

DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT (DSMES) FOR
UNDERSERVED GROUP IN CALEXICO, CALIFORNIA

by

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A DNP Project Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF NURSING PRACTICE

In the Graduate College

THE UNIVERSITY OF ARIZONA

2025

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

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Final approval and acceptance of this DNP project are contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

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ACKNOWLEDGMENTS

I want to express my deepest gratitude to my chair and faculty at the University of Arizona, especially Dr. Lori Martin-Plank, for believing in this project, pushing me to think like a DNP, and guiding me with honesty, patience, and high standards. Your mentorship shaped not only this project, but the kind of provider I am becoming.

I express my most sincere appreciation to El Centro Regional Medical Center Outpatient Clinic in Calexico for providing the space and resources necessary for this quality improvement project to take place in a real-world setting where it is needed most. Thank you to leadership and clinic stakeholders, including MSN. Raul Lizarraga and BSN Vanessa Moncada, for opening space for culturally responsive diabetes education and trusting me to do this work in partnership with your team.

A very special thank you to Dr. Stephen Jaime, the diabetes educator, who provides bilingual, patient-centered care every day. Your dedication to teaching, answering questions without judgment, and showing respect to every patient inspired the structure and spirit of the DSMES intervention. This project would not exist without you.

To the adults living with Type 2 Diabetes who agreed to learn together, ask questions, and share their experiences. You are the heart of this work. Your voices, your barriers, and your resilience are the reason this project matters. This work is for you and because of you.

LAND ACKNOWLEDGEMENT

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. The University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

DEDICATION

To my partner, thank you for being there in every way. You were not just my cheerleader but my bankroller on this one. For also believing in the decision I made to get this degree, for cheering me on when I was tired, and for telling me I was doing a good thing even when I doubted myself. I was carried by your patience, your kindness, and your faith.

To my sons, Julian and Adrian, we made it. You are the reason for everything I do, including the most challenging decision I made to become a nurse practitioner, so I can provide you with a better future. Hopefully, this article has become the cornerstone of your dream. If I can do this, then you can do anything, the biggest and best things. I love you more than words can hold, higher than you can reach is how I feel about all of the things above. I apologize for when I wasn't there; you should know it was all for you.

To my parents, your grit, love, and sacrifice made me who I am. You taught me to work and not whine, to keep going even in misery. This would all be impossible without you.

Tomás, an amazing and inspirational friend. Thank you for insisting that I apply to this competitive program, so I could share the strength you believed was in me, even when I couldn't see it. Because you pushed me to think I could.

And most importantly, to God, thank you for leading me, guarding my heart, and staying with me every step of the way through each high and low. I will keep pushing myself, even when fear and discomfort make me want to give up or when obstacles seem insurmountable. This work is for a purpose, and I'm thankful to be trusted with it.

Table of Contents

Abstract	8
Background	10
Local Problem	10
Patient Education	13
Conceptual/Theoretical Model(s)	16
Literature Synthesis	17
Evidence Search	17
Comprehensive Appraisal of Evidence	18
Self-Efficacy	19
Culturally Customized Educational Interventions	19
Strengths of Evidence	20
Weaknesses of Evidence	20
Gaps and Limitations	20
Purpose	21
Methods	21
Site	21
Stakeholder Engagement	22
<i>Key Stakeholders</i>	22
Engagement Strategies	24
Feedback Mechanisms	24
Participants and Recruitment	25
<i>Eligibility Criteria</i>	25
<i>Exclusion Criteria</i>	26
Intervention	26
<i>Model for Implementation: Plan-Do-Study-Act (PDSA) Cycle</i>	29
Plan	30
Do	30
Study	31

Table of Contents – *Continued*

Act	31
Evaluation Measures	31
Analysis	32
Ethical Considerations	33
<i>Respect for Persons</i>	33
<i>Beneficence</i>	33
<i>Justice</i>	34
IRB Review and Approval	34
Results	35
Discussion	36
Alignment with DNP Essentials	37
Sustainability	38
Limitations	38
Conclusion	39
Implications for Future Practice	39
Appendix A Consent and Disclosure Form (English and Spanish)	40
Appendix B Evaluation Instruments (English and Spanish)	43
Appendix C Participant Materials (Post-Education Assessment Tool – English and Spanish Diabetes Medications Adherence – English and Spanish)	46
Appendix D Site Approval Letter	51
Appendix E eIRB – The University of Arizona – Not Human Research	53
Appendix F Recruitment Script (English and Spanish)	56
Appendix G Evidence Table (Literature Review Grid)	59
References	83

Abstract

Purpose: This practice project seeks to explore the effects of a culturally tailored Diabetes Self-Management Education and Support (DSMES) program and its interventions on medication adherence and self-efficacy for a cohort of Hispanic adults 18 years and older who have been diagnosed with T2DM in Calexico. The aim is to establish DSMES as an effective intervention to increase knowledge and adherence.

Background: Type 2 Diabetes mellitus (T2DM) continues to be a public health crisis in underserved communities such as Calexico, California. The communities' lack of access to care, language barriers, and low health literacy has led to poor glycemic control and high prevalence of diabetes related complications.

Methods: The quality improvement (QI) project will follow the Plan-Do-Study-Act (PDSA) framework. Recruitment will be done through an established diabetes education program. A 20-minute in-person, bilingual DSMES session will be conducted with health literacy-sensitive materials. Tools such as the Diabetes Self-Management Questionnaire (DSMQ) and the Medication Adherence Report Scale (MARS-5) will be used before the interventions. This study is consistent with Orem's Self-Care Theory, and it facilitates the incorporation of DSMES into rural primary care.

Results: Six patients were enrolled in a single session day; all provided consent, completed both surveys, and spoke Spanish. Median duration since T2DM diagnosis was 7.5 years. The average adherence increased from 4.08 during the pre-education phase to 5.00 after the education phase. The mean within-person shift was +0.92 points on the 1–5 scale, a statistically reliable gain (paired $t(5) = 8.88$, $p = 0.00030$).

Conclusions: A single point-of-care, Spanish-only DSMES session integrated into the regular clinic flow was feasible and acceptable and led to an early clinically significant improvement in self-reported medication adherence among Hispanic adults with longstanding T2DM.

Background

According to the World Health Organization (WHO) (2024), type 2 diabetes mellitus (T2DM) is a metabolic disease that negatively affects the way the body uses the insulin it produces, thus leading to high blood sugar levels (insulin resistance). Prolonged elevated blood sugar levels may lead to complications such as cardiovascular disease, neuropathy, nephropathy, and retinopathy (American Diabetes Association [ADA], 2024). Research shows that diabetes has become an epidemic both nationally and globally. The National Center for Health Statistics (NCHS) estimated in 2024 that over the period August 2021 to August 2023, diabetes was prevalent among an estimated percentage of adults in the United States (US) with diagnosed and undiagnosed diabetes being 11.3% and 4.5 %respectively; which suggests that about one out of every four adults having been detected with diabetes status were not aware of it (Gwira, Fryar, & Gu, 2024). Globally, the World Health Organization (WHO, 2024) stated that the prevalence of diabetes increased from 108 million in 1990 to 830 million in 2022.

Local Problem

For those diagnosed with diabetes, medication compliance and lifestyle changes can reduce complications and improve quality of life (ADA, 2024). Unfortunately, strict adherence to evidence-based guidelines for diabetes management remains far from optimal among patients (Qaseem et al., 2024). According to the research, nonadherence is widespread among people with diabetes, with approximately 50% of those with diabetes reporting not taking their medications as directed (Shaw, 2025). Lack of understanding and knowledge regarding disease, medications, and diabetic complications has been linked to reduced medication compliance (Gow et al., 2024). Thus, this Doctor of Nursing Practice (DNP) project is a single-site quality

improvement initiative conducted at El Centro Regional Medical Center Outpatient Clinic in Calexico. It will specifically focus on the impact of the Diabetes Self-Management Education and Support (DSMES) program on medication adherence among adults aged 18 years and older with T2DM. This DNP project aims to determine whether a structured DSMES program increases patient knowledge and medication adherence to treatment plans. My proposal shall be an intervention to enhance patient-oriented outcomes via the introduction of a Diabetes Self-Management Education and Support (DSMES) program with an established structure in one primary care practice.

The proposed interventions will be implemented in the city of Calexico, a border town in Imperial Valley, California. Imperial County, which is situated in the southeast corner of the state of California along the US-Mexico border, is the 10th largest county in California by total area and has a land area that extends 4,175.5 square miles (U.S. Census Bureau, 2023a). The county had a 2010 population of 179,702, yielding a population density of around 43 people per mile when considering the county's total land area (U.S. Census Bureau, 2023b). This vast geography and low population density make access to healthcare, including treatment for chronic diseases such as T2DM, particularly challenging. Residents frequently travel long distances for medical care due to ruralness and a lack of medical specialties. In addition to a lack of medical specialties, the Imperial County Public Health Department (ICPHD) (2019) found that the Imperial Valley has a ratio of population to primary care physician of 4,890:1 vs California 1,090:1. This is the highest population to primary care physician ratio in the entire state (ICPHD, 2019). These factors create unequal access to healthcare and poor health outcomes within the county (U.S. Census Bureau 2023a, 2023b).

Research shows that Calexico experiences a higher-than-normal prevalence of people with type 2 diabetes that can be related to genetic, socioeconomic, and lifestyle characteristics. Recent statistics have indicated that 15.6% of adults aged 20 years or older in Calexico have been diagnosed with diabetes compared to California's reported 10.5% state average (California Department of Public Health [CDPH], 2022) and the US national average of 14% (ADA, 2024).

Moreover, because the Hispanic ethnicity makes up a substantial portion of Calexico's population, they are at a higher risk for T2DM due to high rates of obesity (39.7%), lack of access to health care, and socioeconomic barriers (Data USA, 2023). Over 97% of the city's residents are of Hispanic or Latino ethnicity, almost 44% are foreign-born, and less than 80% are US citizens, compared to a national average of 93.4% of US citizens (Data USA, 2023). The median household income in Imperial County is \$45,834, vs California's median income of \$71,228, and holds a poverty average of 24.2% vs California's poverty average of 14.3% (ICPHD, 2019). Regarding education, the percentage of high school graduates was 69% vs the US average of 87.7% (ICPHD, 2019). These are all known social determinants of health that lead to a lack of access to care, language barriers, and a greater risk for chronic diseases such as diabetes. Providing culturally specific diabetes education and increased access to care in Calexico is essential for lowering the disability of diabetes in this population. These daunting statistics highlight the need for effective diabetes management programs (Data USA, 2023).

Furthermore, limited access to DSMES in Imperial Valley County may be a significant barrier. Currently, there is only one diabetic education program available to serve the entire county (El Centro Regional Medical Center, 2024). According to the American Diabetes Association's "Find a Diabetes Education Program" tool, when searching by ZIP code 92231

(Calexico, CA). This limited availability can make it increasingly difficult for patients to schedule timely appointments, especially when the educator is shared among multiple facilities such as El Centro Regional Medical Center (ECRMC) hospital, the El Centro clinic, and the Calexico clinic. This scarcity of educational resources likely impacts the ability of Calexico residents to manage their diabetes effectively, particularly concerning medication adherence. The latest in a series of structural changes to regional healthcare delivery is AB-918, Health Care District: County of Imperial, which forces the closure of two local community hospitals in the Imperial Valley: Pioneers Memorial Hospital and El Centro Regional Medical Center (ECRMC). Under this bill, the assets, liabilities, and operational rights of both hospitals will be transferred to a newly created Imperial Valley Healthcare District, a joint powers authority created under the bill and empowered to coordinate and administer all hospital operations in the county. The bill ensures that the new district's first governing board negotiates and completes the acquisition of ECRMC and Pioneers Memorial by November 5, 2024, to create a single, integrated healthcare organization in Imperial County. The goal of the merger is to stabilize hospital operations, make care more accessible to patients, and establish a viable financial system by operating as one organization through collaborative decision-making, consolidated management, and integrated service delivery across the region (CALMatters, 2024). The change in distribution of funding, management, and staff may create additional barriers to accessing timely, community-specific diabetic education and care.

Patient Education

Despite the existence of a plethora of treatment options for T2DM, many adult patients experience poor glycemic control because of suboptimal education on disease management, lack

of medication adherence, and lifestyle (Taylor, Yazdi, & Beitelshees, 2021). In this context, lifestyle is modifiable behaviors, including diet and physical activity. Most experts stress that lifestyle modification, particularly weight reduction in patients who are overweight or obese, should be implemented at diagnosis. A sustained improvement in eating and exercise behavior can substantially improve metabolic control and, in some instances, postpone the requirement for pharmacotherapy (Taylor, Yazdi, & Beitelshees, 2021). Although routine diabetes care is offered by primary care providers, structured diabetes self-management education and support programs are inconsistently implemented within primary care (Power et al., 2020), which can be the case when a provider is managing excessive demands, as they are in the Imperial Valley with a ratio of 4,890 patients per provider. The lack of patient education and support is a significant contributor to inadequate self-management, leading to higher usage of health resources and avoidable diabetes complications (ADA, 2024).

The unavailability of structured DSMES programs has been linked to adverse health outcomes for people with T2DM (Berthoumieux et al., 2024). A DSMES program is a structured and evidence-based intervention that increases patients' knowledge, behaviors, and self-efficacy in managing their condition (Berthoumieux et al., 2024). Self-efficacy refers to an individual's confidence in their ability to perform behaviors required to achieve a healthy outcome (Berthoumieux et al., 2024). Effective DSMES programs have been associated with higher self-efficacy, adherence, glycemic control, and lower HbA1c levels, and lower diabetes-related complications (Qaseem et al., 2024). For context, a HbA1c level is a blood test that measures a person average blood sugar levels over the three months, thus allowing for the evaluation of how well a patient's blood sugar is being managed over time (ADA, 2024) The importance of

DSMES programs within diabetic care are emphasized in national guidelines, including those established by the ADA and the Centers for Disease Control and Prevention (CDC, 2024).

The systemic application of a formal DSMES initiative relates to national and state-level health agendas, including the ADA Standards of Care (2025), and the US Department of Health and Human Services (HHS, n.d.), Healthy People 2030 initiatives that prioritize education focusing on patients and their needs and prevention and management of chronic diseases. DSMES programs are a recognized reimbursable service under the Centers for Medicare and Medicaid Services (CMS) (Centers for Disease Control and Prevention [CDC], n.d.), further supporting the need for DSMES in diabetes management. The California Department of Public Health (CDPH) has also identified the high burden of diabetes along the border region as a target for improvement in community-based interventions (CDPH, 2022). This project aligns with the larger goal of improving population health and lowering the burden of diabetes-related health care by embedding DSMES into the primary care setting.

The impact of T2DM extends beyond the individual themselves; families and societies are also affected. Poorly controlled diabetes causes increased hospitalization, disability, and financial burdens for families (ADA, 2025). For communities like Calexico, where healthcare disparities and limited access to specialized diabetes care are prevalent, a structured DSMES program can empower patients and caregivers through information and competencies needed to manage this chronic disease. Significantly, Calexico's rate of diabetes-related hospitalizations between 2016 and 2017 was around 28 per 10,000 residents, far exceeding California's statewide average of 18 per 10,000, thus suggesting the urgent need for education and disease management programs focused on diabetes (CDPH, 2022). This program can potentially lessen health

disparities by addressing social determinants of health, including health literacy and access to preventive services (Taylor et al., 2021).

From an organizational point of view, introducing a structured DSMES program in primary care settings can increase the efficiency of care, patient satisfaction, and clinical outcomes (Ernawati, Wihastuti, & Utami, 2021). Empowering patients with self-management skills improves health outcomes and minimizes the incidence of diabetes-related complications, ER visits, and hospital readmissions (Qaseem et al., 2024). DSME has also shown value through these endpoints per the Quintuple Aim (Nundy, Cooper, & Mate, 2022), including improved patient experience, population health, lower cost of care delivery, and improvements in providers' well-being due to more appropriate use of resources.

Focused on addressing a gap in diabetes self-management education, this intervention aims to improve patient adherence and glycemic control within one primary care environment. This DNP project seeks to measure the effectiveness of a formalized DSMES program in increasing patient knowledge and care adherence.

Conceptual/Theoretical Model(s)

The establishment of a formal DSMES program closely aligns with Orem's Self-Care Theory (SCT), which posits that individuals possess the innate ability to care for themselves and can be empowered through the provision of proper knowledge and skills (Fereidooni et al., 2024). Patients who are more actively involved in the treatment process, managing their health, tend to have better health outcomes than those who are less involved (Fereidooni et al., 2024). As described by Orem, self-care involves individuals' knowledge of themselves and their lifestyle practices, which are motivated by their self-efficacy to adhere to them and continue to

use medications. This psycho-education-based theory is at the core of the DSMES program, developed for adult patients with type 2 diabetes mellitus (T2DM) at Calexico, which focuses on providing specific, individualized education to optimize self-efficacy. Studies have shown that higher self-efficacy significantly improves diabetes self-management behaviors and outcomes, including medication adherence, dietary adherence, physical activity, and glycemic control (Fereidooni et al., 2024; Jiang et al., 2021). Understanding that the adult diabetic population in Calexico, at large, has limited access to structured education, low health literacy, and socioeconomic constraints, teaching patients DSMES directly meets the health deviation self-care requisites outlined in Orem's theory and makes the implementation of DSMES in primary care evident for patient care. This type of intervention, which provides education, can improve individual self-care behaviors and may lead to fewer community complications as well as healthcare disparities.

Literature Synthesis

Evidence Search

Evidence-based literature was comprehensively reviewed from 2020 to 2025 to inform the creation of a culturally tailored Diabetes Self-Management Education and Support (DSMES) intervention for Hispanic adults with type 2 diabetes mellitus (T2DM) in Calexico, California. The search of the PubMed, NIH, and University of Arizona Health Sciences Library databases utilized terminology such as "type 2 diabetes," "DSMES," "self-management," "culturally tailored," and "self-efficacy." Filters were as follows: peer-reviewed articles, English, human subjects, and adults aged 18 and above. Based on applicability to DSMES outcomes, including HbA1c reduction, self-care behavior, cultural tailoring, and mode of delivery, the results of the

4,174 records searches were screened. After applying the eligibility criteria, 18 high-quality studies were included in this synthesis, comprising randomized controlled trials (RCTs), systematic reviews, meta-analyses, and clinical guidelines.

The literature uniformly holds that DSMES is efficacious in improving glycemic control, self-efficacy, emotional health, and adherence. Minimally invasive programs designed for minority populations, particularly those using digital formats, have also demonstrated superior engagement and outcomes. However, many had methodological weaknesses, including reliance on self-report, absence of control groups, and lack of extensive long-term follow-up. There are very few DSMES programs available for Hispanic populations, particularly in rural areas like Calexico, CA, where both cultural and language barriers are an issue.

These findings shape the DNP project as they highlight the need to:

- Implement embedded DSMES within primary care environments to improve access and sustainability of diabetes self-management education.
- Use mobile and community-based tools to reach underserved Hispanic adults.
- Develop evidence-informed frameworks to implement structured, culturally tailored interventions that resolve known barriers.

Comprehensive Appraisal of Evidence

DSMES interventions are effective in achieving clinical and psychosocial outcomes. The American Diabetes Association (ADA, 2025) and American Association of Clinical Endocrinology (AACE, 2022) recommendations emphasize the importance of DSMES at each pivotal point in diabetes care. Studies like Powers et al. (2020) and Romadlon et al. (2024). State that DSMES programs have been shown to reduce A1c, improve self-management, and prevent

complications. Similarly, Berthoumieux et al. (2024) reported a significant reduction in A1c levels at 12 months with digital DSMES.

Carmienke et al. (2022) and Chowdhury et al. (2024) found that involvement in DSMES was associated with improved behaviors related to self-monitoring and increased adherence to dietary recommendations. Chan et al. (2021) and Jiang et al. (2021) demonstrated that structured DSMES programs improved emotional coping and metabolic outcomes. Presley et al. (2020) reported that cultural tailoring and the use of technology for engagement were the most successful. (2020) and Yaagoob et al. (2024).

Self-Efficacy

Jiang et al. (2021) found that a DSMES program focused on self-efficacy significantly improved diabetes self-management and HbA1c levels at 12 months. Chan et al. (2021) reported improved coping skills and illness perceptions, leading to indirect improvements in self-care behaviors. Studies by Shi et al. (2025) and Ernawati et al. (2021) also found significant increases in self-efficacy following DSMES interventions.

Culturally Customized Educational Interventions

Minority populations who received culturally tailored DSMES programs were more likely to participate. Powers et al. (2020) and Yaagoob et al. (2024) highlighted the importance of culturally relevant content provided in accessible modalities, such as WhatsApp or through community leaders. Nagpal et al. (2023) highlight the effective use of a community leader-led DSMES model in India. Presley et al. (2020) demonstrated improved glycemic control and emotional well-being when using mobile peer support in conjunction with DSMES, particularly among low-income African American populations. Similarly, Shi et al. (2025) and Berthoumieux

et al. (2024) found that programs featuring culturally relevant materials and support structures yielded more positive results, such as increased participation and information retention.

Strengths of Evidence

The research combined numerous upper or high-level evidence, including systematic reviews and RCTs (Chowdhury et al., 2024; Romadlon et al., 2024; Mannucci et al., 2022). The studies employed valid (accurate, reliable, & relevant) instruments and strong design features, such as intent-to-treat analyses, large samples, and multicenter data collection. Findings are consistent with the ADA (2025) and AACE (2022) guidelines, which provide strong recommendations based on graded evidence. Long-term outcome studies such as Berthoumieux et al. (2024) promote the sustainability of the integral use of digital DSMES.

Weaknesses of Evidence

Some studies lacked control groups (Jiang et al., 2023; Berthoumieux et al., 2024), which hindered the ability to draw causal inferences. Some studies relied on self-reported data, which may introduce bias and yield incorrect data as participants may not be honest (Tanaka et al., 2021; Yaagoob et al., 2024). The diversity of interventions, modes of delivery, and cultural contexts among studies made it difficult to standardize and compare the interventions. Some (Yaagoob et al., 2024; Tanaka et al., 2021) studies were qualitative or single-center with small samples, limiting generalizability.

Gaps and Limitations

There is little research focusing on DSMES interventions specific to Hispanic populations, and even less research that targets rural or underserved areas such as Calexico, CA. Most studies, which were small, did not include long-term follow-ups to measure whether the

behavior change was sustained. Few studies provided an integration of DSMES into routine care workflows or models that emphasize quality of care vs quantity, such as the value-based model. The cost-effectiveness and scalability of culturally tailored programs also remain underexplored. Further studies should focus on tailored DSMES for targeted subgroups that include community-oriented approaches.

Purpose

The aim of this Doctor of Nursing Practice (DNP) quality improvement project is to evaluate the effectiveness of a Diabetes Self-Management Education and Support (DSMES) intervention in increasing medication adherence and self-efficacy among Hispanic adults with type 2 diabetes mellitus (T2DM) in the city of Calexico, California. The interventions will be based on Orem's Self-Care Theory and will be designed to enhance patients' understanding of their treatment regimen and promote behaviors to increase adherence. Outcomes will be assessed using validated tools such as the Diabetes Self-Management Questionnaire (DSMQ) and the Medication Adherence Report Scale (MARS-5). Ultimately, this study seeks to facilitate the integration of DSMES into primary care workflows at ECRMC Outpatient Calexico Clinic, aiming to reduce health disparities and improve diabetes outcomes in adults with type 2 diabetes mellitus.

Methods

Site

The project was executed at the El Centro Regional Medical Center (ECRMC) Calexico Outpatient Clinic, a rural family practice clinic in Calexico, California. The clinic primarily treats patients on Medi-Cal or Medicare. The ECRMC Calexico patient population is essentially

older than 65 years old, Hispanic, Spanish-speaking patients with low average income and education. This clinic consists of a total of 10 medical providers, and services include primary care, cardiology, gastroenterology, nephrology, neurology, pediatrics, and general radiology/laboratory services (ECRMC.org, 2025). Patients diagnosed with T2DM, a diabetic educator, and DNP faculty mentors are key stakeholders. ECRMC only provides the physical space for diabetic education to take place; therefore, patients participating in this project will continue to receive care from their established providers. However, their primary provider will not be present during the DSMES session.

Stakeholder Engagement

Key Stakeholders

1. *Patients diagnosed with type 2 diabetes* – Patients were the main beneficiaries of this DSMES program as they may have improved glycemic control, quality of life, self-care behaviors, and overall improved patient outcome (Powers et al., 2020)
2. *Family members and caregivers* – These stakeholders supported the patient’s own daily management of the disease, thus decreasing caregiver burden and stress (Powers et al, 2020).
3. *Physicians, nurse practitioners, and physician assistants who practice in Calexico, CA, and provide care for patients with diabetes* – These stakeholders are crucial in the referral process. These stakeholders monitor clinical outcomes and adjust treatment plans based on the patients’ progress. DSMES programs had been shown to improve patient outcomes and reduce complications thus leading to fewer clinic visits, which reduce provider workload.

4. *Diabetic educators and nurses* – This DSMES program was executed and delivered with critical roles of diabetes educators and registered nurses from Calexico, California, providing the individualized, culturally, and linguistically appropriate patient education that promotes the skills for self-care behaviors, medication adherence, and evidence-based lifestyle modifications. The success of the DSMES program relied on active collaboration among stakeholders to facilitate program delivery and customize diabetes education to meet the unique needs of each participant.
5. *DNP faculty and preceptors* – Benefit from applying academic mentorship to an actual quality improvement project, obtaining experience for the implementation and evaluation of DSMES in a primary care setting, and solidifying the academic-practice partnership with ECRMC Calexico Clinic.
6. *Imperial County Health Department* – This stakeholder had the opportunity to gather information on diabetes self-management outcomes in this local community, which may inform future local public health interventions.
7. *Hospitals and clinics* – These stakeholders hosted or provided the space or the educational programs. Hospitals and clinics benefited from the increased compliance, thus improved patient outcomes and decreased hospital readmissions.
8. *Insurers* – DSMES has been shown to reduce complications and healthcare costs, thus these stakeholders benefit financially.
9. *Employers* – These stakeholders benefited from healthier employees, thus fewer sick days are needed, and productivity is increased.

Engagement Strategies

1. Communicating with patients based on their perspective:
 - Used culturally tailored materials delivered in both English and Spanish.
 - Example of this category: Provide patient resources (e.g., educational handouts).
2. Healthcare provider involvement:
 - Collaborate with PCPs to refer patients to any DSMES courses.
 - Educated providers on the benefits of DSMES for their patients by providing quick access to education materials such as a one-page DSMES referral guide, national guidelines (ADA, CDC), eligibility criteria, how to refer, and the local DSMES program contact information.

Feedback Mechanisms

1. Patient surveys and interviews:
 - Assessed knowledge gain through pre- and post-education surveys.
 - Conducted surveys to assess patient satisfaction and identify areas for improvement.
2. Provider feedback:
 - Collected feedback on the effectiveness and feasibility of DSMES.
3. Program evaluation reports:
 - Reported findings to stakeholders in order to maintain transparency and review next steps.

Participants and Recruitment

All participants in this project were patients enrolled in the Diabetic Education Program who had not previously received diabetic education. The bilingual Spanish- and English-speaking diabetic educator was present and assisted me in identifying eligible patients for the project.

Recruitment was accomplished by attending a meeting with the diabetes educator in order to screen and identify qualified patients according to the project's inclusion criteria. The patients identified for screening were those who received a prior referral and had been approved to participate in the DSMES program. Once patient selection occurred, the diabetic educator facilitated communication with chosen patients. The patients were given a short verbal description of the project's purpose, expectations, time commitment, and safeguards for confidentiality. Interested individuals were asked to complete the informed consent form to continue with the enrollment process, which consisted of baseline data collection, including pre-intervention questionnaires. All questions and concerns were answered to facilitate informed consent.

This approach simplified recruiting a single group who participated in the project's full duration (pre-intervention and post-intervention).

Eligibility Criteria

Eligibility criteria for inclusion were as follows:

1. Participants had a documented diagnosis of type 2 diabetes mellitus (T2DM) in the electronic health record (EHR).
2. Participants were aged 18 years or older.

3. Participants self-identified as Hispanic.
4. Participants were able to read, speak, and write in Spanish as appropriate.
5. Participants were using at least one prescribed diabetes medication.
6. Participants demonstrated eagerness and capacity to engage in educational initiatives.

Exclusion Criteria

1. Any diagnosed cognitive impairment (e.g., dementia) that would interfere with understanding educational materials.
2. Inability to communicate effectively in the Spanish language.

Additional informational materials about the intervention (survey tools and educational resources) were provided before the study began. To achieve full participation, all cycles had to be completed (pre-intervention survey [baseline] and post-intervention survey [immediate]).

Participants were assured of their right to decline to participate or withdraw from the study at any time without any negative impact on their medical care. Consent was obtained by the project lead.

Intervention

The proposed intervention was implemented in the City of Calexico, CA. Calexico is in Imperial County, which faces many serious challenges in healthcare access due to its rural setting and lack of specialty services. This prompts patients to often travel long distances for care, especially for chronic conditions such as T2DM. For context, Imperial County has the highest patient-to-provider ratio in the state of California. Research has revealed that the city of Calexico has a higher rate of diabetes (15.6%) compared to the state average of 10.5%. This can be linked to genetic, socioeconomic, and lifestyle factors. Calexico is predominantly Hispanic

(over 97%), and many residents face barriers such as poverty, low income, limited education, and language barriers. Given these multifaceted challenges, it is imperative to implement diabetic education that is culturally tailored to Calexico's population.

This Doctor of Nursing Practice (DNP) project utilized one group of patients who were already enrolled in the diabetic education program, but who were new and had not received diabetic education. This project took place at the ECRMC Calexico Outpatient Clinic. The mission of this project design was to assess and enhance adherence to the American Diabetes Association (ADA) measures through Diabetes Self-Management Education and Support (DSMES) in adult patients with a diagnosis of type 2 diabetes mellitus (T2DM). With high rates of T2DM and ongoing barriers to accessing structured diabetes education in the community, this study aimed to enhance diabetes management by incorporating knowledge gained from patients about their experiences, beliefs, and issues related to self-management and adherence. Understanding these viewpoints can guide the adoption of the program for DSMES, ensuring it addresses patient perspectives. Additionally, adding context to both societal and personal environments was crucial for developing culturally relevant training and long-lasting lifestyle interventions in diabetes management that could lead to sustainable control of the disease condition, enhancing quality of life.

This tailored Diabetes Self-Management Education and Support (DSMES) intervention for underserved adult patients with type 2 diabetes mellitus (T2DM) in Calexico, CA, was planned and implemented. An in-person education format was chosen because robust evidence supports its superiority for DSMES interventions in self-management behaviors and clinical outcomes relative to remote formats (Powers et al., 2020; Romadlon et al., 2024). Prevention

through face-to-face delivery also improved communication, allowing participants to ask questions, voice concerns, or seek clarification, thereby providing a personalized approach that is fundamental in populations with low health literacy. The participants were interviewed using a structured questionnaire to document how they were taking their medications and to identify any issues regarding adherence. After this evaluation, a 20-minute educational lesson on the benefits and significance of taking medications as prescribed was delivered. Individual intervention sessions in Spanish were conducted. Spanish was the primary language. Following the educational lesson, a post-intervention survey was implemented to assess the impact of the session on participants' knowledge and motivation (i.e., their intention) to integrate new information about diabetes management into their diabetes self-care regimen. Medication adherence-focused education content and methods were adapted from the Association of Diabetes Care and Education Specialists (ADCES) (ADA, 2025).

Patients were provided with printed handouts authored for an audience at a 2nd to 4th-grade reading level, confirmed via the Flesch-Kincaid Grade Level assessment (Readable, n.d.). To facilitate understanding, the materials were purposefully designed to include bold fonts, graphic illustrations, culturally appropriate examples, and minimal use of medical jargon. The handouts were reviewed with each participant, and they were encouraged to review them at home and bring any questions to future follow-up visits.

To measure the impact of the DSMES intervention, a combination of validated tools was employed:

1. The medication adherence section of the DSMQ (Schmitt et al., 2013) selectively utilizes only items related to medication adherence behavior.

2. Medication Adherence Report Scale (MARS-5), a validated five-item self-report scale to assess intentional and unintentional nonadherence behaviors (Chan et al., 2020).

Medication adherence was assessed at the start of the project and again following completion of the DSMES program.

Because health literacy was known to be a barrier among minority and underserved populations (Shi et al., 2025), the intervention prioritized plain language, visual support, and tailored counseling strategies. The content was culturally sensitive and included medication examples relevant to Calexico's Hispanic population.

The primary focus of the intervention was to help patients improve their self-efficacy regarding medications and adhere to their medication regimens. The project also aimed to promote a sustainable change in patients' behavior by improving their self-confidence in independent diabetes management by Orem's Self-Care Theory (Jiang et al., 2021).

Combining the DSMQ (medication adherence component) and MARS-5 was intended to yield a more comprehensive assessment, encompassing self-reported adherence behavior and patient beliefs about their self-efficacy in understanding and managing their medicines, all important drivers of long-term adherence and glycemic outcome.

Model for Implementation: Plan-Do-Study-Act (PDSA) Cycle

The implementation framework for this DNP project was the Institute for Healthcare Improvement's (IHI) Plan-Do-Study-Act (PDSA) cycle. The PDSA cycle was chosen for its iterative structure, which allows flexibility and continuous improvement through ongoing evaluation and refinement. This technique supported project implementation by detecting and

resolving problems in real time to ensure the intervention is tailored to the needs of patients and the community and optimized for impact and sustainability.

Plan. The early stage of intervention planning involved conducting a needs assessment of the patient population. The project leader worked alongside the Imperial Valley Diabetic Educator, using a pre- and post-questionnaire. Spanish materials were developed or adapted based on this assessment. The population in this clinic was predominantly Mexican, Spanish-speaking, elderly, and of low educational level. The recruitment strategy explicitly specified inclusion (adult patients diagnosed with T2DM in ECRMC Calexico Outpatient Clinic) and exclusion (patients who may be unable or unwilling to participate) criteria. A questionnaire tool was administered pre-intervention and reviewed by the DM educator and university members of my project. The questionnaire addressed how long they have had T2DM, how long they have been taking medications, what medications they take, whether they are using them as ordered, and why not.

Do. The project underwent review and approval by the Institutional Review Board (IRB) at The University of Arizona. Once IRB approval was granted, recruitment and intervention proceeded according to the approved study protocol. The interventions included an education session about medication adherence and self-care management techniques. Culturally and linguistically appropriate resources supported these educational efforts by discussing the most common medications participants use to control their illness. Respondents were informed that participation was 100% voluntary and that they had the right to discontinue participation at any point without any adverse effects. All participants received bilingual educational services from

the project. In addition, during future phases, I collected and analyzed pre- and post-test survey data.

Study. During the study phase, I conducted pre- and post-intervention surveys. Quantitative insights from these methods provided rich information about the patient's experience and the impact of DSMES interventions in real-world settings.

Act. During the act phase, the results informed adjustments or modifications to the DSMES program. Feedback from patients, DM educators, and faculty mentors guided refinements to ensure maximum effectiveness. I reported lessons learned from the PDSA cycles, ensuring sustainable, adaptable, and scalable educational practices for diabetes management. Key strategies included planning for the dissemination of findings through providers at the clinic, office managers, and the ECRMC education department. This report facilitated evidence-informed practice and encouraged change to improve diabetes management and patient education.

Evaluation Measures

Medication adherence was monitored using selected questions from the Diabetes Self-Management Questionnaire (DSMQ) and the 5-item MARS (MARS-5). The DSMQ questionnaire assessed behaviors associated with medication adherence, directly associated with narrative and general knowledge, in adults with T2DM at the El Centro Regional Medical Center (ECRMC) Calexico Clinic. The response options were given on a 5-point Likert scale: "Never" (5), "Rarely" (4), "Sometimes" (3), "Often" (2), "Always" (1). Responses of "Not required as part of my treatment" were not included in the analysis.

The validated 5-item self-report scale, MARS-5 (Medication Adherence Report Scale) was included to capture both intentional and unintentional adherence. Participants also answered five open-ended questions post-intervention to obtain recommendations for ongoing quality improvement (QI).

Data privacy and security were protected at all times; surveys were anonymized. All data, survey responses, and consent forms were maintained in a secure Excel database protected with a password. The master key, associated with a numerical identifier for participants, was stored on a double-protected cloud drive accessible only by the project director. All data attained were not included in the patients' medical records.

Analysis

Basic descriptive statistics were employed to analyze data from the Excel program's pre- and post-intervention DSMQ and MARS-5 surveys. Descriptive statistics consisted of measures of central tendency (mean and median), measures of spread (standard deviation), and frequency distributions. These data were then used to construct a complete unit of analysis for medication adherence among participants before and after the DSMES intervention.

Summed scores of medication adherence-related DSMQ items and MARS-5 were analyzed to determine change, particularly toward better medication adherence behavior. To assess the effect of the intervention, the pre- and post-test scores and the differences were analyzed.

The results, such as standard deviations and response percentages, were presented in a well-documented manner. This approach will enable clear data interpretation.

Ethical Considerations

This quality improvement project was guided by the three fundamental ethical principles of *Respect for Persons*, *Beneficence*, and *Justice*, as originally articulated by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1979). Each of these principles was systematically addressed and explicitly integrated into the project's design, implementation, and evaluation to ensure the protection of participants and the ethical integrity of the initiative.

Respect for Persons

Respect for people acknowledges the capacity of individuals to make informed choices about participation in research. Participants provided informed consent, including information about the project's purpose, the procedures involved, what was expected of them, any potential risks and benefits, confidentiality measures, and the voluntary nature of participation. Potential participants received both verbal and written information in Spanish, their preferred language, in plain, culturally appropriate language. Participants were assured they could withdraw from the project without affecting their care at the El Centro Regional Medical Center (ECRMC) Calexico Clinic. The data for each individual obtained from the medication adherence section of the DSMQ instrument and the MARS-5 instruments were kept confidential. Project data were stored securely by the project director in a password-protected file, but de-identified participant codes were used to enhance privacy.

Beneficence

The principle of beneficence holds that one ought to maximize potential benefits while minimizing potential harm. The goal of this project is to increase health literacy, medication

adherence, and self-efficacy in underserved Hispanic adults affected by T2DM. All the participants' questions or concerns were answered immediately (in person) in a safe, supportive learning environment where everyone spoke Spanish and English as needed. Educational handouts tailored to a lower reading level were translated into Spanish for comprehension and comfort. No physical or psychological risks were expected, and benefits included improving the understanding and management of diabetes medications, leading to improved health outcomes.

Justice

Justice addressed the fairness of who is selected to participate and how benefits were distributed. Consistent inclusion criteria were applied, facilitating relevant recruitment of participants who had a diagnosis of T2DM, were aged ≥ 18 years, identified as Hispanic, were Spanish-speaking, and were on diabetes medications at the time of the study. Recruitment was voluntary and was not coerced or selective based on socioeconomic status, gender, or immigration status. All eligible patients at the clinic during the recruitment period had an equal chance to participate. So, the entire project was bound by the principle of justice and equitable treatment of all the participants.

IRB Review and Approval

The University of Arizona Institutional Review Board (IRB) determined on October 21, 2025, that the study entitled “Diabetes Self-Management Education and Support (DSMES) for Underserved Group in Calexico, California” or Submission ID: STUDY00007204 – is not considered by the federal regulations to constitute research involving human subjects. Thus, full IRB is not required for this investigation. This determination is limited to the submitted protocol, and all future modifications, if any, must be reviewed by the IRB.

Results

Six adults were recruited at the outpatient clinic on a single day. All six patients who satisfied the inclusion criteria consented to participate and completed both pre-intervention and post-intervention questionnaires. All participants were Spanish speakers. There were no missing data. Participants had a median time since T2DM diagnosis of 7.5 years (range: 1–19 years). The median duration of use with diabetes drugs was 6 years (range: 1–18 years). Participants reported being on a median of two diabetes medications at baseline, with the number of medications ranging from 1 to 4.

Medication adherence was rated on a 5-point scale (1 = least adherent, 5 = most adherent) based on DSMQ and MARS-5 items. Then, for clarity interpretation, scores were also transformed to a 0–100 scale. The mean adherence score before the intervention was 4.08 (SD = 0.25), which corresponds to approximately 81.7 out of 100 on the scale. Post-intervention, the mean adherence score was 5.00 (SD = 0.00), which equaled 100 points out of a possible 100. All six participants improved from pre to post. Individual improvements on the 0–100 scale ranged from +16.7 to +33.3 percentage points. Mean change in adherence score (Post- & Pre-Evaluation) was +0.92 points on the 1–5 scale (change SD = 0.25). This corresponds to an average of +18.3 percentage points on the 0–100 scale. The 95% confidence interval for the mean change ranged from 0.65 to 1.18, indicating an overall shift towards higher ratings in the sample.

By a paired t-test, the difference in adherence between pre- and post- was statistically significant, $t(5) = 8.88$, $p = 0.00030$. The effect size of this within-subject change was significant (Cohen's $d_z = 3.63$). Zero post-intervention variance (SD = 0) was observed because

all participants achieved the highest adherence score at post evaluation. In this small, full-Spanish-speaking sample, a one-time, point-of-care educational and counseling intervention was associated with immediate, uniform responses to self-reported medication adherence.

Discussion

This quality improvement (QI) initiative demonstrated that a brief, bilingual DSMES encounter can be integrated into the standard primary care workflow at this outpatient clinic serving a Spanish-speaking population. The intervention was delivered in an actual clinical encounter, in real time, by the project leader, and utilized materials that were culturally and linguistically accessible. This is a crucial finding, as it suggests that structured diabetes services do not need to be delivered in separate referral-based clinic settings: the service can be delivered at the point of care without increasing the number of visits, the need for external personnel, or other resources.

The distribution of responses indicates that the DSMES session was clear, meaningful, and actionable for these patients. Those who participated in the project were not newly diagnosed and had spent years controlling type 2 diabetes and taking medication. This would suggest that compliance is not just a prescribing issue but a communication and support one. Another important finding regarding implementation is that the intervention was well-received and not disruptive. Patients were amenable to medication education and brief counseling when provided in their preferred language and consistent with their current treatment.

Additionally, this project illuminated a systems-level nursing role. The strategy was to move beyond individual education toward developing a replicable process: screen for patients with type 2 diabetes; administer focused DSMES in Spanish using health literacy-sensitive

materials and equipment; and document short-term effects on self-management behavior. That structure positions advanced practice nurses to influence how chronic disease is managed within the clinic, not just for a single patient.

Moving forward, the clinic's next goal is to transition from immediate response to durability. The current data describe what occurred immediately after the intervention. What remains to be seen is whether those behavioral changes are sustained.

Ultimately, however, as it was created for this particular outpatient location and to enhance local care, the fact that it will guide care at this site benefits the community. Thus, the conversation favors continuing to deliver DSMES encounters as part of routine care, monitoring findings over time, and using these data to optimize clinic workflow. In this sense, the project operated as both a clinical intervention and an exercise in leadership for sustainable, culturally relevant chronic disease management.

Alignment with DNP Essentials

The application and assessment of this intervention are consistent with numerous DNP Essentials (AACN, 2006). The project illustrates systems-level quality improvement and patient safety principles by embedding a structured medication-focused DSMES encounter directly into existing primary care workflow to target a recognized care gap in medication adherence (Essential II; AACN, 2006). The clinical fellow will also gain experience applying scholarship for evidence-based practice by implementing validated self-report adherence instruments, prospectively collecting paired pre-post data, and analyzing within-subject change to measure effect (Essential III; AACN, 2006). Finally, this project meets the clinical prevention and population health goals of enhancing the inherent health of communities by offering culturally

and linguistically concordant education to Spanish-speaking adults with T2DM, a group at high risk for inadequate disease management (Essential VII; AACN, 2006).

Sustainability

The intervention was conducted at the point of care, using clinic personnel (no additional staff; flow charts), Spanish education materials, and typical clinic procedures, with 100% consent and completion during both surveys. This progress indicates that the process is patient acceptable, feasible for clinicians to replicate, and may be integrated into chronic disease management by adapting existing resources and tools that facilitate the DNP role in driving practice-based, system-scale change in care delivery within one setting (AACN, 2006).

Limitations

The sample was small ($n = 6$) and collected on a single day at a single clinic; generalizability beyond this site is limited. The study design employed pre-/post-testing without a comparison group, so some of the improvement may be attributed to response bias (short-term) or to increased focus during the visit. Medication compliance was based on self-report; it was not verified by an objective measure (e.g., refill history). Post-intervention data were collected immediately after the educational intervention, and it is unclear whether this improvement was sustained over time. Furthermore, all subjects achieved the maximum possible score following the intervention, resulting in a ceiling effect and limiting the ability to analyze response variations. Regardless of these limitations, the observed statistically significant and clinically large change suggests that our workflow should continue to be utilized locally as a quality improvement project in the outpatient setting.

Conclusion

This QI project shows that a brief, point-of-care, Spanish-language DSMES encounter is feasible and acceptable in our clinic. Recruitment is effective, participation is comprehensive, and patients are eager to receive medication-centered education in their preferred language during their visit. This is particularly relevant in a Hispanic, predominantly Spanish-speaking population treated for a known chronic disease.

The results suggest that this intervention is effective in achieving clinically important improvements in self-reported medication adherence among adults with chronic type 2 diabetes who are already receiving pharmacologic treatment. It is clinically important to encourage adherence, as it means people taking prescribed diabetes medicines consistently. Prescribing medication consistency is one of the key behaviors leading to glycemic control that reduces long-term complications in type 2 diabetes. For this clinic, these results justify combining such focused DSMES-style teaching and counseling into the regular workday rather than as an add-on or optional service.

Implications for Future Practice

Hence, our findings are not generalizable to the public outside of the El Centro Regional Medical Center outpatient clinic in Calexico. Instead, they are employed to direct internal improvements in practice at this site. The next stage for this clinic is to maintain delivery of the intervention and observe whether enhanced self-reported adherence can be maintained long-term.

Appendix A

Consent and Disclosure Form (English and Spanish)

Consent and Disclosure Form
University of Arizona – ECRMC Calexico Clinic

Dear Participant,

My name is **Carolina Gonzalez**, and I am a graduate student at the University of Arizona, currently pursuing a **Doctor of Nursing Practice (DNP)** degree with a focus in **Family Practice**. As part of my doctoral education, I am conducting a quality improvement project at El Centro Regional Medical Center – Calexico Clinic. The purpose of this project is to improve medication adherence among adults with type 2 diabetes by providing brief, personalized education session.

WHAT PARTICIPATION INVOLVES:

- Completion of a short 9-question survey.
- A brief educational session.
- You may skip any question that does not apply to your situation.
- There is no cost to participate.


CONFIDENTIALITY:

- Only I, Carolina Gonzalez (the project lead), will know about your participation.
- Your name will not be collected or linked to your answers.
- Instead of using your name, a private code will be used to keep your information anonymous.
- No one else—including clinic staff or providers—will see your answers.
- All responses will be kept anonymous and confidential.
- Information will be stored on a password-protected computer that only I can access.
- Results will be reported as group findings only, without identifying anyone.

VOLUNTARY PARTICIPATION:

- Your involvement is entirely voluntary.
- You may withdraw at any time without any impact on your care.
- There are no legal obligations or risks associated with participating.
- This project has been reviewed and designated as non-human subjects research by the University of Arizona Institutional Review Board (IRB).

CONTACT INFORMATION:

Carolina Gonzalez, RN, BSN, MSHSA
Doctor of Nursing Practice (DNP) Student
University of Arizona
 gonzalezcl@arizona.edu

CONSENT STATEMENT:

By signing below, you indicate that you have read and understood this consent form, have had the opportunity to ask questions, and voluntarily agree to participate in this quality improvement project.

Consentimiento Informado

University of Arizona – ECRMC Calexico Clinic

Estimado/a participante,

Mi nombre es **Carolina Gonzalez** y soy estudiante de posgrado en la **Universidad de Arizona**. Actualmente estoy cursando el Doctorado en Práctica de Enfermería (DNP) con un enfoque en **Medicina Familiar**. Como parte de mi educación doctoral, estoy realizando un proyecto de mejora de calidad en El Centro Regional Medical Center – Clínica de Calexico. El objetivo de este proyecto es mejorar la adherencia a los medicamentos en adultos con diabetes tipo 2 mediante una sesión breve de educación personalizada.

¿QUÉ IMPLICA SU PARTICIPACIÓN?

- Completar una breve encuesta de 9 preguntas.
- Una sesión educativa breve.
- Puede omitir cualquier pregunta que no sea aplicable a su situación.
- La clase es gratis


CONFIDENCIALIDAD:

- Solo yo, Carolina Gonzalez (la líder del proyecto), sabré sobre su participación.
- Su nombre no será recolectado ni vinculado a sus respuestas.
- En lugar de su nombre, se usará un código privado para mantener su información anónima.
- Nadie más —incluido el personal o los proveedores de la clínica— verá sus respuestas.
- Todas las respuestas se mantendrán anónimas y confidenciales.
- La información será almacenada en una computadora protegida con contraseña a la que solo yo tendré acceso.
- Los resultados se informarán únicamente como hallazgos grupales, sin identificar a ninguna persona.

PARTICIPACIÓN VOLUNTARIA:

- Su participación es completamente voluntaria.
- Puede retirarse en cualquier momento sin que esto afecte su atención médica.
- No existen obligaciones legales ni riesgos asociados con esta participación.
- Este proyecto ha sido revisado y clasificado como investigación que no involucra sujetos humanos por la Junta de Revisión Institucional (IRB) de la Universidad de Arizona

INFORMACIÓN DE CONTACTO:

Carolina Gonzalez, RN, BSN, MSHSA
Estudiante de Doctorado en Práctica de Enfermería (DNP)
Universidad de Arizona
 gonzalezcl@arizona.edu

DECLARACIÓN DE CONSENTIMIENTO:

Al firmar a continuación, usted indica que ha leído y comprendido este formulario de consentimiento, ha tenido la oportunidad de hacer preguntas y acepta participar voluntariamente en este proyecto de mejora de calidad.

Appendix B

Evaluation Instruments (English and Spanish)

Evaluation Instruments

Instructions: Please answer the following questions that apply to you for diabetes treatment:

- How long have you had diabetes?
- How long have you been taking medication for diabetes?
- Which medications are used?

DSMQ

1. I take my diabetes medication as prescribed.

1	2	3	4	5
Always	Often	Sometimes	Rarely	Never

2. I tend to take or skip my diabetes medication

1	2	3	4	5
Always	Often	Sometimes	Rarely	Never

MARS-5.

3. I alter the dose of my diabetes medication

1	2	3	4	5
Always	Often	Sometimes	Rarely	Never

4. I stop taking my diabetic medication for a while (One of them, some of them or all of them).

1	2	3	4	5
Always	Often	Sometimes	Rarely	Never

5. I decide to miss out a dose of my diabetic medication

1	2	3	4	5
Always	Often	Sometimes	Rarely	Never

6. I take less of my diabetic medication than instructed

1	2	3	4	5
Always	Often	Sometimes	Rarely	Never

Instrumento de Evaluación

Instrucciones: Por favor, responda las siguientes preguntas sobre su tratamiento para la diabetes:

- ¿Cuánto tiempo ha sido diabético?
- ¿Cuánto tiempo lleva tomando medicamentos para la diabetes?
- ¿Qué medicamentos toma?

DQMS

1. Tomo mi medicamento para la diabetes según lo prescrito.

1	2	3	4	5
Siempre	Frecuentemente	Aveces	Raramente	Nunca

2. Tiendo a saltarme mi medicamento para la diabetes.

1	2	3	4	5
Siempre	Frecuentemente	Aveces	Raramente	Nunca

MARS-5

3. Cambio la dosis de mi medicamento para la diabetes.

1	2	3	4	5
Siempre	Frecuentemente	Aveces	Raramente	Nunca

4. Dejo de tomar mi medicamento para la diabetes por un tiempo (uno, algunos o todos).

1	2	3	4	5
Siempre	Frecuentemente	Aveces	Raramente	Nunca

5. Decido omitir una dosis de mi medicamento para la diabetes.

1	2	3	4	5
Siempre	Frecuentemente	Aveces	Raramente	Nunca

6. Tomo menos cantidad de mi medicamento para la diabetes de lo indicado.

1	2	3	4	5
Siempre	Frecuentemente	Aveces	Raramente	Nunca

Appendix C

**Participant Materials (Post-Education Assessment Tool – English and Spanish | Diabetes
Medications Adherence – English and Spanish)**

Post-Education Assessment Tool

Instructions: Please answer the following questions based on your current understanding and intentions after receiving education on medication adherence.

1. I understand the importance of taking my diabetes medication exactly as prescribed.

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

2. I intend to take my diabetes medication as prescribed every day.

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. I will avoid skipping doses of my diabetes medication.

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. I will not change the dose of my medication without consulting my healthcare provider.

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. I recognize the risks of stopping my diabetes medication and will continue taking it as directed.

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6. I am committed to improving my health by adhering to my diabetes medication regimen.

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Instrumento de Evaluación Posterior a la Educación

Instrucciones: Por favor, responda las siguientes preguntas en base a su comprensión actual e intenciones después de recibir educación sobre la importancia de tomar su medicamento para la diabetes.

1. Entiendo la importancia de tomar mi medicamento para la diabetes exactamente como fue prescrito.

1	2	3	4	5
Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo

2. Tengo la intención de tomar mi medicamento para la diabetes todos los días según lo indicado.

1	2	3	4	5
Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo

3. Evitaré saltarme dosis de mi medicamento para la diabetes.

1	2	3	4	5
Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo

4. No cambiaré la dosis de mi medicamento sin consultar a mi proveedor de salud.

1	2	3	4	5
Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo

5. Reconozco los riesgos de dejar de tomar mi medicamento para la diabetes y continuaré tomándolo como se me indicó.

1	2	3	4	5
Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo

6. Estoy comprometido(a) a mejorar mi salud al seguir mi tratamiento médico para la diabetes.

1	2	3	4	5
Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo

Diabetes Medications Adherence

Take your diabetes medicine exactly as your doctor tells you. If you forget a dose, take it as soon as you remember unless it's almost time for the next one. Do not take two doses at the same time. Keep your medicine in a cool, dry place, away from heat and moisture.			
Drug Class	Examples	Taken with Food	Side Effects
Biguanides	Metformin	Yes	Upset stomach, loose stools, stomach pain. May cause low vitamin B12 with long use.
	Extended-release formulations	Yes, with the evening meal	You may notice an empty tablet in your stool. This is normal and means your body has already used the medicine.
SGLT2 Inhibitors	Canagliflozin, Dapagliflozin, Empagliflozin	Optional	More urine, yeast infections, tiredness, and dry mouth.
DPP-4 Inhibitors	Sitagliptin, Saxagliptin	Optional	Stuffy nose, sore throat, headache, joint pain.
Thiazolidinediones (TZDs)	Pioglitazone, Rosiglitazone	Optional	Weight gain, swelling in legs, tiredness. May affect bones or bladder.
Sulfonylureas	Glipizide, Glyburide, Glimepiride	30 minutes before a meal	Low blood sugar (carry a snack), weight gain.
Alpha-Glucosidase Inhibitors	Acarbose, Miglitol	Yes	Gas, bloating, upset stomach.
Meglitinides	Repaglinide,	30 mins before a meal	Low blood sugar if you skip meals, upset stomach.
Look at your medicine before you use it. It should look clear or light yellow. Do not use it if it looks cloudy or has dots inside. If you forget a dose, take it when you remember, only if your next dose is 3 or more days away. Keep new pens in the fridge (cold place). After opening, you can store it at room temperature for up to 21 days. Do not freeze your pen. Do not share your pen or needle with anyone.			
Drug Class	Examples	Side Effects	
GLP-1 Receptor Agonists	Semaglutide (Ozempic) Tirzepatide (Mounjaro) Dulaglutide (Trulicity)	Nausea, stomach upset, constipation, or diarrhea. Sometimes mild redness at the shot site. Rare: severe stomach pain or swelling of the neck.	
Low blood sugar: You may feel shaky, sweaty, dizzy, or confused. Eat or drink something sweet right away (juice, candy).			
High blood sugar: You may feel thirsty, tired, or need to urinate often. Call your doctor if symptoms continue or worsen.			
<i>Note.</i> Sourced from Food and Drug Administration (2025).			

Medicamentos para la Diabetes

Tome sus medicinas exactamente como su doctor le diga. Si olvida una dosis, tómelas cuando lo recuerde, a menos que ya casi sea hora de la siguiente. No tome dos dosis al mismo tiempo. Guarde sus medicinas en un lugar fresco y seco, lejos del calor y la humedad.			
Tipo de medicina	Ejemplos	Tomar con alimentos	Effectos Secundarios
Biguanides	Metformin	Sí	Dolor o malestar en el estómago, diarrea. Puede bajar la vitamina B12 si se usa por mucho tiempo.
	Metformina XR	Sí, con la cena	Puede ver la pastilla vacía en sus heces. Esto es normal y significa que su cuerpo ya usó la medicina.
Inhibidores SGLT2	Canagliflozin, Dapagliflozin, Empagliflozin	Opcional	Orina más, infecciones de hongos, cansancio, boca seca.
Inhibidores DPP-4	Sitagliptin, Saxagliptin	Opcional	Nariz tapada, dolor de garganta, dolor de cabeza, dolor en las articulaciones.
Tiazolidinedionas (TZD)	Pioglitazone, Rosiglitazone	Opcional	Aumento de peso, hinchazón en las piernas, cansancio. Puede afectar los huesos o la vejiga.
Sulfonilureas	Glipizide, Glyburide, Glimepiride	30 min. antes de comer	Azúcar baja (lleve un dulce o jugo), aumento de peso.
Inhibidores de la alfa-glucosidasa	Acarbose, Miglitol	Sí	Gas, hinchazón, malestar estomacal.
Meglitinidas	Repaglinide,	30 min. antes de comer	Azúcar baja si no come, malestar estomacal.
Su medicina debe verse clara y sin color o amarillo claro. No la use si se ve turbia o tiene pedacitos dentro. Si olvida inyectarse, tiene hasta 3 días después del día de su dosis. Guarde las plumas sin abrir en el refrigerador y lejos de la luz. Una vez abiertas, pueden guardarse a temperatura ambiente hasta por 21 días. No congele las plumas y nunca comparta las agujas o las plumas con otras personas.			
Clase de Medicamento	Examplos	Effectos Secundarios	
Agonistas del receptor GLP-1	Semaglutide (Ozempic) Tirzepatide (Mounjaro) Dulaglutide (Trulicity)	Náuseas, malestar en el estómago, estreñimiento o diarrea. A veces hay enrojecimiento donde se aplica. Dolor fuerte de estómago o hinchazón del cuello.	
<p>Azúcar baja: Puede sentir temblores, sudor, mareo o confusión. Coma o beba algo dulce de inmediato (jugo, dulce). Azúcar alta: Puede sentir sed, cansancio o necesidad de orinar seguido. Llame a su doctor si los síntomas continúan o empeoran.</p> <p><i>Note.</i> Información obtenida de la Administración de Alimentos y Medicamentos de los Estados Unidos (FDA, 2025).</p>			

Appendix D
Site Approval Letter



Raul A. Lizarraga
El Centro Regional Medical Center
1415 Ross Avenue
El Centro, CA, 92243

October 17th, 2025

Re: Medication adherence to Diabetes

Dear Carolina Gonzalez,

El Centro Regional Medical Center (ECRMC) is aware of your proposed Quality Improvement Project (QIP) and your request to conduct this project at ECRMC. Your proposal has been reviewed by ECRMC's Multidisciplinary Research Council (MRC) and has been approved. We understand that the involvement of our organization and staff in assisting you to accomplish your research goals includes access to electronic health record data in accordance with all applicable laws and regulations and access to participants in our Diabetes education center. As per the organization's governing policies, you are required to provide regular updates regarding the progress of your project, including any adverse or untoward events, and to present the final findings to the council at the conclusion of the project.

We look forward to working with you.

Sincerely,

A handwritten signature in black ink, appearing to read "Raul A. Lizarraga", is positioned below the word "Sincerely,".

Raul A. Lizarraga, MSN, RN
Research Lead/Manager
MRC Chair



Appendix E

eIRB – The University of Arizona – Not Human Research



University of Arizona IRB
 845 N Park Ave., Suite 537A
 Tucson, AZ 85719
 Fax: 520-621-9810
VPR-IRB@arizona.edu

NOT HUMAN RESEARCH

October 21, 2025

Carolina Gonzalez

Dear Carolina Gonzalez:

On 10/21/2025, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title:	Diabetes Self-Management Education and Support (DSMES) for Underserved Group in Calexico, California.
Investigator:	Carolina Gonzalez
IRB Submission ID:	STUDY00007204
Sponsor:	None
Prime Sponsor:	None
IND, IDE, or HDE:	None
Documents Reviewed:	<ul style="list-style-type: none"> • Advisor Attestation C Gonzalez.pdf, Category: Other; • Consent and Disclosure Form.docx, Category: Consent Form; • Diabetes Presentation.pdf, Category: Other; • Evaluation Instruments.docx, Category: Data Collection Tool; • IRB Protocol , Category: IRB Protocol; • Letter of approval diabetes Carolina.pdf, Category: External Site Authorization; • Participant Materials.docx, Category: Participant Material; • Post Evaluation.docx, Category: Data Collection Tool; • Recruitment Script.docx, Category: Recruitment Materials;





University of Arizona IRB
845 N Park Ave., Suite 537A
Tucson, AZ 85719
Fax: 520-621-9810
VPR-IRB@arizona.edu

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.

IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving humans in which the organization is engaged, please submit a new request to the IRB for a determination.

All Covered Individuals must disclose all sponsored and non-sponsored Research Projects to the Office for Responsible Outside Interests (OROI) prior to Conducting Research if the individual is an Investigator. Please visit the [OROI](#) website for more information.

We value your feedback and would appreciate you taking the time to complete our survey about your experience with the IRB staff:

https://uarizona.co1.qualtrics.com/jfe/form/SV_ehQ04WxNA06b42i.

If questions arise at any time during your study, please email the general IRB inbox at VPR-IRB@arizona.edu.

Appendix F

Recruitment Script (English and Spanish)

**University of Arizona DNP Project
El Centro Regional Medical Center – Calexico Clinic
Help Improve Diabetes Care in Our Community!**

Hello! My name is Carolina Gonzalez, a Doctor of Nursing Practice (DNP) student at the University of Arizona, completing my clinical residency at ECRMC Calexico Clinic.

I am inviting adult patients (18 years and older) with Type 2 Diabetes to participate in a Diabetes Self-Management Education and Support (DSMES) program. This class is designed to improve medication adherence.

What's Involved

- Attend one brief educational sessions
- Receive bilingual (English/Spanish) educational materials and tools
- Complete short questionnaires before and after the program

Why Participate?

- Learn strategies to manage your diabetes confidently
- Receive personalized guidance from our healthcare team
- Support improved diabetes care in Calexico!

Your participation is voluntary and confidential. Choosing to participate will not affect your medical care.

 Contact: Carolina Gonzalez, DNP Student

 Email: gonzalezc1@arizona.edu

Or speak with our Diabetes Educator at your next visit.

**Proyecto DNP de la Universidad de Arizona
El Centro Regional Medical Center – Clínica de Calexico**

¡Hola! Mi nombre es Carolina Gonzalez, estudiante del Doctorado en Práctica de Enfermería (DNP) en la Universidad de Arizona, realizando mi residencia clínica en la Clínica de Calexico de ECRMC.

Estoy invitando a pacientes adultos (de 18 años o más) con diabetes tipo 2 a participar en un programa de Educación y Apoyo para el Autocontrol de la Diabetes (DSMES). Esta clase es para hablar sobre los medicamentos para la diabetes.

¿Qué Incluye?


- Participar en una sesiones educativas breves
- Recibir materiales educativos bilingües (inglés/español)
- Completar cuestionarios cortos antes y después del programa

¿Por Qué Participar?

- Aprenda estrategias para manejar su diabetes con confianza
- Reciba orientación personalizada de nuestro equipo de salud
- Contribuya a mejorar el cuidado de la diabetes en Calexico

Su participación es voluntaria y confidencial. Participar o no hacerlo no afectará su atención médica.

 Contacto: Carolina Gonzalez, Estudiante DNP

 Correo electrónico: gonzalezcl@arizona.edu

O hable con nuestro Educador en Diabetes en su próxima cita.

Appendix G

Evidence Table (Literature Review Grid)

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
American Association of Clinical Endocrinology (AACE) (2022)	The American Association of Clinical Endocrinology (AACE) Clinical Practice Guideline: Developing a Diabetes Mellitus Comprehensive Care Plan – 2022 Update.	Clinical Practice Guideline. Aim of Study: To provide updated and evidence-based recommendations for the comprehensive management of diabetes mellitus (DM). To improve screening, diagnosis, treatment, and prevention of diabetes complications.	Applies to patients with prediabetes, Type 1 diabetes (T1D), Type 2 diabetes (T2D), gestational diabetes mellitus (GDM), and secondary diabetes. Age Groups: Pediatric, adult, and elderly populations included. Sex and Gender: Guidelines applicable to all genders. Includes: Patients with established diabetes or at risk for diabetes. Healthcare professionals and interdisciplinary teams managing diabetes.	Comprehensive diabetes management recommendations, including: Screening and diagnosis of diabetes. Pharmacologic and non-pharmacologic interventions. Use of continuous glucose monitoring (CGM) and insulin therapy. Diabetes self-management education (DSMES) programs. Cardiovascular, kidney, and neurological complication management. Annual updates to guidelines based on new evidence.	May require adaptation to different healthcare systems and populations. Generalized recommendations may not fully account for individual patient variability. Lack of high-quality RCTs for certain recommendations (expert consensus used instead).	Emphasizes individualized care, use of technology, and integration of self-management education. Primary Outcomes: Improved glycemic control, diabetes complication prevention, and quality of life. Secondary Outcomes: Assessment of lifestyle modifications, pharmacotherapy effectiveness, and diabetes technology adoption. Expanded screening recommendations for diabetes and prediabetes. Updated glycemic targets for individualized diabetes care. Emphasis on cardiovascular risk reduction using GLP-1 receptor agonists (GLP-1 RAs) and SGLT2 inhibitors. Integration of diabetes technology
American Diabetes Association (ADA) (2025)	Standards of Care in Diabetes 2025	Clinical Practice Guideline. Aim of Study: provide evidence-based recommendations for diabetes care, including	Target Population: Patients with diabetes (Type 1, Type 2, gestational, monogenic diabetes, and post-transplant diabetes).	Comprehensive evidence-based recommendations for diabetes care, updated annually, covering all aspects of diabetes management,	Generalized recommendations may not fully capture individual patient variability.	Provides the latest evidence-based guidance on diabetes prevention, diagnosis, management, and self-care education. Primary Outcomes: Improved glycemic control, reduction in diabetes-related

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
		<p>screening, diagnosis, prevention, and management of diabetes and its complications. To serve as a comprehensive clinical guideline for healthcare providers treating patients with diabetes.</p>	<p>People at risk for diabetes (prediabetes, metabolic syndrome, high BMI, genetic predisposition). Special populations (older adults, pregnant individuals, children, and individuals with comorbidities).</p>	<p>including self-management education Comprehensive framework for DSMES programs, emphasizing person-centered care, accessibility, and integration into routine diabetes management Representativeness: Broadly representative of diverse patient populations across different settings. Systematic literature review and expert consensus grading. Adjustments for new research findings, guideline adherence, and clinical applicability. Reviewed by major medical organizations ensuring credibility. Annual updates ensure ongoing evidence review and incorporation of emerging data.</p>	<p>Guidelines require healthcare system adjustments, provider training, and patient adherence strategies.</p>	<p>complications, and enhanced quality of life. Secondary Outcomes: Assessment of risk factors, health disparities, and impact of lifestyle modifications.</p>
Berthoumieux et al. (2024)	Long-Term Results of a Digital Diabetes Self-	Retrospective Cohort Study Aim of Study: To evaluate the long-	Country of Study: United States (Developed Country)	Intervention Description	Limitations Self-reported A1C values	Outcomes Primary Outcome: HbA1c changes

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
	Management and Education Support Program Among Adults With Type 2 Diabetes	term effectiveness of a digital diabetes self-management education and support (DSMES) program on HbA1c and body mass index (BMI) among adults with Type 2 Diabetes (T2DM).	<p>Setting: Digital DSMES program, available through private health insurance plans and employer-based healthcare coverage.</p> <p>Location: Predominantly urban populations.</p> <p>Sample Characteristics:</p> <p>Total Participants: 1,322 adults with T2DM enrolled in the Omada for Diabetes program.</p> <p>Age: Mean 53.5 years</p> <p>Sex: 56.9% female</p> <p>Ethnicity: 71.5% White, 11.8% Black, 8.6% Hispanic, 3.7% Asian, 4.3% Other</p> <p>Socioeconomic Status: 74.2% had an income above \$50,000 per year</p> <p>Education Level: 62.2% had at least a college degree</p> <p>BMI: Mean 36.9 kg/m² (majority classified as obese)</p> <p>Inclusion Criteria:</p>	<p>Program: Omada for Diabetes (Digital DSMES program)</p> <p>Delivered by: Certified Diabetes Care and Education Specialists (CDCESs) and Health Coaches</p> <p>Mode of Delivery: Mobile app & web-based platform</p> <p>Duration: 2 years</p> <p>Components: 104 educational lessons on diabetes management.</p> <p>Self-monitoring (weight, blood glucose, meal tracking).</p> <p>Behavioral coaching and peer support forums.</p> <p>C) Control/Comparison Description</p> <p>No control group (study focused on within-group changes over time).</p> <p>D) Sample Size at Baseline</p> <p>Total Sample: N = 1,322</p>	<p>(potential reporting bias).</p> <p>No control group (causality cannot be established).</p> <p>Potential selection bias (participants were self-motivated individuals).</p> <p>Evidence Gaps & Future Research</p> <p>Need for an RCT to assess causal relationships.</p> <p>Longer-term follow-up on diabetes-related complications.</p> <p>No Control Group: Lacks a comparison group to isolate intervention effects.</p> <p>Self-Reported Data: A1C and engagement</p>	<p>Secondary Outcomes: Weight, BMI, program engagement</p> <p>Measurements: Self-reported A1C values</p> <p>Connected glucose monitors</p> <p>BMI calculated from weight changes</p> <p>Reported Results</p> <p>HbA1c Reduction: HbA1c $\geq 8\%$ group: Decreased from 9.48% to 7.47% over 12 months ($p < 0.001$).</p> <p>HbA1c $< 8\%$ group: Maintained stable HbA1c at $\sim 6.5\%$.</p> <p>BMI Reduction: -1.17 kg/m² over 12 months.</p> <p>Weight Loss: -7.26 lbs average weight loss.</p> <p>Sustained Engagement: 50.8% of participants remained highly engaged, suggesting digital DSMES programs can maintain patient participation over time.</p>

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
			<p>Enrollment in Omada for Diabetes program between 2019-2022. A recorded baseline HbA1c value and at least one follow-up HbA1c within 12 months.</p> <p>Self-reported diagnosis of T2DM.</p> <p>Participation Rate: High participation, though engagement levels varied (50.8% highly engaged).</p>	<p>Intervention Group: 1,322 (No control group)</p> <p>Subgroups:</p> <p>HbA1c \geq8% at baseline: N = 411</p> <p>HbA1c <8% at baseline: N = 911</p> <p>E) Baseline Comparisons</p> <p>Significant baseline differences:</p> <p>Participants with HbA1c \geq8% were younger, had lower income, and higher BMI.</p> <p>F) Study Sufficiently Powered?</p> <p>Power Calculation Not Reported, but the large sample size suggests sufficient power.</p> <p>Long-Term Follow-Up: 12 months of data collection provides insight into sustained effects.</p> <p>Real-World Digital DSMES Evaluation: Study offers evidence for scalability of digital diabetes programs.</p>	<p>metrics rely on patient-reported values, introducing potential bias.</p> <p>Limited Generalizability: Majority White, higher-income, educated participants, limiting applicability to diverse socioeconomic groups.</p>	

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
Carmienke et al. (2021)	Participation in structured diabetes self-management education programs and its associations with self-management behavior a nationwide population-based study	Observational cross-sectional study. Aim of Study: To examine the association between participation in structured diabetes self-management education (DSME) programs and self-management behaviors (SMB) among adults with diabetes in Germany.	Country of Study: Germany (Developed Country) Setting: Public healthcare system; outpatient settings for DSME delivery. Location: Nationwide study, covering urban and rural areas. Sample Characteristics: Total Participants: 1,379 adults with diabetes Age: Mean 63.8 years (DSME participants); 67.9 years (non-participants) Sex: 42.2% female (DSME participants); 46.0% female (non-participants) Socioeconomic Status (SES): Mixed; majority in middle-income range Education: Not explicitly detailed Occupation: 31.5% employed, 66% retired/disabled Living Status: 71.5% DSME participants lived with a partner	Intervention Description Structured DSME Program (mandatory physician referral). Delivered by: Certified DSME-trained nurses and physicians. Mode of Delivery: Group education, outpatient setting. Duration: Non-insulin T2DM: 4 weekly sessions (90 min each). Insulin-treated T2DM: 12 sessions. Topics: Diabetes education, self-monitoring, lifestyle management, foot care, diet adherence, and medication adherence. Control/Comparison Description Non-DSME Participants (never attended DSME programs). Standard diabetes care without structured education.	The observational nature of the study introduces potential confounding factors that may influence the results. Cross-Sectional Design: Causality cannot be determined (association only). Self-Reported Data: Potential recall bias and social desirability bias. No Differentiation by Diabetes Type: Study does not separate T1DM vs. T2DM, limiting applicability.	Primary Outcome: Association between DSME participation and self-management behaviors (SMB). Measures: HbA1c testing frequency Diet plan adherence Foot self-exams (FSE) Self-monitoring of blood glucose (SMBG) Retinopathy screening frequency Clinical foot exams Use of a diabetes health passport DSME Participation Increases Self-Management Behaviors: Keeping a diabetes diary (OR 3.83; 95% CI 2.74–5.36) Following a diet plan (OR 1.88; 95% CI 1.21–2.92) Self-monitoring blood glucose (SMBG) (OR 2.96; 95% CI 2.20–3.98) Foot self-examinations (FSE) (OR 2.64; 95% CI 2.01–3.47) HbA1c testing (≥ 4 times per year) (OR 2.58; 95% CI 1.88–3.52)

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
			<p>Diabetes Duration: Mean 12.8 years (DSME group) vs. 8.1 years (non-DSME)</p> <p>Inclusion Criteria: Adults ≥ 18 years diagnosed with diabetes. Self-reported diabetes status. Participation in DSME programs recorded.</p> <p>Participation Rate: 26.9% response rate (from invited survey participants).</p>	<p>Sample Size at Baseline</p> <p>Total Sample: N = 1,379</p> <p>DSME Participants: N = 864 (62.7%)</p> <p>Non-DSME Participants: N = 515 (37.3%)</p>		<p>Retinopathy screening adherence (OR 3.30; 95% CI 2.31–4.70)</p> <p>Clinical foot exams (OR 3.68; 95% CI 2.76–4.89)</p>
Chan et al. (2021)	An Intervention to Change Illness Representations and Self-Care of Individuals With Type 2 Diabetes: A Randomized Controlled Trial	<p>Randomized Controlled Trial (RCT)</p> <p>Aim of Study: To examine the efficacy of a Common-Sense Model (CSM)-based intervention in improving illness representations, self-care, self-care self-efficacy, use of adaptive coping strategies, and glycated</p>	<p>Country of Study: Hong Kong (Developed Country)</p> <p>Setting: Public healthcare system (diabetes outpatient clinic)</p> <p>Location: Urban population, covering New Territories East Cluster of the Hospital Authority.</p> <p>Sample Characteristics: Total Participants: 455 adults with T2DM</p>	<p>Method of Allocation: Randomized and modified ITT analysis. CSM-Based Group Intervention (5 weekly group sessions, 2 hours each). Delivered by: Clinical psychologist with a research assistant.</p> <p>Group Size: 12–18 participants.</p> <p>Content: Cognitive restructuring: Correcting negative illness beliefs.</p>	<p>No significant effect on HbA1c despite improvements in self-care and coping</p> <p>No long-term follow-up beyond 6 months.</p> <p>Control group received educational booklets, possibly affecting</p>	<p>Primary Outcome: Self-care behavior.</p> <p>Secondary Outcomes: Self-care self-efficacy. Use of adaptive coping strategies. HbA1c levels. Illness representations (cognitive and emotional perceptions of diabetes). Measurements: Validated Chinese versions of standardized scales. Follow-up Periods: Baseline, 1-month, and 6-month follow-up. Method of Analysis</p>

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
		hemoglobin (HbA1c) among individuals with Type 2 Diabetes Mellitus (T2DM).	Age: 35–65 years Sex: 51.8% male, 48.2% female Education: 61% completed secondary school Employment: 55.6% employed, 24% retired Socioeconomic Status: Mixed background, monthly income varied Diabetes Duration: Mean 10.68 years HbA1c at baseline: 7.77% (mean) Complications: 41.8% had nephropathy, 24.5% had retinopathy Inclusion Criteria: Diagnosed with T2DM. 35–65 years old. Fluent in Cantonese. Participation Rate: 455/1575 (28.9%) agreed to participate.	Emotion-focused coping: Relaxation exercises, stress management. Behavioral coping: Problem-solving, anger management. Homework assignments (e.g., relaxation exercises, disclosure writing). Control Group Description Standard diabetes care + 5 educational booklets covering: Cause, symptoms, treatments, self-care activities. Resources for diabetes support. Sample Size at Baseline Total Sample: N = 455 Intervention Group: N = 230 Control Group: N = 225 Baseline Comparisons Control group had more men (60.4%) than intervention (43.5%). More employed participants in control	illness perceptions. The study primarily relied on self-reported measures for self-care behavior, self-efficacy, and coping strategies. study was conducted in an urban healthcare setting in Hong Kong and only included Cantonese-speaking adults. Majority of participants were middle-aged (35–65 years), meaning older adults with potentially greater diabetes-related complications were	Modified Intention-to-Treat (ITT) analysis. Reported Results Self-care increased significantly in intervention group ($F(2,840) = 7.78, p < .001$). Self-care self-efficacy increased ($F(1.89,794.57) = 14.40, p < .001$). Adaptive coping improved ($F(1.94,812.93) = 4.75, p = .010$). No significant HbA1c reduction ($p = .406$). Attrition Details 28 (6.1%) lost to follow-up. Higher non-response in unemployed individuals.

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
				(68.9%) than intervention (42.6%). Adjusted for gender and employment in analysis. Sample size calculation reported. Power 0.8, $\alpha = 0.05$.	underrepresented.	
Chowdhury et al. (2024)	The effectiveness of diabetes self-management education intervention on glycaemic control and cardiometabolic risk in adults with type 2 diabetes in low- and middle-income countries: A systematic review and meta-analysis	Systematic Review & Meta-Analysis (Based on 44 studies) Aim of Study: To assess the effect of diabetes self-management education (DSME) interventions on glycaemic control, cardiometabolic risk, self-management behaviors, and psychosocial well-being among adults with Type 2 Diabetes Mellitus (T2DM) in low- and middle-income countries (LMICs).	Country of Study: Multi-country (21 low- and middle-income countries) Setting: Diabetes clinics/hospitals: 34% Public/private healthcare settings: 48% Community/home-based programs: 18% Location: Urban and rural settings Sample Characteristics: Total Participants: 11,838 (5,887 intervention, 5,951 control) Age Range: 42–71 years (mean age ~55 years) Study Duration: 4–348 weeks (majority ~6 months)	Allocation varied by study, including RCTs and quasi-experimental studies, randomization, cluster assignments, and matched-pair designs. Intervention Description Diabetes Self-Management Education (DSME) Programs Delivered face-to-face, via mobile apps, group education, or telemedicine. Incorporated diet, exercise, medication adherence, stress management. Intervention providers: Healthcare professionals, diabetes educators, community health workers.	Differences in intervention format and healthcare infrastructure across countries may limit generalizability. The exclusion of non-randomized studies may limit the inclusion of real-world interventions. Significant differences not reported in summary. Some studies adjusted for confounding variables	HbA1c Reduction: RCTs: -0.64% (95% CI: -0.45% to -0.83%). Quasi-experimental: -1.27% (95% CI: -0.63% to -3.17%). Cardiometabolic Risk Reduction: BMI, LDL, TG, and BP improved. Self-Management Behaviors Improved. No significant harm or adverse events reported.

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
			<p>Glycemic Control at Baseline: Mean HbA1c not reported in summary</p> <p>Demographics: Gender and socioeconomic data not consistently reported.</p> <p>Inclusion Criteria: Adults with T2DM living in LMICs. Receiving standard diabetes care. Participating in DSME interventions.</p>	<p>Total Sample: 11,838 participants</p> <p>Intervention Group: 5,887</p> <p>Control Group: 5,951</p> <p>Primary Outcomes: HbA1c reduction (0.64% mean decrease in RCTs). Fasting Blood Glucose (FBG) improvement.</p> <p>Secondary Outcomes: Cardiometabolic risk factors: BMI, WC, LDL, HDL, BP, triglycerides. Diabetes knowledge, self-efficacy, and self-care behaviors.</p> <p>Follow-up Periods Varied across studies (4 weeks – 348 weeks), majority ~6 months.</p>		
Ernawait et al. (2021)	Effectiveness of diabetes self-management education (DSME) in type 2 diabetes mellitus (T2DM) patients: Systematic literature review	<p>Systematic literature review of 15 selected studies.</p> <p>Aim of Study: To examine the effectiveness of diabetes self-management education (DSME)</p>	Country of Study: Multi-country Recruited from previous studies via clinical trials and observational study databases (Google Scholar, PubMed, ProQuest, ScienceDirect).	<p>Varies by study:</p> <p>RCTs: Randomized allocation.</p> <p>Quasi-experiments: Pre-post or non-random group comparison.</p> <p>Retrospective and descriptive studies used chart reviews.</p>	<p>Method of Analysis</p> <p>Narrative synthesis and tabular comparison.</p> <p>No pooled meta-analysis in this review.</p> <p>No ITT analyses</p>	<p>Primary Outcomes: HbA1c reduction</p> <p>Fasting blood glucose</p> <p>Self-care behavior</p> <p>Medication adherence</p> <p>Self-efficacy</p> <p>Quality of life</p> <p>Subjective measures: Self-efficacy, knowledge, behavior changes (validated questionnaires).</p>

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
		interventions on self-care behaviors and clinical outcomes in patients with T2DM	Eligibility reflected those diagnosed with T2DM and receiving DSME. Representativeness varies across studies but generally targets people with T2DM across different settings. Inclusion criteria: Research on DSME or DM self-care. DSME-related outcomes. Full text in English or Indonesian. Published in Q1–Q3 journals. Total selected articles: 15	Sample Size at Baseline Across 15 studies: 6,000 participants total. Individual studies ranged from 30 to 4,587 participants. Combined objective clinical markers (HbA1c) with behavioral/self-efficacy metrics. Focused on Q1–Q3 journals and peer-reviewed full-text articles.	explicitly mentioned. Variability in DSME format, duration, and provider. Limited generalizability due to cultural differences. Inconsistent reporting on demographic details and attrition. Need for standardized DSME protocols. Explore influence of cultural, provider, and technological factors. Examine long-term impact and sustainability. Different providers, durations, and delivery methods make	DSME consistently improved: Knowledge, behavior, self-efficacy, and quality of life. Significant reduction in HbA1c and fasting blood glucose in most studies.

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
					results hard to synthesize.	
Jiang et al. (2023)	The effect of diabetes management shared care clinic on glycated hemoglobin A1c compliance and self-management abilities in patients with type 2 diabetes mellitus	Prospective Cohort Study To evaluate the impact of the Diabetes Management Shared Care Clinic (DMSCC) on glycemic control (HbA1c levels), diabetes self-management abilities, and emotional distress in patients with Type 2 Diabetes Mellitus (T2DM).	Country of Study: China (Developed country) Healthcare Setting: Public healthcare system, primary and specialized diabetes care settings Location: Urban setting Sample Characteristics: Total Participants: 124 Age Range: 18-80 years (Mean: 54.57 years) Sex: Male: 61.29% Female: 38.51% Marital Status: Married: 95.16% Education Level: Primary school: 21.77% Junior high school: 39.52% Senior high school: 25.81% Bachelor's degree or above: 12.90% BMI (kg/m ²): Mean 24.34 ± 3.25	Total Sample: 124 Intervention Group: 124 Control Group: None Baseline Comparisons HbA1c at Baseline: 7.92% ± 1.95% HbA1c Compliance Rate: 42.74% BMI & Blood Pressure: Baseline data reported Paired-sample t-tests and Wilcoxon signed-rank tests for pre- and post-intervention comparisons. Delivered by: Endocrinologists, diabetes specialist nurses, pharmacists, dietitians, sports instructors Components: In-hospital consultations (2-4 times/year) Online diabetes coaching (via a mobile app) Monitoring & reminders (glucose	Patients with more severe conditions were excluded, potentially leading to an underestimation of the intervention's impact in high-risk populations. No control group for direct comparison. Power calculations were not explicitly reported	Primary Outcomes: HbA1c change HbA1c compliance rate Self-management behaviors (SDSCA-6 scale) Secondary Outcomes: Empowerment (DES-DSF scale) Emotional distress (PAID-5 scale) HbA1c Decrease: 7.92% → 6.94% (P < 0.01) HbA1c Compliance Rate Increase: 42.74% → 69.35% (P < 0.01) Diabetes Distress Reduction: Improved PAID-5 scores (P < 0.01)

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			Smoking Status: 16.13% were smokers Inclusion Criteria: Age 18–80 years Diagnosed with T2DM per WHO criteria Enrolled in the DMSCC program Completed at least one follow-up visit and self-management assessment Single-group cohort study (No control group)	levels, medication, diet, physical activity) Lifestyle coaching based on the American Diabetes Association (ADA) and American Association of Diabetes Educators (AADE-7) guidelines		
Jiang et al. (2021)	The effectiveness of a self-efficacy-focused structured education program (SSEP) in improving metabolic control and psychological outcomes of type 2 diabetes patients: A 12-month follow-up of a multicenter randomized controlled trial.	Multicenter Randomized Controlled Trial (RCT). Aim of Study: To evaluate the long-term effects (12-month follow-up) of a Self-Efficacy-Focused Structured Education Program (SSEP) on glycemic control (HbA1c) and psychosocial outcomes in patients with Type	Country of Study: China (Developed Country) Healthcare Setting: Public hospitals (4 non-tertiary hospitals) Primary and specialized diabetes care settings Location: Urban setting Sample Characteristics: Total Participants: 265 Age Range: 18-75 years	Randomization Method: Block randomization (blocks of 8) Routine diabetes education (face-to-face physician consultations + monthly class education). Quarterly follow-ups (face-to-face/telephone). Sample Size at Baseline Total Sample: 265 Intervention Group (SSEP): 133	Excluding insulin users may limit generalizability to patients requiring more intensive therapy. No cost-effectiveness evaluation. The control group received minimal intervention, making comparisons less robust.	Primary Outcomes: HbA1c reduction (1.13% decrease in the intervention group) Secondary Outcomes: Waist circumference, total cholesterol, LDL-C improvement Improved diabetes self-efficacy and self-management behaviors Reduced diabetes distress HbA1c Reduction: Intervention Group: -1.13% (P < 0.001) Control Group: -0.69% Waist Circumference: -3.14 cm (P = 0.001)

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
		2 Diabetes Mellitus (T2DM).	Glycemic Control at Baseline: HbA1c $\geq 7.5\%$ Inclusion Criteria: Diagnosed with T2DM per WHO criteria HbA1c $\geq 7.5\%$ in past 12 weeks No insulin use in past 3 months Age 18-75 years Willing to participate in the structured education program	Control Group (Routine Education): 132 Power calculation performed ($\alpha = 0.05$, power = 0.8, 20% attrition rate). intention-to-Treat (ITT) analysis Generalized Estimating Equations (GEE) for repeated measures	Objective measures were not included	Total Cholesterol Reduction: -0.30 mmol/L (P = 0.032) LDL-C Reduction: -0.25 mmol/L (P = 0.008) Improved Self-Management Behaviors: +10.67 (P < 0.001) Diabetes Distress Reduction: -4.97 (P < 0.001)
Mannucci et al. (2022)	Self-Management in Patients with Type 2 Diabetes: Group-Based vs. Individual Education – A Systematic Review with Meta-Analysis of Randomized Trials	Systematic Review & Meta-Analysis of RCTs Aim of Study: To compare group-based vs. individual diabetes education programs for self-management in Type 2 Diabetes Mellitus (T2DM) patients. Assess the impact on glycemic control (HbA1c), lipid profile, body weight, blood pressure, patient	Country of Study: International (Multiple studies from various countries) Location: Both urban and rural settings across different countries. Sample Characteristics: Number of RCTs included: 14 RCTs Total Patients: Varied across studies (range 25–421 per study) Mean Age: 60.8 years Baseline HbA1c: 8.0% BMI: 30.7 kg/m ²	Total Sample Across 14 RCTs: Not explicitly stated (Varied from 25 to 421 participants per study) Delivered by: Multidisciplinary teams (physicians, nurses, dietitians, psychologists, pharmacists, and diabetes educators) Format: Group sessions (varied from 3–19 sessions per study) Follow-up Periods ≥ 6 months across all included studies	Confounding Control: Some studies adjusted for baseline differences, others did not. High heterogeneity across studies Some studies may have misclassified patients with Type 1 Diabetes Varying number of sessions and	Primary Outcome: Change in HbA1c Secondary Outcomes: Body Mass Index (BMI), Waist Circumference Lipid Profile (LDL, Total Cholesterol) Blood Pressure (Systolic & Diastolic) Patient Knowledge & Adherence Quality of Life (QoL) HbA1c Reduction: No significant difference (-0.39%, p = 0.11) Weight & BMI: No significant difference Lipid Profile & Blood Pressure: No significant difference

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
		adherence, and quality of life.	Inclusion Criteria: Adults with Type 2 Diabetes (T2DM) Comparing group-based vs. individual education programs RCTs with at least a 6-month follow-up	Weighted Mean Difference (WMD) and Mantel-Haenszel Odds Ratio (MHeOR) with 95% Confidence Intervals (CI).	duration across studies	Patient Knowledge & Adherence: Higher in group-based programs Quality of Life (QoL): Better in group-based education
Nagpal et al. (2023)	A stepped wedge cluster randomized trial to evaluate the effectiveness of a community leader-driven kit-based diabetes self-management education approach in improving diabetes control and care: Study protocol for the DELhi Diabetes INTervention Trial (DEDINTT).	Stepped Wedge Cluster Randomized Trial (Sw-CRT). Aim of Study: To evaluate the effectiveness of a community leader (CL)-driven, kit-based diabetes self-management education (DSME) program. To assess the impact on diabetes control (HbA1c), quality of care, and cardiovascular risk. To determine the cost-effectiveness and sustainability of the intervention.	Country: India (Developing Country) Location: Urban Sample Characteristics: Adults with Type 2 Diabetes (T2DM). Enrolled in the earlier DEDICOM-II survey. Socioeconomic diversity: Participants from lower, middle, and higher socioeconomic groups. Inclusion Criteria: Adults diagnosed with T2DM for over one year. Willing to participate in DSME intervention. Total Sample Size: 360 participants across 30 clusters	ITT analysis using R software for Sw-CRT design. Stepped Wedge Cluster Randomized Trial (Sw-CRT). Clusters randomly assigned to transition from control to intervention in 5 steps. Minimizes confounding by allowing all clusters to act as their own controls. Community Leader (CL)-Led DSME Program. CLs trained for one month (50+ hours). Uses community leaders instead of healthcare professionals, making it cost-effective and scalable.	Participants already exposed to diabetes care through DEDICOM-II survey, possibly making them more health-conscious than the general population. Excluding severe cases may overestimate intervention effectiveness. No structured DSME program. Participants continued usual medical care without	Primary Outcome: Change in HbA1c before and after intervention. Secondary Outcomes: Lipid profile, blood pressure, drug adherence. Preventive care compliance (eye & foot exams). Cost-effectiveness and quality of life (QoL). Intervention group showed ~1% HbA1c reduction, proving peer-led education can improve glycemic control. Improved preventive care compliance in intervention group. Better diabetes self-management behaviors.

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
				Evaluates biological (HbA1c, lipids), behavioral (adherence, self-care), and economic (cost-effectiveness) outcomes. Follow-up Periods. Baseline, 3 months post-intervention, and quarterly evaluations.	additional education. Limiting applicability to rural areas or different cultural settings.	
Odgers-Jewell et al. (2023)	Group-based self-management education for people with type 2 diabetes mellitus (Protocol)	Systematic Review and Meta-Analysis (Cochrane Review). Aim of Study: To assess the effects of group-based self-management education for adults diagnosed with type 2 diabetes mellitus (T2DM) on clinical, lifestyle, and psychosocial outcomes in the short (6–10 months), medium (>10–18 months), and long (>18 months) term.	Country of Study: International Location: Urban and rural populations included. Inclusion Criteria: Adults diagnosed with T2DM, participation in group-based education, minimum intervention duration of one session lasting one hour. Participants were randomized into intervention and control groups where applicable. Inclusion Criteria: Adults with a confirmed diagnosis of T2DM.	Randomized controlled trials (RCTs) used to allocate participants to intervention and control groups. Intent-to-Treat (ITT) Analysis and pre-protocol analyses used. Follows Cochrane Handbook guidelines for systematic reviews, ensuring rigor. Includes face-to-face, online, and hybrid interventions, making the findings more applicable to different healthcare settings. Baseline characteristics (age, sex, ethnicity, HbA1c	Selection bias could exist if studies with low representation of certain demographics were included. Some studies report power calculations; statistical significance assessed through P-values and confidence intervals. Variability in interventions and study settings makes direct	Primary Outcomes: Glycemic control (HbA1c levels), patient-reported outcomes, adverse events. Secondary Outcomes: Blood pressure, blood lipid profiles, anthropometric measures, morbidity/complications, all-cause mortality. Effect sizes, confidence intervals, p-values, and standard deviations were reported across studies. Glycemic control improved significantly in group-based education interventions. Psychosocial outcomes, including diabetes distress and quality of life, improved in some studies.

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
			Participants receiving group-based self-management education. Participants in interventions of any duration delivered via face-to-face, online, or telehealth methods.	levels) were compared where available. Follow-up Periods: Short-term: 6–10 months. Medium-term: >10–18 months. Long-term: >18 months.	comparison difficult.	
Powers et al. (2020).	Diabetes Self-management Education and Support in Adults With Type 2 Diabetes: A Consensus Report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American	Expert Consensus Report. Aim: To provide consensus recommendations to improve clinical care and education services through Diabetes Self-Management Education and Support (DSMES) for adults with type 2 diabetes.	Country: United States (Developed Country) Intended to be nationally representative of U.S. adults with type 2 diabetes. Adults with T2DM eligible for DSMES.	Interventions based on best practices and expert guidance. Narrative synthesis and literature review DSMES delivered in multiple formats: in-person, group classes, telehealth, home visits, web-based programs. Delivered at 4 critical times: 1) At diagnosis, 2) Annually/not meeting targets, 3) With complications, 4) During care/life transitions. Comprehensive Stakeholder Representation Offers actionable, tailored DSMES strategies at four critical points in diabetes care	Limitations Low utilization of DSMES. Under-recognition of psychosocial and financial barriers. Limited awareness among providers. Evidence Gaps Need for culturally tailored interventions. Need for integration of DSMES into value-based care models. Wide variation in how DSMES is	All outcomes derived from validated literature (meta-analyses and RCTs). DSMES improves A1C by 0.45–0.57%. Reduces all-cause mortality, complications, ED visits, hospitalizations. Improves psychosocial metrics like empowerment, distress, and self-efficacy.

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
	Association of Nurse Practitioners, and the American Pharmacists Association				delivered across settings; no standardized delivery model suggested.	
Presley et al. (2020)	Mobile-Enhanced Peer Support for African Americans with Type 2 Diabetes: a Randomized Controlled Trial	Randomized Controlled Trial (RCT). Aim of Study: To evaluate the effectiveness of a mobile health (mHealth)-enhanced peer support intervention combined with community-based diabetes self-management education (DSME) compared to DSME alone in low-income African Americans with poorly controlled Type 2 Diabetes.	Country of Study: United States Location: Urban, low-income neighborhoods in Jefferson County, Alabama. Sample Characteristics: Age: >19 years, mean age ~55 years. Sex: Majority were female (71%). Ethnicity: African American population. Socioeconomic Position: Low-income, receiving care at a safety-net healthcare system. Education Levels: Some high school (19.6%), high school diploma (34%), some college (33%), college degree (13.4%). Inclusion Criteria:	Randomization: Participants were randomly assigned to either the intervention group (DSME + mHealth-enhanced peer support) or the control group (DSME alone). Confounding was minimized through baseline assessments and stratified randomization. Total Sample (N): 120 participants randomized. Intervention Group (N): 70 participants. Control Group (N): 50 participants. No major baseline differences except higher interpersonal distress in the intervention group (p=0.017).	Excluding non-English speakers may limit generalizability to multilingual populations. Limited sample size affected power to detect significant A1c differences. Short duration (6 months) limited long-term assessment.	Primary Outcome: Change in A1c from baseline to 6 months. Secondary Outcomes: Diabetes distress (measured using the Diabetes Distress Scale). Depressive symptoms. Social support and self-efficacy. Quality of life (EQ-VAS scale). A1c Reduction (p=0.004) Intervention: 10.1 → 9.6 Control: 9.8 → 9.1 Diabetes Distress Reduction (p=0.041) Intervention: 2.7 → 2.1 Control: 2.6 → 2.3

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
			<p>African American adults ≥ 19 years old. A1c $\geq 7.5\%$ (poor glycemic control). Receiving care at CGMHS (a public safety-net healthcare provider). Agreement to Participate: 120 participants were randomized. 97 participants completed the study.</p>	<p>Follow up period: 6 months Intention-to-Treat (ITT) analysis used. Adjusted for age, gender, insulin use, and diabetes duration.</p>		
Romadlon et al. (2024)	Comparative Effects of Diabetes Self-Management Programs on Type 2 Diabetes Clinical Outcomes: A Systematic Review and Network Meta-Analysis	Systematic Review and Network Meta-Analysis (NMA) Aim of Study: To compare the effects of Diabetes Self-Management Education (DSME), Diabetes Self-Management Support (DSMS), and Diabetes Self-Management Education and Support (DSMES) on Type 2 Diabetes clinical outcomes. Primary outcomes included HbA1c,	Country of Study: International 108 randomized controlled trials (RCTs) with 17,735 participants. Location: Both urban and rural populations included. Health-related factors: Mean diabetes duration: 8.6 years. Comorbidities present in 62.9% of participants. 73.2% were on combination therapy (oral hypoglycemic agents & insulin). Inclusion Criteria:	Evaluated using Cochrane Risk of Bias 2.0 tool (73.1% low risk, 21.3% some concerns, 5.6% high risk). Intention-to-Treat (ITT) and per-protocol analysis used. Adjusted for confounders such as comorbidities and medication use. Total Sample (N): 17,735 participants across 108 studies. Intervention Group(s) N: Varies by study. Control Group(s) N: Varies by study.	30% of studies raised concerns about missing data. Some studies had high dropout rates due to study duration. Some studies had methodological concerns (5.6% high bias risk). Short follow-up periods in some trials.	Primary Outcomes: HbA1c (Glycemic Control). Fasting Blood Glucose (FBG). Total Cholesterol (TC). Systolic Blood Pressure (SBP). Diastolic Blood Pressure (DBP). HbA1c Reduction: DSMES vs. UC: -0.61% (95% CI: -0.74 to -0.49) (High certainty). DSMES vs. DSME: -0.23% (95% CI: -0.40 to -0.07). FBG Reduction: DSMES vs. UC: -23.33 mg/dL (95% CI: -31.33 to -15.34). Blood Pressure Reduction:

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		fasting blood glucose (FBG), total cholesterol (TC), systolic blood pressure (SBP), and diastolic blood pressure (DBP).	Adults ≥ 18 years old with Type 2 Diabetes. Participants receiving DSME, DSMS, or DSMES. Studies reporting HbA1c, FBG, TC, SBP, or DBP. DSME: Education on diabetes self-care, delivered by healthcare professionals (doctors, nurses, diabetes educators). DSMS: Ongoing behavioral, psychosocial, and clinical support beyond formal education. DSMES: Combination of DSME and DSMS, with an emphasis on education and long-term support. Usual Care (UC): Routine diabetes management without structured self-management programs.	Network meta-analysis used rigorous statistical models to maintain power. P-values and confidence intervals provided for all comparisons.		SBP: -3.05 mmHg (95% CI: -5.20 to -0.91). DBP: -2.15 mmHg (95% CI: -3.36 to -0.95).

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
Shi, H., Liu, C., & Luo, H.-Y. (2025).	Impact of community public health care on treatment effect, health cognition, and self-management in patients with type 2 diabetes.	Randomized Controlled Trial (RCT) Aim of Study: To evaluate the impact of community-based public health nursing on blood glucose control, health cognition, and self-management in patients with Type 2 Diabetes Mellitus (T2DM).	Country of Study: China (developed country). 100 participants randomized (50 per group). Location: Urban areas Sample Characteristics: Age: Mean 64.8 years (Conventional nursing group) and 63.7 years (Community nursing group). Sex: Male (57%), Female (43%). Majority were retired or low-income individuals. Participants had limited health literacy and self-management skills. Health-related factors: Mean BMI: 27.0 kg/m ² . Diabetes duration: ~6.8 years. Inclusion Criteria: Diagnosed with T2DM per Chinese Diabetes Society guidelines.	Randomized controlled trial (RCT) using a random number table method. Minimization of confounding: Both groups had similar baseline characteristics (P > 0.05) Statistical significance reported (P < 0.05) SPSS 21.0 software. Chi-square test (χ^2) and t-test used for statistical comparisons.	Single-center study (Chengdu, China). Small sample size (N=100). Short duration (6 months). Lack of long-term follow-up data. Patients with cognitive impairment may limit applicability to broader T2DM populations.	Primary Outcomes: Blood glucose control (Fasting Blood Glucose, 2-hour Postprandial Blood Glucose). Diabetes cognition level. Self-management ability. Secondary Outcomes: Patient satisfaction scores. Blood Glucose Control: Fasting Blood Glucose: Intervention: 9.71 → 6.52 mmol/L (P = 0.020). Control: 9.67 → 7.41 mmol/L. Postprandial Blood Glucose: Intervention: 14.12 → 8.43 mmol/L (P < 0.001). Control: 14.08 → 10.65 mmol/L. Diabetes Cognition Score: Intervention: 12.54 → 19.66 (P < 0.001). Control: 12.82 → 15.34. Self-Management Ability Score: Intervention: 31.38 → 41.60 (P < 0.001). Control: 30.46 → 35.98. Satisfaction Rate: Intervention: 98% (P = 0.027). Control: 86%.

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
Tanaka et al. (2021)	Effects of physician's diabetes self-management education using Japan Association of Diabetes Education and Care Diabetes Education Card System Program and a self-monitoring of blood glucose readings analyzer in individuals with type 2 diabetes: An exploratory, open-labeled, prospective randomized clinical trial	Single-center, prospective, open-label, randomized clinical trial. Aim of Study: To evaluate the effects of physician-led diabetes self-management education (DSME) using the Japan Association of Diabetes Education and Care (JADEC) Diabetes Education Card System Program and a self-monitoring of blood glucose (SMBG) analyzer on glycemic control in individuals with type 2 diabetes receiving insulin therapy.	<p>≥18 years old with normal cognitive function.</p> <p>Country of Study: Japan (developed country) Location: Urban healthcare setting. Sample Characteristics: Age: Mean age of participants was 61.0 ± 8.4 years. Sex: Majority male (60 males, 16 females). Inclusion Criteria: Age ≥20 years. Diagnosed with type 2 diabetes for ≤5 years. Had been using SMBG for ≥3 months. HbA1c level between 7.0% and 11.0%. Capable of answering study questionnaires. Receiving insulin therapy (covered under the Japanese national health insurance).</p>	<p>Participants were randomly allocated into Intervention and Control groups using stratified block randomization considering age, HbA1c, and insulin injection frequency.</p> <p>Sample Size at Baseline: Total Sample (N): 76 Intervention Group (N): 38 Control Group (N): 38</p> <p>Analysis used unpaired t-tests, Mann–Whitney U-tests, and Wilcoxon's signed rank tests.</p> <p>Stepwise linear regression assessed associations between HbA1c changes and other variables.</p> <p>No intention-to-treat (ITT) analysis was mentioned.</p> <p>Innovative Educational Tool: The study evaluates the JADEC Diabetes</p>	<p>Single-center study limits external validity.</p> <p>Open-label design introduces bias.</p> <p>Small sample size with no power calculation.</p> <p>Physician-driven treatment adjustments may confound results.</p> <p>Follow up in 6 months, longer-term studies to evaluate sustainability of HbA1c improvements.</p> <p>Small Sample Size & No Power Calculation.</p> <p>The study may be</p>	<p>Primary Outcome: Change in HbA1c levels over 6 months.</p> <p>Secondary Outcomes: Change in BMI, SMBG frequency, insulin dose. Diabetes Treatment-Related Quality of Life (DTR-QOL).</p> <p>SMBG questionnaire scores (perceived importance, pain, frustration, confidence, willingness to share results).</p> <p>HbA1c Changes: Intervention Group: Baseline HbA1c 8.0% → 7.7% at 6 months (p < 0.05). Control Group: Baseline HbA1c 8.0% → 7.9% at 6 months (p = 0.63, not significant). Between-group difference not statistically significant (p = 0.412).</p>

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
				Education Card System Program. Conducted within a hospital-based environment, reflecting actual clinical practices.	underpowered to detect meaningful differences.	
Yaagoob et al. (2024)	People with type 2 diabetes experiences of using WhatsApp-based diabetes self-management education and support: The process evaluation	Qualitative descriptive study using semi-structured interviews. Aim of Study: To explore the experiences of people with type 2 diabetes mellitus (T2DM) using a newly developed WhatsApp-based diabetes self-management education and support (DSMES) program.	Country of Study: Saudi Arabia Location: Urban setting in the southwest region of Saudi Arabia. Sample Characteristics: Total Participants Interviewed: 23 out of 40. Age: Not explicitly provided, but participants ranged from young adults to older adults. Sex: 12 males (52.2%), 11 females (47.8%). Marital Status: 82.6% were married. Education Level: 47.8% had a high school diploma, 39.1% had a university degree. Income Levels: Varied, with 34.8%	Total Sample (N): 40 (RCT participants). Interviewed Participants (N): 23. Qualitative Content Analysis (Elo & Kyngäs framework). Data Coded & Categorized into Themes. Interviews transcribed & validated by experts. Positive Experiences: Participants found the program accessible, convenient, and effective. Barriers Overcome: Reduced need for travel, time-saving, easy healthcare access. Lifestyle Changes: Increased engagement in healthy diet, exercise, glucose monitoring.	Interviews were conducted 1–3 months post-intervention. Participants were already engaged in DSMES, potentially biasing results toward positive experiences. No comparison group (qualitative study design). Single-center study limits applicability to other regions and healthcare settings. No objective health outcomes	Primary Outcome: Participant experiences with WhatsApp-based DSMES. Themes Identified: Acceptability (Ease of use, navigation, content appropriateness, cultural relevance). Flexible accessibility (Ease of reaching healthcare providers, no travel/appointments needed). Promoting a healthy lifestyle Improved knowledge, motivation, self-efficacy, peer support. Future program preferences. Desire for real-time engagement, additional healthcare professionals, family involvement.

Author's Last Name; Pub. Year	Title of Publication	Type of Study	Participants	Major Strengths of the Study	Major Weakness of the Study	Main Outcomes of Findings
			<p>earning more than SAR 10,000/month.</p> <p>Diabetes Management: 78.3% used oral hypoglycemic agents. 21.7% used both oral agents and insulin.</p> <p>Diabetes Duration: 47.8% had diabetes for more than 5 years. 26.1% had diabetes for one year or less.</p> <p>Health Status: 82.4% had no diabetic complications. Some reported hypertension (13%), heart disease (4.3%), and hyperlipidemia (13%).</p> <p>Inclusion Criteria: Adults diagnosed with T2DM. Participated in the 6-week WhatsApp-based DSMES intervention. Provided informed consent.</p>	<p>Cultural Relevance: Participants valued guidance on meal planning during Ramadan.</p>	<p>(HbA1c, BMI).</p>	

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