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Interventions to Improve the Management of Medically Uninsured Adult Patients with Type 2 Diabetes Mellitus in Primary Care, Community-Based Settings

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Interventions to Improve the Management of Medically Uninsured Adult Patients with Type 2 Diabetes Mellitus in Primary Care, Community-Based Settings.

by

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DEDICATION

This project is dedicated with eternal gratitude to my parents, Ann and Jim Miskovich, who provided unwavering encouragement and abiding love. You instilled a sense of purpose in me and inspired me to believe that I could accomplish anything! You are my heroes.

To my children, Casandra and Jeffrey, who reminded me on the bad days that I was not alone. I'll love you forever and like you for always. I'm so very proud of you! You are my starshine and sunshine.

To my siblings, Nancy, Jim, Tom, and best friend Judy: thank you for your steadfast encouragement, love, and support. Sue and Karen, your kindness will never be forgotten.

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ABSTRACT

Interventions to Improve the Management of Medically Uninsured Adult Patients with Type 2 Diabetes Mellitus in Primary Care, Community-Based Settings

This project measured the effect of a clinical algorithm on the provision of care to medically uninsured adult patients with type 2 diabetes and a low socioeconomic status (SES). Primary providers often fail to implement established standards for diabetes care to their maximal benefit and do not achieve American Diabetes Association (ADA) treatment standards. Saydah, et al. (2004) reported that only 48% of patients with diabetes achieved the recommended HbA_{1c} goal, and 33% reached blood pressure and LDL targets. Goals for all three clinical parameters were obtained by only 7% of patients. The Stetler Model of Evidence-based Practice (EBP) provided the framework for this project. The setting was a primary care clinic for the medically uninsured. Practice patterns for primary care providers were compared to the 2010 ADA standards through chart audits (*N* = 61). An EBP clinical algorithm was designed and placed within each chart and a focused clinic visit was offered. After three months, a posttest chart audit assessed changes in health care provider practice patterns. Data analysis included descriptive statistics, means, and paired *t* test describing practice patterns prior to and following implementation of EBP recommendations. All of the 22 process of care standards demonstrated improvement. A pretest audit revealed the mean number of the standards completed was 13.68 (SD = 5.15) and posttest audits identified an increase in the mean number to 18.91 (SD = 4.91). This difference was statistically significant, $t(60) = -9.23$, ($p = .000$). The implementation of an evidence-based clinical algorithm to prompt provider interventions resulted in improved care to medically uninsured, adult patients with diabetes.

Key Words: Evidence–based practice, type 2 diabetes, medically uninsured, low socioeconomic status, and clinical algorithm.

CHAPTER 1

INTRODUCTION

Evidence-based practice (EBP) is crucial for promoting excellence in health care. EBP is a problem-solving approach that incorporates the best available research evidence to guide clinical decision-making (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Key elements of the process include: (a) developing a systematic search for relevant evidence, (b) critically appraising the evidence, (c) integration of clinical expertise, and (d) incorporating patient preferences and values into the decision (Melnyk & Fineout-Overholt, 2005). The Institute of Medicine's Health Professions Educational Summit (Greiner & Knebel, 2003) identified the use of EBP as one of the five core competencies for health care education. Advanced practice nurses (APNs) must become competent consumers of the best available evidence to guide clinical decision-making. The doctor of nursing practice (DNP) prepares advanced practice nurses (APNs) to design and implement EBP projects within various healthcare settings, in the search for improved quality in health care.

Background

Diabetes currently affects an estimated 23.6 million people, or 7.8% of the United States (US) population. Another 57 million American adults have pre-diabetes (Center for Disease Control [CDC], 2008). The nonwhite ethno-racial groups and those with low socioeconomic status (SES) are at higher risk of acquiring diabetes (Brown et al., 2004; Hux & Mei, 2003). The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) (2007) reported that for people aged 20 years or older, 6.6% of non-Hispanic whites, 7.5% of Asian Americans, 10.4% of Hispanics, and 11.8% of non-Hispanic blacks had a diagnosis of diabetes. The overall prevalence of diabetes is increased in those with low education and income (Brown et al., 2004). Low SES increases ones

vulnerability for higher morbidity and mortality associated with diabetes (Dray-Spira, Gary-Webb, & Brancati, 2010; McEwen et al., 2007).

Flaskerud and Winslow (1998) contend that a lack of socioeconomic and environmental resources increase a population's exposure to risk factors and inhibits their ability to evade illness. Socioeconomic resources encompass social status, income, education, housing, social support, and marginalization. The authors equate environmental resources with access to health care and quality. Reduced access to healthcare was associated with poverty, ethnic minorities, limited transportation, unsafe neighborhoods, a limited number of healthcare providers, and an under or uninsured healthcare status.

Glazier, Bajcar, Kennie, and Willson (2006) in a systematic review of *Interventions to Improve Diabetes Care in Socially Disadvantaged Populations*, define socially disadvantaged groups as "those that have low SES or belong to an ethno-racial minority" (p. 1675). They conceptualize "social disadvantage as related to patient, provider, and health system factors that can affect self-management and provider management and ultimately manifest as clinical outcomes" (p. 1675).

The health burden of diabetes remains unevenly distributed across socioeconomic strata. In people with diabetes, SES influences access to healthcare, health behaviors, and the quality of care (Dray-Spira, Gary-Webb, & Brancati, 2010). The National Health Interview Surveys have documented lower educational attainment, higher unemployment, and lower family income among Americans who have reported having diabetes, although the influence of race was not assessed (Drury, Danchik, & Harris, 1985). Data from the Second National Health and Nutrition Examination Survey (NHANES II) suggest that the racial disparity in diabetes may be greatest at lower levels of education and income, especially among women (Cowie et al., 1993).

The direct and indirect costs of diabetes were estimated at $176 billion; this included $116 billion for direct medical costs and $58 billion related to disability, loss of work, and premature mortality (NIDDK, 2007). Much of the burden of the cost of diabetes treatment is attributed to potentially preventable microvascular and macrovascular complications. Outcomes of the Diabetes Control and Complications Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS) have demonstrated the benefits associated with intensive glucose control in preventing or hindering the onset of chronic complications (DCCT, 1993; Stratton et al., 2000; UKPDS, 1998). Evidence-based practice standards of care for patients with diabetes focus on glycemic, lipid, and blood pressure screening and control (American Diabetes Association [ADA], 2010). Failure to follow the current practice standards results in sub-optimal clinical outcomes (Couch, Sheffield, Gerthoffer, Ries, & Hollander, 2003; O'Connor et al., 2005; Peterson et al., 2008). Primary care providers are responsible for the delivery of evidence-based care to reduce the risk of costly, acute and chronic complications of diabetes.

Statement of the Problem

Data from the literature supporting the need for the project.

Randomized trials have demonstrated that aggressive glycemic control, as measured by serum HbA_{1c} levels (DCCT, 1993), will reduce complications associated with diabetes (UKPDS, 1998). The 2010 ADA Standards of Medical Care in Diabetes establishes a HbA_{1c} goal of < 7% (ADA, 2010). Although evidence-based treatment standards are available for managing diabetes and treating or preventing its complications, these interventions are commonly underutilized, particularly among individuals of low SES (Cowie & Eberhardt, 1995; Karter, Ferrara, Darbinian, Ackerson, & Selby, 2000). Primary care providers often fail to implement established standards for

diabetes care to their maximal benefit and do not achieve treatment goals established by the ADA (Coon & Zulkowski, 2002; Saaddine et al., 2002).

Population based studies confirm treatment goals are frequently not met (Harris, Eastman, Cowie, Flegal, & Eberhardt, 1999; Saaddine et al., 2002). The Third National Health and Nutrition Examination Survey (NHANES III) (Harris, Flegal, Cowie, & Eberhardt, 1998) conducted from 1988-1994 and the NHANES 1999-2000 (Koro, Bowlin, Bourgeois, & Fedder, 2004) comprised nationally representative samples of the noninstitutionalized civilian US population, obtained by a complex, stratified, multistage probability cluster sample design. Both surveys oversampled non-Hispanic blacks, Mexican Americans, and individuals aged 60 years and older; NHANES 1999-2000 also oversampled low-income individuals. Participants were interviewed in their homes to establish sociodemographic, medical, and family history data. A standardized set of physical examinations and laboratory measurements was performed in a mobile health center. In both surveys, HbA_{1c}, total serum cholesterol, and blood pressure were measured. The overall response rate for completion of the interview and physical examination was 78% in the NHANES III and 75% in NHANES 1999-2000. Data from the two NHANES studies demonstrated inconsistency between current evidence-based practice standards and the reported clinical outcomes.

Saydah, Fradkin, and Cowie, (2004) examined the trends in control of risk factors that encompassed nearly a decade using data from the NHANES III (N = 1265) and the NHANES 1999-2000 (*N* = 441). In the NHANES 1999-2000, only 37.0% of subjects achieved the target goal of HbA_{1c} level < 7.0%, and 37.2% were ≥ 8.0%; these percentages did not change significantly from the NHANES III (*p* = .11 and *p* = .87, respectively). Only 35.8% of participants achieved the target of systolic blood pressure (SBP) < 130 mm Hg and diastolic blood pressure (DBP) < 80 mm Hg, and 40.4% had hypertensive blood pressure levels (SBP ≥ 140 or DBP ≥ 90 mm Hg). These

percentages did not change significantly from the NHANES III (p= .10 and p= .56, respectively). Over half (51.8%) of the participants in the NHANES 1999-2000 had total cholesterol levels of 200 mg/dL or greater (vs. 66.1% in the NHANES III; $p < .001$). “In total, only 7.3% (95% confidence interval, 2.8%-11.9%) of adults with diabetes in the NHANES 1999-2000 attained recommended goals of HbA_{1c} level < 7%, blood pressure < 130/80 mm Hg, and total cholesterol level < 200 mg/dL (5.18 mmol/L)” (p. 335).

The inconsistency between evidence-based practice recommendations and actual practice is partially attributed to “clinical inertia,” (Shah, Hux, Laupacis, Zinman, & Van Walraven, 2005) which has been defined as the acknowledgment of a problem with a patient’s management, but a failure to take action and alter the plan of care (Phillips et al., 2001). Previous studies have shown that clinical inertia hampers the care of patients with diabetes. A study of 1,028 patients with elevated HbA_{1c} levels found that 54% had no adjustments to their therapy over one year of surveillance (Wetzler & Snyder, 2000). An additional study reported appropriate therapy was initiated for only one-half of patients with diabetes not meeting glycemic control targets, one-third of patients not meeting blood pressure targets, and less than one-quarter of patients not meeting LDL cholesterol targets (Grant et al., 2004).

Considerable data exists about disparities in health care related to race, ethnicity, and SES. The 2006 National Healthcare Disparities Report identified disparities in nearly every aspect of health care, ranging from preventive care through the management of chronic illness (Agency for Healthcare Research and Quality [AHRQ], 2006). This disparity holds true for uninsured adults with diabetes. In industrialized nations type 2 diabetes is common in all populations; however, it disproportionately affects socially and materially disadvantaged adults (DeNavas-Walt, Proctor, & Smith, 2006; Institute of Medicine [IOM], 2007). For example, insured adults with diabetes undergo a dilated eye examination three times more often than the uninsured (Beckles et al., 1998). The

medically uninsured patient demonstrates a seven times increased risk of having retinopathy (Baker, Watkins, Wilson, Bazargan, & Flowers, 1998). The uninsured receive fewer preventive health services and examinations of the feet and demonstrate poorer glycemic control (Beckles et al., 1998). Ward (2009) found the incidence of end-stage renal disease (ESRD) was higher in areas with poorer financial access to care. The incidence was also greater in areas with more frequent hospitalizations for hyperglycemic complications, "indicating that poorer diabetes-specific care was associated with higher rates of ESRD caused by diabetes" (Ward, 2009, p. 1035).

Diabetes is most often managed in a primary care setting. Despite evidence that appropriate diabetes management enhances outcomes (DCCT, 1993; UKPDS, 1998), studies indicate primary care providers are not meeting current ADA standards of care. Rationales for the failure to achieve ADA treatment goals include the lack of knowledge, time, personnel, treatment protocols, and altered clinical focus associated with treating both acute care and chronic care patients within the primary care setting (Rothman & Wagner, 2003).

Interventions to improve the provision of care to patients with diabetes may address self-care strategies, the health care provider, or the health care system (Glazier et al., 2006). The purpose of this EBP project was to systematically identify and analyze evidence that delineates strategies to improve health care provider interventions to adult patients with type 2 diabetes and low socioeconomic status within a primary care, community-based setting. The outcome of the review of literature provided the evidence upon which the EBP intervention was designed, implemented, and evaluated. It is imperative to provide primary care providers and the clinics in which they work, with resources designed to overcome clinical inertia and improve the provision of care for patients with diabetes. King and Wolfe (2009) noted that "attempts to improve care in any one area should involve modest time requirements and capitalize on the resources

currently available to the practice" (p. 25). Denver, Barnard, Woolfson, and Earle (2003) demonstrated disease-specific clinics provide more effective intervention than general practice, where acute and chronic care patients are managed. This approach can be adapted within a primary care nurse-managed clinic.

Data from the clinical agency supporting the need for the project.

The Catherine McAuley Clinic (CMC) is a faith-based nurse-managed primary health care clinic that provides services to the medically uninsured residing within Northwest Indiana and living within 200% of the federal poverty level. The Sisters of Mercy and the Sisters of Saint Francis founded the clinic, opened on March 11, 1996, as a response to the 1994 Healthy Community Survey which revealed a lack of available healthcare services for the medically uninsured.

Data from 2008 revealed 11,713 patient visits; this increased to 20,479 patient visits in 2009 and 26,390 in 2010. Approximately 55% of the patients are between ages 51 – 65 years, followed by 40% between ages 36 – 50 years. Seventy-five per cent are female and 25% are male. The racial characteristics include: 45% Caucasian, 30% Hispanic, and 20% African American. Over 79% of the patients followed at the CMC reside within the city of Hammond. The remaining 21% represent a variety of northwest Indiana communities, including Whiting, Griffith, Gary, and East Chicago (Kozub, 2010).

Professional Research Consultants (2005) completed an epidemiologic study that examined the health status of citizens in northwest Indiana using Healthy People 2010 objectives. This study identified serious health disparities among citizens of northwest Indiana in comparison with Healthy People 2010 goals; these disparities are particularly evident among people living within 200% of poverty and those from minority backgrounds. A needs assessment of minority populations in Lake County reported comparable findings. The Indiana Minority Health Coalition's analysis of existing health data revealed that considerable health disparities exist by race and ethnic group. Results

of focus groups and key informant interviews conducted with Lake County residents indicated that they perceived “HIV/AIDS, diabetes, heart conditions, and strokes as major health problems” (Jewell et al., 2005, p. 4). The study identified significant barriers to accessing healthcare such as: (a) culture, (b) communication between provider and patient, (c) lack of health knowledge and promotion, (d) personal and economic situation, (e) system problems, and (f) lack of transportation (Jewell et al., 2005). These findings are consistent with the current demographic profile of CMC patients.

The 2009 CMC Annual Report (Kozub, 2010) identified diabetes, hypertension, and obesity as the primary diagnoses of patients treated at the clinic. An informal review of patient charts, conducted in preparation for a grant, revealed considerable variation in provider interventions with patients presenting with diabetes. Currently, the clinic lacks a formalized quality assurance process. Therefore, statistical data was not available. Discussion with the CMC manager affirmed the need to develop tools that enhance EBP interventions to meet the needs of patients with diabetes (M. Kozub, personal communication, May 7, 2010).

Purpose of the EBP project

While several studies have suggested patients with diabetes achieve improved glycemic control with care from specialists compared to care received from primary care practitioners, the specific interventions resulting in this difference have not been established (De Berardis et al., 2004; Shah, Hux, Laupacis, Zinman, & Van Walraven, 2005). Additionally, referral from primary care to diabetes specialty care is not a consistent viable option for the medically uninsured due to cost.

Literature sources identify several potential interventions to improve the quality of care provided to patients with diabetes. Glazier et al., (2006) completed a systematic review of interventions to enhance diabetes care in those with low SES. The interventions focused on one of the following: (a) the patient with diabetes, (b) the health

care provider, or (c) the health care system. Results demonstrated the need to adapt interventions to the local community. Recommended adaptations require individualized provider-to-patient intervention with attention to health literacy and cultural sensitivity. Over 10 patient contacts were recommended over a six-month time period. The use of "community educators" was recommended, however may result in additional resource demands for their education, supervision, and maintenance. This systematic review of the literature also noted key strategies that include "individualized assessment and reassessment, incorporating treatment algorithms, focusing on behavior-related tasks, providing feedback, and high-intensity interventions delivered over a long duration" (Glazier et al., p. 1687).

This EBP project began with posing the clinical question that directed the subsequent investigation. All concepts related to the clinical issue were reviewed prior to delineating the clinical question. This included a review of current evidence-based practice standards for the management of diabetes and evidence available on the management of type 2 diabetes with patients from a low SES within a community-based setting. An integrative review of the best evidence published since 2005 was completed, thus expanding the current published systematic review. This review was completed to identify and synthesize evidence regarding the effectiveness of provider interventions to improve diabetes care among patients from lower SES. The critique included research published between January 2005 and January 2011. Pertinent findings from the literature reviewed were translated into a plan and then implemented into practice at the CMC. The final step included evaluation of the change in practice.

The PICO format was utilized to identify a specific question for completion of the literature review (Melnyk & Fineout-Overholt, 2005). This format clarified and classified the patient population, intervention, comparison, and outcome of interest.

P: What is the patient population? Adult patients with low SES and Type 2 diabetes. Low SES is defined as those residing within 200% of poverty and medically uninsured.

I: What is the intervention of interest? A clinical algorithm based on the 2010 ADA standards, to prompt provider interventions.

C: What is the comparison of interest? Current practice, established through a review of patient charts.

O: What is the outcome of interest? Improved patient assessment and monitoring by the primary care provider.

Specifically, the PICO question addressed by the EBP project was: Will a clinical algorithm improve diabetes care in adult patients with low SES within a nurse-managed, primary care, outpatient setting?

Significance of the project

In 2006, diabetes was identified as the seventh leading cause of death. Overall, the risk of death among those with diabetes is approximately two times greater than similar aged individuals without the disease (CDC, 2007). In the US, diabetes is the leading cause of renal failure, acquired blindness, and nontraumatic limb amputations. It is a major contributor to cardiovascular disease, accounting for over 70% of deaths in adults with diabetes (CDC, 2007). An estimated 60 – 70% of patients with diabetes are diagnosed with nervous system damage, resulting in neuropathy, erectile dysfunction, gastroparesis, carpal tunnel syndrome, or additional neurologic dysfunction (CDC, 2007; Shahady, 2008).

Currently, a gap exists between provider knowledge and patient management, resulting in poor patient outcomes. Saydah et al. (2004) reported that only 48% of patients with diabetes, receiving primary care, achieved the recommended HbA_{1c} goal,

and 33% reached blood pressure and LDL targets. As noted earlier, goals for all three clinical parameters were obtained by only 7% of patients.

The purpose of this EBP project was to determine if implementing and evaluating a clinical algorithm would reduce the performance gap demonstrated in diabetes care within a predominately nurse-managed primary care clinic. The implementation of EBP standards should result in improved provider interventions with medically uninsured, adult patients diagnosed with diabetes. The burden of diabetes can be reduced if evidence-based targets are achieved for LDL cholesterol, blood pressure, and $HbA_{1c.}$ Improved quality of care will result in decreased acute and chronic complications of diabetes.

CHAPTER 2

FRAMEWORKS AND REVIEW OF LITERATURE

In this chapter two frameworks applied to the EBP project are discussed. An integrative review of the literature pertinent to the project will then follow.

EBP Framework: The Stetler model of EBP

The Stetler/Marram model of research utilization was first published in 1976 to facilitate application of research findings at the provider level of practice (Stetler & Marram, 1976). Since that time, the model has undergone several refinements to facilitate research utilization in the academic setting and the practice setting at both the organizational and the provider level (Stetler, 1994). The current Stetler model is "practitioner-oriented" with its focus on critical thinking and implementation of research findings by the individual provider. EBP evolves from research utilization related actions that are both integrated and sustained in practice (Melnyk & Fineout-Overholt, 2005).

The concept of evidence is a key component of the model. Stetler (2001) differentiates external and internal evidence. External evidence is defined as "research findings but also includes consensus of national experts" (p. 272). Internal evidence includes the components listed and "other sources of credible information or data" (p. 272). These sources include systematically obtained data from local consensus opinion, experience of groups or individual practitioners, and information from "performance, planning, quality, outcome, and evaluation activity" (Melnyk & Fineout-Overholt, 2005, p. 189).

The Stetler model outlines a prescriptive series of five phases to assess and use research findings, which facilitates safe and effective EBP. These phases include:

1. Preparation: This phase initiates the process by defining the purpose, issue, problem, or need, and verifying the priority. Potential internal and external

factors, such as beliefs, resources, or time lines, that may affect the decision making process, are identified. The preparation phase also includes systematically initiating a search for relevant research literature.

2. Validation: The second phase involves systematically analyzing each study to determine the quality of evidence and clinical significance. Each study is validated regarding its relative level of support for the key topic. During this phase the practitioner determines if there is sufficient evidence to continue.
3. Comparative evaluation/decision making: During this phase the practitioner synthesizes and evaluates the findings to determine desirability and feasibility of applying the findings to practice.
4. Translation/application: During this phase, the evidence is converted into a plan and implemented.
5. Evaluation: The final phase requires evaluating the plan based on the degree to which it was implemented and the outcomes (Stetler, 2001).

The model integrates a set of assumptions that stimulate the critical thinking and practitioner orientation of the model. A core assumption is that research utilization can occur both formally and informally. Formal organization-sanctioned research utilization projects often result in new organizational policies, procedures, or protocols. Informally, practitioners may apply research findings to enhance or validate current practice, alter a way of thinking about an issue, assessment, treatment plan or intervention strategy (Melnyk & Fineout-Overholt, 2005; Stetler, 2001). Utilization may be directly observable or indirect and difficult to delineate; the outcomes may alter one’s way of thinking or affect an observable plan of action.

An additional assumption is that nonresearch-related evidence will supplement research findings; this includes alternative sources of evidence such as national consensus reports, local program data, and affirmed local consensus. Stetler affirms

internal and external factors can impact the view and use of evidence. The lack of knowledge and skills related to research utilization and EBP can inhibit appropriate and effective use. The final assumption is that research and evaluation do not provide us with absolutes; “outcomes do not provide unconditional direction for application to all patients, in all situations” (Stetler, 2001, p. 274).

Application of the EBP framework to the EBP project.

In the first phase of the Stetler model, preparation, the purpose of the project that guided the literature review was identified. The CMC manager assisted with identification of a primary clinic need. Verification of need and support was obtained from key staff members and the clinic advisory board. Staff provided input, and a tentative timeline for implementation of the EBP project was established. Delineation of the PICO question and objective of the integrative review preceded the literature search. The intent of the review was to examine the evidence identifying factors that enhance provider interventions with medically uninsured adult patients, with low SES, diagnosed with type 2 diabetes that receive healthcare at a primary care clinic. Initial literature searches with the refined PICO question yielded little relevant literature. However, the university’s research librarian provided very useful information to ensure literature searches generated the results intended.

The second phase of the Stetler model, validation, involved analyzing the chosen literature with utilization as a guiding concept. Using the Critical Appraisal Skills Programme (CASP, 2007) the articles identified were analyzed and critiqued. The Rating System for Hierarchy of Evidence provided by Melnyk and Fineout-Overholt (2005), was then utilized to rate the level of evidence (see Table 2.1). Based on the strength of evidence, it was determined there was sufficient evidence to continue. The literature review of interventions to enhance provider care to low SES patients with diabetes revealed that each of the following was effective:

- cultural tailoring of the intervention,
- use of community educators,
- one-on-one patient to provider interventions with individualized assessment and reassessment,
- use of treatment algorithms by health care providers,
- focus on behavior-related tasks in the intervention,
- use of patient feedback regarding control of disease, and
- high-intensity interventions (>10 contact times) delivered over a long duration (≥ 6 months) (Glazier et al., 2006).

The third phase, comparative evaluation/decision making, incorporated an assessment of the findings from the literature and a determination of level of desirability and feasibility to apply to practice. During this phase, potential risks involved, the required resources, and the readiness of staff were considered. Key stakeholders of the EBP project included clinic nurses, the CMC manager and the medical director, four primary care providers that included two nurse practitioners and two physicians, and patients. Overwhelming support for the project was evident with the majority of stakeholders. This was manifested by active participation in the planning process. However, one primary provider was resistant to any proposed change in his/her established pattern of providing care. This resistance was met with providing additional individualized education regarding EBP, the project, current practice standards, and organizational support manifested by allowing for patient referrals to a focused diabetes clinic.

The fourth phase, translation/application, involved translating the results into a plan and then implementing it. Dissemination of EBP recommendations based on the review of the literature was completed at staff and individual face-to-face provider meetings.

Table 2.1

Rating System for the Hierarchy of Evidence

Level	Description
Level I	Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs) or EBP clinical guidelines based on systematic reviews of RCTs
Level II	Evidence obtained from at least one well-designed RCT
Level III	Evidence obtained from well-designed controlled trials without randomization
Level IV	Evidence from well-designed case-control and cohort studies
Level V	Evidence from systematic reviews of descriptive and qualitative studies
Level VI	Evidence from a single descriptive or qualitative study
Level VII	Evidence from the opinion of authorities and/or reports of expert committee

Note: Adapted with permission from Melnyk, B. M., & Fineout-Overholt,E. (2005).*Evidence-based practice in nursing and healthcare, p. 10.* Philadelphia: Lippincott, Williams, and Wilkins.

All stakeholders received a verbal synopsis of the EBP project, including an overview of the data generated from the literature review. The EBP project integrated major recommendations from the systematic review of the literature. No one intervention was identified as superior to the other options. The EBP project included:

- Establishing a set clinic day “focused” on culturally sensitive, individual provider-patient interventions. Two nurse practitioners provided focused diabetes care on each Tuesday. Patients with diabetes seen at the clinic were presented the option of attending a focused visit or maintaining a routine visit with the provider of their choice. Providers were also free to refer patients to the focused diabetes clinic. One bi-lingual nurse practitioner, fluent in Spanish, was available to provide comprehensive care to Hispanic patients.
- All providers were encouraged to schedule a minimum of one monthly patient visit for those not achieving glycemic, lipid, or blood pressure targets. Based on EBP recommendations, the visit frequency was increased for the majority of patients not achieving the recommended ADA goals.
- A clinical algorithm representing current ADA evidence-based practice was developed and placed within the chart of each patient diagnosed with diabetes (Appendix A). The algorithm provided a prompt for appropriate EBP primary care provider clinical interventions. Current recommendations for individualized patient assessment were included.
- The clinical algorithm included a prompt to evaluate behavior-related tasks with each patient visit. This encompassed an assessment of patient knowledge, skills, and behaviors related to diabetes and high-risk lifestyle activities (Appendix A).

- A patient report card was developed to provide individual patient feedback that reflected the level of control of disease. All providers were asked to complete the report card at the initial visit or upon diagnosis of diabetes and then quarterly. One copy of the patient report card remained within the chart and one was provided to the patient (Appendix B).

While the implementation of EBP clinical recommendations presented very low stakeholder risk, there were potential financial risks for the clinic. Increased cost associated with providing focused diabetes care was attributed to expanded visit time and frequency. However, the CMC management and advisory board determined that the benefits realized to patients in terms of improved quality of care would compensate for the time and resources allocated to the expanded focused care. Lastly, provider readiness to implement an EBP clinical algorithm that prompts patient intervention was assessed.

The fifth and final phase, evaluation, included an assessment of the EBP plan based on the extent to which it was implemented and the outcomes achieved. A chart audit tool was developed to reflect each component of the ADA practice standards and the clinical algorithm (Appendix C). An initial chart audit was conducted prior to implementation of the EBP plan. At that time, charts were reviewed to determine whether implementation of established clinical practice standards had occurred in the preceding year. The date of the intervention was identified to later delineate an appropriate date for recommended annual evaluations. Three months following the implementation of the clinical algorithm and focused diabetes clinic, a second audit was completed.

Strengths and limitations of the EBP framework. Each of the five phases of the Stetler model was implemented which resulted in a well-designed execution of the EBP project. A major strength was the model's characterization of evidence as something that

provides proof for decision making, encompassing the results of formal research as well as the consensus of identified experts. The individual practitioner focus provided direction in a series of critical thinking steps developed to reduce barriers to effective implementation of the best evidence.

Theoretical Framework: The Transtheoretical Model of Behavior Change

The Transtheoretical Model (TTM) of health behavior change has been beneficial to those interested in enhancing motivation for behavioral change in patients. More recently, the model is being applied to the field of organizational change (Prochaska, Prochaska, & Levesque, 2001). The application of the TTM to healthcare providers when a change to EBP is warranted could continue to expand its practical efficacy. In this model, five distinct motivational stages are identified (Vallis et al., 2003):

- Precontemplation. The individual is not intending to change in the foreseeable future, typically measured as the next six months.
- Contemplation. The individual is not committed to take action at present, but is intending to within the next six months.
- Preparation. The individual is actively considering changing his or her behavior in the immediate future (e.g., within the next month).
- Action. The individual has actually made an overt behavior change in the recent past, but the changes are not well established (i.e., for six months or less)
- Maintenance. The individual has changed his or her behavior for over six months and is working to sustain the overt change (Ruggiero & Prochaska, 1993).

Prochaska et al. (2001) reported that resistance to change in an organization is often the result of poorly planned implementation and is the major cause of failure. The

TTM provides a guide to stimulate a change to EBP for those in the precontemplative and contemplative stages. Within either stage, the focus is on establishing a professional relationship with individuals and "assisting them to progress to the next stage of readiness, rather than working with them on actual behavior change strategies" (Melnyk, & Fineout-Overholt, 2005, p. 450). Interventions to facilitate the movement from the precontemplative or contemplative stages to a stage of readiness to change include intensification of provider beliefs that EBP results in improved patient outcomes and highest quality of care. It is imperative to support the providers' self-efficacy (Melnyk, & Fineout-Overholt, 2005) throughout the change process. Healthcare providers in the preparation or action stage require assistance with applying EBP strategies; examples might include assistance with literature search strategies, conducting a critical appraisal, or implementing the evidence based plan.

When matching the stage in which the individual healthcare provider is currently engaged, with the intervention strategies, the TTM proposes that resistance, tension, and the time needed to implement the change should decrease (Prochaska et al., 2001). The TTM advocates matching the intervention to promote change to the individual care provider's stage of readiness to change. This process supports and encourages full provider participation in the EBP change initiative, regardless of their readiness to take action.

Application and Strengths of the Theoretical Framework to the EBP Project.

The TTM allowed for the identification of the process of change and the stage of readiness to change for each healthcare provider. Once identified, a guide for planned interventions to facilitate change was developed. Even if health care providers are aware of the evidence and are willing to change, to alter well established patterns of care is difficult, especially if the clinical environment is not conducive to change. A key challenge in all avenues of health care is to create a professional setting to pursue

quality of care (Grol & Grimshaw, 2003). Most current knowledge of obstructions to and motivations for change is not derived from well designed prospective studies, but from observational studies and theoretical reflections (Grol & Wensing, 2004).

The TTM enables the 'change agent' to adapt information and provide support according to the individual's (or group's) stage of readiness, with the collective effect producing a desired permanent behavioral change. Although the model was initially devised to motivate behavioral change in patients, it is now finding use within the field of EBP (Chilvers, Harrison, Sipos, & Barley, 2002).

The TTM does not provide an established tool to assess the stage of change for health care providers. However, a number of tools focused on the measurement of health behavior change for health promotion activities, such as physical activity, smoking cessation, self-management of diabetes or healthy diet are available. A questionnaire to determine provider readiness to change was adapted from existing tools (Appendix D). Interventions to motivate change were then tailored to each provider's stage of change (Appendix E).

Literature search

Sources examined for relevant evidence. An integrative review was carried out since it allowed for the inclusion of a broad range of primary research using both qualitative and quantitative methods. Five databases were searched to identify relevant evidence. Additionally, current evidence-based clinical practice standards for the management of diabetes were identified.

Search engines. Five databases were searched to identify relevant evidence. These included: Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Cochrane Library, Joanna Briggs Institute (JBI), and ProQuest. An additional hand search from the related reference lists was also included.

Key words. Key words used in various combinations were applied within each search engine to identify pertinent references. The key words included: type 2 diabetes mellitus, non-insulin dependent diabetes, primary care, protocol, algorithm, outcome, treatment outcome, healthcare outcome, professional compliance, low socioeconomic status, medically uninsured, and poverty.

Inclusion criteria. Inclusion criteria for the literature review included sources that were: (a) published after 2000; (b) targeted primary care provider interventions directed toward adults with type 2 diabetes living within a low SES or identified as medically uninsured or underinsured; (c) conducted within community-based, primary care settings; (d) written in English; and (e) conducted in industrialized countries. Journal articles, dissertations, systematic reviews, and EBP standards were included in the review. Initially, 63 citations were identified; however, following application of the inclusion criteria, only 12 studies warranted a closer review.

Exclusion criteria. Sources were excluded if they: (a) were a poor quality of evidence; (b) targeted a specific age group other than adults, such as pediatric, adolescent, or geriatric populations; (c) targeted patients with gestational diabetes; (d) focused on acute care facilities; (e) addressed health-care system design; or (f) focused on patient self-management. Additionally excluded articles included those studies published in a foreign language and not clearly specifying the medically uninsured or low SES groups. Of the 63 citations identified, 51 met the exclusion criteria.

Expert opinions. Clinical practice standards combine research data and expert knowledge to guide decisions for a specific health problem (Fleming, 2006). The 2010 ADA Clinical Practice Standards were utilized as the reference for this EBP project (ADA, 2010).

Relevant evidence. Initially, citations and abstracts of articles were reviewed to identify sources that potentially met the inclusion criteria. Then, a full text review was

conducted to determine alignment with both inclusion and exclusion criteria. The review of the literature revealed relatively little work that addressed the effectiveness of provider interventions to improve care of the patient with diabetes and low SES. Comparable results were identified by Brown (2007). While numerous comprehensive reviews have evaluated the effectiveness of provider interventions to improve diabetes care at the patient, provider, health care system, and community levels, they fail to address those with low SES. Available reviews identify improved diabetes outcomes by self-management, education, disease management, case management, family interventions, and integration of community health workers; however, each fails to address the effectiveness of interventions among disadvantaged groups (Armour, Norris, Jack, Zhang, & Fisher, 2005; McEwen et al., 2007; Norris, Engelgau & Narayan, 2001; Norris, Lau, Smith, Schmid, & Engelau, 2002; Peterson et al., 2008).

A review of the results from each database searched is found in Table 2.2. Initially 12 publications were identified; however only ten were found to be appropriate for inclusion and two were excluded. Ultimately, one systematic review and nine individual studies met all criteria and were included in the review. The PubMed search resulted in a systematic review of “Interventions to improve diabetes care in socially disadvantaged populations” (Glazier et al., 2006). An analysis of this systematic review revealed evidence about health system interventions to improve diabetes care and patient self-management, thus it was excluded. However, a hand search of the reference list revealed five studies that met all of the inclusion criteria (Chapin, Williams, & Adair, 2003; Clancy, Brown, Magruder, & Huang, 2003; Davidson, Karlan, & Hair, 2000; Echeverry, Dike, Washington, & Davidson, 2003; Jovanovic et al., 2004). The Pub Med search identified a second systematic review that assessed the effectiveness of evidence-based medicine tools available to primary care professionals to improve the quality of type 2 diabetes management. This review supported the use of provider

feedback reports and the implementation of individual computer based decision support systems to improve the process of care. Because this review failed to address provider interventions or those with low SES and focused on organizational design (de Belvis et al., 2009), it was excluded.

The five studies identified through a hand-search of references from Glazier et al. (2006) were conducted in primary care settings and focused on adult patients with type 2 diabetes and low SES. Of these five studies, two were randomized controlled trials (Clancy et al., 2003; Jovanovic et al., 2004), two were comparative studies (Davidson et al., 2000; Echeverry et al., 2003), and one was a prospective controlled trial (Chapin et al., 2003).

One Cochrane Collaboration systematic review was identified that focused on an "intervention to improve the management of diabetes mellitus in primary care, outpatient and community settings" (Renders et al., 2009, p. 1). This systematic review included studies published through 2000. While the review was not limited to patients with low SES, a hand search of the citations revealed the inclusion of seven studies addressing patients with low SES. The review addressed health provider performance, encompassing process outcomes that were consistent with those identified in this EBP project. A search of Joanna Briggs Institute did not result in relevant evidence.

In CINHAL, a search with all key words used in various combinations resulted in 15 potential sources. Application of inclusion and exclusion criteria resulted in five sources; one randomized control trial (Rothman et al., 2010) and one observational study (Parchman, Romero, & Pugh, 2006). One study was a duplicate (Glazier et al., 2006) and the remaining two failed to meet inclusion criteria. A search of ProQuest resulted in three potential sources. However, after application of inclusion criteria only two met all criteria. Of these, one was a qualitative study (Larme & Pugh, 2001) and the

other a randomized control trial (Phillips et al., 2005). The culmination of all searches and application of inclusion and exclusion criteria resulted in 10 relevant sources.

Levels of evidence.

The Rating System for Hierarchy of Evidence (Melnyk & Fineout-Overholt, 2005, p. 10) was utilized to rate the level of evidence (see Table 2.1). Quality of evidence was systematically appraised using the Critical Appraisal Skills Programme (CASP, 2007). The appraisal tool employs 10 questions that are designed to systematically assess the evidence. A total score of 20 points, two per question, indicates each study construct was completed. If the information was not available one point was assigned, and no points were awarded if the study construct was not completed. Each of the ten studies was given a quality grade based on the following scores: 0-7 =unacceptable, 8-14 = fair and 15-20 = excellent. Appendix F provides a summary of the evidence including study design, level of evidence, CASP score, objective, outcome, intervention, and level of evidence.

Appraisal of Relevant evidence.

A summary of major findings and clinical recommendations from the inclusive literature with the level of evidence is depicted in Appendix F. The Cochrane Systematic Review (Renders et al., 2009) examined the effects of healthcare provider interventions or the organizational system, on improving the management of patients with diabetes in primary care, outpatient, and community settings. The review included forty-one studies involving more than 200 practices and 48,000 patients. Twenty-seven studies were randomized control trials (RCT), 12 were controlled before and after studies (CBAs), and two were interrupted time series (ITS). The studies were diverse in terms of interventions, participants, settings, and outcomes. All studies utilized multiple intervention strategies. Twelve studies targeted interventions provided by health

Table 2.2

Included and Excluded Literature in Search

Database	Included Literature	Excluded Literature
Cochrane Library	Renders, et al., 2009	
CINAHL	Rothman, et al., 2010	Glazier, et al., 2006 (duplicate)
	Parchman, Romero & Pugh, 2006	
PubMed	Chapin, Williams, & Adair, 2003	Glazier, et al., 2006
	Clancy, Brown, Magruder, & Huang, 2003	de Belvis et al., 2009
	Davidson, Karlan, & Hair, 2000	
	Echeverry, Dike, Washington, & Davidson, 2003	
	Jovanovic, et al., 2004	
ProQuest	Larme & Pugh, 2001	
	Phillips et al., 2005	
Joanna Briggs Institute	No applicable studies	

professionals, nine targeted the organization, and 20 studies targeted both. The review reported that a combination of professional interventions improved process outcomes. These outcomes included continued education, chart audit, provider feedback, peer review, chart reminders or prompts, and local consensus processes. However, the impact of these interventions on patient outcomes was infrequently assessed and remained less clear.

Eight of the individual studies applied either one or a combination of the following provider interventions: (a) focused diabetes management team, (b) application of a clinical algorithm or prompt, (c) provider feedback following chart review, and (d) the provision of a focused patient visit. Each of the reviewed references evaluated the impact of provider interventions on the integration of the ADA process of care clinical practice standards. The ninth study (Larme & Pugh, 2001) utilized a qualitative approach to identify factors that hindered the application of diabetes practice standards within the clinical setting.

Five individual studies evaluated the effect of a diabetes management team on diabetes process of care: Chapin et al. (2003); Clancy et al. (2003); Davidson et al. (2000); Jovanovic et al. (2004); and Rothman et al. (2010). Four of these studies (Chapin et al., 2003; Davidson et al., 2000; Jovanovic et al., 2004; Rothman et al., 2010) also addressed the potential impact of a clinical algorithm and provider feedback on improved process of care. Clancy et al. (2003) evaluated the effect of a diabetes management team in combination with a focused patient visit on diabetes process of care. Two studies (Echeverry et al., 2003; Phillips et al., 2005) evaluated the effect of combined provider feedback following chart audit with the use of a clinical algorithm to prompt provider process of care interventions. Two studies targeted intervention on a focused diabetes care office visit (Clancy et al., 2003; Parchman et al., 2006). One study

investigated the impact of a focused patient visit on the integration of evidence-based process of care interventions (Parchman et al., 2006).

Key components of the nine individual studies are summarized according to major interventions. Parchman et al. (2006) examined the relationships between quality of diabetes care delivered, the type, and length of the visit, and time to the next follow-up visit within 20 primary care clinics for 211 patients. During each patient encounter, the quality of diabetes care was measured as the percentage of the five following services delivered providing they had not been offered in the previous year: foot examination, referral for an eye examination, a glycosylated hemoglobin (HbA1c) measurement, a lipid panel, and a urine microalbumin test. They found that primary care encounters with patients diagnosed with type 2 diabetes were multifaceted and often occurred with competing demands that served as a barrier to delivering necessary diabetes services. The following findings supported this conclusion: (a) diabetes services were less likely to occur during visits for acute illness; (b) the percentage of indicated services delivered increased as the duration of the visit increased; and (c) follow-up visits were scheduled sooner if fewer of the indicated services were delivered.

Jovanovic et al. (2004) utilized a RCT to determine if using specific, population-directed, case management strategies could improve glycemic control in ethnic minority and/or low-income populations compared to other groups. This study utilized registered nurses and registered dietitians working in collaboration with an endocrinologist to provide diabetes case management to the intervention group. Evidence-based practice standards and algorithms for medication and insulin initiation and/or regulation were used. Results demonstrated that diabetes case management was a viable treatment approach that could significantly improve glycemic control in disadvantaged populations. Davidson et al. (2000) evaluated diabetes case management carried out by pharmacists in a free medical clinic. The pharmacists followed an algorithm written by a diabetologist

who was also available for telephone consultation on an as needed basis. Subjects within the intervention group demonstrated a 0.8mg/dl reduction in HbA1c when compared to the non-intervention group.

Echeverry et al. (2003) evaluated the effectiveness of a low-literacy diabetes educational reminder card presented to the provider by individual patients versus use of a standardized diabetes progress note. The researchers sought to determine if the reminder card would enhance use of ADA process measures by primary providers. Findings indicated process measures of diabetes care (foot exam, urine protein, and lipid panel testing) were met moderately well. However, the use of a standardized diabetes progress note was more effective in prompting the ordering of process measures.

Rothman et al. (2010) employed a RCT to determine if a comprehensive disease management program designed to overcome clinician deficits and patient barriers, including low literacy, improved blood pressure, and glycemic control. The comprehensive disease management program included: (a) application of evidence-based treatment algorithms, (b) one-to-one educational sessions including medication management and counseling, and (c) strategies to overcome patient barriers to care. Intervention patients with low literacy were significantly more likely to obtain goal HbA1c and blood pressure. This study demonstrated that a comprehensive diabetes management program benefited patients with low literacy to a greater extent than patients with higher literacy.

Chapin et al. (2003) evaluated the impact of a visual tool, the “Take Home Diabetes Record” (THDR) that depicts glycemic control on subsequent measurements of HbA1c. The THDR served as a clinical prompt that was provided to intervention patients at a primary care visit. This prompt was later handed to the health care provider at the subsequent office visit. The THDR served to stimulate patient and provider responses to

the glycemic levels. A greater decrease in mean HbA1c versus control subjects was identified (0.047) resulting in improved glycemic control.

Clancy et al. (2003) evaluated group visits in the management of patients with low SES and type 2 diabetes. Patients were randomly assigned to receive care in groups or continue usual care. Patients who received care in groups demonstrated improvement in the ADA standards of care, improved sense of trust in the healthcare provider, and reported improved coordination of care, increased community orientation, and enhanced culturally competent care.

One study (Phillips et al., 2005) addressed provider clinical inertia, and researchers investigated interventions that improved process of care and patient outcomes. Health care providers were randomized to one of the following intervention groups: (a) received reminders that provided patient specific recommendations for management at the time of the patient's visit, (b) face-to-face feedback on performance, and (c) both interventions. Those receiving both feedback and a chart reminder demonstrated the greatest improvement in patient outcomes for glycemic control. Feedback on performance aimed at overcoming clinical inertia was shown to improve glycemic control.

One qualitative study (Larme & Pugh, 2001) sought to identify factors that impeded the application of diabetes practice standards within the clinical setting. Open-ended, semi-structured interviews lasting 1-2 hours were conducted with 32 key informants (physicians, certified diabetes educators, researchers, and agency personnel) in South Texas, an area with high diabetes prevalence and a large proportion of minority and low-income patients. The study revealed that knowledge deficits and negative attitudes of health care providers, in addition to contextual barriers, must be addressed to facilitate implementation of diabetes practice standards in clinical practice. Recommendations to reduce these barriers included an increased focus on prevention,

improvements in health care delivery for chronic diseases, and increased attention to the special needs of minority and low-income populations. Appendix F provides a summary of the reviewed literature.

Construct EBP

The reviewed evidence supports the implementation of the following strategies to improve health care provider interventions to adult patients with type 2 diabetes and low socioeconomic status within a primary care, community-based setting:

- Implementation of an evidence-based clinical algorithm;
- Focused diabetes office visits;
- Feedback on clinical performance;
- Clinical reminders or prompts;
- Continuing education on current evidence-based practice standards; and
- Frequent one-on-one culturally sensitive interventions.

Synthesis. The literature review supported the use of multifaceted provider interventions that result in improved process of care for patients with type 2 diabetes and a low SES. Ultimately, the goal when managing patients with diabetes is to prevent the acute and chronic complications or alleviate the co-morbid health problems of hypertension, dyslipidemia, retinopathy, and nephropathy. Enhanced process of care measures can potentially reduce existing health disparities in diabetes care and improve clinical outcomes.

The results reported in the Cochrane Systematic Review (Renders et al., 2009) identified improved adherence to process of care standards when a combination of provider education with chart audit, provider prompts, and provider feedback was implemented. The impact on patient outcomes was less clear, as the majority of studies

failed to report these outcomes. Those assessing patient outcomes reported improvement in blood pressure, lipids, and/or glycemic control.

Only one study (Parchman et al., 2006) applied a single professional intervention that explored the effect of a focused diabetes visit on process of care. This observational study demonstrated that 100% of all process-of-care indicator services were delivered with a mean visit time of 19.4 minutes. However, patient outcomes were not reported.

Combinations of two or three interventions were utilized within the remaining individual studies. Four of these studies implemented a focused diabetes management team in combination with a clinical algorithm or prompt, and healthcare provider feedback following a chart review (Chapin et al., 2003; Davidson et al., 2000; Jovanovic et al., 2004; Rothman et al., 2010). In these studies, improved process of care measures resulted in a decline in HbA_{1c} that ranged from 0.9% (Chapin et al., 2003) to 3.5% (Davidson et al., 2000).

Two of the studies utilized a clinical algorithm and provider feedback (Echeverry et al., 2003; Phillips et al., 2005). Both studies demonstrated improved ADA process of care measures. Echeverry et al. (2003) did not report patient outcomes; however, Phillips et al. (2005) reported a 0.6% reduction in HbA_{1c}.

One study examined the effect of a diabetes management team combined with a focused group patient visit on provider interventions (Clancy et al., 2003). This study demonstrated statistically significant improvement in achievement of the ADA process of care indicators. Upon completion of the study, the intervention group demonstrated greater improvement in glycemic and lipid control; however, the results were not statistically significant.

The one qualitative study (Larme & Pugh, 2001) revealed that provider knowledge deficits and negative attitudes interfered with diabetes care. Additionally, several contextual barriers existed that impeded the ability to implement evidence-based

care. Major barriers included negative attitudes toward diabetes care, lack of resources, low reimbursement rates, increased patient loads, and lack of time. All of these factors resulted in provider reported failure to implement diabetes practice standards within a primary care setting. The identified contextual barriers must be addressed if evidence-based standards are to be implemented in clinical practice. Larme and Pugh (2001) recommended continued education of health care providers to disseminate new knowledge; however, they also acknowledged the need for changes in the US health care delivery system before the major contextual barriers to evidence-based diabetes care can be removed. Recommendations for changes within the current healthcare system that supported enhanced diabetes prevention strategies, improved chronic illness care, and an increased focus on the health care needs of minority and impoverished groups are needed.

Best practice model recommendation.

Poorly controlled glycemia among individuals with type 2 diabetes comprises a major public health problem in the US. Inadequately controlled diabetes correlates with premature death, disability, and decreased quality of life. The major therapeutic objective for prevention of acute and chronic complications of diabetes is glycemic control (Bowlin et al., 2004). The reviewed evidence supports the implementation of the following strategies within the EBP project to improve health care provider interventions for adult patients with type 2 diabetes and low socioeconomic status within a primary care, community-based setting:

- Implementation of an evidence-based clinical algorithm to prompt provider interventions;
- Focused diabetes office visits;
- Patient feedback on clinical outcomes;

- Clinical reminders or prompts;
- Continuing education on current evidence-based practice standards; and
- Frequent one-on-one culturally sensitive interventions.

The Cochrane systematic review (Renders et al., 2009) determined that multifaceted provider interventions including reminders, audit, feedback, peer review, and consensus processes improve the performance of health care providers. The evidence presented in the literature served as the basis for development of provider interventions that may enhance the overall quality of care provided to low SES patients with type 2 diabetes that receive primary care at the CMC.

Guideline implementation and response to the clinical question. The clinical question was developed with input from the CMC manager. An initial review of the literature was completed to identify the current EBP standards of care for adults with type 2 diabetes. This data provided the framework for the development of a clinical algorithm, patient report card, and chart audit tool. All staff at the clinic received a copy of the tools and an overview of the EBP project. This was followed with a staff meeting that focused on defining EBP, the EBP project, and a review of current EBP ADA clinical standards. The provider readiness to change assessment was administered and the results were used to develop interventions that supported provider use of EBP.

An initial chart audit was conducted to obtain baseline data from each of the four primary health care providers at CMC. Charts from fifteen patients with a diagnosis of type 2 diabetes, were evaluated for each provider to determine process of care for the prior year. The indicators for process of care included: blood pressure, blood glucose, HbA_{1c}, weight, LDL cholesterol, HDL-cholesterol, triglycerides, serum creatinine, urine microalbumine–creatinine ratio, assessment of the feet, examination of sensation to feet, annual influenza vaccine, making a follow up appointment, and referral for an annual dilated eye examination (Appendix A). The process of care indicators are consistent with

the 2010 ADA Clinical Practice Standards (ADA, 2010). An assessment of behavior-related tasks addressed by each provider at a patient visit was also reviewed. Behavior-related tasks included self-care training, evidence of hypoglycemia or hyperglycemia, nutrition counseling, and controllable risks (smoking, alcohol, physical activity) (Appendix A).

The following responsibilities were delegated at the initial CMC staff meeting:

1. The receptionist placed each of the following within the chart of every patient presenting to the clinic with a diagnosis of diabetes: (a) the algorithm depicting the recommended process of care and behavior related tasks (Appendix A) and (b) the patient report card (Appendix B). The patient report card was available for each provider to share with each patient. One copy of the report card was placed in the chart and another given to the patient.
2. The registered nurses and medical assistant were asked to document the patient's blood pressure, and weight; there was no change in this process from previous established practice.
3. The physicians and nurse practitioners received both group and individual education, in addition to a written summary of the current clinical practice standards that are supported by the ADA. Each had an opportunity to provide input and ask questions. The initial meeting was followed by a monthly verbal and written prompt to support each provider's use of EBP.
4. Each patient was given the option of receiving focused diabetes care on a designated clinic day or to continue to receive routine care. Spanish speaking patients were offered an appointment with a bi-lingual nurse practitioner. The clinic receptionist and volunteers responsible for scheduling presented this option to all patients with diabetes.

5. Three months after implementation of the EBP project a second chart audit was completed to determine the outcomes of the EBP project. The same chart audit tool was utilized to measure the outcomes. By completing a post audit, the initial PICO question was answered.

CHAPTER 3

METHOD OF INTERVENTION

In this chapter the EBP project design, sample and setting, data collection, measurement and management of data, and implementation of practice change are described.

Design

A pretest – posttest design was implemented to investigate the effect of a clinical algorithm on the provision of primary care to adult patients with Type 2 diabetes and low SES within a nurse-managed, outpatient clinic. The 2010 ADA Clinical Practice Standards of Medical Care in Diabetes provided the structure for the development of a chart audit tool. Data from chart audits of CMC patients prior to algorithm implementation were compared with data from chart audits following a minimum of three months of algorithm implementation. The pretest – posttest scheme permitted the examination of changes in provider interventions that were stimulated through the EBP project. The pretest evaluation was completed in September 2010 prior to the implementation of the clinical algorithm. The posttest chart audit was initiated in December 2010 and concluded in January 2011.

Sample and setting.

The Catherine McAuley Clinic (CMC) is a faith-based, nurse-managed primary health care clinic that provides services to Northwest Indiana's medically uninsured who are living within 200% of the federal poverty level. The clinic was founded by the Sisters of Mercy and the Sisters of Saint Francis following a 1994 Healthy Community Survey revealed a lack of available healthcare services for the medically uninsured.

A task force representing St. Margaret-Mercy Healthcare Centers (SMMHC) staff and local community representatives worked diligently for two years to develop and fund the CMC. The nurse-managed CMC, opened on March 11, 1996 as a predominantly

volunteer-based clinic. It is located in Hammond, Indiana, a city with a population of approximately 75,704. An estimated 21.9% live at or below poverty level and 12.4% report not owning an automobile. The ethnic composition of Hammond's population is 50% white, 30% Hispanic, and 20% African American. An estimated 23% have less than a high school education, and 25% report Spanish as their primary language (U. S. Census Bureau, 2006). Hammond has census tracts 203-208 that are designated a Medically Underserved Area (MUA). Within Hammond's MUA designated regions, the minority population ranges from 25%-54% (MUA/P, 2009). Currently, the CMC is the sole provider of primary care health services in Hammond for the medically uninsured, living within 200% of the federal poverty level.

In 2009, the CMC recorded 20,479 patient visits. Approximately 55% of the patients are between ages 51 – 65 years, followed by 40% between ages 36 – 50 years. Seventy-five per cent are female and 25% are male. The racial characteristics include 45% Caucasian, 30% Hispanic, and 20% African American.

The CMC has four primary care providers: two part-time physicians, one part-time nurse practitioner (NP), and a full-time clinic manager who is also a NP. Additional part time staff includes a medical director, two registered nurses, one medical assistant, and two receptionists. One NP, one receptionist, and one medical assistant are fluent in Spanish. All NPs function autonomously and have the option of consulting with one of the physicians, should the need arise. The medical director reviews five per cent of randomly selected charts. However, a comprehensive quality assurance program is not in place.

Each health care provider has a vital role in assisting patients with management of diabetes. It is therefore, imperative to comprehend factors that influence care. This includes deviations from EBP standards. Current practice patterns for each of the four primary care providers were compared to the 2010 ADA Clinical Practice Standards. A

goal of auditing 15 charts per provider was initially established. Unfortunately, one physician provider was absent from the clinic for a period of time which resulted in a shifting of care to the NP providers. This resulted in an audit of 25 physician charts and 36 NP charts.

Outcomes

Outcome data included descriptive statistics for baseline patient demographic data including age, gender, and ethnicity. Healthcare providers were identified by profession utilizing a designation of MD or NP. Descriptive statistics, including means and paired *t* tests, were calculated to describe initial practice patterns and subsequent practice patterns following implementation of EBP recommendations. Each of the 22 standards of care was analyzed independent of the others to determine if specific standards were or were not followed.

Providers that were consistent with the recommended annual patient assessments were evaluated as having met the recommended practice standards. Only those failing to incorporate all EBP standards into their plan of care at the initial audit and/or post audit were evaluated as failing to meet the clinical algorithm. Additional variables assessed with the chart audit tool included provider documentation on the chart algorithm, utilization of the patient report card, and provider referral to the focused diabetes clinic.

Data

The doctoral student implementing the EBP project was responsible for the collection of all data. Patient confidentiality was strictly maintained by instituting security measures for the management of patient data. Each patient chart was assigned a code to maintain confidentiality. Additionally, each health care provider was assigned a code number. The master list containing identifiers and assigned code numbers was accessible only to the doctoral student. All data were stored in a locked file cabinet

within the CMC. Data were entered in a password protected 16.0 edition of SPSS. No data included patient identifiers and only aggregate data were reported.

Collection.

Pretest and posttest data were collected on a chart audit tool that was developed from standards identified by the 2010 ADA Clinical Practice Standards (Appendix C). Additional patient demographic data, identification of healthcare provider by profession, and provider evaluation of process of care, and behavior related tasks were assessed. An assessment of provider documentation on the clinical algorithm, use of the patient report card, and referral to the focused diabetes clinic was ascertained. After training, the clinic receptionist was responsible for randomly selecting the patient charts that were audited.

Measures and their reliability and validity.

The 2010 ADA Clinical Practice Standards of Medical Care in Diabetes provided the structure for the development of an algorithm and chart audit tool (Appendices A and C). The audit tool does not have established reliability and validity. However, content validity was ascertained from two healthcare professionals possessing expertise in diabetes patient care. The first healthcare provider is a Certified Diabetes Educator and the second is an Endocrinologist. Each expert determined complete alignment of the audit tool, patient report card, and clinical algorithm with established 2010 ADA Clinical Practice Standards of Medical Care in Diabetes.

Analysis.

An initial pretest chart audit was initiated and completed in September 2010 following IRB approval. All pretest chart audits occurred prior to the placement of the EBP clinical algorithm within the patients' charts. The analysis of this data was not completed until the posttest clinical algorithm chart audit was concluded.

The CMC does not have a formal quality assurance program in place. Therefore, statistical data were not available to affirm the need for the EBP project. The need evolved from discussions with the CMC manager and medical director. Additional evidence was gathered following an informal review of patient charts that was conducted in preparation for a grant. This chart review data revealed significant variation in provider interventions with patients presenting with diabetes.

Data gathered from the pretest-posttest chart audits were analyzed using a password protected 18.0 edition of SPSS. Descriptive statistics, including means and paired *t* tests, were calculated to describe initial practice patterns and subsequent practice patterns following implementation of EBP recommendations. Each of the 22 standards of care was analyzed independent of the others to determine if specific components of the algorithm were or were not followed.

Implementation of practice change

Multiple steps were developed in the implementation of the EBP project. These steps included: (a) design of the clinical algorithm and chart audit tool that incorporated 22 standards from the 2010 ADA Clinical Practice Standards, (b) organizational approval of the algorithm, (c) healthcare provider education, and (d) integration of the clinical algorithm and focused diabetes clinic.

Design of a clinical algorithm and chart audit tool. The 2010 ADA Clinical Practice Standards of Medical Care in Diabetes provided the framework for the development of a 22-item algorithm and chart audit tool. The 2010 ADA standards are evidence-based and allowed the healthcare provider to evaluate the quality of the evidence used to support each standard. The systematic review utilized to develop the standards was available for review (ADA, 2010) and provided a scientific rationale for each recommendation. The practice standards undergo an annual critical peer review before submission to the ADA Professional Practice Committee for approval and

subsequent dissemination for use. As described above, the algorithm, patient report card, and chart audit tool received support for content validity from two experts in diabetes care.

Organizational approval. Following the development of the algorithm, organizational review and approval was sought. This process included an initial appraisal from the CMC manager and medical director. Initial approval by the CMC management was followed by a presentation of the EBP project to the clinic advisory board. This board is comprised of hospital administrative staff, physicians, APNs, and community representatives. They addressed the merit of the EBP project and approval was obtained. IRB approval was then obtained from Valparaiso University and St. Margaret-Mercy IRB committees.

Healthcare provider education. An initial audit of 61 patient charts was completed to determine baseline provider adherence to current practice standards prior to implementation of the clinical algorithm. Following the collection of baseline data, all staff at the CMC were included in the educational process. A face-to-face inservice for all staff provided a synopsis of (a) EBP, (b) the EBP project, and (c) the 2010 ADA Clinical Practice Standards. The inservice was attended by the majority of CMC personnel. Those not in attendance received a copy of the 2010 ADA Clinical Practice Standards and the algorithm. This was followed with a face-to-face meeting to offer clarification.

Integration of the clinical algorithm and focused diabetes clinic. The TTM provided a guide to motivate healthcare provider change to EBP. Each of the primary care providers completed the 7- question assessment of readiness to change tool. Two providers were found to be within the action stage that indicated an overt behavior change within the recent past. Two additional providers were in the maintenance stage, which indicated an established change in behavior. Unfortunately, the results of the

pretest chart audit did not reflect clinical performance consistent with the 2010 ADA Clinical Practice Standards for all four primary care providers even though the data indicated providers perceived they were in the action or maintenance stages. Since the TTM encourages stimulus control during the action stage, environmental change was created to encourage movement towards the EBP. Environmental change was addressed by providing: (a) individual provider education, (b) a focused diabetes clinic, and (c) a clinical algorithm to prompt EBP.

Those within the maintenance stage were provided with support to integrate the EBP interventions into routine practice. This was addressed through: (a) the provision of ongoing support at individual monthly meetings with each provider, (b) demonstrating the positive impact of EBP on improved quality of care by offering each provider feedback, (c) obtaining continued organizational support of the EBP interventions, and (d) demonstrating patient satisfaction as evidenced by increased utilization of the focused diabetes clinic.

A monthly face-to-face meeting with all primary care providers served to reinforce the use of EBP standards of care, the patient report card, and the focused diabetes clinic day. Providers were encouraged to schedule a monthly patient return-visit with those not achieving glycemic, lipid, or blood pressure clinical targets.

After three months, posttest clinical algorithm data were collected. A second chart audit was completed to determine change in practice patterns. These outcomes were disseminated to the clinic manager, medical director, and staff. Provider feedback specific to the outcomes is necessary to support the objective of improved quality of patient care based on the TTM.

Protection of human subjects

The Valparaiso University and St. Margaret-Mercy IRB committees reviewed and approved the EBP project. No individual patient consent was requested since all patients

sign a general consent for care upon application to the CMC. All data collected in the EBP project was existing chart data. Additionally, the project focused on determining the adherence of provider interventions to current EBP clinical standards. No direct patient care was manipulated. All information obtained by the doctoral student was handled in a confidential manner and kept within a locked cabinet at the CMC.

CHAPTER 4

FINDINGS

The purpose of this EBP project was to determine if the design and implementation of a diabetes clinical algorithm would improve diabetes care in adult patients with low SES within a nurse-managed, primary care, outpatient clinic. To measure the effectiveness of the diabetes clinical algorithm a pretest-posttest chart audit was completed on 61 patient charts.

Sample characteristics

Sixty-one medical charts comprised the sample population. The medical records represented patients between 23 and 61 years of age who were diagnosed with type 2 diabetes and were receiving medical care at the CMC for at least one year prior to the implementation of the EBP project. The mean age was 48.1 years. All patients were medically uninsured and identified as living within 200% of poverty. The sample consisted of 33 females (54.1%) and 28 males (45.9%). Twenty-six (42.6%) were identified as Caucasian, 19 (31.1%) were African American, 15 (24.6%) were Hispanic, and 1 (1.6%) was identified as other (see figures 4.1 and 4.2).

The healthcare providers included two board certified adult nurse practitioners and two general practice medical doctors (MDs). Thirty-six of the patients received their healthcare from the NPs and 25 obtained care from the MDs. The TTM provided a guide to motivate healthcare provider change to EBP. Each of the primary care providers completed a 7-question assessment of readiness to change tool. Two providers were found to be within the action stage that indicated an overt behavior change within the recent past. Two additional providers were in the maintenance stage, which indicated an established change in behavior.

Figure 4.1 Race of the sample population

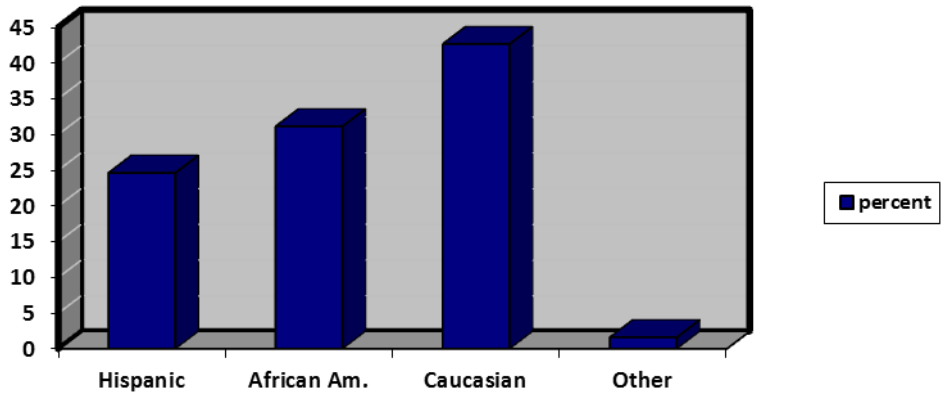
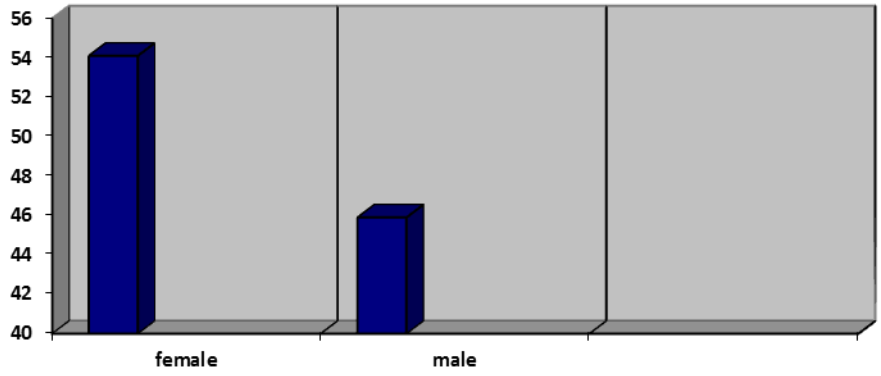


Figure 4.2 Gender of the sample population



Changes in Outcomes

Statistical testing. A pretest – posttest design, also known as a before and after design, was utilized to answer the PICO question. This strategy allowed for the observation of the effects of the clinical algorithm both before and after its implementation. Data were analyzed using SPSS version 18. A paired *t* test analysis was completed to compare pretest chart audit results with those of the posttest chart audit. The paired *t* test was selected because it is the appropriate parametric measure for evaluating the statistical difference between the means of matched groups (Gravetter & Wallnau, 2008).

Significance. The clinical algorithm incorporated 22 process of care interventions, therefore multiple outcomes were measured to address the PICO question, "Will a clinical algorithm improve diabetes care in adult patients with low SES within a nurse-managed, primary care, outpatient setting?"

There was a significant difference in the number of process of care interventions completed by the healthcare providers between the pretest (M = 13.68, SD = 5.15) and posttest (M = 18.91, SD = 4.91) chart audits (t = -9.23, p <.000). All of the 22 process of care interventions included in the clinical algorithm demonstrated improvement in completion rates with the posttest chart audits, as measured by frequency and *t* tests (see Table 4.1). However, four process of care interventions failed to demonstrate statistical significance with *t* test analysis. The interventions demonstrating improvement without statistically significant differences included the pretest–posttest measurements of: (a) weight, (b) serum HbA_{1c} levels, (c) serum lipid profiles, and (d) serum creatinine levels. The data for the paired samples *t* test and level of significance are displayed in Table 4.1.

The majority of patients were referred to the focused diabetes clinic. A total of 63.9% of patients (n = 39) obtained focused diabetes care, while 36.1% (n = 22)

received routine care. The clinical algorithm that was placed within each patient's chart following the initial audit, was utilized by the healthcare provider as a means of documentation in 60.7% of the charts (*n* = 37). The patient report card was implemented with only 21.3% (*n* = 13) of the subjects.

Table 4.1

Process of Care Interventions: Pretest and Posttest Frequency and Statistical Difference

	Pre	Post			
Variable	*n*	*n*	*t*	*df*	*p* value
weight	57	61	2.052	60	.045
BP	59	61	1.426	60	.159
BMI	25	42	4.464	60	.000
Inspect feet & pulses	40	52	3.488	60	.001
HbA_{1c}	58	59	.444	60	.658
Review (SMBG) Record	36	55	5.210	60	.000
Review/adjust medications to control glucose	51	58	2.789	60	.007
Review/adjust medications to control blood pressure	50	57	2.425	60	.018
Review/adjust medications to control lipids	40	55	4.423	60	.000
Review self-management skills	33	54	2.873	60	.006
Review dietary needs	32	54	5.818	60	.000
Review physical activity	26	53	6.485	60	.000
Counsel on smoking cessation	26	51	6.455	60	.000
Counsel on alcohol use	22	51	7.374	60	.000
Assess for depression or other mood disorder	41	52	3.633	60	.001

Process of Care Interventions: pretest and posttest continued

	Pre	Post			
Variable	*n*	*n*	*t*	*df*	*p* value
Low-dose aspirin	30	47	4.464	60	.000
Lipid profile	49	55	1.762	60	.083
Serum creatinine	55	57	.704	60	.484
Urine albumin-creatinine	28	53	5.725	60	.000
Foot exam	26	47	5.245	60	.000
Refer dilated eye exam	32	51	5.210	60	.000
Influenza vaccination	8	29	5.612	60	.000

CHAPTER 5

DISCUSSION

The quest to deliver the highest quality care for patients requires the APN to keep abreast of new and innovative changes in health care. Concomitantly, escalating health care costs, expansion of scientific knowledge and emphasis on patient satisfaction takes on greater significance. EBP provides a guide for the APN in addressing this challenge. The integration of best evidence with clinical expertise and patient preferences provides the foundation to designing and delivering quality care. Following implementation of the EBP project, an evaluation of the process and outcomes is necessary to determine which components of the intervention were successful and which were not successful.

Explanation of Findings Using PARIHS Model

The Promoting Action on Research Implementation in Health Services (PARIHS) model was used to evaluate this EBP project. The PARIHS model evolved from a United Kingdom (UK) research development team that originated in the Royal College of Nursing (Rycroft-Malone, 2004). Three core elements of the PARIHS model are utilized to identify successful implementation of evidence-based practice: (a) the type of evidence used, (b) the quality of the context to manage change, and (c) the type of facilitation needed to guarantee successful change (Rycroft-Malone et al., 2004a).

The components of the model have undergone significant modification since it was first introduced (Kitson, Harvey, & McCormack, 1998). A concept analysis of the three key elements was completed in 2002 resulting in a refinement of the model (Rycroft-Malone et al., 2002) and subsequent research established content validity (Rycroft-Malone et al., 2004b). An assumption of the model is that each of the three core elements has equal importance in the successful implementation of EBP. The core elements may be ranked from high to low, according to their presentation within the

practice setting. When each core element is ranked near the high end of the continuum, there is a greater likelihood of successful implementation of EBP.

This EBP project addressed the PICO question, “Will a clinical algorithm improve diabetes care in adult patients with low SES within a nurse-managed, primary care, outpatient setting?” All of the 22 process of care interventions included in the clinical algorithm demonstrated improvement in completion rates with the posttest chart audits. The majority of patients (63.9%; *n* = 39) were referred to the focused diabetes clinic; however, the patient report card was implemented with only 21.3% (*n* = 13) of the subjects. The PARIHS model was used to assess the EBP project implementation in an attempt to identify factors that contributed to the outcomes.

Evidence. The PARIHS model equates evidence with the knowledge created from four sub-elements: (a) research, (b) clinical experience, (c) patient experience, and (d) local data or information (Rycroft-Malone et al., 2004a). The first sub-element is research. Pertinent research studies must be identified and critically appraised to determine validity, reliability, and applicability to the clinical question, patient population, and setting. Rycroft-Malone, describes research as existing along the high end of the continuum when it “is well conceived and conducted and whether there is a consensus about it” (2004, p. 298).

The second sub-element of the PARIHS model is clinical experience. The health care provider must analyze his/her past and current clinical experience and its influence on clinical judgment and knowledge. Clinical experience is ranked as high when it “has been made explicit and verified through critical reflection, critique, and debate” (Rycroft-Malone, 2004, p. 298). The expert practitioner is characterized by Benner (1984) as possessing the capacity to determine when a course of action can be implemented, altered, or delayed, based on expert clinical judgments. Health care providers validate clinical experience through provider critique and reflection.

The third sub-element of evidence is patient experience; it is proportional to the use of patient preferences in the decision-making process. Patient experience is ranked as high “when patient preferences are used as part of the decision making process, and when patient narratives and experiences are seen as a valid source of evidence” (Rycroft-Malone, 2004, p. 298). Health care providers must consider patient preferences as relevant when gathering evidence.

The final sub-component of evidence includes the use of local data/information that is evaluated and used in the decision-making process (Rycroft-Malone et al., 2004b). Local data/information is ranked as high when it is “systematically collected and evaluated…and could be considered in decision-making processes at individual and organizational levels” (Rycroft-Malone, 2004, p. 298).

Research. The APN draws on a multitude of diverse sources of research to guide decision making in practice (Rycroft-Malone et al., 2004b). When initiating the EBP project, a review of the literature was completed to examine the evidence identifying factors that enhance provider interventions with medically uninsured adult patients, with low SES, diagnosed with type 2 diabetes that receive healthcare at a primary care clinic. One systematic review and nine individual studies met all criteria and were included in the review. The CASP (2007) was employed to critique the research evidence. This was followed with the application of The Rating System for Hierarchy of Evidence (Melnyk & Fineout-Overholt, 2005) to rate the level of evidence. The overall strength of evidence was high and then guided the development of the EBP project.

The research evidence supported the implementation of the following strategies to improve health care provider interventions to adult patients with type 2 diabetes and low socioeconomic status within a primary care, community-based setting:

- Implementation of an evidence-based clinical algorithm;
- Focused diabetes office visits;

- Feedback on clinical performance;
- Clinical reminders or prompts;
- Continuing education on current evidence-based practice standards; and
- Frequent one-on-one culturally sensitive interventions.

The initial EBP plan was discussed with and approved by the CMC clinic manager, medical director, and clinic advisory board. Thompson et al. (2001) concluded, “It is the presentation and management of research knowledge in the workplace that is the significant challenge in getting research-based information into practice” (p. 915). A study of nurses' perceptions of barriers to using research information in clinical decision-making revealed that nurses identified problems in interpreting and applying research findings. Those who reported confidence with research-based information perceived the lack of organizational support as a significant barrier (McCaughan, Thompson, Cullum, Sheldon, & Thompson, 2002).

Clinical experience. The DNP student has 35 years of nursing experience, with over 30 years of experience as a NP. Diabetes management has been provided for 18 years. Additionally, attendance at annual continuing diabetes education facilitates the provision of evidence-based care. When initiating this EBP project, an initial review of the literature was completed to identify the current EBP standards of care for adults with type 2 diabetes. The 2010 ADA Clinical Practice Standards of Medical Care in Diabetes provided the structure for the development of a clinical algorithm, patient report card, and chart audit tool. The audit tool did not have established reliability and validity. However, content validity was established by two healthcare professionals possessing expertise in diabetes patient care. The first healthcare provider is a Certified Diabetes Educator and the second is an Endocrinologist. Each expert determined complete alignment of the audit tool, patient report card, and clinical algorithm with established

2010 ADA Clinical Practice Standards of Medical Care in Diabetes. All staff at the clinic received a copy of the tools and an overview of the EBP project. This was followed with a staff meeting that focused on defining EBP, the EBP project, and a review of current EBP ADA clinical standards.

Each of the four health care providers completed a 7- question assessment of readiness to change tool that encouraged reflection on their previous and current clinical experience. The TTM guided the assessment. Two providers were found to be within the action stage that indicated an overt behavior change within the recent past. Two additional providers were in the maintenance stage, which indicated an established change in behavior.

Patient experience. Parchman et al. (2006) demonstrated that a focused diabetes visit resulted in 100% of all process-of-care indicator services delivered with a mean visit time of 19.4 minutes. Thus, patient experience and preference was addressed by presenting each patient with the option of receiving a focused diabetes clinic visit or care as usual. Additionally, a NP fluent in Spanish was available to provide culturally sensitive care to the Spanish-speaking patients. The majority of patients (63.9%; *n* = 39) were referred to the focused diabetes clinic. Additional evidence demonstrated that the use of a patient-feedback tool enhanced the implementation of provider process of care interventions (Chapin, Williams, & Adair, 2003). The patient report card was designed to facilitate open discussion of clinical objectives and outcomes between the health care provider and patient. The patient report card was implemented with only 21.3% (*n* = 13) of the subjects. It is not known if the report card prompted verbal feedback during an individual visit, without the provider completing the report card. This component of the intervention was not evaluated.

Local data and information. The final source of applicable evidence is local data that have been systematically gathered and evaluated (Rycroft-Malone, 2004).

Chart audits can provide information on clinical performance to inform decision making processes at individual and organizational levels (Rycroft-Malone, 2004; Rycroft-Malone et al., 2004a). The CMC did not have a formal quality assurance program in place. Therefore, initial statistical data reflecting provider performance were not available. However, baseline data were gathered following an informal review of patient charts that was conducted in preparation for a grant. This data revealed significant variation in provider interventions with patients presenting with diabetes. A subsequent pretest – posttest chart audit demonstrated a significant difference in the number of process of care interventions completed by the healthcare providers. All of the 22 process of care interventions included in the clinical algorithm demonstrated improvement in completion rates with the posttest chart audits, as measured by frequency and *t* test (pretest M = 13.68, SD = 5.15 and posttest M = 18.91, SD = 4.91; chart audits t = -9.23, p <.000).

Context. Kitson et al. (1998) defined context within EBP as the environment or setting in which implementation of the proposed change is to occur. McCormack (2002) completed a concept analysis explicitly on context to expand the knowledge related to this key element of the PARIHS model. Culture, leadership, and evaluation were the sub-elements identified to exemplify the concept (McCormack et al., 2002). Each of the sub-elements was described on a continuum from weak to strong. A strong context was identified as one receptive to change, displaying clearly defined boundaries, transparent decision-making processes, and possessing the necessary resources. Wallin, Estabrooks, Midodzi, and Cummings (2006) identified a direct association between positive contexts and research utilization among nurses. The authors reported that higher levels of research utilization were associated with a positive context. An assessment of context provides insight into the organization’s influence on the implementation of the EBP change.

Receptive context. The EBP project was implemented at the CMC, a service line (SL) within a larger faith based not-for-profit health care system. SL management involves identifying the health care system's different business units, or service lines, and the contributions they make to overall performance. In this context, performance was measured against a balanced array of criterion including clinical quality, levels of patient experience and staff satisfaction, and financial performance. Ideally, a single individual, usually a primary provider, is held accountable for this performance and can choose how it can be improved (Moyes, 2008). Although one way of improving performance is to increase profitability, SL management should not be dismissed as solely cost cutting because it can also provide clinical staff with opportunities to redesign services to provide better care (Kerfoot, 1993).

The CMC was developed in response to a mission of the Roman Catholic health care system to minister to the sick and neglected. The staff consists of a core group of paid professionals and a variety of volunteers who include MDs and NPs. The staff is committed to the mission and the majority of staff were receptive to EBP change leading to increased quality patient care.

An initial chart audit was conducted to obtain baseline data from each of the four primary health care providers at CMC. One MD provider was verbally resistant to the use of the EBP tools which included the use of the chart algorithm for documentation, patient report card, and focused diabetes clinic. This MD's verbal resistance was also apparent with the initiation of the chart audits. Shortell and Kaluzny (2006) noted that the intent of any evaluation is to influence the performance of those under scrutiny. Wennberg, Blowers, Parker, and Gittelsohn (1977) reported physicians respond to internally imposed peer review. However, when the outcome of evaluation is devoid of consequences, there is no apparent effect on behavior (Wones, 1987).

Data from the chart audit were analyzed and reported as aggregate, therefore individual provider outcomes were not known. No organization-imposed consequences were attached to the results. Provider resistance to an NP initiated chart audit and the lack of consequences for behavior may have contributed to the decreased utilization of the EBP tools.

Culture. Pettigrew (1979) described organizational culture as an outcome of human activity; individuals shape, modify, and manage the culture according to their beliefs, values, knowledge, and needs. Pettigrew argued that one of the most important features of organizational culture is that certain things are shared and held in common by groups (1979). The CMC's mission guides the operation, management, and daily activities of the clinic. The employees and clinic volunteers consistently act in a manner that reflects this mission; this is evident in interactions with patients and when providing community outreach. The Catholic values and ethics influence the type of services provided or not provided. All CMC staff are focused on providing care to the medically uninsured, regardless of ability to pay. The organizational culture displays a questioning spirit, which is consistent with a learning organization. This culture is conducive to facilitating evidence-based change (Rycroft-Malone, 2004a). Staff meetings and the exploration of patient resources focus on expanding access to and quality of health care.

The EBP project was received with enthusiasm from the clinic administration and staff, as its goal was consistent with the CMC mission. However, efforts were needed to overcome resistance demonstrated by one volunteer MD. Interventions implemented to overcome resistance included the provision of additional individualized education regarding EBP, the project, and current practice standards. Organizational support was manifested by allowing for patient referrals to a focused diabetes clinic. Additionally, the CMC manager and medical director encouraged full support from all staff and volunteers. Ultimately, the one provider responded by ignoring all attempts to encourage

change to EBP. Funk, Tornquist, and Champagne (1995) investigated obstacles to the use of research evidence by nurses. One of the top obstacles to the implementation of evidence included the lack of physician cooperation. The literature identifies a supportive organizational process as a major component in facilitating the integration of evidence into practice (Stetler, 2003; Stetler, 2001; Stetler et al., 1998; Titler, Steelman, Budreau, Buckwalter, & Goode, 2001; Wallin, Bostrom, Wikblad, & Ewald, 2003). While organizational support of the EBP project was evident, there was limited intervention with the one resistant MD due to the voluntary status.

Leadership. "Leaders have a key role to play in transforming cultures and are therefore influential in shaping a context that is ready for change" (Rycroft-Malone, 2004, p. 299). A transformational leader engages each follower and transforms each to move beyond personal needs and interests toward the collective goal or mission (Marriner-Tomey, 1993).The CMC is managed by a NP who has a collaborative practice agreement with an internal medicine physician. This physician is the medical director who reviews 5% of each NP's charts and provides consultation for patients referred by the NPs. The medical director is physically present within the clinic approximately four hours per week; the medical director completes no routine clinic administrative services. The NP/manager is solely responsible for clinic operations and management. While an organizational chart defines the manager as reporting to the Vice President of Medical Affairs, in reality the chain-of-command includes the Vice President of Ancillary Services. An independent Board of Advisors oversees the clinic and reports to the chief executive officer. The board must approve all decisions affecting clinic policy, mission, and funding.

The EBP project was initially presented to the board in August, 2010 and obtained full support. An enthusiastic response was elicited from the clinic manager, staff, NPs, and medical director. As noted earlier, one MD was resistant to the EBP

project, while the second MD voiced interest and support. The clinic manager and medical director intervened with the one resistant MD to gain support; however, a passive approach was utilized and no consequences were attached to a failure to implement EBP standards. The passive approach was related to the volunteer status of the MD and the non-confrontational leadership style displayed by management. Finding providers willing to volunteer their time at a clinic is difficult, thus confronting the MD may have led to a loss of clinic support. The clinic manager's intervention with the MD was in stark contrast to the leadership style displayed with the staff and other NPs. The clinic manager strives to empower the staff, providing formal and informal educational opportunities, encourages mentoring, and advocates for EBP.

Evaluation. The final component, evaluation, was defined as strong when there was performance feedback on all levels using multiple sources of information and provided through multiple methods (McCormack et al., 2002). All non-volunteer staff are annually evaluated by the clinic manager. Feedback on professional performance is elicited from the staff and considered in the evaluation process. The medical director audits the state mandated 5% of charts and provides individual feedback to each NP. No formal evaluation or quality audit is completed with the volunteer medical staff.

The EBP project incorporated a pretest-posttest chart audit that encompassed 22 ADA process of care standards. A chart audit for both NPs and MDs was completed prior to and after integration of the EBP change. There was a significant difference in the number of process of care interventions completed by the healthcare providers between the pretest (M = 13.68, SD = 5.15) and posttest (M = 18.91, SD = 4.91) chart audits (t = -9.23, p <.000). All of the 22 process of care interventions included in the clinical algorithm demonstrated improvement in completion rates with the posttest chart audits, as measured by frequency and t tests. This was the first formal audit conducted in the 15-year history of the CMC. The 2001 report from the Institute of Medicine (IOM)

exposed the high prevalence, exorbitant cost, and health consequences of clinical errors in health care (IOM, 2001). This EBP project supports the need for ongoing performance evaluation as a mechanism to stimulate EBP and ensure quality in patient care.

Facilitation. The third major element can fluctuate from "providing help and support to achieve a specific goal to enabling individuals and teams to analyze, reflect and change their own attitudes, behaviors and ways of working" (Harvey et al., 2002, p. 580). Facilitation is the process of making things easier for individuals or groups. Facilitators assist others to comprehend what change is needed and how change should occur to implement EBP (Rycroft-Malone et al., 2002). Grundy (1982) found that facilitators begin with a predetermined goal, and incorporate their ideas to direct the project. Facilitation includes the implementation of clinical standards to enhance the effectiveness of care or improve healthcare provider competence (Harvey et al., 2002).

Purpose. Harvey et al. (2002) proposed that the purpose of facilitation varies from supplying assistance and support to accomplishing a specific goal, to aiding individuals with the analysis of their behaviors to promote change. Gerrish and Clayton (2004) investigated factors affecting the implementation of EBP. They concluded that health care organizations must implement various strategies to encourage use of EBP. Major strategies include facilitation, administrative support, and a culture that embraces change. The DNP student clearly articulated the purpose of the EBP project. The CMC manager assisted with identification of a primary clinic need. Verification of need and support was obtained from key CMC staff members and the clinic advisory board. Staff provided input and a tentative timeline for implementation of the EBP project. EBP tools were developed to facilitate implementation of the ADA practice standards. Staff were provided with an initial education session encompassing all components of the EBP project and practice standards. Additional monthly sessions were completed to allow for feedback, provide support, and encourage change to EBP. The majority of staff were

receptive to the education, as evidenced by attendance at the sessions, and the results of the posttest chart audits indicating increased integration of the ADA practice standards.

Role. The facilitator role is primarily concerned with providing realistic assistance and staff support (Harvey et al., 2002). The literature makes a distinction between a facilitator role that is focused on 'doing for others' versus a role that places emphasis on 'enabling others' (Loftus-Hills & Harvey, 2000). Loftus-Hill and Harvey describe the 'doing role' as "practical and task driven, with a focus on administrating, supporting and taking on specific tasks" (2000, p. 581). This is distinguished from the 'enabling' facilitator role that is "developmental in nature, seeking to explore and release the inherent potential of individuals" (Loftus-Hills & Harvey, 2000, p. 581). The DNP student assumed both of the defined roles.

All aspects of the DNP project were developed, planned, and implemented independently. Staff education, the design of all EBP tools, and implementation of the focused diabetes clinic were tasks completed in an attempt to facilitate change to EBP. Additionally, staff education focused on professional development that resulted in improved quality of care provided to patients with type 2 diabetes. The posttest chart audits demonstrated improvement in all ADA process of care standards as a result of the algorithm. It is suggested the facilitation of change to EBP was effective.

Skills and attributes. Harvey et al. (2002) identifed interpersonal and communication skills as prerequisites to the facilitator role. They reported that "effective facilitators require a tool kit of skills and personal attributes that they can use depending on the context and purpose" (Harvey et al., 2002, p. 582). Flexibility is required to identify and implement the requirements necessary in a given situation. The DNP student implemented a combination of verbal and written communication skills to affect

change with staff at the CMC. Communication included a formal presentation of the EBP project to the advisory board and staff, in addition to informal face-to-face discussions. A written summary of the evidence-based practice standards and all of the EBP tools were disseminated to the staff. Additionally, clinical expertise was demonstrated at the focused diabetes clinic visits, which enhanced facilitator credibility. The focused visits also provided an opportunity to model EBP, implement the algorithm, patient report card, and provide authenticity to the project.

Implications for Theory

Stetler model. The Stetler Model of Research Utilization was designed to be a practical approach for integrating research findings into EBP for the individual health care provider (Stetler, 1994). The five phases of the Stetler Model (2001) were found to be applicable to a primary care practice setting and thus, guided the development and implementation of the EBP project.. The five progressive steps articulated in the model allowed for a well planned implementation of the change. Stetler (1998) identified nursing leadership's role in integrating evidence into practice. Three key activities were associated with successful implementation: establishing a new culture for use of EBP, creating the capacity for members of an organization to adapt and change to EBP, and altering the organization's infrastructure to sustain the change. The EBP project incorporated each of these activities to promote a sustained change to EBP delivered to medically uninsured adult patients with type 2 diabetes within a community-based nurse managed clinic.

Upon completion of the project, the CMC management articulated an intent to continue the use of the clinical algorithm to prompt provider interventions that are consistent with current practice standards. The use of the patient report card is available for use by individual providers, and remains an option to prompt patient-provider discussion. While there is interest in continuing the focused diabetes clinic, an additional

NP was not hired or assigned this responsibility on a designated clinic day. This is due to recent budget cuts and the fact that during the implementation of the EBP project, the DNP student volunteered services 16 – 24 hours per week. The CMC advisory board and management are investigating the continued implementation of the focused diabetes visit as a mechanism to continue quality, evidence-based patient care. It is hoped that the data from this EBP will provide the objective data needed to secure the support for continued focused diabetes clinic visits.

Transtheoretical model. The second model selected to guide the EBP project was the TTM. This model provided a guide to motivate healthcare provider change to EBP. Levesque, Prochaska, and Prochaska (1997) demonstrated the application of TTM to assess organizational readiness to change. An additional study applied TTM to a family service agency to introduce change (Prochaska, 2000). Each of these studies demonstrated how the application of TTM provided organizational leadership with necessary readiness information to guide the change initiatives (Levesque, Prochaska, Prochaska, & Dewart, 2001).

One limitation of the TTM included the lack of an established assessment instrument for use specifically with health care providers. The lack of an established instrument resulted in the development of a 7-question assessment of readiness to change questionnaire by the DNP student. Each of the primary care providers completed the assessment of readiness to change. Two providers indicated an overt behavior change within the recent past and were found to be within the action stage. Two additional providers indicated an established change in behavior and were in the maintenance stage. Results of the pretest chart audit did not reflect clinical performance consistent with the 2010 ADA Clinical Practice Standards for all four primary care providers even though the TTM assessment data indicated the providers perceived they were in the action or maintenance stages. Consistent with the TTM, stimulus control

during the action stage was completed; environmental change was created to encourage movement towards the EBP. Environmental changes that were addressed include: (a) individual provider education, (b) a focused diabetes clinic, and (c) a clinical algorithm to prompt EBP.

Providers within the maintenance stage were supported to integrate the EBP interventions into routine practice. Interventions that addressed maintenance included: (a) ongoing support at individual monthly meetings with each provider, (b) demonstrating the positive impact of EBP on improved quality of care by offering individual provider feedback, (c) obtaining continued organizational support of the EBP interventions, and (d) demonstrating patient satisfaction as evidenced by increased utilization of the focused diabetes clinic.

Interventions that served to reinforce health care provider utilization of EBP standards of care included the (a) monthly face-to-face meeting with all primary care providers, (b) patient report card, (c) clinical algorithm, and (d) focused diabetes clinic day. Providers were encouraged to schedule a monthly patient return-visit with those not achieving clinical targets. Provider feedback specific to the posttest outcomes of clinical practice standards was completed to support the objective of improved quality of patient care based on the TTM. The project was completed prior to determining the effect of the provider feedback.

Implications for Education and Research

The findings from this project suggest that continued professional education is needed to promote the delivery of evidence-based care to patients with low SES receiving healthcare within a community-based clinic. A chart audit provided an effective means of determining the initial educational needs of the healthcare providers. Additional chart audits are proposed to determine unidentified educational needs of health care providers. The APN with DNP education possesses the knowledge and skills

necessary to implement an on-going assessment of provider and staff educational needs and subsequently provide evidence-based education. Collaboration with organizational management can facilitate this process and ultimately expand the provision of EBP.

The implementation of a clinical algorithm is an effective means to prompt provider interventions that reflect current evidence-based standards. Additional research is needed to determine if improved quality of care will persist following completion of the EBP project. All providers were aware of the EBP project and cognizant of the chart audits. This knowledge may have affected provider interventions and utilization of the clinical algorithm. Further research is required to determine if the algorithm, focused diabetes visit, and report card, may have an impact on patient outcomes. A review of the literature demonstrated a paucity of data demonstrating the effect of evidence-based interventions on specific measures such as BP, lipids, glycemic control, and renal function.

Conclusion.

A recent report from the Institute of Medicine (2000) Committee on Quality of Health Care in America demonstrated that the fifth largest cause of death in the United States is associated with errors in health care. This report led to increased focus on the quality of health care performance in daily practice and greater accountability for patient outcomes (Aherne, Lamble, & Davis, 2001). Continued professional development through education is viewed as a tactical health system resource.

An evaluation of quality data derived from chart audits serves as a source to identify educational needs and subsequent program implementation to improve provider care delivery. However, to be effective, the health care organization must provide a clear delineation of provider accountability, responsiveness, and performance (Aherne et al., 2001). Management must articulate consequences for provider performance and outcomes. Practice-reinforcing strategies and following evidence-based education are

effective means to prompt provider change to EBP (Davis, Thomson, Oxman, & Haynes, 1995). The doctorally prepared APN possesses the skills necessary to facilitate change to EBP within a variety of healthcare organizations and improve the quality of patient care.

This EBP project answered the initial PICO question: Will a clinical algorithm improve diabetes care in adult patients with low SES within a nurse-managed, primary care, outpatient setting? Outcome data demonstrated an improvement in all 22 ADA process of care standards following implementation of an evidence-based clinical algorithm. The doctorally prepared APN possesses the knowledge and skills necessary to effectively implement EBP within a variety of settings to promote quality in health care.

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BIOGRAPHICAL MATERIAL

Ms. Miskovich graduated from Purdue University with an associate degree in the science of nursing in 1976. While working in various medical surgical units she continued her education at Purdue University and earned a baccalaureate in nursing in 1978 and family nurse practitioner certificate. Since 1978, she has been practicing as an adult nurse practitioner and is board certified through ANCC. She completed the MSN in Community Health Nursing at St. Xavier University in 1981. She is also an Associate Professor of Nursing at Purdue University Calumet campus teaching in both the undergraduate and graduate curriculum. Ms. Miskovich is a member in Sigma Theta Tau Mu Omega chapter, the American Academy of Nurse Practitioners, and serves on the Board of the Society of Nurses in Advanced Practice. She has authored several professional articles and presented at local and national nursing conferences. Lynn is currently pursuing a DNP at Valparaiso University. Her EBP project was accepted for competitive poster presentation at MNRS and awarded second place. The EBP project is also accepted for presentation at the AANP national conference. Throughout her career, Lynn has been committed to improving health care to the medically underserved in Northwest Indiana and to educating and mentoring nursing students. She has demonstrated this commitment by working as a nurse practitioner and educator with area indigent clinics. Ms. Miskovich served as a member of a task force that developed the Catherine McAuley Clinic for the medically uninsured, where she continues to work as a nurse practitioner, since its inception in 1996. She established a medical home for homeless women and children enrolled at Sojourner Truth House through a collaborative partnership with a Federally Qualified Healthcare Center in Lake County. This has enabled these women and children to obtain much-needed preventive and primary healthcare. In 2010, she was awarded the Area Health Education Center of Indiana (AHEC) “Partnership Matters” Award.

ACRONYM LIST

ADA: American Diabetes Association

AHRQ: Agency for Health Care Research and Quality

APN: Advanced Practice Nurse

BP: Blood Pressure

CASP: Critical Appraisal Skills Programme

CMC: Catherine McAuley Clinic

CDC: Center for Disease Control

CBAs: Controlled Before and After Studies

DCCT: Diabetes Control and Complications Trial

DBP: Diastolic Blood Pressure

DNP: Doctor of Nursing Practice

EBP: Evidence Based Practice

ESRD: End-stage Renal Disease

FPG: Fasting plasma glucose

HbA_{1c}: Hemoglobin A 1 C or Glycosylated Hemoglobin

ITS: Interrupted time series

IOM: Institute of Medicine

MUA: Medically Underserved Area

NHANES: National Health and Nutrition Examination Survey

NIDDK: National Institute of Diabetes and Digestive and Kidney Diseases

NP: Nurse Practitioner

PARIHS: Promoting Action on Research Implementation in Health Services

RCT: Randomized Control Trial

SES: Socioeconomic status

SBP: Systolic Blood Pressure

THDR: Take Home Diabetes Record

TTM: Transtheoretical Model

UKPDS: United Kingdom Prospective Diabetes Study

US: United States

APPENDIX A

Diabetes clinical algorithm
REGULAR VISIT ASSESS AT LEAST QUARTERLY
GOAL: DATE OF VISIT & OUTCOME:

DATE OF VISIT						
weight	Ideal Wt.:					
blood pressure	<130/80 mm Hg					
BMI	<25 kg/m^2					
Inspect feet & pulses	+ 2					
HbA_{1c} twice a year if at goal	<7					
Review self-monitoring blood glucose (SMBG) record	Preprandial 70-130 Postprandial <180					
Review/adjust medications to control glucose	Check if completed					
Review/adjust medications to control blood pressure	Check if completed					
Review/adjust medications to control lipids.	Check if completed					
Review self-management skills	Check if completed					
Review dietary needs	Check if completed					
Review physical activity	Check if completed					
Counsel on smoking cessation.	Check if completed					
Counsel on alcohol use.	Check if completed					
Assess for depression or other mood disorder	Check if completed					
Low-dose aspirin for CVD prevention (MEN >50 & WOMEN >60 + 1 RISK FACTOR).	Check if completed					
Annually						
Lipid Profile LDL Triglycerides HDL	 <100; <70/with CVD <150 Men >40; Women >50					
Serum creatinine	Per lab					
Urine albumin-creatinine ratio x 3	<30					
Foot exam: 10 g monofilament & 1 of the following: vibration 128 Hz Ankle reflex	State if present or impaired response. Give date completed					
Refer dilated eye exam	Date of referral Date of exam.					
Influenza vaccination	Date of vaccine.					

APPENDIX B

Patient Report Card

	GOAL	**DATE OF VISIT**	**DATE OF VISIT**	**DATE OF VISIT**
weight	Ideal Wt.:			
blood pressure	<130/80 mm Hg			
BMI	<25 kg/m^2			
Inspect feet & pulses	+ 2			
HbA_{1c} (every 3 mo.) twice a year if at goal	<7			
Review self-monitoring blood glucose (SMBG) record	Before meal: 70-130 1 – 2 Hr. after meal: <180			
ANNUAL TESTS: completed more often if not at goal				
Lipid Profile: LDL Triglycerides HDL	 ≤100; ≤70/with CVD ≤150 Men ≥40; Women ≥50			
Serum creatinine	Per lab			
Urine albumin-creatinine ratio x 3	<30			
Foot exam: 10 g monofilament & 1 of the following: vibration 128 Hz Ankle reflex	State if present or impaired response. Date			
Refer dilated eye exam	Date of referral Date of exam.			
Influenza vaccination	Date of vaccine.			

APPENDIX C
CHART AUDIT FORM

Pre-EBP Protocol: _____ Post EBP Protocol:_____
PROVIDER: NP MD Referral to Focused Diabetes Clinic Date:_____
PT. AGE:_____ GENDER:_____ ETHNICITY:_____ CHART # _____

Assess quarterly		**DATE**	**DATE**	**DATE**	**DATE**
weight	Ideal Wt.:				
blood pressure	<130/80 mm Hg				
BMI	<25 kg/m^2				
Inspect feet & pulses	+ 2				
HbA_{1c} twice a year if at goal	<7				
Review self-monitoring blood glucose (SMBG) record	Preprandial 70-130 Postprandial <180				
Review/adjust medications to control glucose	Check if completed				
Review/adjust medications to control blood pressure	Check if completed				
Review/adjust medications to control lipids.	Check if completed				
Review self-management skills	Check if completed				
Review dietary needs	Check if completed				
Review physical activity	Check if completed				
Counsel on smoking cessation.	Check if completed				
Counsel on alcohol use.	Check if completed				
Assess for depression or other mood disorder	Check if completed				
Low-dose aspirin for CVD prevention (MEN >50 & WOMEN >60 + 1 RISK FACTOR).	Check if risk assessed				

Assess Annually

Lipid Profile LDL Triglycerides HDL	 <100; <70/with CVD <150 Men >40; Women >50				
Serum creatinine	Per lab				
Urine albumin-creatinine ratio x 3	<30				
Foot exam: 10 g monofilament & 1 of the following: vibration 128 Hz Ankle reflex	State if present or impaired response. Give date completed				
Refer dilated eye exam	Date of referral Date of exam.				
Influenza vaccination	Date of referral. Date of vaccine.				

Documentation on clinical algorithm: yes/no Patient report card: yes/no

APPENDIX D
ASSESSMENT OF READINESS TO CHANGE.

Not at all	Somewhat	Very Much

Question	1	2	3	4	5
1. I plan to continue with my current practice strategies for the care of patients with diabetes.					
2. I feel comfortable describing evidence-based practice strategies for the management of diabetes to a colleague.					
3. I am willing to learn to apply the best evidence for the management of diabetes to my practice. (Precontemplation)					
4. I intend to implement evidence-based practice strategies for the management of diabetes within the foreseeable future (next 3 months). (Contemplation)					
5. I intend to immediately implement current evidence for the management of diabetes. (Preparation)					
6. I have implemented current practice standards for the management of diabetes in the recent past. (Action)					
7. I have utilized current practice standards for the management of diabetes for the past 6 months or longer. (Maintenance)					

APPENDIX E

Interventions to facilitate stages of change

STAGE of CHANGE	INTERVENTION
Precontemplation: Decisional balance (weighing the pros & cons of change) Consciousness raising: increase awareness & information about EBP Dramatic relief: Demonstrate how EBP strategies help reduce negative consequences Environmental reevaluation: Reflect on how EBP impacts all patients	Promote awareness of EBP innovation. • Provide education related to current ADA Clinical Practice Standards. Direct face-to-face education and written summary of the current practice standards were provided. • Stimulate interest and involvement. Provide summaries of the literature review that demonstrate improved provider and patient outcomes. • Help to focus on the benefits and reduce the perceived negative aspects.
Contemplation: Have individuals reflect on their self-image as it relates to EBP.	Create understanding; this was provided during the individual provider meetings. • Share available EBP standards. • Develop insight into own routines by sharing results of initial chart audit. • Determine overall attitude (open-minded or defensive). • Willingness to acknowledge gaps in performance.
Preparation: Self-liberation involves making a choice and commitment to change.	Develop positive attitude to change • Discussed the advantages of change to EBP: Review of scientific merit of change. Discuss the credibility of EBP source. • Create positive intentions/decision to change. • Provided comprehensive overview of EBP to increase the degree of confidence in each provider's skills. Offered monthly meeting and additional written clarification of EBP standards. • Addressed the perception of potential problems of putting change into practice. Open discussion at staff meetings and with individual consultation.
Action: Stimulus control: Change the environment to promote the change. Counterconditioning: Implement strategies to maintain the change.	Try out change in practice • Perception of practical barriers (time, staff, money); discussion with clinic manager, medical director and staff on a monthly basis. • The clinical algorithm and patient report card were developed to facilitate provider change and served as an easy to follow clinical prompt. • Provided an opportunity to try change on small scale;15 patients per provider. • Provided a focused diabetes clinic day to facilitate change. Confirm value of change • Encouraged discussion of whether first

	experiences positive or negative • Discussed the degree of cooperation experienced and reaction of patients and colleagues with clinic manager. • Monthly discussion with clinic manager regarding the impact of EBP practice interventions on clinic in terms of number of patient visits, staff responsibilities, and cost.
Maintenance: Helping relationships: Maintain support for the change. Reinforcement management: use rewards for positive change.	Integrate new practice into routines • Continued support for provider willingness and ability to redesign processes. • Recommendation to CMC manager and advisory board to embed EBP in organization. • Provide support and resources upon completion of the project. • Demonstrate positive impact of EBP on clinic, providers, and patients by sharing outcome data.

(Grol, 1992)

Appendix F

Included Literature: Major Findings and Outcomes

Authors	Study Design/ Level of Evidence/ CASP Score	Sample (all are low SES)	Outcome	Intervention	Comments
Chapin, Williams, & Adair, 2003	Prospective controlled trial Level III 18	57 intervention group & 70 control group	A visual tool depicting patient Glycosylated hemoglobin levels (THDR) was provided to the intervention group; this prompted care resulting in improved glycemic control.	Focused diabetes management team Clinical algorithm or prompt Provider feedback	The THDR was placed within the patient's chart, where providers would find them and give to the patient. This prompted provider-patient discussion of the level of diabetes control.
Clancy, Brown, Magruder, & Huang, 2003	Randomized controlled trial Level II 20	59 intervention group (group visits) & 61 control group (usual care).	Patients who received care in groups demonstrated improvement in the ADA standards of care, improved sense of trust in physician, and improved coordination of care, increased community orientation, and culturally competent care.	Focused diabetes management team Focused visit	There was improvement in the process of care indicators, however no significant differences in glycemic or lipid control.
Davidson, Karlan, & Hair, 2000	Case control study Level IV 20	89 cases 92 controls	Subjects within the intervention group demonstrated a 0.8 reduction in HbA1c when compared to the nonintervention group.	Focused diabetes management team Clinical algorithm or prompt Provider feedback	Pharmacists followed an algorithm written by a diabetologist who was also available for telephone consultation on an as needed basis.

Echeverry, Dike, Washington & Davidson, 2003	Comparative study Level IV 19	209 medical charts reviewed in the intervention group & 218 in the noninterventio n group	Process measures of diabetes care (foot exam, urine protein, and lipid panel testing) were met moderately well with the use of a reminder card provided to the provider. Standardized diabetes progress notes were more effective in prompting the ordering of process measures.	Clinical algorithm or prompt Provider feedback	Majority of providers found the reminder card prompted them to do the necessary exam or test. 50% found the reminder card a distraction for patient care due to increased questions from the patient.
Jovanovic, et al., 2004	Randomized controlled trial Level II 20	171 intervention group & 146 control group	Diabetes case management, added to primary care, improved glycemic control compared with the control group. Diabetes case management reduced disparities in diabetes health status among low-income ethnic populations.	Focused diabetes management team Clinical algorithm or prompt Provider feedback	The reduction in HbA1c was consistently greater in the intervention group at each time point (p = 0.001), ranging between 0.65 at 6 months and 0.87 at study end (25.3 months).
Larme & Pugh, 2001	Qualitative study Level VI 19	32 diabetes-related professionals (physicians, certified *diabetes* educators, researchers, and agency personnel) participated in the study	Contextual barriers must be addressed to facilitate implementation of diabetes practice guidelines in clinical practice. Outcomes include an increased focus on prevention, improvements in health care delivery for chronic diseases, and increased attention to the special needs of minority and low-income populations.		Open-ended interviews lasting 1–2 hrs.were conducted in the professionals' offices.

Parchman, Romero & Pugh, 2006	Observational study Level VI 18	20 primary care clinics for 211 patients	(1) Diabetes services were less likely to occur during office visits for acute illness. (2) The percentage of diabetes services delivered increased as the duration of visit increased. (3) Follow-up visits were scheduled sooner if fewer of the diabetes services were delivered.	Focused visit	Patient visits for follow-up of a chronic disease were 4.8 times more likely to receive all (100%) of the services that were indicated (95% CI, 1.95-12.01) than those visiting for an acute problem. A higher percentage of indicated services were completed during a chronic illness follow-up visit, 80.0%, than during an acute illness encounter, 60.3% (*P* <.001).
Phillips et al., 2005	Randomized control trial Level II 20	345 medical residents randomized to be either control subjects or to one of three intervention groups.	Feedback on performance focused on overcoming clinical inertia improves glycemic control and blood pressure. Those receiving both feedback and a chart reminder demonstrated the greatest improvement in patient outcomes for glycemic control.	Clinical algorithm or prompt Provider feedback	The intervention groups included: (1) reminders that provided patient specific recommendations for management at the time of the patient's visit; (2) face-to-face feedback on performance, or (3) both.
Rothman, et al., 2010	Randomized control trial Level II 20	112 intervention group & 105 control group	Intervention patients with low literacy were significantly more likely to obtain goal HbA1c and blood pressure. A comprehensive diabetes management program benefited patients with low literacy to a greater extent than patients with higher literacy.	Focused diabetes management team Clinical algorithm or prompt Provider feedback	The comprehensive disease management program included: (1) application of evidence-based treatment algorithms, (2) one-to-one educational sessions including medication management and counseling, (3) strategies to overcome patient barriers.
Renders, et al., 2009	Cochrane Systematic Review Level I 20	Systematic Review examined the effects of healthcare provider interventions	A combination of professional interventions improved process outcomes; these include continued education, chart	Continued education, chart audit, provider feedback, peer review, chart reminders or prompts, and local	Twelve studies targeted interventions provided by health professionals, nine targeted the organization, and 20 studies targeted both.

		or the organizational system, on improving the management of patients with diabetes in primary care, outpatient, and community settings.	audit, provider feedback, peer review, chart reminders or prompts, and local consensus processes.	consensus processes.	