). (n.d.). *Complications.* https://www.diabetes.org/diabetes/complications.

American Diabetes Association. (2020). Standards of medical care in diabetes—2020 abridged for primary care providers. *Clinical diabetes: a publication of the American Diabetes*

Association, *38*(1), 10.

American Diabetes Association. (2021, January). *Classification and diagnosis of diabetes: Standards of medical care in diabetes—2021.* https://care.diabetesjournals.org/content/44/Supplement_1/S15.

American Diabetes Association. (2021). *Statistics: The cost of diabetes.* https://www.diabetes.org/resources/statistics/cost-diabetes.

Amin, H. S., Alkadhaib, A. A., Modahi, N. H., Alharbi, A. M., & Alkhelaif, A. A. (2016). Physicians' awareness of guidelines concerning diabetes mellitus in primary health care setting in Riyadh KSA. *Journal of Taibah University Medical Sciences*, *11*(4), 380-387.

Amin, M. N., Hussain, M. S., Sarwar, M. S., Moghal, M. M. R., Das, A., Hossain, M. Z., ... & Islam, M. S. (2019). How the association between obesity and inflammation may lead to insulin resistance and cancer. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 13*(2), 1213-1224. https://doi.org/10.1016/j.dsx.2019.01.041

Ansari, S., Haboubi, H., & Haboubi, N. (2020). Adult obesity complications: challenges and clinical impact. *Therapeutic Advances in Endocrinology and Metabolism*, *11*. https://doi.org/10.1177/2042018820934955

Barra, M., & Singh Hernandez, S. S. (2018, October). Too big to be seen: weight-based discrimination among nursing students. *Nursing Forum, 53*(4), 529-534. https://doi.org/10.1111/nuf.12282

Barrett, D., & Noble, H. (2019). What are cohort studies?. *Evidence-Based Nursing*, *22*(4), 95-96.

Barry, E., Roberts, S., Oke, J., Vijayaraghavan, S., Normansell, R., & Greenhalgh, T. (2017). Efficacy and effectiveness of screen and treat policies in prevention of type 2 diabetes: systematic review and meta-analysis of screening tests and interventions. *BMJ (Clinical Research ed.)*, 356, i6538. https://doi.org/10.1136/bmj.i6538

Bernerth, J. B., Cole, M. S., Taylor, E. C., & Walker, H. J. (2018). Control variables in leadership research: A qualitative and quantitative review. *Journal of Management, 44*(1), 131-160. https://doi.org/10.1177/0149206317690586

Bhupathiraju, S. N., & Hu, F. B. (2016). Epidemiology of Obesity and Diabetes and Their Cardiovascular Complications. *Circulation research*, *118*(11), 1723–1735. https://doi.org/10.1161/CIRCRESAHA.115.306825

Bluhm, R. (2016). The eierarchy of evidence, meta-Analysis, and systematic review. *The Routledge Companion to Philosophy of Medicine,* 223-231.

Boles, A., Kandimalla, R., & Reddy, P. H. (2017). Dynamics of diabetes and obesity: epidemiological perspective. *Biochimica et Biophysica Acta (BBA)-Molecular Basis of Disease*, *1863*(5), 1026-1036. https://doi.org/10.1016/j.bbadis.2017.01.016

Brooke, J. M., & Mallion, J. (2016). Implementation of evidence-based practice by nurses working in community settings and their strategies to mentor student nurses to develop evidence-based practice: A qualitative study. *International Journal of Nursing Practice*, *22*(4), 339–347. https://doi.org/10.1111/ijn.12470

Burnes, B. (2020). The Origins of Lewin's Three-Step Model of Change. *The Journal of Applied Behavioral Science, 56*(1), 32–59. https://doi.org/10.1177/0021886319892685

Burnes, B., & Bargal, D. (2017). Kurt Lewin: 70 Years on. *Journal of Change Management*, *17*(2), 91–100. https://doi-org /10.1080/14697017.2017.1299371

Busetto, L., Luijkx, K., Calciolari, S., Ortiz, L., & Vrijhoef, H. (2018). Barriers and Facilitators to Workforce Changes in Integrated Care. *International journal of integrated care*, *18*(2), 17. https://doi.org/10.5334/ijic.3587

Centers for Disease Control and Prevention (CDC). (2020). *National diabetes statistics report, 2020.* https://www.cdc.gov/diabetes/data/statistics-report/index.html.

Centers for Disease Control and Prevention (CDC). (2021). *Adult obesity facts.* https://www.cdc.gov/obesity/data/adult.html.

Centers for Disease Control and Prevention. (2021). *Diabetes sets.* https://www.cdc.gov/diabetes/basics/getting-tested.html.

Centers for Disease Control and Prevention. (2022). *Cost-effectiveness of diabetes interventions.* https://www.cdc.gov/chronicdisease/programs-impact/pop/diabetes.htm

Challinor, J. M., Galassi, A. L., Al-Ruzzieh, M. A., Bigirimana, J. B., Buswell, L., So, W., Steinberg, A. B., & Williams, M. (2016). Nursing's potential to address the growing cancer burden in low-and middle-income countries. *Journal of Global Oncology*, *2*(3), 154–163. https://doi.org/10.1200/JGO.2015.001974

Cheng, Y. J., Kanaya, A. M., Araneta, M. R. G., Saydah, S. H., Kahn, H. S., Gregg, E. W. & Imperatore, G. (2019). Prevalence of diabetes by race and ethnicity in the United States, 2011-2016. *Jama*, *322*(24), 2389-2398. https://doi.org/10.1001/jama.2019.19365.

Chubbs, D. O. (2017). Primary Care Provider Adherence to the Canadian Diabetes Association Clinical Practice Guideline for Chronic Kidney Disease. *Doctor of Nursing Practice (DNP) Projects. 112.* https://scholarworks.umass.edu/nursing_dnp_capstone/112

Cohen, I. G., & Mello, M. M. (2018). HIPAA and protecting health information in the 21st century. *Jama, 320(3), 231-232.* https://doi.org/ 10.1001/jama.2018.5630

Cummings, S., Bridgman, T., & Brown, K. G. (2016). Unfreezing change as three steps: Rethinking Kurt Lewin's legacy for change management. *Human Relations, 69*(1), 33–60. https://doi.org/10.1177/0018726715577707

Deborah, O. K. (2018). Lewin's Theory of Change: Applicability of its principles in a contemporary organization. *Journal of Strategic Management, 2*(5), 1-12.

Dennison, R. A., Chen, E. S., Green, M. E., Legard, C., Kotecha, D., Farmer, G. & Griffin, S. J.

(2021). The absolute and relative risk of type 2 diabetes after gestational diabetes: A systematic review and meta-analysis of 129 studies. *Diabetes Research and Clinical Practice*, *171*, 108625. https://doi.org/10.1016/j.diabres.2020.108625

Einarson, T. R., Acs, A., Ludwig, C., & Panton, U. H. (2018). Prevalence of cardiovascular disease in type 2 diabetes: a systematic literature review of scientific evidence from across the world in 2007-2017. *Cardiovascular diabetology*, *17*(1), 83. https://doi.org/10.1186/s12933-018-0728-6

Einarson, T. R., Bereza, B. G., Acs, A., & Jensen, R. (2017). Systematic literature review of the health economic implications of early detection by screening populations at risk for type 2 diabetes. *Current Medical Research and Opinion, 33*(2), 331-358. https://doi.org/10.1080/03007995.2016.1257977

Endrejat, P. C., Baumgarten, F., & Kauffeld, S. (2017). When theory meets practice: Combining Lewin's ideas about change with motivational interviewing to increase energy-saving behaviours within organizations. *Journal of Change Management*, *17*(2), 101-120. https://doi.org/10.1080/14697017.2017.1299372

Esquives, B. N., Ramos, K. Q., & Stoutenberg, M. (2021). Exploring Strategies to Engage Hispanic Patients in Screening for a Diabetes Prevention Program at a Local Community Health Center. *Journal of Health Care for the Poor and Underserved*, *32*(1), 487–505. https://doi.org/10.1353/hpu.2021.0036

Feldman, A. L., Griffin, S. J., Fhärm, E., Norberg, M., Wennberg, P., Weinehall, L., & Rolandsson, O. (2017). Screening for type 2 diabetes: Do screen-detected cases fare better?. *Diabetologia*, 60(11), 2200-2209. https://doi.org/10.1007/s00125-017-4402-4

Golden, S., Maruthur, N., Mathioudakis, N., Spanakis, E., Rubin, D., Zilbermint, M., & Hill-Briggs, F. (2017). The case for diabetes population health improvement: Evidence-based

programming for population outcomes in diabetes. *Current Diabetes Report*, *17*(7), 51. https://doi.org/10.1007/s11892-017-0875-2

Goyal R, & Jialal I. (2021). Diabetes Mellitus Type 2. *StatPearls.* https://www.ncbi.nlm.nih.gov/books/NBK513253/

Gumapac, S. (2021). Implementation of Barcode Medication Administration (BCMA): Evaluating Medication Errors and the Impacts of Transition to BCMA in a Hospital Setting. *ProQuest*. 28497731. https://doi.org// https://www.proquest.com/openview/0bf39b1b94052bdb2bd453d7f17e5c13/1?pq-origsite=gscholar&cbl=18750&diss=y

Gupta, S., & Bansal, S. (2020). Does a rise in BMI cause an increased risk of diabetes?: Evidence from India. *PloS One*, *15*(4), e0229716.

Hafez, D., Nelson, D. B., Martin, E. G., Cohen, A. J., Northway, R., & Kullgren, J. T. (2017). Understanding type 2 diabetes mellitus screening practices among primary care physicians: a qualitative chart-stimulated recall study. *BMC Family Practice, 18*(1), 50. https://doi.org/10.1186/s12875-017-0623-3

Hansen, M. B., Kidholm, K., Nøhr, C., Schmidt, T., & Elmholdt, K. T. (2019). Model for Evaluating the Implementation of a Third Generation EHR System. *Context Sensitive Health Informatics: Sustainability in Dynamic Ecosystems*, 141-147. https://doi.org//10.3233/SHTI190153.

Happel, P. (2019, June 21). *Fewer than 15% of patients undergo diabetes screening.* Healio. https://www.healio.com/news/primary-care/20190618/fewer-than-15-of-patients-undergo-diabetes-screening.https://doi.org/10.1371/journal.pone.0229716

Hill-Briggs, F., Adler, N. E., Berkowitz, S. A., Chin, M. H., Gary-Webb, T. L., Navas-Acien, A., ... & Haire-Joshu, D. (2021). Social determinants of health and diabetes: a scientific review.

Diabetes Care, 44(1), 258-279. https://doi.org/10.2337/dci20-0053.

Hussain, S. T., Lei, S., Akram, T., Haider, M. J., Hussain, S. H., & Ali, M. (2018). Kurt Lewin's change model: A critical review of the role of leadership and employee involvement in organizational change. *Journal of Innovation & Knowledge*, *3*(3), 123-127. https://doi.org/10.1016/j.jik.2016.07.002

Javed, R., Mohsin, S. N., Adnan, M., & Naz, S. (2019). Prevalence of Type 2 Diabetes among asymptomatic adults of Lahore Pakistan. *Iranian Journal of Science and Technology, Transactions A: Science, 43*(5), 2185-2192. https://doi.org/10.1007/s40995-019-00747-9

Jones, B., Vaux, E., & Olsson-Brown, A. (2019). How to get started in quality improvement. *BMJ*, 364. https://doi.org/10.1136/bmj.k5437

Kandula, N. R., Moran, M. R., Tang, J. W., & O'Brien, M. J. (2018). Preventing Diabetes in Primary Care: Providers' Perspectives About Diagnosing and Treating Prediabetes. Clinical diabetes *: A Publication of the American Diabetes Association, 36*(1), 59–66. https://doi.org/10.2337/cd17-0049

Kaur, G., Lakshmi, P. V. M., Rastogi, A., Bhansali, A., Jain, S., Teerawattananon, Y. & Prinja, S. (2020). Diagnostic accuracy of tests for type 2 diabetes and prediabetes: A systematic review and meta-analysis. *PloS One, 15*(11), e0242415. https://doi.org/10.1371/journal.pone.0242415.

Kern County Public Health Services Department. (2017). *Community health assessment: 2015-2017.* http://kernpublichealth.com/wp-content/uploads/2017/04/Community-Health-Assessment_04.18.17_1.pdf.

Kim, M. S., Jo, D. S., & Lee, D. Y. (2019). Comparison of HbA1c and OGTT for the diagnosis of type 2 diabetes in children at risk of diabetes. *Pediatrics & Neonatology*, *60*(4), 428-434. https://doi.org/10.1016/j.pedneo.2018.11.002

Le Roux, M., Walsh, C., Reid, M., & Raubenheimer, J. (2019). Diabetes-related knowledge, attitude and practices (KAP) of adult patients with type 2 diabetes mellitus in the Free State province, South Africa. *South African Journal of Clinical Nutrition*, *32*(4), 83-90. https://doi.org/10.1080/16070658.2018.1468536

Lyu, H. G., Davids, J. S., Scully, R. E., & Melnitchouk, N. (2019). Association of domesticresponsibilities with career satisfaction for physician mothers in procedural vs nonprocedural fields. *JAMA Surgery, 154*(8), 689-695.

Mainous, A. G., Tanner, R. J., Scuderi, C. B., Porter, M., & Carek, P. J. (2016). Prediabetes screening and treatment in diabetes prevention: the impact of physician attitudes. *The Journal of the American Board of Family Medicine*, *29*(6), 663-671. https://doi.org/10.3122/jabfm.2016.06.160138

Malone, J. I., & Hansen, B. C. (2019). Does obesity cause type 2 diabetes mellitus (T2DM)? Or is it the opposite?. *Pediatric Diabetes, 20*(1), 5-9. https://doi.org/10.1111/pedi.12787

Manios, Y., Mavrogianni, C., Lambrinou, C. P., Cardon, G., Lindström, J., Iotova, V., ... & Androutsos, O. (2020). Two-stage, school and community-based population screening successfully identifies individuals and families at high-risk for type 2 diabetes: The Feel4Diabetes-study. *BMC Endocrine Disorders, 20*(1), 1-11. https://doi.org/10.1186/s12902-019-0478-9

Martos-Cabrera, M. B., Mota-Romero, E., Martos-García, R., Gómez-Urquiza, J. L., Suleiman-Martos, N., Albendín-García, L., & Cañadas-De la Fuente, G. A. (2019). Hand hygiene teaching strategies among nursing staff: A systematic review. *International Journal of Environmental Research and Public Health, 16*(17), 3039. https://doi.org/10.3390/ijerph16173039

McArthur, C., Bai, Y., Hewston, P., Giangregorio, L., Straus, S., & Papaioannou, A. (2021).

Barriers and facilitators to implementing evidence-based guidelines in long-term care: a qualitative evidence synthesis. *Implementation Science*, *16*(1), 1-25. https://doi.org/10.1186/s13012-021-01140-0

Melnyk, B., & Overholt-Fineout, E. (2015). *Evidence-based practice in nursing and healthcare: A guide to best practice*. (3rd ed.). Philadelphia, PA: Wolters Kluwer Health

Nikitara, M., Constantinou, C. S., Andreou, E., & Diomidous, M. (2019). The role of nurses and the facilitators and barriers in diabetes care: A mixed methods systematic literature review. *Behavioral Sciences (Basel, Switzerland)*, *9*(6), 61. https://doi.org/10.3390/bs9060061

Olafsdottir, E., Andersson, D. K., Dedorsson, I., Svärdsudd, K., Jansson, S. P., & Stefánsson, E. (2016). Early detection of type 2 diabetes mellitus and screening for retinopathy are associated with reduced prevalence and severity of retinopathy. *Acta Ophthalmologica, 94*(3), 232-239. https://doi.org/10.1111/aos.12954

Paci, M., Faedda, G., Ugolini, A., & Pellicciari, L. (2021). Barriers to evidence-eased practice implementation in physiotherapy: A systematic review and meta-analysis. *International Journal for Quality in Health Care.33* (2), mzab093. https://doi.org/10.1093/intqhc/mzab093.

Palladino, R., Vamos, E. P., Chang, K. C. M., Khunti, K., Majeed, A., & Millett, C. (2020). Evaluation of the diabetes screening component of a national cardiovascular risk assessment programme in England: A retrospective cohort study. *Scientific Reports, 10*(1), 1-11. https://doi.org/10.1038/s41598-020-58033-3

Pallant, J. (2020). SPSS survival manual: *A step by step guide to data analysis using IBM SPSS.* Routledge.

Pippitt, K., Li, M., & Gurgle, H. E. (2016). Diabetes mellitus: screening and diagnosis. *American*

Family Physician, *93*(2), 103-109. https://www.aafp.org/afp/2016/0115/p103.html?fbclid=IwAR0mumjybmXGWrDUW_h7q2FRWxkHCS401ZkU_gTMbnqE4XcSOyvg3Eu7fKY.

Piyasena, M. M. P. N., Murthy, G. V. S., Yip, J. L., Gilbert, C., Peto, T., Premarathna, M., & Zuurmond, M. (2019). A qualitative study on barriers and enablers to uptake of diabetic retinopathy screening by people with diabetes in the Western Province of Sri Lanka. *Tropical Medicine and Health*, *47*(1), 1-10. https://doi.org/10.1186/s41182-019-0160-y

Ravangard, S. F., Scott, A. E., Mastrogiannis, D., & Kominiarek, M. A. (2017). Early diabetes screening in obese women. *The Journal of Maternal-fetal & Neonatal Medicine : The Official Journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians, 30*(23), 2784–2788. https://doi.org/10.1080/14767058.2016.1263294

Ravangard, S. F., Scott, A. E., Mastrogiannis, D., & Kominiarek, M. A. (2017). Early diabetes screening in obese women. *The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians*, *30*(23), 2784–2788. https://doi.org/10.1080/14767058.2016.1263294.

Regmi, D., Al-Shamsi, S., Govender, R. D., & Al Kaabi, J. (2020). Incidence and risk factors of type 2 diabetes mellitus in an overweight and obese population: a long-term retrospective cohort study from a Gulf state. *BMJ Open*, *10*(7), e035813. http://dx.doi.org/10.1136/bmjopen-2019-035813

Roşca, V. I. (2020). Implications of Lewin's field theory on social change. *Proceedings of the International Conference on Business Excellence, 14* (1), 617-625. https://doi.org/ 10.2478/picbe-2020-0058.

Rusdiana, Savira, M., & Amelia, R. (2018). The effect of diabetes self-management education on Hba1c level and fasting blood sugar in type 2 diabetes mellitus patients in primary health care in Binjai City of North Sumatera, Indonesia. *Open Access Macedonian Journal of Medical Sciences, 6*(4), 715–718. https://doi.org/10.3889/oamjms.2018.169

Sanz-Corbalán, I., Lázaro-Martínez, J. L., García-Morales, E., Molines-Barroso, R., Álvaro-Afonso, F., & García-Álvarez, Y. (2018). Advantages of early diagnosis of diabetic neuropathy in the prevention of diabetic foot ulcers. *Diabetes Research and Clinical Practice,* 146, 148-154. https://doi.org/10.1016/j.diabres.2017.12.018

Schmidt, A. M. (2019). Diabetes mellitus and cardiovascular disease: emerging therapeutic approaches. *Arteriosclerosis, Thrombosis, and Vascular Biology, 39*(4), 558-568.

Schnurr, T. M., Jakupović, H., Carrasquilla, G. D., Ängquist, L., Grarup, N., Sørensen, T. I. & Kilpeläinen, T. O. (2020). Obesity, unfavourable lifestyle and genetic risk of type 2 diabetes: A case-cohort study. *Diabetologia*, *63*(7), 1324-1332. https://doi.org/10.1007/s00125-020-05140-5

Selvin, E., Wang, D., Matsushita, K., Grams, M. E., & Coresh, J. (2018). Prognostic Implications of Single-Sample Confirmatory Testing for Undiagnosed Diabetes: A Prospective Cohort Study. *Annals of Internal Medicine, 169*(3), 156–164. https://doi.org/10.7326/M18-0091

Sheridan, B., Chien, A. T., Peters, A. S., Rosenthal, M. B., Brooks, J. V., & Singer, S. J. (2018). Team-based primary care: The medical assistant perspective. *Health Care Management review, 4*3(2), 115-125. https://doi.org// 10.1097/HMR.0000000000000136

Simmons, D., & Zgibor, J. C. (2017). Should we screen for type 2 diabetes among asymptomatic

individuals? Yes. *Diabetologia*, *60*(11), 2148-2152. https://doi.org/10.1007/s00125-017-4397-x.

Simmons, R. K., Griffin, S. J., Lauritzen, T., & Sandbæk, A. (2017). Effect of screening for type 2 diabetes on risk of cardiovascular disease and mortality: A controlled trial among 139,075 individuals diagnosed with diabetes in Denmark between 2001 and 2009. *Diabetologia, 60*(11), 2192-2199. https://doi.org/10.1007/s00125-017-4299-y

Sinclair, S. H., & Schwartz, S. S. (2019). Diabetic retinopathy–an underdiagnosed and undertreated inflammatory, neuro-vascular complication of diabetes. *Frontiers in Endocrinology, 10*, 843.

Sitasuwan, T., & Lertwattanarak, R. (2020). Prediction of type 2 diabetes mellitus using fasting plasma glucose and HbA1c levels among individuals with impaired fasting plasma glucose: a cross-sectional study in Thailand. *BMJ Open*, *10*(11), e041269. http://dx.doi.org/10.1136/bmjopen-2020-041269.

Stacy, M., Gross, G., & Adams, L. (2021). Applying Organizational Change Theory to Address the Long-Standing Problem of Harassment in Medical Education. *Teaching and learning in medicine*, 1-9. https://doi.org/10.1080/10401334.2021.1954523

Sweet, C. C., Jasik, C. B., Diebold, A., DuPuis, A., & Jendretzke, B. (2020). Cost savings and reduced health care utilization associated with participation in a digital diabetes prevention program in an adult workforce population. *Journal of Health Economics and Outcomes Research, 7*(2), 139. https://doi.org//10.36469/jheor.2020.14529

Tappen, R. M., Wolf, D. G., Rahemi, Z., Engstrom, G., Rojido, C., Shutes, J. M., & Ouslander, J. G. (2017). Barriers and Facilitators to Implementing a Change Initiative in Long-Term Care Using the INTERACT® Quality Improvement Program. *The health care manager*, *36*(3), 219–230. https://doi.org/10.1097/HCM.0000000000000168

Tayek, C. J., Cherukuri, L., Hamal, S., & Tayek, J. A. (2018). Importance of fasting blood glucose goals in the management of type 2 diabetes mellitus: a review of the literature and a critical appraisal. *Journal of diabetes, metabolic disorders & control*, *5*(4), 113–117. https://doi.org/10.15406/jdmdc.2018.05.00148

Teguh, A., Hariyati, R. T. S., & Muhaeriwati, T. (2019). Applicability of Lewin's change management model for optimization management function in nursing delegation between head nurse and team leader: A mini project in Jakarta military hospital. *International Journal of Nursing and Health Services* (IJNHS), 2(2), 66-74. https://doi.org/10.35654/ijnhs.v2i2.136

Thornton Snider, J., Sullivan, J., van Eijndhoven, E., Hansen, M. K., Bellosillo, N., Neslusan, C., ... & Kasiske, B. L. (2019). Lifetime benefits of early detection and treatment of diabetic kidney disease. *PloS One, 14*(5), e0217487. https://doi.org/10.1371/journal.pone.0217487

Timm, L., Harcke, K., Karlsson, I., Sidney Annerstedt, K., Alvesson, H. M., Stattin, N. S. & Daivadanam, M. (2020). Early detection of type 2 diabetes in socioeconomically disadvantaged areas in Stockholm–comparing reach of community and facility-based screening. *Global health action, 13*(1), 1795439. https://doi.org/10.1080/16549716.2020.1795439

Torday, J. S., & Baluška, F. (2019). Why control an experiment?: From empiricism, via consciousness, toward Implicate Order. *EMBO reports, 20*(10), e49110. https://doi.org/10.15252/embr.201949110

Tseng, E., Greer, R. C., O'Rourke, P., Yeh, H. C., McGuire, M. M., Clark, J. M., & Maruthur, N. M. (2017). Survey of primary care providers' knowledge of screening for, diagnosing and managing prediabetes. *Journal of general internal medicine*, *32*(11), 1172–1178. https://doi.org/10.1007/s11606-017-4103-1

Udod, S., & Wagner, J. (2018). Common change theories and application to different nursing situations. *Leadership and Influencing Change in Nursing*. Pressbooks.

United States Census Bureau. (2020). *Dashboard – Bakersfield City, California.* census.gov/quickfacts/fact/dashboard/bakersfieldcitycalifornia/POP010220#POP010220

United States Preventive Service Task Force (USPSTF). (2021). *Task force issues draft recommendation statement on screening for prediabetes and type 2 diabetes.* https://uspreventiveservicestaskforce.org/uspstf/sites/default/files/file/supporting_documents/prediabetes-screening-newsbulletin.pdf?utm_source

Vasavada, A. & Taub, LFM. (2021). *Diabetes mellitus screening*. StatPearls Publishing.

Verma, S., & Hussain, M. E. (2017). Obesity and diabetes: an update. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *11*(1), 73-79. https://doi.org/10.1016/j.dsx.2016.06.017

Vos, R. C., den Ouden, H., Daamen, L. A., Bilo, H. J., Denig, P., & Rutten, G. E. (2020). Population-based screen-detected type 2 diabetes mellitus is associated with less need for insulin therapy after 10 years. *BMJ Open Diabetes Research and Care, 8*(1), e000949. http://dx.doi.org/10.1136/bmjdrc-2019-000949

Wojciechowski, E., Pearsall, T., Murphy, P., & French, E. (2016). A case review: Integrating Lewin's theory with lean's system approach for change. *Online journal of issues in nursing*, *21*(2). https://www.doi.org/10.3912/OJIN.Vol21No02Man04

Wondmkun, Y. T. (2020). Obesity, insulin resistance, and type 2 diabetes: associations and therapeutic implications. *Diabetes, metabolic syndrome and obesity: targets and therapy,* 13, 3611. https://doi.org/10.2147/DMSO.S275898

World Health Organization (WHO). (2021). *Obesity and overweight.* https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.

World Health Organization (WHO). (2021). *Obesity and overweight.* https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.

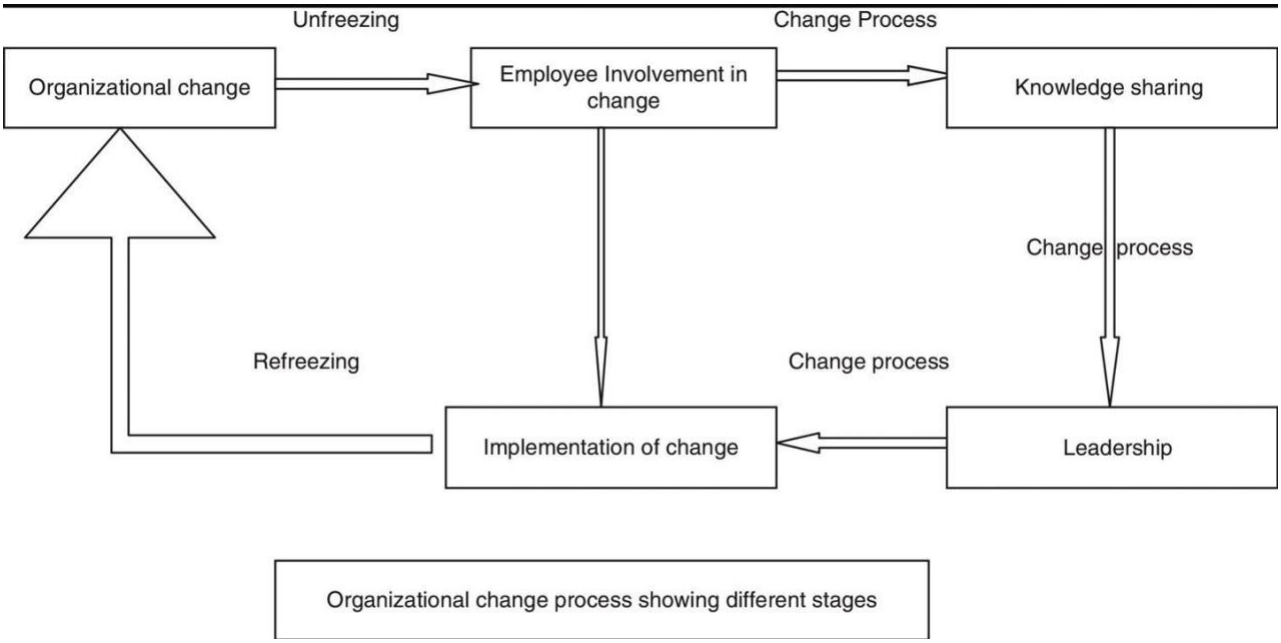
World Health Organization (WHO). (n.d.). *Screening for type 2 diabetes.* https://www.who.int/diabetes/publications/en/screening_mnc03.pdf.

Yusoff, M. S. B. (2019). ABC of content validation and content validity index calculation. *Resource, 11*(2), 49-54. https://doi.org/10.21315/eimj2019.11.2.6

Zhu, Y., Sidell, M. A., Arterburn, D., Daley, M. F., Desai, J., Fitzpatrick, S. L. & Ferrara, A. (2019). Racial/ethnic disparities in the prevalence of diabetes and prediabetes by BMI: Patient outcomes research to advance learning (PORTAL) multisite cohort of adults in the U.S. *Diabetes Care*, *42*(12), 2211-2219.https://doi.org/10.2337/dc19-0532

Appendix A

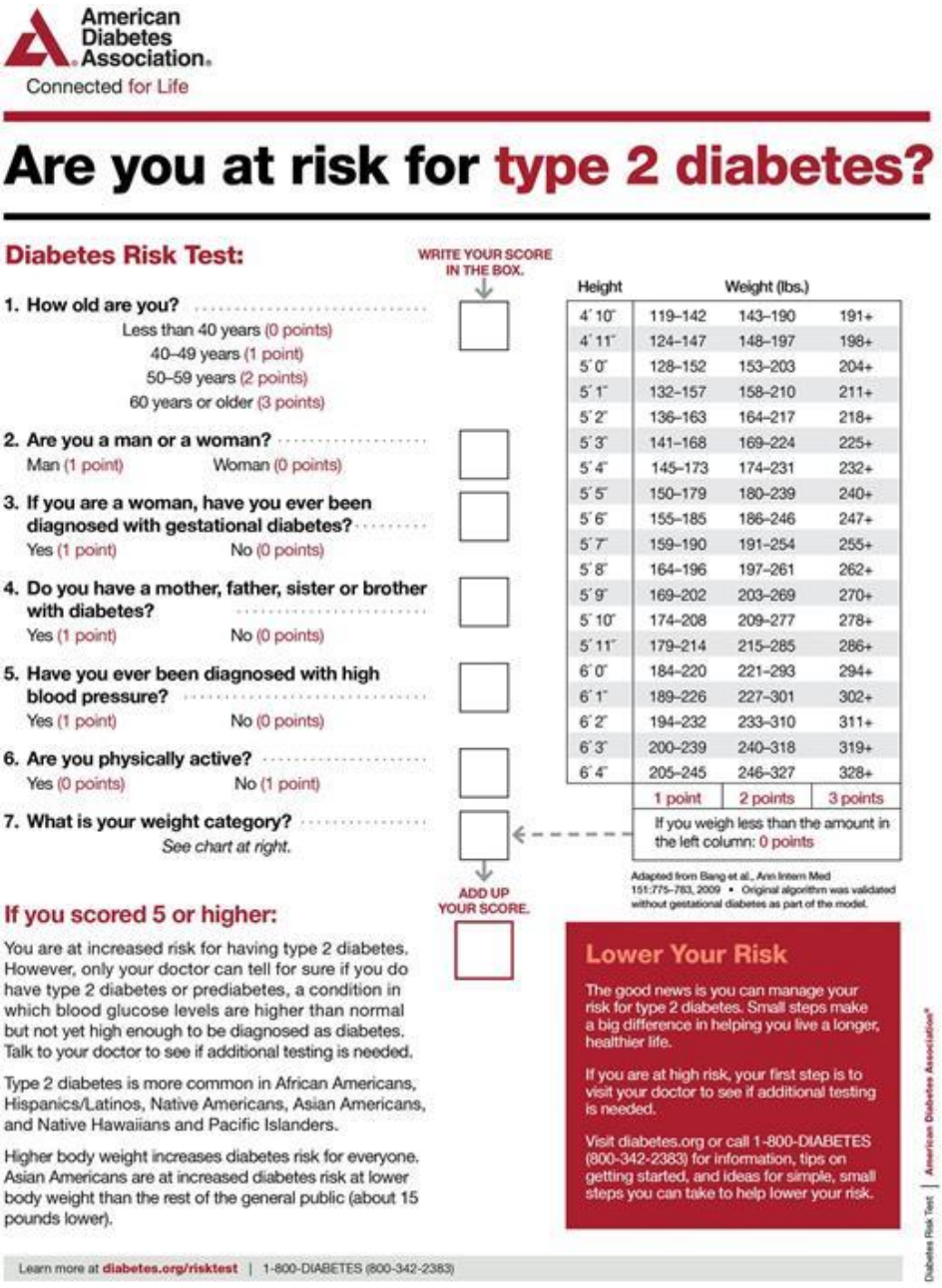
Lewin's Change Theory



From Hussain et al., (2018)

Appendix B

ADA Risk Test



From ADA, (2020)

Appendix C

Pre-Post Early Diabetes Screening Knowledge Survey

Pre-Post Early Diabetes Screening Knowledge Survey

Demographic

1. Gender
   - Male
   - Female

2. Age
   - 18-25
   - 26-35
   - 36-45
   - 46-55
   - 56-65
   - 6=65+

3. Ethnicity
   - White
   - African American
   - Hispanic or Latino
   - Native American
   - Asian American
   - Native Hawaiian or Other Pacific Islander

4. Tenure as a health care provider
   - <5 years
   - 5-10 years
   - 10+ years

Knowledge Testing for prediabetes and risk for future diabetes in asymptomatic people should be considered in adults of any age.
   - **True**
   - False

5. Testing for prediabetes and risk for future diabetes in asymptomatic people be considered when they have a BMI of ≥ 25 kg/m2 and have one or more additional risk factors for diabetes
   - **True**
   - False
6. Testing for prediabetes and risk for future diabetes in asymptomatic Asian Americans be considered when they have a BMI of ≥ 23 kg/m2 and have one or more additional risk factors for diabetes
   - **True**
   - False
7. Patients with prediabetes (A1C ≥ 6.0% [39 mmol/mol], IGT, or IFG) should not be tested yearly.
   - True

   - **False** (Patients with prediabetes (A1C ≥ 6.0% [39 mmol/mol], IGT, or IFG) should be tested yearly)
8. Women who were diagnosed with GDM should have lifelong testing at least every 3 years.
   - **True**
   - False
9. For all other patients, testing should begin at age 65 years
   - True
   - **False** (For all other patients, testing should begin at age 45 years)
10. If results are normal, testing should be repeated at a minimum of 5-year intervals, with consideration of more frequent testing depending on initial results and risk status
    - True
    - **False** (If results are normal, testing should be repeated at a minimum of 3-year intervals, with consideration of more frequent testing depending on initial results and risk status)
11. Testing for prediabetes should be considered in children and adolescents who are overweight or obese (BMI > 85th percentile for age and sex, weight for height > 85th percentile, or weight > 120% of ideal for height) and who have additional risk factors for diabetes
    - **True**
    - False
12. To test for type 2 diabetes, fasting plasma glucose is more reliable over 2-h plasma glucose during 75-g oral glucose tolerance test, and A1C.
    - True
    - **False** (To test for type 2 diabetes, fasting plasma glucose, 2-h plasma glucose during 75-g oral glucose tolerance test, and A1C are equally appropriate)
13. Are familiar with the ADA Risk Test?
    - **Yes**
    - No

Appendix D

Early Screening Diabetes Educational Presentation

1

Objectives

Understand	Understand the early screening requirements for diabetes based on American Diabetes Association (ADA) standards of medical care
Learn	Learn how to use the ADA Risk Test as a tool for early diabetes screening
Discuss	Discuss the updated workflow that included the use of ADA Risk Test
Practice	Practice how to use the ADA Risk Test with sample cases/scenarios

2

Asymptomatic Adults

- Screening for type 2 diabetes with an informal assessment of risk factors or validated tools should be considered in asymptomatic adults.

(ADA, 2020)

BMI

- Testing for type 2 diabetes in asymptomatic people should be considered in adults of any age who are overweight or obese (BMI >25 kg/m2 or >23 kg/m2 in Asian Americans) and who have one or more additional risk factors for diabetes

(ADA, 2020)

Age

- For all people, testing should begin at age 45 years.

Age

(ADA, 2020; (Alanazi et al., 2017))

5

Repeat Testing

- If tests are normal, repeat testing carried out at a minimum of 3-year intervals is reasonable.

(ADA, 2020)

6

Tools for Testing

- To test for type 2 diabetes, fasting plasma glucose, 2-h plasma glucose during 75-g oral glucose tolerance test, or A1C can be used.

(ADA, 2020)

Children

- Testing for type 2 diabetes should be considered in children and adolescents who are overweight or obese (BMI .85th percentile for age and sex, weight for height .85th percentile, or weight.120% of ideal for height) and who have additional risk factors for diabetes

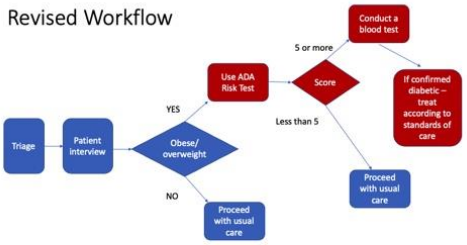
(ADA, 2020; Tillotson et al., 2021)

Using the ADA Risk Test

(ADA, 2020)

9

Revised Workflow



10

Practice Case #1

A 31-year-old white male with no significant past medical history is referred by his workplace to a primary care physician for an elevated blood pressure (BP). He presents to the clinic with no complaints. His mother and grandmother both have diabetes. He has had a 15-pound (lb) weight gain over the last year and has become more sedentary. Weight is 209 lb, and height is 5' 11". On examination he displays moderate central obesity, but otherwise the examination is normal.

- QUESTIONS
  - ✓ Should you use the ADA risk test for this patient?
  - ✓ If NO – why not?
  - ✓ If YES – based on the test results, what are your next steps?

Practice Case #2

42–year–old woman of Native American descent, and a new mother. Diagnosed with gestational diabetes at week 30 of pregnancy. She weighs 190 lbs and is 5ft 5in in height. She has no family history of diabetes. She is working from home and admitted that she has no time to exercise.

- QUESTIONS
  - ✓ Should you use the ADA risk test for this patient?
  - ✓ If NO – why not?
  - ✓ If YES – based on the test results, what are your next steps?

Appendix E

Chart Audit Tool

Data of audit: _____

Chart #: _____

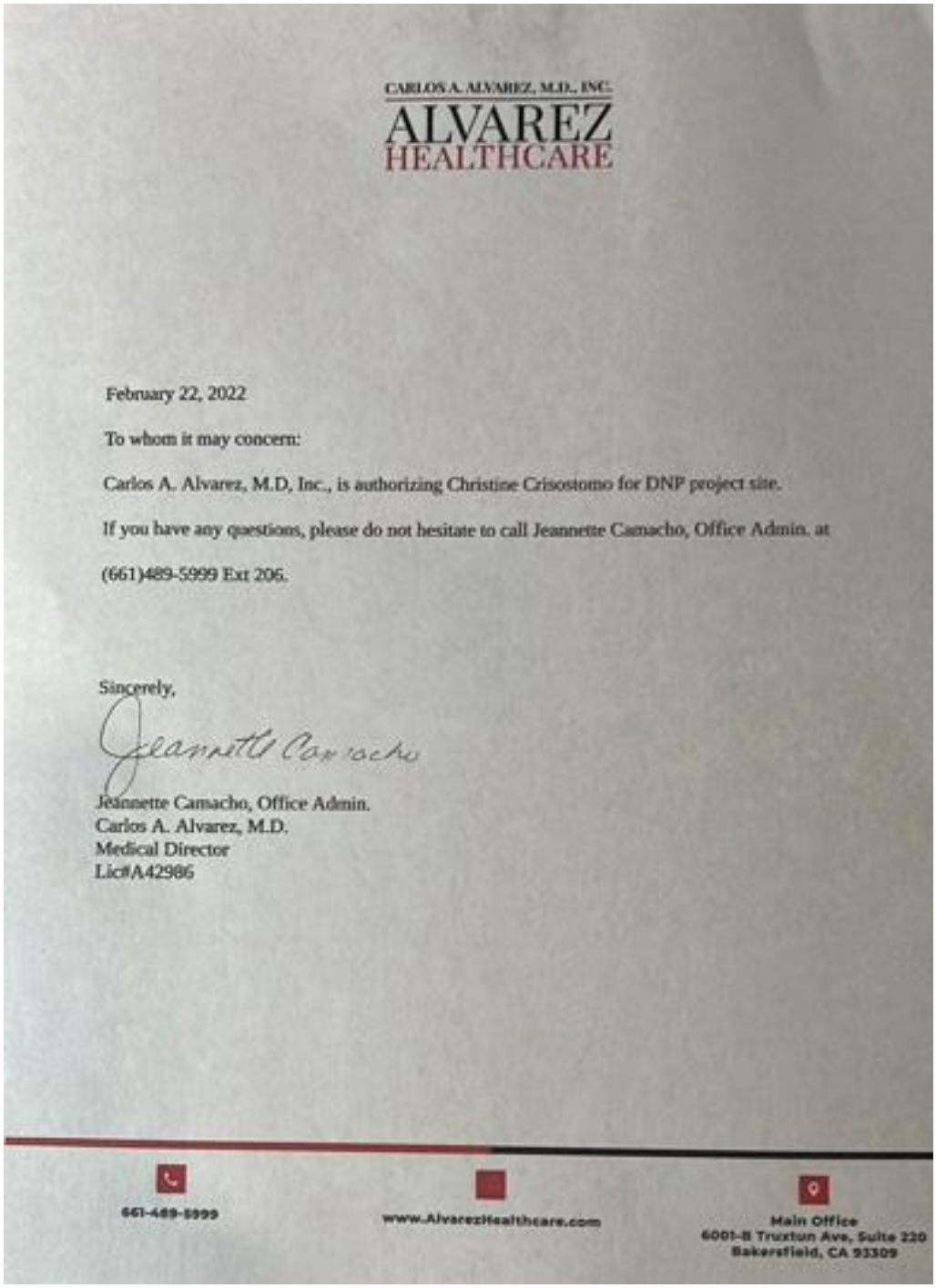
Patient ID (initials & birthdate): _____

Auditor: _____

Audit items	**Answer**
Documentation of patient age	☐ Yes ☐ No
Documentation of patient race	☐ Yes ☐ No
Documentation of patient sex	☐ Yes ☐ No
Documentation of patient height	☐ Yes ☐ No
Documentation of patient weight	☐ Yes ☐ No
Documentation of patient's family history of diabetes	☐ Yes ☐ No
Documentation of patient blood pressure	☐ Yes ☐ No
Documentation of use of ADA risk test on obese/overweight patient (with BMI greater than 25)	☐ Yes ☐ No
Patient with BMI greater than 25 but not screened using ADA Risk Test	☐ Yes ☐ No
Patient with BMI greater than 25 but not screened using ADA Risk Test due to previous history of diagnosis.	☐ Yes ☐ No
Patient with BMI greater than 25 but not screened using ADA Risk Test due to patient already taking DM II medications	☐ Yes ☐ No
Evidence of blood test performed to confirm diabetes on patient assessed as high risk through the ADA Risk Test	☐ Yes ☐ No
Blood test not performed on patient assessed as high risk through the Diabetes Risk Test	☐ Yes ☐ No

Appendix F

Letter authorizing project completion at the project site



CARLOS A. ALVAREZ, M.D., INC.

ALVAREZ
HEALTHCARE

February 22, 2022

To whom it may concern:

Carlos A. Alvarez, M.D, Inc., is authorizing Christine Crisostomo for DNP project site.

If you have any questions, please do not hesitate to call Jeannette Camacho, Office Admin. at (661)489-5999 Ext 206.

Sincerely,

Jeannette Camacho

Jeannette Camacho, Office Admin.
Carlos A. Alvarez, M.D.
Medical Director
Lic#A42986

661-489-5999

www.AlvarezHealthcare.com

Main Office
6001-B Truxtun Ave, Suite 220
Bakersfield, CA 93309