Improving Diabetes by Improving Diabetes Education in Primary Care

Loretta Wall, RN, BSN, MHI and April T. Hill, DNP, FNP, ENP

Arizona State University
Abstract

Diabetes is a leading cause of morbidity in the world. About 42 million people worldwide have diabetes. Poorly managed diabetes leads to long term complications and mortality. Diabetes self-management education (DSME) has been effective in preventing or delaying complications. The purpose of this project is to implement a diabetes self-management education (DSME) program in primary care and to evaluate its impact on glycemic control and diabetes knowledge in a selected group of adults 18 years or older in a community-based practice.

Keywords: diabetes education, diabetes self-management, hemoglobin A1C, DSME and structured diabetes education,
Improving Diabetes by Improving Education

Diabetes is one of the most common chronic diseases and is estimated to be the fifth leading cause of death in the country (Chaney, 2015). This prevalent disease is associated with the development of increasing mortality, morbidity and rising healthcare costs. Optimal diabetes care requires active involvement of patients. However, in order to engage, one must have an understanding of diabetes and how to manage it. Thus, diabetes education is the cornerstone of diabetes management.

**Problem Statement**

The complexity of diabetes remains a challenge for many people. About 422 million people, worldwide, have diabetes and the prevalence of this disease continues to rise (World Health Organization (WHO), 2016). In the United States, 29.1 million people have diabetes (Center for Disease Control (CDC), 2014). In the state of Texas, alone, an estimated 11% of adults have diabetes and 8% have pre-diabetes (Texas Department of State Health Services (TDSHS), 2015). Medicaid has spent more than $280 million on Texas beneficiaries with diabetes (TDSHS, 2015). In 2013, there were 5,262 diabetes related deaths in Texas (TDSHS, 2015). In a person with diabetes, there is a higher risk for serious health complications such as blindness, kidney failure, heart disease, stroke, loss of limbs and a 50% higher risk of death than a person without diabetes (CDC, 2014). Many of these complications are directly related to poor management of the disease (healthypeople.org, 2015).

Quality diabetes control is essential to preventing long-term complications. However, interventions aimed at managing this disease are often inefficient in many health care settings and patient populations. Thus, there is a need for change. One key
A catalyst for change is diabetes self-management education. Diabetes self-management education (DSME) provides individuals with knowledge, skill and the ability to navigate the multitude of daily decisions and activities necessary for better health outcomes (Powers, Bardsley, Cypress, Duker, Funnell, Fischl, Maryniuk, et al., 2015). The objectives of DSME are to support informed decision-making, self-care behaviors, problem solving, and active collaboration with the health care team to improve clinical outcomes, health status and quality of life (Powers, Bardsley, Cypress, Duker, Funnell, Fischl, Maryniuk, et al., 2015). This education is designed to address the patient’s health beliefs, cultural needs, current knowledge, physical limitations, emotional concerns, family support, financial status, and any other factors that may be an obstacle to successful diabetes self-management (Powers, Bardsley, Cypress, Duker, Funnell, Fischl, Maryniuk, et al., 2015). A well-known health initiative devoted to addressing issues spanning the diabetes continuum is the National Diabetes Education Initiative (NDEI). NDEI is a trusted online destination that delivers scientifically rigorous, evidence-based programs, curricula, and tools that enable practicing clinicians to view clinical practice guidelines, pathophysiology, understand rationale for early intervention with appropriate lifestyle and pharmacologic management to arrest disease progression (NDEI.org, 2017). Another source for diabetes education is American Association of Diabetes Educators. It is a multi-disciplinary professional organization dedicated to improving diabetes care through innovative education, management and support (AADE.org, 2017).
Background and Significance

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia with disorders of carbohydrate, fat and protein metabolism (Sadeghian, Madhu, Kannan, & Agrawal, 2016). This disorder is a result of defects in insulin secretion and/or insulin action (Sadeghian, Madhu, Kannan, & Agrawal, 2016). It is associated with microvascular and macrovascular disease, which can present as myocardial infarction, stroke, end stage renal disease, retinopathy and foot ulcers (McCulloch, Nathan, Mulder, 2017). It is now one of the leading causes of mortality in the world. (WHO, 2016). Hence, there is a need to gain control of this disease.

Diabetes self-management education (DSME) is critical in preventing or delaying complications of diabetes (Haas, Maryniuk, Beck, Cox, Duker, Edwards, 2014; Wong, Wong, Wan, Chan, Lam, 2015, Prezio, Pagan, Shuval, Culica, 2014). Researchers have found that the benefits of DSME are improved knowledge, constructive self-care behaviors, and better clinical outcomes such as lowered hemoglobin A1C levels, decreased risk of major complications, weight loss, and enhanced quality of life (Gumbs, 2012). Many diabetes education programs exist. However, their effectiveness varies.

Regardless of race and culture, group based self-management educational programs using structured guidelines have been significantly effective in improving glycemic control (Sadeghian, Madhu, Agrawal, Kannan, Agrawal, 2016; Essein ,Otu, Umoh, Enang, Hicks, Walley, 2017).

Structured group education is geared towards informed choice, empowerment, shared decision making, patient-centered care and social learning theory while other strategies suggest the importance of frequent interventions and regular follow-ups
undertaken over an extended period of time, to promote enduring change (Long & Gambling, 2011; Dineen, et al., 2014).

Recent collection of evidence is available to support the effectiveness of diabetes self-management education on diabetes. A randomized controlled trial was done to determine the success of a community-based group intervention in reducing the levels of hemoglobin A1c and long-term health risks (Lynch, Liebman, Ventrelle, Avery, Richardson, 2014). The intervention was culturally tailored and was more effective than usual care at improving glycemic control (Lynch, et al., 2014).

A different randomized study, conducted in internal medicine practices, general medical practices and group practices, assessed the efficacy of three different diabetes management interventions. (Piatt, Anderson, Brooks, Songer, Siminerio, Korytkowski, & Zgibor, 2010). The interventions included: Chronic Care Model, a Provider Only intervention and Usual Care practices. The study revealed sustained improvements in A1C, non-HDLc, and blood pressure at 3-year follow-up (Piatt, et al., 2010).

In continued efforts to promote better diabetes control, internet-based self-management programs have been explored. A randomized controlled trial of computer-based self-management interventions revealed only a small positive effect on blood glucose control (Pal, Eastwood, Michie, Farmer, Farmer, Barnard, Peacock, 2013). However, mobile phone interventions appear to have larger effects (Pal, Eastwood, Michie, Farmer, Farmer, Barnard, & Peacock, 2013).

Local health departments used a change facilitation model to implement quality improvement projects that focused on two major themes: increasing community outreach to patients and providers and improving internal operations related to the delivery of
diabetes self-management education services (Dearinger et al., 2013). Core components of the change model include quality improvement team development and on-site training. This training enabled the local health departments to gather data on patient needs and preferences and implement projects specific to their community. This improved the delivery of their diabetes self-management education services. Ultimately, it improved the number of patients receiving educational services (Dearinger et al., 2013).

Culturally tailored diabetes education can lead to significant improvements in self-care, as well. It is important to understand traditions in cultures and that just talking about diet and exercise is not enough to produce lifestyle changes (Carter, Berkley, Barba, Kautz, & Donald, 2013). Culturally appropriate health education is basically tailored to the cultural or religious beliefs or linguistic skills of the community being approached (Attridge, Creamer, Ramsden, Cannings,-John, & Hawthorne, 2014). A systematic literature review of RCTs was done to assess the effectiveness of culturally appropriate health education in people with diabetes. The results showed that there was glycemic control and increased knowledge of diabetes following culturally appropriate health education (Attridge, et al., 2014).

An education program was developed for people with diabetes mellitus already on insulin to enable effective self-management, improve confidence, reduce hypoglycemia and enable peer group support (Fairfield, Amin, & James, 2014). The curriculum was evidence based and tailored to the individual needs of groups. The structured education included use of a trained and competent diabetes educator; a written curriculum; quality assurance and regular audits. The content covered: understanding insulin action; monitoring blood glucose; understanding the influence of food and activity on blood
glucose levels; reducing the risk of hypoglycemia and its management and managing illness and travel. This team-led program resulted in an improvement in glycemic control as evidenced by decreased hemoglobin A1C, increased patient satisfaction and confidence.

**Internal Evidence**

In a primary care practice in southwestern U.S. with a high number of patients presenting with uncontrolled diabetes, health care providers must make a valid effort to encourage and empower individuals to self-manage their diabetes. Internal evidence from fieldwork reveals more than 70% of patients with diabetes has an HbA1c of 7.0% or higher. Some obstacles to adherence include access to medications, the inability to consistently stick to a diet plan, lack of exercise and lack of understanding the link between the food they consume and hemoglobin A1C.

There are methods for risk assessment, screening and patient education. Currently, a local primary care clinic in Texas, does not have a risk assessment or a screening tool for clients with diabetes. Additionally, there is no process in place to provide consistent structured patient education for individuals with diabetes.

New policies and interventions need to be developed and implemented to improve individuals’ participation in self-care behaviors, self-management and ultimately clinical outcomes. In light of diabetes self-management education being paramount to the improvement of an individuals’ quality of life, it would be interesting to know what is the most effective diabetes self-management education method. This inquiry has led to the clinically relevant PICOT question, “In adults with diabetes, how does a structured
diabetes self-management education compared to current practice of usual diabetes education affect HbA1c over 3 months?”

**Search Strategy**

Databases searched for the literature review included Cochrane, Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, and Academic Search Premier. The focus of the search strategy was to find literature to support the PICOT question. Keywords included; *Education and Diabetes self-management; Diabetes Self-management And Education AND Efficacy; Self-management education efficacy and diabetes; Structured diabetes education and effectiveness; Diabetes education and verbal; Diabetes education and improving clinical outcomes and structured; Diabetes Education AND self efficacy; DSME AND A1C; Structured diabetes education and clinical outcome*. The searches were restricted to peer-reviewed journals written in English and published from 2010 to 2017. Initial yields were produced, abstracts and results were examined to determine relevancy to the clinical question. Studies included evaluated the relationship between diabetes self-management education and improving clinical outcomes. Those excluded were articles that involved individuals without the diagnosis of diabetes, provided unclear documentation, inconclusive evidence, or were impertinent to this review.

The Cochrane Database (Appendix D) was assessed, yielding 5731 reviews. The CINAHL database was assessed (Appendix A), yielding 34 reviews. PubMed (Appendix B) was assessed, yielding 368 reviews. Academic Search Premiere database (Appendix C) was reviewed, yielding 2939 reviews. A total of 71 articles were collected from these searches, and then critically examined according to the level of evidence and clinical
relevancy. Thirteen final articles were chosen for inclusion in this review: Systematic reviews, randomized controlled trials, and meta analyses.

**Critical Appraisal and Synthesis**

Thirteen studies were included in this literature review, all of which were evaluated using Melnyk and Fineout-Overholt's (2010) hierarchy of rapid critical appraisal. Many of the studies answered the PICOT question and are within the last five years. Most of the studies are of high level of evidence. The articles ranged from level I to level VII evidence, with eleven of the thirteen studies ranking as levels I and II. (Appendix F). Although the one level VII article is not considered the strongest evidence, it offers important guidelines provided by experts on the topic of diabetes education. This information will be valuable in the development of an evidence-based project (EBP) focusing on improving clinical outcomes by improving diabetes education.

Most of the participants were between ages 40-60 years old and equally represent male and female. There is broad ethnic representation across studies. Globally, other countries are represented. The sample sizes are ranged from 88 to 520,345. Tools to measure outcomes varied across studies. However, 11 out of 14 measured HbA1C (Appendix F).

The instruments used are widely accepted and valid. The consistent measurements were those used measure HbA1c, self-efficacy, diabetes and distress (Appendix F). Measurements are valid and reliable as demonstrated by high construct validity reported as a Cronbach’s alpha. (Appendix E). Of the final 14 studies, nine were randomized controlled trials, three systematic reviews, one meta-analysis and one cross-sectional analysis. Seventeen variables were selected for inclusion in the synthesis table based on
relevance to the PICOT question (Appendix F).

Many studies found significant relationships between structured DSME and improved hemoglobin A1C. Some studies found significant relationships between culturally tailored education and improved HbA1C, diabetes knowledge and self-efficacy. Few studies found relationships between DSME and improved quality of life.

**Conclusion**

The current standard of care is inconsistent and ineffective in managing diabetes as evidenced by the rising burden of the disease. This literature review revealed that the cornerstone of diabetes management is diabetes education. This literature review revealed that multi-faceted, structured diabetes self-management education and culturally tailored diabetes education were more effective than usual practices. These approaches improve HbA1c, self-management skills, self-efficacy, diabetes knowledge and quality of life.

**Theoretical Framework**

Self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives (Bandura, 1994). Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. A person who is self-efficacious approaches difficult situations as challenges to be mastered instead of threats to be avoided. An efficacious individual approaches situations with assurances that can be controlled. In order to have adequate control over diabetes, one must have robust sense of efficacy to sustain the perseverant effort needed to succeed in maintaining a health lifestyle. The selected theory that describes the interrelated concepts and behaviors of this body of evidence is Self-efficacy theory (Appendix G).
**Conceptual Framework**

Ongoing self-care is necessary for effective management of diabetes. This is often achieved through diabetes self-management education. Healthcare providers must use evidence-based healthcare delivery models, such as the chronic care model (CCM), to improve outcomes for people with diabetes. The Chronic Care Model (Appendix H) is an organizing framework for improving chronic illness care by providing a multifaceted framework of six interrelated elements. The idea of CCM is that quality care is not isolated. It creates a culture and mechanisms that promote safe, high quality care; it assures the delivery of effective, efficient clinical care and self-management support; promotes clinical care that is consistent with scientific evidence and patient preferences; organizes patient and population data to facilitate efficient and effective care; empowers and prepares patients to manage their health and health care; and mobilizes community resources to meet the needs of patients (AADE, 2014).

The theoretical/conceptual framework presents a systematic way of understanding events, behaviors and/or situations. The selected framework will describe a set of interrelated concepts, definitions, and propositions that explain or predict events or situations by specifying relationships among variables.

This model can be applied to an evidence-based project. The CCM has proven to be effective in sustaining diabetes self-management programs. It could be incorporated in primary care by facilitating patient-centered care, patient empowerment and self-management support as it relates to diabetes. The CCM could help with assembling diabetes management protocol, tools and education materials that are user-friendly, culturally tailored and at the appropriate literacy level for people with diabetes.
**Evidence-Based Model**

The chosen evidence base model is that of Translating Evidence into Clinical Practice (Appendix I). This conceptual model is a systematic process grounded in change theory, research utilization and standardized nomenclature (Pipe, Wellik, Buchda, Hansen & Martyn, 2005). It facilitates the translation of research into practice (Pipe, et al.). There are six phases: assessing the need for change; linking the problem with interventions and outcomes; synthesizing the best evidence; designing a change in practice; implementing and evaluating the practice; and integrating and maintaining the practice change (Pipe, et al.).

**Applying Evidence to Practice/Methods**

Primary care providers can improve management of diabetes by improving diabetes self-management education. The evidence suggests that usual care is not sufficient in helping patients gain glycemic control. The evidence shows that structured and culturally tailored diabetes self-management education is effective in improving diabetes knowledge, self-efficacy, clinical outcomes and quality of life. The stakeholders include the providers, the healthcare workers and patients.

The first three phases of the EBP model were accomplished through fieldwork, the exhaustive search of evidence, and the critical appraisal and synthesis of that evidence. The design phase began with me utilizing the evidence to design a practice change for the primary care clinic.

The practice design was submitted and approved by Arizona State University Institutional Review Board committee. The setting was a primary care clinic in Mansfield, TX. The participants were scheduled for an office visit for pre-intervention
HbA1c check and Diabetes Knowledge Test (DKT). The DSME session was followed. It included diabetes educational videos and compiled sources for a DSME leaflet. This was followed by a post-test. Three months later, another HbA1c was drawn.

**Outcomes/ Results**

Data was collected, coded and entered into SPSS. With collaboration with a statistics consultant, descriptive statistics non-parametric tests were run to analyze data and produce figures and tables. Frequencies reported on all ordinal and nominal data. The sample consisted of 60% male and 40% female. Descriptive statistics was reported on all scale data. The average age of the participants is 72 (SD = 8.34) and the ages ranged from 65 to 82 years of age. There were clinical and statistical significant improvements in diabetes knowledge post intervention (p=0.043). There were clinical significant improvements in HbA1c values (P=1.00) post intervention.

**Impact/Discussion**

By implementing DSME programs in primary care and monitoring HbA1c, patients should gain improved diabetes knowledge, self-efficacy and glycemic control. Patients, providers and the health care system will see significant benefits from focusing on the implementation of evidence-based diabetes education program. Some strengths of the project include, the patients, provider and the office staff seemed very receptive to the practice change. However, there were some barriers: time and available staff. For sustainability, the office may have to set aside a specific day to do the education sessions or hire more people. Policy and procedural changes could help with the consistent provision of diabetes education in primary care.
Conclusion

The DNP project demonstrated that implementing DSME in primary care can improve diabetes knowledge and glycemic control. These results seem to be in line with the current literature. Patients and health care providers should consider DSME interventions in the primary care settings. This can improve patient knowledge about DM self-management and ultimately, improve health outcomes. This DNP project paves the way for future research that should focus on a larger sample across different populations.
References


Retrieved from guideline.gov


doi:http://dx.doi.org/10.1016/j.ampre.2014.08.016


## Appendix A

**CINAHL**

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Appendix B

Pubmed

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## Appendix E

### Evaluation Table

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<th>Citation</th>
<th>Theory/Conceptual Framework</th>
<th>Design/Method</th>
<th>Sample/Setting</th>
<th>Major Variables &amp; Definitions</th>
<th>Measurement/Instrumentation</th>
<th>Data Analysis (stats used)</th>
<th>Findings/Results</th>
<th>Level/Quality of Evidence; Decision for practice/application to practice</th>
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<tbody>
<tr>
<td>Attridge, et al. (2014). Culturally appropriate health education for people in ethnic minority groups with type 2 diabetes mellitus.</td>
<td>Chronic care model</td>
<td><strong>Design:</strong> Systematic Review</td>
<td><strong>Purpose:</strong> To assess the effectiveness of culturally appropriate health education for people in ethnic minority groups with type 2 diabetes mellitus.</td>
<td><strong>Sample:</strong> N= 7 n=1,000 Setting: Primary healthy care centers or hospital clinics; (USA, Canada, South Africa, New Zealand, Australia Gender: Male &amp; female (% unclear) AA; British South Asians; Surinam Asians; Mexican American; Peurto Ricans; American Somoans, Native Americans</td>
<td><strong>IV1:</strong> CAE <strong>IV2:</strong> Usual diabetes education <strong>DV1:</strong> Glycemic control (Change in HbA1C) <strong>DV2:</strong> Triglycerides <strong>DV3:</strong> Total Cholesterol <strong>DV4:</strong> Knowledge <strong>DV5:</strong> BMI <strong>DV6:</strong> QOL</td>
<td>Glycemic control: Laboratory measurements of HbA1C Self-efficacy: Stanford SE scale Diabetes SC behaviors: Summary of Diabetes Self-Care Activities; BIPQ</td>
<td><strong>Funnel Plots Random effects Model Meta analyses</strong></td>
<td><strong>DV1 – HbA1c improved after CAE (MD: -0.4%; 95% CI: -0.5 to -0.2)</strong> <strong>DV2: Reduction in Triglycerides (40% CI: -40 to -8)</strong> <strong>DV3: Neutral effects on total cholesterol DV4:</strong> Knowledge <strong>Level 1</strong></td>
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<td>Essein, et al., (2017). Intensive Patient Education improved Glycaemic Control in Diabetes Compared to conventional education: a RCT in a Nigerian Tertiary Care Hospital Funding: Novartis &amp; Biofem – Funders had no role in study design or data collection.</td>
<td>Chronic Care Model</td>
<td>Design Unblinded, parallel-group RCT</td>
<td>n=118</td>
<td>IV-Intensive Pt Education</td>
<td>HbA1C measurements obtained by nurses using Clover A1c Analyzer</td>
<td>SAS with two-sided hypothesis testing &amp; significance at the 0.05 level</td>
<td>Intensive Group HbA1C - 1.8% (95% CI= -2.4 to -1.2) lower than conventional group</td>
<td>Level II Strengths : Robust results demonstrating improved clinical outcomes Weakness: The trial had only 6 month f/u pd. Unclear on how generalizable the results are bc of pt population Practice: Can be used in practice to</td>
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<tr>
<td>Citation</td>
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<td>Sample/Setting</td>
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<td>Fairfield, et al., (2014). ‘Getting there’: the impact of structured insulin management education in a high ethnic ix population with type 1 and type 2 diabetes</td>
<td>Self Efficacy</td>
<td>Design</td>
<td>NICE guidelines</td>
<td>Purpose: develop an education program for people with type 1 or 2 diabetes to enable effective self-management, improve confidence, reduce hypoglycemia &amp; enable peer group support.</td>
<td>n= 40; 68% male; age 35-82y.o Caucasian: 18; Asian: 22 Setting: Cross river state Nigeria; Teaching hospital, endocrinology clinic.</td>
<td>Inclusion: Type 1 or 2 diabetes; on medications; Able to speak and understand English</td>
<td>IV:DAFNE for T1DM  IV2: DESMOND for T2DM DV1-A1C DV2 Lipids DV3 BP DV4 Quality of life</td>
<td>DV 1 – blood work DV 2: Blood work DV 3: BP cuff DV4:Pt feed-back; no scale was used</td>
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</table>

ADDQOL= Audit of Diabetes-Dependent Quality of Life; BP: Blood pressure CAE: Culturally appropriate education; CI: confidence interval; CMA= Comprehensive meta-analysis; CHW: Community health worker; CT = controlled trial; CV= Cardiovascular DEP: Diabetes education program. DSME= Diabetes self-management education; DTTP: diabetes teaching and treatment program. ES: effect size; GE = group education; HbA1C= glycylated hemoglobin; mo: month; N= no of studies; n= no of participants; PRiH (Peurto Rican identified Hispanic); PRIMAS: self-management oriented education program. PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-analysis. QOL: Quality of Life; RCT= randomized control trial; NICE: National Institute for Health and care Excellence. SDSCA- Summary of Diabetes Self-care activities; SYSTAT: Systat software. WMG – weekly mean glycemia; T2DM: Type 2 Diabetes Mellitus
<table>
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<th>Level/Quality of evidence/ Decision for practice/ application to practice</th>
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<td>Ferguson, et al., (2015). Does diabetes self-management education in conjunction with primary care improve glycemic control in Hispanic Patients, Funding- unclear Potential for publication bias</td>
<td>Chronic care Model</td>
<td>Design: Systematic Review &amp; Meta-analysis of PubMed, Cochrane Library, CINAHL</td>
<td>N= 24 n= 2784 Hispanic Mean age: 47.9-70.3 Setting: Diabetic Clinic MA, TX, NY, CA,PR</td>
<td>IV1: DSME individual IV2 DSME group IV3-DSME telephone/eletronic IV4: DSME multimodal</td>
<td>Glycemic control measured by blood draw: Hb A1C</td>
<td>PRISMA guidelines. Subgroup analyses Funnel plot Failsafe N test CMA</td>
<td>DV: At &gt; 6 month A1C reduction was -.25 (95% CI, -.42 to -.07) Most successful DSME = Culturally tailored</td>
<td>Level I Strengths: RCTs Weakness: Interventions represent large variability in DSME design; Heterogeneity; limited published studies. Practice: Usable</td>
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<td>Gonzalez, I., et al. (2015). Long-term effects of an intensive=practical diabetes education program and self-care</td>
<td>Chronic Care Self efficacy Cognitive behavior</td>
<td>Cross sectional study, repeated measure design. Purpose: Long term effects of DEP</td>
<td>N=1 n= 40: 57.5% Female: 23; Male: 17 Setting: Diabetes outpatient clinic San Cecillio University</td>
<td>IV-DEP DV1-HbA1c DV2: knowledge of Diabetes</td>
<td>ECODI scale SDSCA Diabetes Care Profile Confidence in Diabetes Self-Care Blood work</td>
<td>Non-parametric data were analyzed with McNemar ’s test ANOVA</td>
<td>DV1: HbA1c – lower at 6 mo &amp; 12 mo f/u P&lt;.000 SD = 1.28 DV2:</td>
<td>Level III Strengths: Results support hypothesis; Significant decrease inA1C; measures of glycemia; T2DM: Type 2 Diabetes Mellitus</td>
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ADDQOL= Audit of Diabetes-Dependent Quality of Life; BP: Blood pressure CAE: Culturally appropriate education; CI: confidence interval; CMA= Comprehensive meta-analysis; CHW: Community health worker; CT = controlled trial; CV= Cardiovascular DEP: Diabetes education program. DSME= Diabetes self-management education; DTTP: diabetes teaching and treatment program. ES: effect size; GE = group education; HbA1C= glycosylated hemoglobin; mo: month; N= no of studies; n= no of participants; PRiH (Peurto Rican identified Hispanic); PRIMAS: self-management oriented education program. PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-analysis. QOL: Quality of Life; RCT= randomized control trial; NICE: National Institute for Health and care Excellence. SDSCA- Summary of Diabetes Self-care activities; SYSTAT: Systat software. WMG – weekly mean glycemia; T2DM: Type 2 Diabetes Mellitus
No conflicts of interests declared

Funded by the Regional Ministry of Health Andalusia, Spain

Hospital in Spain

**Inclusion:** T1DM on insulin  
**Exclusion:** physical impairment; psychological impairment; been recently diagnosed; not being a native Spanish speaking.

SPSS software

Perceived barriers decreased Knowledge increased – Mean value increased(SD =1.24)

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<thead>
<tr>
<th>Citation</th>
<th>Theory/Conceptual Framework</th>
<th>Design/Method</th>
<th>Sample/Setting</th>
<th>Major Variables &amp; Definitions</th>
<th>Measurement/Instrumentation</th>
<th>Data Analysis (stats used)</th>
<th>Findings/Results</th>
<th>Level/Quality of Evidence; Decision for practice/</th>
</tr>
</thead>
</table>
| Hermanns, N. (2013). The effect of a diabetes education programme (PRIMAS) for people with type 1 diabetes: Results of a randomized trial. | | | | Design  
Multi-center Randomized trial - SYSTAT  
**Purpose:** develop an education program for people with type 1 or 2 diabetes to enable effective self-management, improve confidence, reduce hypoglycemia & enable peer group | n=160 participants  
Setting: Outpatient clinics in Germany  
**Inclusion:** Type 1  
**Age:** <18 & <75  
**BMI:** >20 & <40  
**HbA1c:** >7 & <13  
Informed consent; Ability to understand & speak German.  
**Exclusion:** Psychological or IV:PRIMAS  
**DV1:** DTTP  
**DV2:** A1C  
**DV3:** self management  
**DV4:** Distress  
**DV5:** Self-efficacy | DV1 – blood work  
DV2: Self-care behavior  
DV3: Diabetes-related distress scale  
DV4: Diabetes Self efficacy scale | 95% confidence interval – 0.4% -SYSTAT  
DV1: 0.4% greater reduction of DV2: HbA1c in PRIMAS; HbA1C unchanged in DTTP  
DV3: -PRIMAS = greater decrease in distress  
DV 4: PRIMAS = | |

**Strengths:**  
Weakness: Not blinded; .  
Practice: it has practice implications however, this article has low level of evidence.

ADDQOL= Audit of Diabetes-Dependent Quality of Life; BP: Blood pressure CAE: Culturally appropriate education; CI: confidence interval; CMA= Comprehensive meta-analysis; CHW: Community health worker; CT = controlled trial; CV= Cardiovascular DEP: Diabetes education program. DSME= Diabetes self-management education; DTTP: diabetes teaching and treatment program. ES: effect size; GE = group education; HbA1C= glycylated hemoglobin; mo: month; N= no of studies; n= no of participants; PRiH (Peurto Rican identified Hispanic); PRIMAS: self-management oriented education program. PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-analysis. QOL: Quality of Life; RCT= randomized control trial; NICE: National Institute for Health and care Excellence. SDSCA- Summary of Diabetes Self-care activities; SYSTAT: Systat software. WMG – weekly mean glycaemia; T2DM: Type 2 Diabetes Mellitus
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<th>Findings/ Results</th>
<th>Level of Evidence; Decision for practice/ application to practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piatt, et al. (2010). 3-Year Follow-up of Clinical and Behavioral Improvements following a Multifaceted Diabetes Care intervention</td>
<td>Chronic care Model Self-efficacy</td>
<td>Design RCT – 4 phases; cross sectional</td>
<td>Purpose: To determine if improvements observed in clinical, behavioral, &amp; psychosocial outcomes measured in 12 months following multifaceted diabetes care intervention were sustained at 3-year follow up</td>
<td>n=11 primary care n=42 providers n=119 patients Setting: Supurb of Pittsburgh, Pennsylvania; 11 Primary care practices Demograph: HS education; FT employment or PT employment Income level &gt;$20,000/yr; Home ownership Inclusion: diabetes; A1C &gt; 7%; informed consent;</td>
<td>IV1: Chronic care model IV2: Provider intervention only IV3: Usual Care DV1: Glycemia DV2: BP DV3: Self Monitoring blood glucose DV4: A1c</td>
<td>Clinical testing Questionnaire – Modified Diabetes Care Profile World Health Organization (Ten) Quality of Well being Index BP cuff Blood work - laboratory. A1C DCS 200 analyzer; Cholestech LDX system</td>
<td>Paired t tests McNemar SAS DV1; Glycemic improvement – (-0.5%) DV2 BP control (-4.8%) DV3: Self monitor blood glucose (86.7%-100%) DV4: A1c improvement p=.09 Non-HDLc P=.01</td>
<td>Level II Strengths: Chronic care model; 3 groups; Primary care offices; 4 phases; cross-sectional ;confirm multifaceted interventions Weakness: Small sample size University institutional review board did not permit contacts with</td>
</tr>
</tbody>
</table>

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<th>n=63 pts outpatient Setting: Sao Paulo, Brazil Inclusion: 35-75y.o A1C&gt;8 Exclusion: Noncompliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pimazoni-Netto, et al. (2011). Rapid Improvement of Glycemic Control in Type 2 Diabetes Using weekly intensive multifactorial interventions: structured glucose monitoring, patient education, and adjustment of therapy</td>
<td>Chronic Care Self efficacy Cognitive behavior</td>
<td>Design: Proof of concept RCT Purpose: to test the hypothesis that more frequent adjustment of therapy, combined with a multifactorial interdisciplinary approach could result in a more rapid glycemic control</td>
<td>Accuchek Performa Roche Bloodwork</td>
<td>IV-intensive treatment DV-WMG DV2: SD DV3: A1C</td>
<td>Computer analysis (SMBG); onside compariso n. WMG, SD, A1C. perform X² test to assess null hypothesis</td>
<td>DV1: Significant changes in WMG, DV2: SD &amp; DV3A1C occurred more rapidly in intensive treatment group.</td>
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<td>Level II Strengths: Results support hypothesis; Significant decrease in A1C Weaknesses: Small sample size; short duration of study; Practice: Practice implications because the study shows improved clinical outcomes</td>
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<tr>
<td>Rygg, et al. (2011). Efficacy of ongoing group based diabetes self-management.</td>
<td>Self-efficacy</td>
<td><strong>Design</strong> RCT – open pragmatic, parallel group; randomized by computer</td>
<td><strong>Purpose:</strong> To determine if improvements observed in clinical, behavioral, &amp; psychosocial outcomes</td>
<td><strong>IV1:</strong> DSME <strong>IV2:</strong> Usual Care</td>
<td><strong>DV1:</strong> A1C <strong>DV2:</strong> Self management</td>
<td>In A1C 90% power and a 0.05 significance level PAM score of 6.0(S.D 11.1) Analysis of covariance</td>
<td>A1C improvement – (-0.5% BP control (-4.8%) Self monitor blood glucose (86.7%-100%)</td>
<td>Level II Strengths: Intervention group showed better diabetes knowledge, improved self-management skills; Weakness: Participants had lower A1Cs than expected.</td>
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### Citation
Sadeghian, et al., (2016). Effects of self-management educational program on metabolic control in type 2 diabetes

### Theory/Conceptual Framework
Self-care theory

### Design/Method
Design: RCT; parallel group trial

**Purpose:** To evaluate the efficacy of a self-management educational program on metabolic control in type 2 diabetes

### Sample/Setting
n= 306
- **Mean age:** 45.42 (32-60)
- **Gender:** 47 male; 53.3% female
- **Setting:** Diabetic Clinic at Guru Teg Bahadur; India, hospital

### Major Variables & Definitions
- **Inclusion:** HbA1C > 8%
- **Exclusion:** T2DM

### Measurement/Instrumentation
- **Group education:** IV
- **Self-management practices:** Questionnaires, Clinical examination, Investigations

### Data Analysis
- Microsoft Excel
- SPSS
- Chi-square
- Independent t-test
- McNemar’s test
- Generalized estimation equations

### Findings/Results
- Significant improvement in HbA1c (P = .001)

### Practice
- Levels/Quality of Evidence: Decision for practice
- **Level II Strengths:** Study proved self-management program improves metabolic control
- **Weakness:** Practice

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<tbody>
<tr>
<td>Tang, et al. (2014). Comparative Effectiveness of peer Leaders and Community Health Workers in Diabetes Self-Management Support Funding: Peers for Progress grant from American Academy of Family Physicians Foundation, National institute of Diabetes &amp; Digestive, CDC; Funding sources had no role in the study design, data collection, administration of interventions, analysis, interpretation or reporting of data or decision to submit findings for</td>
<td>Self care</td>
<td><strong>Design:</strong> RCT <strong>Purpose:</strong> compare peer lead vs community health worker outreach intervention in sustaining improvements in A1c</td>
<td>n= 116 Setting: University of Michigan <strong>Age:</strong> 48-50 <strong>Inclusion:</strong> at least 21 y.o Regular health care provider Self-identified as Latino <strong>Exclusions:</strong> physical limitations Terminal health Psychiatric illness excessive alcohol or illicit drug use</td>
<td>IV1- Peer lead DSME IV2: Community worker DV1- HbA1c DV2 CV disease risk DV3: distress</td>
<td>Laboratory: HbA1c, cholesterol</td>
<td>Longitudinal analysis</td>
<td>Both PL &amp; Community leader led to improved patient outcomes. PL- HB1c: (-0.6 – 6.6mmol). (P=0.0004) CHW: -0.3 to -3.3) P=0.234</td>
<td>Level II Strength: high level of evidence HbA1C Weakness: Small sample size</td>
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Appendix F

Synthesis Table

<table>
<thead>
<tr>
<th>Author</th>
<th>Attridge</th>
<th>Essien</th>
<th>Fairfield</th>
<th>Ferguson</th>
<th>Gonzalez</th>
<th>Hermanns</th>
<th>Johnson</th>
<th>Pimazoni-Netto</th>
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<tr>
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DSME: Diabetes Self-Management Education; N/A: Not available; RCT: randomized controlled trial; SE: Self efficacy scale; SR: Systematic review; US: United State; USA: United States of America;
Appendix G

BANDURA’S SELF-EFFICACY THEORY

Influences

- Performance Accomplishments
- Vicarious Learning
- Social Persuasion
- Emotional Arousal

Perceived Self-Efficacy

Possible Outcomes

- Persistence
- Performance
- Approach versus Avoidance
Appendix H

The Chronic Care Model

Community
Resources and Policies
- Self-Management Support

Health Systems
Organization of Health Care
- Delivery System Design
- Decision Support
- Clinical Information Systems

Improved Outcomes

Informed, Activated Patient
Productive Interactions
Prepared, Proactive Practice Team

Developed by The MacColl Institute
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Appendix I

EBP Model

1. **Assess**
   - Need for change in practice
   - Include stakeholders
   - Collect internal data about current practice
   - Compare internal data with external data
   - Identify problem

2. **Link**
   - Problem intervention and outcomes
   - Use standardized classification systems and language
   - Identify potential interventions and activities
   - Select outcomes indicators

3. **Synthesize**
   - Best evidence
   - Search research literature related to major variables
   - Critique and weigh evidence
   - Synthesize best evidence
   - Assess feasibility, benefits, and risk

4. **Design**
   - Practice change
   - Define proposed change
   - Identify needed resources
   - Plan implementation process
   - Define outcomes

5. **Implement and evaluate**
   - Change in practice
   - Pilot study demonstration
   - Evaluate process and outcome
   - Decide to adapt, adopt, or reject practice change

6. **Integrate and maintain**
   - Change in practice
   - Communicate recommended change to stakeholders
   - Present staff inservice education on change in practice
   - Integrate into standards of practice
   - Monitor process and outcomes

Source: Urof Nurs © 2005 Society of Urologic Nurses and Associates