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The Effect of Practice Facilitation on Diabetes Outcome Measures

Systems Change Project,
Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Nursing Practice

St Catherine University

St Paul, Minnesota

Margaret Joy Longley

November, 2012

ST. CATHERINE UNIVERSITY
ST. PAUL, MINNESOTA

This is to certify that I have examined this
Doctor of Nursing Practice systems change project
written by

Margaret Joy Longley

and have found it is complete and satisfactory in all respects,
and that any and all revision required by
the final examining committee have been made.

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Faculty Project Advisor

12/14/12

Date

DEPARTMENT OF NURSING

This project is dedicated to:

My mother, Violet, for her gentle spirit and ongoing presence in my life.

My father, Ted, for his creativity and guidance.

My sister, Joanne, for her unending love, support and courage.

My children, Bryanna, Kristofer, and Meghan, for all they have taught me about life, and love.

My DNP colleagues and faculty for their support and friendship during our journey together.

A special thank you to my project committee:

Dr Rozina Bhimani, Dr Alice Swan, and Cheryl Larson, MAN, CNP

Their feedback and support have been invaluable

Executive Summary

Diabetes is one of the most serious public health problems of the twenty first century (Albright, 2007; Glasgow et al., 1999). The rate of increase in the occurrence of diabetes and its complications has placed a tremendous burden on the American health care system and threatens to affect close to one third of the population in the next thirty years. Diabetes complications markedly reduce the quality and length of life and contribute to enormous health care costs. Several large studies have shown that effective treatments and practices may substantially reduce the impact of diabetes (Herman, 2007).

Performance measures for diabetes have been in place since the late 1990s (Murphy, Chapel, & Clary, 2004). There is evidence that control of outcome measures such as LDL-cholesterol, blood pressure and HgbA1c have a positive impact on reducing the severity and progression of diabetes. The systems change project was developed to pilot a facilitator model for system change using evidence based quality measures to improve diabetes outcomes in a small primary care clinic. Results of the project showed significant improvement in the effects of clinicians (random effects) on diabetes outcome measures (fixed effects) for LDL-cholesterol ($p = 0.017$), HgbA1c ($p = 0.004$), and tobacco nonuse ($p = 0.0051$). The change in percent composite outcome measures for diabetes was also significant ($p = 0.01$). The hierarchical generalized linear model was used to account for provider impact on patient outcomes. Response to the facilitator model was generally positive as a means of promoting a quality improvement initiative in diabetes, encouraging a multidisciplinary model of chronic disease management and enhancing the use of organizational systems to plan and track patient care.

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The Effect of Practice Facilitation on Diabetes Registry Outcome Measures

Chapter 1

Background

Diabetes is a major public health problem with tremendous medical, economic, and personal consequences. It is a chronic illness that affects people across the lifespan, and is one of the most costly diseases to the United States (Glasgow et al., 1999; Narayan, Boyle, Thompson, Sorenson, and Williamson, 2007). If not diagnosed and treated properly diabetes can lead to serious complications such as heart disease, stroke, blindness, lower-limb amputations, kidney failure, disability and premature death.

Rising Prevalence

Diabetes is a chronic and devastating disease that now affects 8.3% of the United States (U.S.) population, and 11.3% of Americans over the age of twenty (American Diabetes Association, 2011). Diabetes is the seventh leading cause of death in the U.S. (Centers for Disease Control and Prevention, 2012). The number of new cases of diabetes diagnosed each year began to increase in 1992. From 1990 to 2010 the incidence of diabetes in the US nearly tripled. The prevalence of diabetes in the United States also remained constant until the early 1990s. Between 1990 and 2010, the prevalence of diabetes nearly quadrupled (Centers for Disease Control and Prevention, 2012). If current trends continue, the Centers for Disease Control and Prevention projects that by 2050, one in three adults in the US will have diabetes, an increase of more than 163% (Boyle, Thompson, Gregg, Barker, & Williamson, 2010; Centers for Disease Control and Prevention, 2012).

The development of diabetes is strongly linked with aging, obesity, and the increasing racial and ethnic diversification of the population (Centers for Disease Control and Prevention,

2012). Sixteen percent of people over the age of 65 have diabetes as opposed to 2% of people age 20 to 45 (Centers for Disease Control and Prevention, 2012). The prevalence of diabetes is also higher among certain racial and ethnic groups such as Hispanics and Blacks, but is increasing most rapidly among Native Americans (Agency for Healthcare Research and Quality, 2008).

Complications of Diabetes

Diabetes is now the seventh leading cause of death in the United States (Centers for Disease Control and Prevention, 2012). People with diabetes are at great risk for serious and life-threatening complications. Adults with diabetes have a two to four fold greater chance of developing heart disease or having a stroke (National Diabetes Information Clearinghouse, 2012). Small blood vessel changes in diabetes lead to an increased risk of eye, kidney and nerve disease. Diabetes is the leading cause of adult kidney failure and a major contributor to adult blindness (Centers for Disease Control and Prevention, 2012). The combination of circulatory and nerve disease leads to an increased occurrence of lower-limb amputations (American Diabetes Association, 2011). People with diabetes can, over time, develop nerve damage throughout their body which can lead to chronic pain, immobility, and long-term disability (National Committee for Quality Assurance, 2012). The long prodromal phase before diabetes is diagnosed results in a high rate of complications that are already present at the time the diagnosis is made (Deshpande, Harris-Hayes, & Schootman, 2008).

Poorly controlled diabetes before conception and during pregnancy can cause major birth defects, spontaneous abortions, and excessively large babies posing a risk to mother and child (Centers for Disease Control and Prevention, 2012). Uncontrolled blood sugar during pregnancy

has been associated with an increased risk of metabolic syndrome and diabetes in the offspring (Boney, Verma, Tucker, & Vohr, 2005).

The High Cost of Diabetes

The costs associated with diabetes are staggering. The average medical expenditures among people with diagnosed diabetes are 2.3 times higher than for people without diabetes (American Diabetes Association, 2011). Data released by the Centers for Disease Control in 2007 show that the total cost of diagnosed diabetes in the United States was \$174 billion. This amount included \$116 billion of direct medical costs and \$58 billion of indirect costs from disability, work loss and premature death (Centers for Disease Control and Prevention, 2011; Gilmer et al., 2005). A sampling of 10 million commercial health plan members, showed that the average annual costs incurred by a patient with diabetes in 2009 was \$11,700 compared with the annual costs of \$440 for a patient without diabetes. The average annual cost incurred by a diabetic patient with complications was \$20,700, nearly three times that of a diabetic patient without complications (United Health Center for Health Reform & Modernization, 2010).

The current approach to diabetes care is projected to see annual costs (in 2012 dollars) rise from \$156 billion in 2010 to \$192 billion by 2020 with direct medical costs increasing to \$138 billion and indirect costs from lost productivity increasing to \$54 billion (U.S. Department of Health and Human Services, 2004; Winterfeld, 2009). By some estimates, there is a real possibility that diabetes will bankrupt the healthcare system (American Association of Clinical Endocrinologists, 2011).

Disparities in Health Care

The greatest burden of diabetes falls on racial and ethnic minorities (Prina, 2010; Sequist et al., 2008; White, Beech, & Miller, 2009) There is considerable evidence that the social status

of persons with diabetes and the characteristics of their communities or neighborhoods may determine their risk of mortality and diabetes-related complications (Brown et al., 2004; White et al. 2009). The National Health Interview Surveys documented lower educational attainment, higher unemployment, and lower family income among Americans who reported having diabetes (Mann, Ponieman, Leventhal, & Halm, 2009; Sequist et al., 2008). A study conducted by White et al. (2009) found that more than half of low-income minorities with diabetes held major misconceptions about diabetes and its management that significantly and negatively impacted disease treatment outcomes.

Among Hispanics, the fastest growing minority population in the U.S., the prevalence of diabetes is two times that of non-Hispanic Whites (Braverman, Cubbin, Egerter, Williams & Pamuk, 2010; Centers for Disease Control and Prevention, 2001) and increases significantly for those with less than a high school education (Brown et al., 2011). The lifetime risk for developing diabetes is greater among Hispanics than any other ethnic groups (Centers for Disease Control and Complications, 2011). Between 1990 and 1998 the number of American Indians and Alaska Natives with diabetes increased 71% (Agency for Healthcare Research and Quality, 2008). Rates of diabetes related deaths is higher among Blacks, American Indians, and Hispanics than for Whites (Centers for Disease Control and Prevention, 2012), and diabetes is the fifth leading cause of death for Asian and Pacific Islanders (National Diabetes Information Clearinghouse, 2012).

Certain minority groups also have much higher rates of diabetes related complications, in some cases as much as 50% more than the diabetes population as a whole (Hale et al., 2010). Blacks, especially, are more likely to have serious complications from diabetes, such as end

stage renal disease and lower extremity amputations (Agency for Healthcare Research and Quality, 2001; White et al., 2009).

Effectiveness of Interventions

Diabetes has a tremendous impact on health spending and quality of life for those affected by the disease. Yet type 2 diabetes, the most common form, can be prevented and controlled. Research findings indicate that diabetes prevention and management works (Albright, 2010; Hale et al., 2010; Nguyen, Nguyen, & Felicetta, 2008). The Diabetes Prevention Program showed a 58% reduction in the onset of diabetes over a three year period through the use of diet and exercise alone (National Diabetes Information Clearing House, 2011). Studies in China and Finland have had similar results (Pan et al., 1997; Tuomilehto et al., 2001). Findings from The Diabetes Control and Complications Trial; The United Kingdom Prospective Diabetes Study Group; and the Action to Control Cardiovascular Risk in Diabetes Trial show that with the proper treatment and glucose control, complications can be minimized (National Institutes of Health, 1993; National Institutes of Health, 2008; Turner, Cull, & Holman, 1996). State diabetes prevention and control programs, funded partially by the Centers for Disease Control and Prevention, have been associated with noticeable improvements in diabetes prevention and treatment (Centers for Disease Control and Prevention, 2011). Successful prevention and management of diabetes can decrease the high cost of care and improve the quality of life for all people affected by the disease.

Return on Investment

Public health experts agree that investing in diabetes prevention and control efforts can improve health outcomes across populations and reduce health care costs nationally (Agency for Healthcare Research and Quality, 2008; Albright, 2010). Cost analysis of the Diabetes

Complication and Control Trial showed that even at two to three times the expense of conventional therapy, the lifetime costs of improved care were offset by the lifetime costs of end-stage renal disease, blindness and lower-limb amputations (Diabetes Control And Complications Trial, 1996; Herman & Eastman, 1998). Sidorov et al. (2002) determined that comprehensive care for diabetes in a managed care program resulted in per month claims of \$394.62 for enrollees in the program versus per month claims of \$502.48 for those with diabetes not enrolled in the program. Beaulieu et al. (2006) estimated the cumulative discount in net savings to the health plan for patients enrolled in a diabetes program for 10 years was \$5,345 per diabetic member. Nuckols et al. (2011) found that the cost of care for improved diabetes control was \$830.39 annually as opposed to \$503.38 annually for those with status quo care, but calculated the cost effectiveness ratio to be \$44,869/quality adjusted life year (U.S. dollars for 2009) for those with good diabetes control as defined by HgbA1C <8%.

A growing body of research indicates that payers, patients, and society in general can see a long-term return on investment in diabetes quality improvement (Klonoff & Schwartz, 2008; Krause, 2005). Cost savings are difficult to calculate accurately because of the large number of individuals who have diabetes and have yet to be diagnosed, and those who have diabetes but have not sought treatment. Additionally, evidence points to the fact that the real cost savings for diabetes occur far in the future, and are even more difficult to accurately quantify. Research shows that improved care makes a significant difference on all levels.

Healthcare Mandate

The American health care system has difficulty routinely and consistently translating research into practice, adhering to guidelines for proper care, and improving health care outcomes (McGlynn et al., 2003). These difficulties are particularly true for diabetes care. It is

estimated that 50% of people with diabetes are as yet, undiagnosed (International Diabetes Federation, 2010). Others who are diagnosed lack adequate treatment and do not know how to manage their disease well over time (Agency for Healthcare Quality Improvement, 2008).

A 2006 survey of diabetes care based on data from the National Health and Nutrition Examination Survey and the Behavioral Risk Factor Surveillance System found that only 42% of individuals with diabetes had glycosylated hemoglobin (HgbA1c) levels less than 7% (optimal control), a number that has not substantially changed since 1998 (Agency for Healthcare Quality Improvement, 2008). In Minnesota the statewide rate for optimal diabetes control at the clinic level in 2010 was 37% (Minnesota Community Measurement, 2011).

Legal and Political Mandate

The U.S. government has in the last several years, taken a more active role in a range of programs and initiatives to decrease the impact of diabetes. There is an imperative to extend that engagement to all levels of the health system and all sectors of government and the public to address determinants of disease and transform the system from one of sickness to one of health promotion (O'Connor, 2012; Kahn, 2009). In 2007, the National Council on Development Planning commissioned Mathematica Policy Research, Inc. (Novo Nordisk, 2012) to identify the range and kinds of federal programs, authority, and funding that would influence the incidence, prevalence, treatment, and progression of diabetes. The results show there was a lack of effective, coordinated federal leadership and spending in diabetes prevention, treatment, and care. Yauch, Hawkes, Linn, Gould, and Galbraith (2004) identified three strategies for change: 1) raising the profile of chronic disease in the minds and on the agenda of policy makers; 2) providing policy makers with the necessary evidence to support the case for prevention; and 3) advocating the need for widespread health system changes.

Determinants of Health and Social Justice

In the U.S. today, the single largest cause of poor health outcomes is chronic disease (Centers for Disease Control and Prevention, 2012). Evidence now indicates that the most powerful predictor of whether a person will develop a chronic disease is their socioeconomic status (Bell et al., 2010; Braverman et al.; Sequist et al., 2008; White et al., 2009). The socioeconomic factor is because higher income increases the probability that people can and will choose healthier food and activity levels. Research shows that individuals with higher incomes suffer less from chronic stress which interacts with the immune and neurological system to set up risk factors for many chronic diseases.

Larger social systems that support and surround the individual are influenced by and in turn influence, the individual both positively and negatively. Management of diabetes occurs largely in outpatient settings and most often in primary care clinics. Sequist et al. (2008) found that patient sociodemographic factors explained 13% to 38% of the racial differences in improving diabetes outcome measures. Unfavorable social conditions and ineffective self-management often have a greater impact on health outcomes than planned interventions from medical providers. In such a context, the most important determinants of health are the patients and their interactions with the environment around them. It is essential to look beyond the care of the individual patient to the health of the larger community with attention to equity and the most efficient use of resources in ways that enhance patient and community quality of life.

Quality improvement in diabetes is really about equity in health care delivery. Health disparities produce avoidable suffering, diminish human resources, and decrease productivity on many levels. They deny equal opportunity for health and quality of life. Horizontal equity refers

to the equal treatment for individuals or groups with the same or similar levels of health care need (Ward, 2009). Horizontal equity is an essential component of quality chronic disease care.

The doctor of nursing practice curriculum and the system change project is rooted in the imperative to seek out inequities within the system, and create a vehicle for change that can be self-sustaining and transformative. Such an opportunity occurs with this diabetes project. As a result of the intervention, providers express greater confidence, satisfaction, and success in their ability to care for their diabetes patients, build productive relationships with their patients, and provider teams, and meet organizational expectations. Patients generally are able to see improvement in their diabetes outcomes and consequently have the opportunity to decrease complications and improve their quality of life. Most importantly, care is distributed equally without regard to the individual's race or ethnicity. There are three domains of equity within healthcare: equal access to health care for people in equal need; equal treatment for people in equal need; and equal outcomes for people in equal need (Ward, 2009). Issues of access are only marginally addressed by process and outcome measures for quality improvement. Improvement in quality of care more directly applies to treatment, and outcomes.

The diabetes management regime is among the most demanding regimes of any chronic illness and is based on a number of lifestyle changes that people with diabetes often find difficult to incorporate into their everyday lives. Improving care delivery is essential to developing a more supportive and optimal environment for long term chronic disease management (Averbeck et al., 2009).

Practice Facilitation

According to Baskerville, Liddy, & Hogg (2012), practice facilitation is a multifaceted approach that involves skilled individuals who enable others through a range of intervention components and approaches to address the challenges in implementing evidence-based care guidelines within the primary care setting. Facilitators are individuals with recognized skills in an identified area of health care and who are perceived as credible implementers of change. The role does not impose ways of working on individuals, is neither prescriptive nor directive, but strives to help people recognize and attain their greatest potential. Facilitation has been increasingly used in Europe and Canada since the early 1980s, but is a relatively new concept in the U.S.

The facilitation process itself is by nature both fluid and organized in that clear practice guidelines are the basis for the needed change, but introduction and adaptation to the individual and the context are essential to the successful incorporation of the new methods of operation. As such, a diversity of approaches in moving evidence into practice reflects the multifaceted nature of facilitation. Important roles for the facilitator are to promote awareness for the need for change, provide leadership and management of the change process, encourage relationship building and communication, and provide ongoing mentoring, monitoring, and evaluation.

Several elements of the facilitation process were attractive for the systems change project. Essential components of facilitation were the process of individual and group interaction that was the basis for improved understanding, problem solving, and incorporation of new patterns into daily clinic practice. The opportunity to tailor the facilitation to the local context and to provide individual support and encouragement through the change process offered a unique opportunity to implement theory from both nursing, health care, and business sectors.

Organizational Background

Health care organizations and individual healthcare providers have been under increased pressure to improve treatment outcomes, especially in the area of chronic disease management. The Diabetes Quality Improvement Project founded in 1997 through a partnership between the Center for Medicare and Medicaid Services, the National Committee for Quality Assurance, and the American Diabetes Association, established a single, standardized set of performance measures for diabetes care quality improvement and accountability in the U.S. Changes in the healthcare system to promote improved outcomes were given impetus by the Institute of Medicine report in 2001 that called for providing physicians with more financial incentives for quality improvement (Institute of Medicine, 2001). Further changes through the Affordable Care Act of 2010 at the national and state level have increased the surveillance for diabetes and strengthened the mandate for healthcare organizations to adopt comprehensive programs to improve outcome measures. The development of diabetes registries that track outcomes for patients with diabetes have been an important part of this process. The result of these activities is that local healthcare organizations are strongly encouraged to follow federal guidelines to ensure compliance, reimbursement and better patient outcomes.

This project took place in a multispecialty primary care clinic that is part of a large organization located in the Midwest, U.S. The larger organization is a non-profit institution that primarily serves an urban population. The mission and vision of the larger organization are to serve the community by providing exceptional care, preventing illness, restoring health, and providing comfort to all members. The organization's vision is to put the patient first and lead collaborative efforts that solve the community's health care challenges.

In 2009, a small, multidisciplinary practice comprised of eight medical clinics and four urgent care centers in the Twin City area was absorbed into the much larger healthcare organization that was composed of over one hundred clinics and urgent care centers and ten hospitals throughout the state of Minnesota. The larger system was a recipient of the American Medical Group Foundation's 2008 Acclaim Award for its initiative around optimal diabetes care (Sanderson-Austin, Branning, Bauwens, & Smith, 2009). It also was a two-time recipient of the Minnesota Bridges to Excellence Award (2008 & 2011) for exceptional diabetes care. A stated goal of the larger healthcare organization was to extend the diabetes care initiative activities to include the newly acquired practice.

Organizational Structure

Within the context of these national and organizational mandates, one small healthcare system became the focus of a systems change project to facilitate improved diabetes management outcomes. This clinic is part of the smaller system that was absorbed into the much larger organization. Practice context differed greatly between the smaller system and larger organization. The small, primary care clinic consists of nine internal medicine and family practice physicians, two primary care nurse practitioners, and eleven clinical assistants. The first language of four of the physicians is not English and they received their medical training outside the United States. The clinic is located in the second largest county in the state and serves a largely suburban population. The county is in the lowest one third of the state's health status morbidity and mortality rankings and lowest one third of the state's social and economic factors rankings (Robert Woods Johnson & University of Wisconsin, 2011). Two thirds of the county population is white with the remaining one third consisting primarily of Black and Asian residents. A small percentage of Hispanic and Latino families are served by the clinic. Nearly

16% of the population has an income that is below the poverty level (GeoLytics, 2011). The prevalence of diabetes in this county in 2009 was 7.2% (Centers for Disease Control and Prevention, 2011). The number of patients with diabetes on each physician's registry ranged from 16-106 with four of the six physicians having more than 50 patients on their registry.

Providers' Expectations

Patients with diabetes in the smaller system were added to the organization-wide diabetes registry and all providers in the smaller system were given year-end diabetes outcome targets to achieve for their panel of patients. Outcome targets were based on Minnesota Community Measures evidence-based guidelines with a year-end goal of 38% percent achievement established by the parent organization.

This initiative produced considerable confusion on the part of providers in the smaller system as there was limited communication about the rationale for the initiative and the choice of outcome measures utilized. Additionally, there was no organized diabetes program in the smaller system, nor was there a program in place to educate and support the physicians who sought to improve diabetes outcomes for their patients. There was also a clear understanding communicated to all physicians that financial remuneration, and perhaps job security, was connected to success in meeting outcome goals.

Problem Statement

Monthly diabetes outcome reports and adherence to recognized standards or outcome measures have been linked to job performance reviews and incentive pay for providers. Individual providers have been under increased pressure to change practice patterns to achieve outcome goals for all their patients. Demands of a busy practice, limited reimbursement for services, shorter time for patient visits and a constantly changing understanding of diabetes and

treatment options make it extremely difficult for the primary care provider to deliver quality care.

The systems change project was conceived out of the realization that providers in a small primary care clinic needed assistance to incorporate evidence based guidelines into their practice and gain confidence in caring for their patients with diabetes. At the same time, consumers needed to receive a level of care for their diabetes that met expected standards of care based on current evidence.

Problem Purpose

The purpose of the project was to deliver practice facilitation intervention to improve primary care providers' comfort and improve diabetes quality of care within their primary care clinic.

Research Question

Does practice facilitation improve provider's comfort with adult diabetes care delivery and improve diabetes outcome quality measures?

Project Overview

Six primary care providers and their clinical assistants (provider teams) were coached on a one-to-one basis in the utilization of evidence based guidelines for the delivery of care to their patients with diabetes. A practice facilitation model incorporating a nurse practitioner diabetes specialist with volunteer participants was implemented for a period of four months. The organizational diabetes registry was used to follow patients and adjust treatment. Diabetes outcome measures (LDL-cholesterol, blood pressure, glycosylated hemoglobin, tobacco nonuse and aspirin use) as well as composite measures of all five outcome measures were monitored monthly to determine the effectiveness of the practice changes. This project also met the stated

organizational goals to have all providers improve the quality of diabetes care in their individual practices.

Project Objectives

The objectives of this project were to evaluate the effectiveness of a practice facilitation coaching for providers and provider teams and to incorporate evidence-based guidelines into clinical practice for improved diabetes care. Outcome measures and monthly composite measures were used as indicators of improved care

Project Aims

- 1) To improve diabetes composite measures to a target of 38% by the completion of the project
- 2) To increase providers' knowledge and confidence in caring for their patients with diabetes.
- 3) To improve health team processes for the delivery of evidenced based care to their patients with diabetes by more consistent use of diabetes registry data.

Definition of Terms

BP	Blood pressure
Composite measures	Bundling of measures for a specific condition to determine if all critical aspects of care have been achieved
HgbA1c	Glycosylated hemoglobin, the average blood glucose level for the preceding three month period, expressed in a percent.
LDL (cholesterol)	Low density lipoprotein cholesterol, independent risk factor for heart disease
Outcome measures	Management goals for specific diseases that have been established by consensus as targets for quality care and reflect how the patient's health has improved.

Practice facilitator	Health professional who assists clinicians in research and quality improvement projects.
Process measures	Actions taken by a provider to improve the quality of care such as ordering tests, making referrals and performing examinations
Provider	Health care professional (physician, nurse practitioner, physician assistant or doctor of osteopathy) who directs and manages the health care for an individual patient
Provider team	A group of health professionals consisting of the provider, nurse and/or clinical assistant who work together to deliver care for an individual patient

Chapter 2

Theoretical Framework

The systems change project incorporates three theoretical frameworks: the science of unitary human beings theory by Martha E Rogers, the eight stage process for systems change by John Kotter, and the chronic care model developed by Group Health's MacColl Institute for Healthcare Innovation. Elements from each theory have direct application to the issues confronted by the project, and more particularly, to challenges inherent in working with individuals who are the providers and consumers of healthcare.

Martha Rogers' Science of Unitary Human Beings

Martha Rogers first published her theory in *An Introduction to the Theoretical Basis of Nursing*, (1970). Her work was in response to the need to establish nursing as a science and postulate a set of principles that would direct nurses' thinking and activity (Butcher & Maliski, 2010). Her work derived from extensive reading in the behavioral and physical sciences and her experience as a public health nurse and educator (Phillips, 2010). Rogers' theory has had a profound impact on nursing practice, research, and education as it articulated a model for nursing distinct from the traditional medical model, and more inclusive of an open-system world view (Butcher & Malinski, 2010; Wright, 2007). Her science was rooted in a unitary consciousness paradigm that proposed energy fields as the fundamental unit of the living and nonliving (Watson & Smith, 2002; Wright, 2006). Humans are described as unitary and irreducible, and in harmonic interaction with the environment. As such, humans and the environment interact in a dynamic, infinite, and continuous manner. Rogers' postulates of energy fields, openness, and patterning (recognition through familiar patterns that are greater than the sum of their parts), were underscored by a pandimensionality that identified life processes existing along an

irreversible space and time continuum yet without any spatial or temporal attributes (Klemm & Stashinko, 1997; Phillips, 2010; Watson & Smith, 2002). Rogers used the term homeodynamics to describe the dynamic, ever-changing nature of life and the world. She further identified three concepts associated with pattern manifestation. Resonancy was the term used to describe change that occurred in a nonlinear, continuous flow of higher and lower light frequency wave patterns. Heliacy described the creative, diverse nature of ongoing change, and integrality was the context in which change occurred, namely the mutual, inseparable human-environment field process (Phillips, 2010; Watson & Smith, 2002).

The expanded world view in Rogers' theory focuses attention on human life as a process of dynamic change that is unpredictable, creative, evolutionary, and continuous. Humans within this system are unique, whole, and greater than the sum of their parts, and in perpetual, reciprocal interaction with their environments. Rogers' system is acausal since it has no boundaries and is in constant change (Barrett, 2010; Phillips, 2010). Humans and the environment interact continuously, creating new patterns, and participating in an irreducible wholeness. Nursing's goal then is to see these individuals within their environment, embrace the mutual process of interaction between the individual and the environment, and work to establish strategies and patterns that will promote health and well-being. Rogers' model has application to all areas of health care practice and strongly influences response to change within a system. Change is continuous and must be accepted as a reality in all aspects of human interaction.

Explicit assumptions in her model are focused on the unity of the individual, continuous reciprocal interaction with the environment, the dynamic evolution of existence, the capacity to influence patterns, and the worthiness of the process. Implicit in Rogers' theory is the value and uniqueness of each individual and nursing's potential to contribute and engage in the process.

Effective engagement is predicated on the acceptance of unceasing change, and the uniqueness, and reciprocity between the individual and environment.

Kotter's Eight Stage Process Model

John Kotter, a Harvard Business School professor and graduate of Massachusetts Institute of Technology, has written extensively on change in organizations. His basic thesis, like Martha Rogers, is that change is constant. His model is based on research and direct observation of organizations around the world. He acknowledges a paradigm shift in organizations since the 1960s from a focus on stability and predictability to one of continuous change and innovation (Kotter, 1996). He attributes the need for change to the major economic and social forces that have resulted in a globalization of both markets and competition. He identifies two important factors for successful change. The first is a multistep process that creates motivation and power which will counter the inertia within the organization. The second is the use of highly effective leadership that will establish direction, align people as change agents, and motivate and inspire people to overcome obstacles associated with the change process (Kotter, 1996).

Kotter's eight-stage process (Table 1) is detailed and sequenced, with emphasis on the importance of completing each step before advancing to the next. The theory presents a view of the twenty-first century organization that is less bureaucratic than streamlined, externally oriented, and risk tolerant. He advocates for a more open, candid, and empowering environment for employees. The theory maintains that successful transformation is largely the result of strong leadership and only marginally associated with good management (Kotter, 1996). He clearly defines what is meant by leadership, and argues convincingly that management is a less essential component of successful change because it is too isolated and removed from vision formation.

Table I

Kotter's Eight Stage Process Model

Stage	Goal	Activity
Stage One	Create urgency for change	Develop a sense of urgency around the need that will spark the initial motivation
Stage Two	Form a powerful coalition	Bring together a team of influential people with power from a variety of sources who will support the change process
Stage Three	Create a vision for change	Develop a brief summary of values behind the change and strategy for implementation for change that are clear and easy to remember
Stage Four	Communicate the vision	Talk about the vision openly, honestly, daily and apply to all aspects of the operation
Stage Five	Remove obstacles	Develop and activate the structure for change and act to remove barriers to its development
Stage Six	Create short-term wins	Create small, achievable targets that can motivate with results
Stage Seven	Build on change	Build on what went right and identify how to improve by setting new goals
Stage Eight	Anchor the changes in corporate culture	Incorporate changes into every aspect of the organization

The Chronic Care Model

The chronic care model identifies the essential elements of a health care system that encourages high-quality chronic disease care. These elements are the community, the health system, self-management support, delivery system design, decision support, and clinical information systems. In combination, evidence-based change concepts under each element facilitate productive interactions between informed patients and providers with resources and expertise. Patients are at the center of the health care plan and take an active part in their care (Group Health's MacColl Institute for Healthcare Innovation, RAND, & California Health Care Safety Net Institute, 2008). One of the major problems addressed by the chronic care model is the fact that current care of chronic illness is often reactive and triggered by actual problems instead of being proactive, structured, and planned.

Application to Systems Change Project

Rogers' theory directs attention to the essential role of each individual (both providers and consumers of health care) and the dynamic, complex, and reciprocal nature of interactions between individuals and their environments. Her theory supports principles of social justice and health equity by ensuring respect for all persons and imbedding change within the context of each individual's life circumstance whether that be personal or professional. Kotter's eight stages are a tool to formulate a plan for identifying the needed change, building support for the change, and moving from beginning to end of the change process. His focus on leadership further supports the facilitator role. The chronic care model outlines specific components of ongoing chronic disease care that once again place the individual patient is at the center of the care process. The chronic care model incorporates the range of environments and organizational systems that are essential components of successful disease management and health promotion.

These theories and models support patient centered care and empower providers and consumers of health care to be collaborative in their efforts to improve the quality of their care.

Literature Review

Measuring Quality in Diabetes Care

A great deal of progress has been made in the United States and Europe during the last fifteen years in the development, specification, and field-testing of measures for diabetes care (Nicolucci, Greenfield, & Mattke, 2006). Much of the work on standardized measures for quality care began in the U.S. with the formation of the Diabetes Quality Improvement Program which was a physician driven program (McLaughlin, 2000). The Diabetes Quality Improvement Program evolved into the National Diabetes Quality Improvement Alliance which is composed of national organizations that are concerned about the care of patients with diabetes (Agency for Healthcare Research and Quality, 2008).

In clinical practice, two terms “standards of care” and “outcome measures”, are used frequently. It is important to note the distinction between these two terms. The standards of care for diabetes serve to provide health professionals, patients, researchers, payers, and other interested individuals with the components of diabetes care, treatment goals, and tools to evaluate quality of care (American Diabetes Association, 2012). Outcome measures are an indicator or tool used to assess the level of care provided within a system of care to populations of patients with diabetes (McLaughlin, 2000). Outcome measures do not reflect either the minimal or maximal level of care that should be provided. Measures do, however, serve as a consistent tool across health care systems to demonstrate the quality of care provided to its members. Outcome measures are evidence-based, derived from standards of care and positions statements from professional organizations, and agreed upon by panels of experts in the field of

diabetes care, research, education, data collection, medical reimbursement, and quality improvement (Agency for Healthcare Research and Quality, 2008).

In 2007, the American College of Physicians published an article in which the Appraisal of Guidelines for Research & Evaluation (AGREE) instrument was applied to nine sets of diabetes practice guidelines (Qaseem et al., 2007). Of the nine guidelines, four (National Institute for Health and Clinical Excellence, Scottish Intercollegiate Guidelines Network, Veterans Health Administration and Canadian Diabetes Association) achieved the highest score. However, a review of the literature indicates that in addition to the National Institute for Health and Clinical Excellence guidelines, three other guidelines (American Association of Clinical Endocrinologists, American Diabetes Association, and Institute for Clinical Systems Improvement) now serve as a basis for the formulation of outcome measures in Minnesota (Minnesota Community Measures, 2008). It is important to note that the National Institute for Health and Clinical Excellence, the Institute for Clinical Systems Improvement, and as of 2012, the American Diabetes Association guidelines emphasize that glycemic control should be individualized for each patient. Glycemic control is especially important when tailoring treatment plans to individual patient's health care needs and concerns, but become problematic when outcome measures do not accommodate such flexibility.

Criteria for the development of quality performance outcome measures differ from clinical practice guidelines in that feasibility and variability are important considerations. Feasibility relates to whether the measure can be collected accurately, reliably, and at reasonable cost (Nicolucci et al., 2006). Variability relates to standardization of the measure across multiple health care settings (Nicolucci et al., 2006). All measures use the number of clinically diagnosed diabetic patients as their denominator. Diagnosed patients who have not been tested are

considered to have failed the standard. Missing data is similarly considered to be a failure. Great Britain, Canada, and the United States all have similar outcome measures that include A1c, and LDL-cholesterol levels (Klomp, Dyck, Cascagnette, & Teare, 2010; Si, Bailie, Wang, & Weeramanthri, 2010). Great Britain and Canada include annual screening for nephropathy and eye examination (Si et al., 2010). In the United States glycemic, lipid, and blood pressure control are the major areas of concern for most organizations (Ahmann, 2007, BioMed Central Health Services Research (2010).

Types of Quality Measures

Improving the quality of health care is dependent on the collection and analysis of data. The Agency for Healthcare Research and Quality defines data as “values or estimates generated to describe a concept and track it over time, space, and populations” (Agency for Healthcare Research and Quality, 2008, Module 2, p. 2). Data provides a means of identifying quality problems in healthcare, selecting possible solutions or interventions, evaluating the results of selected interventions, and tracking those results over time. Data can also be used to compare healthcare quality in different regions of the country or different health care systems within a region. The healthcare quality measures used at the national and state level for quality improvement relate to populations. The measures are often rates such as percentages that indicate the number achieving a goal relative to a population base.

Most quality improvement efforts focus on process and outcome measures. Process measures are based on disease specific guidelines of care. Process measures are those actions taken by a healthcare provider to improve the quality of care such as the type of tests ordered, referrals made or exams performed (Agency for Healthcare Research And Quality, 2008) . Since

process measures are dependent on provider orders and actions they are often considered as performance indicators.

The National Healthcare Quality Report process measures for diabetes are (Coffey, Matthews, & McDermott, 2008):

- HgbA1c test-Percent of adults with diabetes who had a hemoglobin A1c measurement in the past year
- Lipid profile-Percent of adults with diabetes who had a lipid profile in the past 2 years
- Eye exam-Percent of adults with diabetes who had a retinal exam in the past year
- Foot exam-Percent of adults with diabetes who had a foot examination in the past year
- Flu vaccination-Percent of adults with diabetes who received an influenza immunization in the past year

Outcome measures refer to the patient's health status or the results of specific treatment recommendations. They are considered to be a marker of how much the patient's health has improved which is the ultimate objective of quality improvement efforts (Agency for Healthcare Research and Quality, 2008).

The National Healthcare Quality Report outcome measures for diabetes are (Coffey et al., 2008):

Test results

- HgbA1c levels-Percent of adults with diagnosed diabetes with HgbA1c levels >9.5% (poor control), <9.0% (needs improvement) and <7% (optimal control)
- Cholesterol levels-percent of adults with diagnosed diabetes with most recent LDL-cholesterol level >130 mg/dl (needs improvement) or <100 mg/per dl
- Blood pressure-percent of adults with diagnosed diabetes with most recent blood pressure <140/90

Hospital admissions (per 1,000,000 population)

- Hospital admissions for adults with uncomplicated, uncontrolled diabetes
- Hospital admissions for adults with short-term complications of diabetes
- Hospital admissions for adults with long-term complications of diabetes
- Hospital admissions for lower extremity amputations for patients of all ages

Process measures have been criticized for having limited connection to actual clinical outcomes (Nicolucci et al., 2006), and outcome measures have been criticized for not accounting for factors that are beyond the provider's control such as patient preference, regime nonadherence, language barriers, etc. (Lovett & Liang, 2012). Composite measures are an attempt to improve on the low statistical significance of process and outcome measures by combining multiple measures in a single measurement (Lovett & Liang, 2012). In this way, composite measures provide an overall summary of the quality of care delivered to a patient. The Institute of Medicine defines composite measures as “the bundling of measures for a specific condition to determine if all critical aspects of care... have been achieved for an individual patient, thereby enhancing measurement to extend beyond tracking performance on separate measures” (Institute of Medicine, 2006, p. 92). The American Medical Association supports the use of composite scores in addition to individual outcome and process measures as a more precise indicator of improvement that captures a spectrum of care (Physician Consortium for Performance Improvement, 2010). Use of a variety of measures encourages clinicians to focus on all aspects of care and facilitates more standardization for better interpretation of quality assessment efforts. Advantages of composite measures are that they are easier to interpret for consumers and fit well into a pay for performance program. Disadvantages are the difficulty in

achieving consensus on composite design and scoring and the loss of important information if the composite score combines unrelated metrics (Romano, Hussey, & Ritley, 2010).

Measuring Quality of Diabetes Care from State and Federal Perspectives

In the U.S., surveillance for diabetes care has changed focus from the use of Healthcare Effectiveness Data and Information Set (HEDIS) which includes measures for glycemic control, lipid control, blood pressure control, and medication for nephropathy (National Committee for Quality Assurance, 2011) to the Institute for Clinical Systems Improvement recommendations that glycemic control should be linked with cardiovascular risk reduction to include lipid and blood pressure control, aspirin use, and tobacco cessation. In 2010, the Institute for Clinical Systems Improvement guidelines were adjusted to target cardiovascular risk. Surveillance for eye and kidney disease was discontinued (Institute for Clinical Systems Improvement, 2010).

On a state level, the Minnesota legislature adopted Minnesota Statute 62U.02 in 2009. The statute required the Minnesota Department of Health to establish a standardized set of quality measures for health care providers across the state for the purpose of producing an annual report on health care quality (Minnesota Department of Health, 2011). The Minnesota Department of Health contracted with Minnesota Community Measurement, a private corporation of health care professionals, in collaboration with Minnesota Hospital Association, the Minnesota Medical Association, the University of Minnesota, Stratis Health (the Medicare Quality Improvement Organization for Minnesota), and many other community collaborators and health care organizations to design, collect, and report new measures for diabetes care, vascular care, and the patient experience of care (Minnesota Department of Health, 2011). The Minnesota Department of Health adopted the first set of administrative rules (Minnesota Rules, Chapter 4654) establishing the Statewide Quality Reporting and Measurement System in December,

2009. Physician clinics and hospitals were required to submit data needed to calculate applicable quality measures and perform risk assessment starting January 1 2010. Minnesota Community Measurement collected data submitted directly by physician clinics via a web-based portal

To meet their statutory requirements to risk adjust quality measures, the Minnesota Department of Health developed a risk adjustment strategy in early 2010 for the first set of physician clinic quality measures included in the Statewide Quality Reporting and Measurement System. The University of Minnesota and Minnesota Community Measurement's Measurement and Reporting Committee reviewed the methodology in mid-2010. In developing the risk adjustment strategy, the Minnesota Department of Health set out to collect data and report quality measure results that were comparable across providers while minimizing the data collection burden on providers. More comprehensive risk adjustment would have required additional data elements be submitted by physician clinics. The more comprehensive adjustment was considered too costly and cumbersome. The Minnesota Department of Health, the University of Minnesota, and Minnesota Community Measurement continue to research and investigate more robust risk adjustment options (Minnesota Department of Health, 2011). The measures in the 2011 Health Care Quality Report for Minnesota were recommended and revised over the years by Minnesota Community Measurement's Measurement and Reporting Committee, approved by their Board of Directors, and reflect current evidence-based guidelines (MN Community Measurement, 2012).

Numerator components for optimal diabetes care measure specifications for 2012 are the percentage of diabetes patients age 18-75 in the measurement period who meet the following targets (MN Community Measurement, 2012).

- HgbA1c less than eight percent
- Low density lipoprotein (LDL) cholesterol less than one hundred mg/dl
- Blood pressure at or below 139/89
- Tobacco nonuse
- Daily aspirin use for those with documented ischemic vascular disease

These measures were agreed upon by all organizations participating in the Statewide Quality Reporting and Measurement System, are referenced in the systems change organization's Diabetes Report, and are used to assess outcomes for each measurement parameter, and for the percentage of patients achieving optimal outcomes in all parameters for the systems change project.

Translating Research into Practice

Evidence based guidelines are not self-implementing (Green & Seifert, 2005). Changing providers long-held patterns of behavior and the environments in which they work is complex and difficult (de Belvis, Pelone, Biasco, Ricciardi, & Volpe, 2009; Willens, Cripps, Wilson, Wolff, & Rothman, 2011). Unless barriers to change can be overcome and action taken to improve compliance, efforts to develop evidence based guidelines are wasted.

A review of health care and social science literature reveals numerous studies that document the limited success of traditional continuing medical education activities (Dancer & Courtney, 2011; Kirkman, Williams, Caffrey, & Marrero, 2001). Case-based learning that aims to incorporate evidence based guidelines to change clinical practice and improve disease outcomes also produces limited long term change (Mold, Aspy, & Nagykaldi, 2008; Oxman, Thomson, Davis, and Haynes, 1995). Learning alone, especially as a single event, is not sufficient to change behavior and results in only modest improvement in outcomes (Lemelin,

Hogg, and Baskerville, 2001; Pike, Indge, Leverton, Ford, and Gilbert, 2010; Sperl-Hillen et al., 2010; Stolee et al., 2009). Audit and feedback systems for clinical management show only small to moderate gains in successful chronic disease management (Jamtvedt, Young, Kristoffersen, O'Brien, & Oxman, 2010). Brown et al. (2011) found that an integrated, web-enabled initiative offered performance improvement and continued medical education as a unified entity for diabetes management. However, most authors have documented particularly poor outcomes in attempts to alter practice behaviors in diabetes and other chronic diseases. In studies where initial practice changes to improve disease outcomes did occur, these changes were not sustained and improved outcome measures did not continue (de Belvis et al., 2009; Kirkman et al., 2001; Lemelin et al., 2001). Generalized guidelines for continuous quality improvement were also not successful (Kottke & Solberg, 2001). Main, Curtis, Pitts, and Irish (2009) did have some success with improvement in ongoing medical education through peer appraisal of learning, but did not relate this to a change in practice behavior or clinical outcomes.

A systems approach with multifaceted learning was found to produce the greatest success in changing provider behavior to incorporate evidence based practice and sustaining that change (Renders et al., 2001). In addition, chronic disease markers tended to improve both for intermediate and outcome measures (Damberg et al., 2010; de Belvis et al., 2009).

Organizational interventions with structured, regular review of patient outcomes had a positive effect on processes of care (Renders et al., 2001). The most effective feedback was outcome focused and occurred in real time (Doran & Sidani, 2007).

Change in Organizations

Factors that produced the sustained changes in clinical practice and resulted in improved quality markers occurred when the organizational culture identified and supported the change

(Pike et al., 2010; Renders et al., 2001; Sperl-Hillen et al., 2010). Such cultures exhibited strong leadership to champion and support change, created an environment that supported individuals through the change process, developed opportunities for teamwork and interaction, addressed participants attitudes about the change, and tailored the change to each site (Fox, Swanson, Kahn, Glaser & Murray; 2008, Ilag et al., 2003; Mathers, Maso, Heyrman & Gaspar, 2007; Ploeg, Davies, Edwards, Gifford, and Miller, 2007; Solberg, Klevan & Asche, 2007).

Interventions that utilized a multicomponent strategy, with a variety of methods that introduced process changes, and incorporated clinical practice guidelines were more successful (Benjamin, Schneider & Hinchey, 1999; Dancer & Courtney, 2011, Mold et al., 2008; Oxman et al., 1995). Damberg et al. (2010) found a positive correlation between large practice organizations size and performance on technical quality and patient experience. Fish, Munro, and Bairstow (2009) found that change occurred more readily when individuals were not completely free to choose their part in the change process and when standards of performance were connected to features of people's tasks, tools, and operating environments. In addition to system components, Sperl-Hillen et al. (2010) found that improvement in diabetes measures was tied to early drug intensification, an increase in continuity of care, participation in diabetes quality initiatives, and the use of multidisciplinary resources.

Practice Facilitation

Much of the literature on the incorporation of evidence based guidelines into clinical practice refer to the use of facilitation and practice facilitators as an important feature of a multicomponent intervention. Clinically based personnel, most often nurses, were seen as essential players in the implementation and perpetuation of practice changes. When supported by nursing and additional clinical staff, practice changes were more successful (Baskerville et al.,

2012; Doran & Sidani, 2007; Jaen et al., 2009; Kottke & Solberg, 2001; Lemelin et al., 2001, Margolis et al., 2004; McAllister & Osborne, 2006; Mold et al., 2008; Pike et al., 2010; Renders et al., 2001). Physicians alone were found to implement guidelines only one third of the time, despite computerized reminders (Willens et al., 2011). In one study looking at diabetes processes in clinical practice, the only practices that continued, foot care and blood pressure measures, were those done by nurses (Friling et al., 2002; Kirkman et al., 2001).

A model proposed by Kitson, Harvey, and McCormack (1998) utilized a system of practice facilitation to assist providers to implement new guidelines into daily practice. She defined facilitation as a technique by which one person “makes things easier” for others (Kitson et al., 1998). Building on Kitson’s conceptual framework, Stetler et al. (2006) further expanded the definition to include a deliberate and valued process of interactive problem solving and support that occurs in the context of a recognized need for improvement, and a supportive interpersonal relationship.

The practice facilitator role has been utilized in Europe since the early 1980s (Telligen, 2012), but is a relatively new concept in the American health system. In the U.S., the role evolved from the Department of Agriculture’s use of agriculture experts who visited farms to assist the farmers’ to incorporate best practices into their daily work (Grumbach, Bainbridge, & Bodenheimer, 2012). In 2003, Donald Berwick, proposed the model for use with physicians in rural practices (Nagykaldi, Mold, Robinson, Niebauer, & Ford, 2006). In 2009, Kevin Grumbach and James Mold, proposed a similar model be used to promote best practices in health care. By 2010, the Affordable Care Act authorized the formation of the Primary Care Extension Program to develop models of practice coaching. Since then several large state-based studies conducted in Oklahoma, Colorado, Oregon, and New York, have found the practice enhancement assistant

model to be a cost effective means of improving patient care through enhanced systems and adherence to best practices in primary care practices (Agency for Healthcare Research and Quality, 2008, Bodenheimer, Wagner, & Grumbach, 2002). It was determined that the total estimated savings from practice facilitation equaled approximately \$2.8 million for the Oklahoma Sonner Care Program (Telligen, 2012).

The most recent Institute of Medicine report supports the role of practice facilitator as an example of the expanding role for nursing (Institute of Medicine of the National Academies, 2010). Dogherty, Harrison, & Graham (2010) found that facilitation is now being viewed as a distinct role as well as a process. Basic activities of the role are to provide project management and leadership, tailor activities to the local context, and link disease outcomes to medical and nursing processes. (Dogherty et al, 2010). Sipila, Ketola, Tala, and Kumpusalo (2008) found that facilitators did a better job of promoting multiprofessional teamwork. Stetler et al. (2006) emphasized that facilitation is a deliberate process of interactive problem solving and support in the context of a recognized need for improvement and supportive interpersonal relationships. Nagykaldi et al. (2006) also found that facilitators were in a unique position to build relationships, improve communication, and share resources within the practice seeking to improve care.

The literature shows that the facilitator role is a distinct one with crucial behaviors and activities. It is gratifying and affirming to read articles by several authors who propose that nursing, especially advanced practice nursing, is in a unique and ideal position to serve as practice facilitators (Doran & Sidani, 2007; Kirkman et al., 2001; Renders et al., 2001; Sipila et al., 2008; Willens et al., 2011).

Summary Recommendations

A review of the literature substantiates the need to improve the quality of care for persons with diabetes and to work more closely with care providers to change the health care system to better employ principles of comprehensive chronic disease management. Both providers and recipients of care should remain the focus of positive change processes that incorporate evidence-based guidelines to guide practice.

Practice facilitators appear to have a positive impact on implementing change within practices, empowering providers to improve care delivery, and incorporating multiple systems and disciplines to sustain necessary change. The role of practice facilitation needs further research as it has the potential of being a cost effective means to improve the quality of care across disciplines while offering much needed support to overworked clinicians. Advanced practice nurses are ideally poised and should be encouraged to equip themselves to move into such positions of leadership. They can serve as facilitators to advocate for a positive change, improve health care quality, and serve as a bridge to unite various disciplines and sectors in health promotion activities for chronic disease.

There is clearly a need to continually review the components of evidence-based guidelines as implemented in disease outcome measures, and question the choices made for ongoing surveillance. Outcome measures should document monitoring and treatment for all the significant complications of a disease and work to make the tracking of such complications more feasible.

Chapter 3

Method

The purpose of the project was to assist primary care providers through the use of a practice facilitation model to improve the quality of diabetes care within their primary care clinic. The specific aims include monitoring of the diabetes patient registry for outcome markers to (a) improve HgbA1c to less than eight percent; (b) decrease low density lipoprotein cholesterol to less than 100 mg/dl; (c) maintain blood pressure at or below 139/89; (d) decrease tobacco nonuse; and (e) add daily aspirin for those with documented ischemic vascular disease.

This project used longitudinal, prospective, mixed methodology where quantitative repeated measures were triangulated with qualitative data to provide a comprehensive understanding of the diabetes outcomes.

Setting

This project took place in a small primary care clinic located in a suburban setting. The clinic recently merged with a larger organization in the Midwest, United States. The larger organization had a system in place for improving diabetes outcomes and in 2008 and 2011 received the Minnesota Bridges to Excellence award for superior patient care in diabetes (Bridges to Excellence, 2011). The small clinic was given outcome goals to achieve within a twelve month period, but little training or leadership in how to achieve the goals. In an attempt to further incentivize the quality improvement efforts, the clinic manager was directed to post all providers' diabetes scores in the clinic break room on a monthly basis.

Sample

Six physicians and six clinical assistants, forming six provider teams (one physician paired with one clinical assistant), participated in the project between January and April, 2012.

Three physicians were board certified in internal medicine and three physicians were board certified in family practice. The number of patients on each physician registry ranged from sixteen to one hundred six with a total of three hundred sixty-six patients on all the diabetes registries reviewed.

Ethical Considerations

Project participation was voluntary and participants were chosen on a first come first included basis. Providers were informed verbally and in writing using informed consent about the purpose and structure of the project. IRB approval was obtained from the organization and St Catherine University. The study was initiated once participants agreed to participation for the entire four month period. Confidentiality was maintained throughout the project. No identifiable patient data were used in the project and access to patient records was under strict Health Insurance Portability and Accountability Act (HIPAA) guidelines. All meetings with providers and provider teams were held in private, secure locations in the clinic. The content of each meeting was not shared outside of the session and all recommendations developed as part of the project were given exclusively to the provider teams. Participants were assured that no part of the project interactions would be transmitted to clinic or health organization administration. It was recognized that participants might feel uncomfortable about communicating their needs for better diabetes patient management outcomes. However, this burden was no more than encountered daily in routine clinic activities and surveillance.

Project data were stored in a locked cabinet in the facilitator's office and was limited to the facilitator, data analyst, and academic advisor. All data will be destroyed at the completion of the academic program and presentation of study findings.

Outcome Measures

Outcome measures used in the project were based on the Minnesota Community Measures and accepted for use across the health care organization. Measures were:

- HgbA1c less than 8%
- Low density lipoprotein (LDL) cholesterol less than 100 mg/dl
- Blood pressure at or below 139/89
- Tobacco nonuse
- Daily aspirin use for those with documented ischemic vascular disease

A composite measure of all five outcome measure was recorded in the diabetes registry on a monthly basis for each provider. Calculation of the monthly composite measure was based on Minnesota Community Measures guidelines, and accepted for use across the health care organization.

Protocol

Six physicians in the adult medicine clinic of a primary care clinic in suburban Minnesota were invited to participate in the project. The diabetes registry for each provider was used as the basis for all interactions, and was initially reviewed to determine individual provider practice patterns for diabetes management. Specific recommendations to improve diabetes outcome scores that were not at target were developed by the practice facilitator who is a nurse practitioner and diabetes specialist. Three interactive sessions were scheduled between the practice facilitator and each provider or provider team. Providers were encouraged to include their clinical assistants (physician-assistant provider teams) in the meetings as research has found that auxiliary clinical personnel are important to successfully implementing and sustaining practice change. The initial session was ninety minutes in length, the second session was thirty

minutes, and the final session was via electronic mail, and scheduled for fifteen minutes. Sessions occurred during regular clinic hours and time was blocked in each provider's schedule to allow for uninterrupted communication. Evidence-based, organizationally approved practice guidelines for diabetes management were used to structure recommendations for care. Care goals and specific interventions for improvement of each suboptimal outcome score were discussed and recorded for future reference. System processes for ongoing disease management and patient tracking utilizing the electronic medical record were reviewed with the provider team. At each session the diabetes registry report, prescribed diabetes, lipid, and blood pressure medications, lab orders, and results, vital signs, and any communication with the patient were reviewed. Attention was directed to glycemic, lipid, and blood pressure control, and tobacco cessation as appropriate. Aspirin use was reviewed for all diabetes patients with documented vascular disease. At every session written recommendations were developed in collaboration with the provider team. These recommendations served as a platform for practice changes over the ensuing month and incorporated comments and suggestions from the provider team. Copies were distributed to each person at the meeting but not shared with general clinic staff or administration. Additional phone and electronic support and feedback were available to each provider team between each session throughout the project. Follow-up sessions began with a review of changes in the diabetes registry and clinical practice since the previous meeting. Opportunity to discuss management or practice issues was planned for every session. The practice facilitator and provider teams were employed by the health care system and covered by HIPAA guidelines to access electronic medical records for patients on the diabetes registry. No patient data were used for completion of the systems change project. Diabetes registry outcome scores were used to assess changes in practice behaviors and disease management outcomes.

Scores for four months before the project, four months during the project, and one month following the project were used to establish a baseline for outcome measures and document changes as a result of the intervention. Analysis of quantitative data from changes in outcome scores was conducted at the conclusion of the project. Qualitative analysis of provider responses to an open-ended question administered at the end of the project was also included.

Data Collection

The healthcare system diabetes outcomes registry was utilized throughout the systems change project to track changes in percent outcome measures before, during, and for one month after the project. The registry also served as a tool to target specific areas of diabetes management that required provider team intervention. Data sets for the registry were established and verified through Minnesota Community Measures, and were the same data sets utilized by all the healthcare organizations in Minnesota currently participating in the state wide diabetes quality improvement efforts. One stated advantage for using the established data sets for all organizations was the ability to compare quality of diabetes care across all participating healthcare organizations in the state. The Minnesota Department of Health promoted this uniformity

Data Analysis Plan

Outcome measures for each provider from point zero to one month following the intervention were included in the data analysis. Inclusion of data from the fifth month permitted results from the third and final interaction to be assessed. The degree of change and number of patients achieving optimal outcomes for each provider were determined using descriptive and inferential statistics. Since the data were repetitious in nature, repeated analysis was performed to prevent the compounding of error term. Data from the diabetes registry outcomes were used to

assess whether the target 38% in outcome measurement was accomplished, and to what degree improvement was achieved.

Both fixed-effects models and random-effects models were used to analyze the data. A fixed-effects model assumes that the data being analyzed have the same quantitative effect and that the differences observed are residual error. In the project, the five outcome measures (LDL-cholesterol, blood pressure, HgbA1c, tobacco nonuse and aspirin use) and the composite measure were considered fixed effects. However, each of the six providers responded differently during the course of the project. The spread in the data were caused not only by the residual error but also by between-provider differences. This type of situation required a random-effects model. A random-effects model enabled the assessment of an entire sample of data for subgroup differences without needing to split the data into subgroups and take into account the inherent differences of individual providers and practice styles (Cleophas & Zwinderman, 2008; Riley, Higgins, & Deeks, 2011).

Qualitative analysis of the open-ended question was done to look for themes related to the second and third aims of the facilitation process. Individual provider response to the process was also correlated to changes in outcome measures over the four months.

Chapter 4

Results

The purpose of the project was to assist primary care providers to improve diabetes quality of care within their primary care clinic. Project aims were to (a) improve diabetes outcome measures to a target of 38% by the completion of the project; (b) increase providers' knowledge and confidence in caring for their patients with diabetes; and (c) improve provider team processes for the delivery of evidenced-based care to their patients with diabetes by more consistent use of the diabetes registry data to individualize treatment plans.

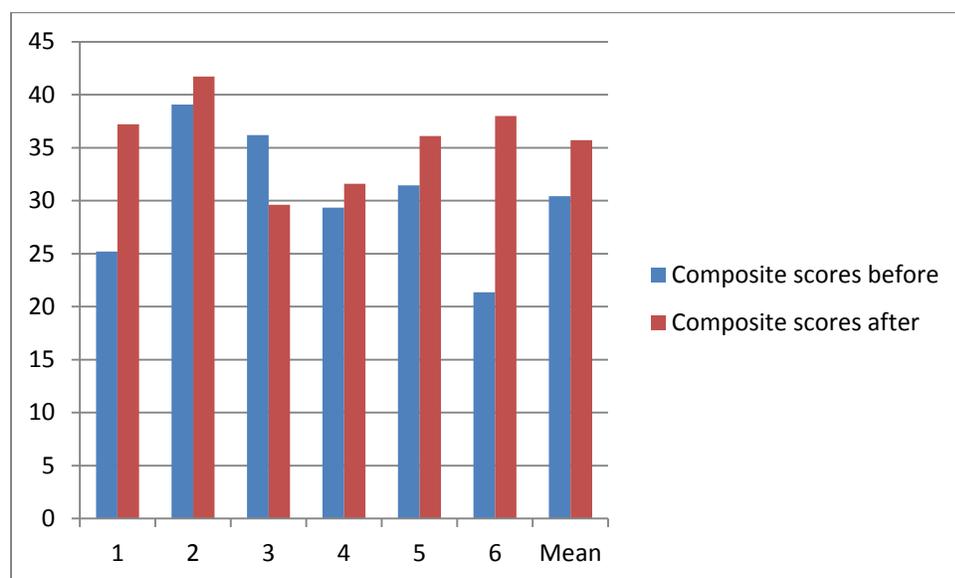
Six providers from the medical clinic participated in the project. Data were derived from the organizational diabetes registry for each provider. Diabetes outcome measures (percent LDL, blood pressure, A1C, tobacco nonusage, aspirin use) and the monthly diabetes composite measure of all five outcomes measures were averaged for each participant for four months prior to the start of the project. The resulting average was used as a baseline. Diabetes outcomes measures and composite measures were tracked for each of four months during the project. Diabetes outcome measures and the composite measures were tracked for one month following the project to capture improvements made during the last month of the project. Correlation analyses and mixed model regression analyses were used to examine the data.

Aim 1: Improve diabetes composite scores to 38% by the end of the project.

Percent composite measures were reviewed at month five, and showed that two of six participants achieved the goal of 38%. One participant achieved 38.0%, and a second achieved 41.7%. Remaining participants achieved composite measures ranging from 29.6% to 37.7% (see Fig 1).

Figure 1

Change in Composite Measures for Providers Before and After the Project



1.) Multi-level Modeling

Each element of the composite measures was further examined using multi-level-modeling. The reason for multi-level-modeling originated from the practice environment. Since variation in care is, in part, related to individual providers, it is important to account for these variations when changes in diabetes outcome measures are evaluated. All model fitting was done using linear mixed-effects analysis. There was a positive change in each measure as the project progressed.

a) Low density lipoprotein (LDL): The individual impact of this project can be seen in the LDL measure. The goal for people with diabetes is to have an LDL outcome measure that is less than 100 mg/dl. Table 1 clearly shows that patients' LDL levels were decreased to a significant level ($p=0.0107$) and this effect was moderately correlated with a change in the

clinician's management of diabetes (-0.397). A decrease in the LDL-cholesterol level is anticipated to improve diabetes patient outcomes.

Table 1

Effects of Clinicians (random effects) on LDL (fixed effects)

Random Effects				
Group Name	Variance	Std Dev	Correlation	
Intercept	4.176578			
Monthly			-0.397	
Residual		3.168111		
Fixed Effects				
Group Name	Value	Std Error	t-value	p-value
Intercept	50.92778	1.945132	26.18217	0.000
Month	0.84333	0.309176	2.72768	0.017

- b) Blood pressure (BP): Another diabetes outcome measure is the patients' blood pressure which is recorded at every visit to ensure that blood pressure is within a normal range. The goal for blood pressure is at or below 139/89. The results indicate that the intervention was not effective as the fixed effect ($p=0.6085$) was not significant (see Table 2). Blood pressure is affected by many factors such as blood pressure cuff size, the patient's position at the time of measurement, the length of time the patient was permitted to be in a resting position prior to measurement, the mental state of the patient at the time of the clinic visit, the skill of the person doing the measurement, etc. It is possible that other contributing factors explain why the blood pressure was not improved significantly. Although random effect (the clinicians' effect) is explained by the correlation of -0.426, it is not significant.

Table 2

Effects of Clinicians (random effects) on Blood Pressure (fixed effects)

Random Effects				
Group Name	Variance	Std Dev	Correlation	
Intercept	5.132988			
Monthly				-0.426
Residual		4.27367		
Fixed Effects				
Group Name	Value	Std Error	t-value	p-value
Intercept	83.06706	2.4465811	33.95230	0.0000
Month	0.21595	0.4170674	0.51779	0.6085

c) Glycosylated hemoglobin (Hgb A1c): Diabetes patients' A1c were checked every 90 days to ensure that blood glucose was within a therapeutic range. The target for HgbA1c was less than 8%. As illustrated in Table 3, the results indicate that the intervention was effective as the fixed effect of the HgbA1c was significant ($p=0.004$). The random effect (clinicians' effect) is explained by the correlation of -0.344. This result means that the individual clinicians' effects were moderately correlated in decreasing the HgbA1c level. The negative sign is encouraging and indicates that blood glucose levels were decreasing while patient outcomes were improving.

Table 3

Effects of Clinicians (random effects) on HgbA1c (fixed effect)

Random Effects				
Group Name	Variance	Std Dev	Correlation	
Intercept	4.45655			
Monthly A1c				-0.344
Residual		2.82597		

Fixed Effects				
Group Name	Value	Std Error	t-value	p-value
Intercept	75.50913	2.0018339	37.71998	0.000
Month	0.86357	0.2757865	3.13130	0.004

d) Tobacco Nonusage: The nicotine in tobacco is known to constrict blood vessels through the body and contributes to further cardiovascular problems including high blood pressure, heart attack, high cholesterol, and peripheral vascular disease (claudication). Smoking also causes insulin resistance in both diabetic and nondiabetic people which further worsens diabetes control, and contributes to the kidney disease, eye disease, and nerve disease seen in diabetes. Smoking cessation is seen as essential to optimal health with diabetes. The results of the study are very encouraging where the fixed effect of tobacco nonusage is significant ($p=0.0051$); however, a low correlation exists (-0.139) for clinicians' efforts that does not explain this significant outcome (see Table 4). It is possible that knowledgeable clinicians were able to energize their patients to change smoking behaviors.

Table 4

Effects of Clinicians (random effects) on Tobacco Nonusage (fixed effects)

Random Effects				
Group Name	Variance	Std Dev	Correlation	
Intercept	5.52423			
Monthly			-0.139	
Residual		1.301606		

Fixed Effects				
Group Name	Value	Std Error	t-value	p-value
Intercept	82.44742	2.2878133	36.03765	0.0000
Month	0.38464	0.1270237	3.02812	0.0051

e) Aspirin (ASA) Use: The fifth outcome measure that is part of the composite score is the use of aspirin. Emerging evidence supports the continuation of daily aspirin use (unless contraindicated) for diabetes patients with known ischemic vascular disease and no longer supports its use in diabetic patients ages 41 and older who have not yet developed ischemic vascular disease. Ischemic vascular disease includes documented heart attack, stroke, and atherosclerosis in any part of the body or blood clots in any arteries. Aspirin has been shown to reduce the occurrence of further events in such individuals. The results (see Table 5) indicate that a change in practice trended toward an improvement in aspirin use but was not significant ($p=0.2903$). In addition, clinicians had a low correlation with this outcome (0.175). The nonsignificant results may have been due to a lower number of patients with documented ischemic vascular disease or the fact that some clinicians changed their practice to reflect the current change in Minnesota Community Measures practice guidelines.

Table 5

Effects of Clinicians (random effects) on Aspirin Use (fixed effects)

Random Effects				
Group Name	Variance	Std Dev	Correlation	
Intercept	7.569179			
Monthly				-0.175
Residual		2.268428		
Fixed Effects				
Group Name	Value	Std Error	t-value	p-value
Intercept	95.96210	3.1619579	30.348950	0.0000
Month	-0.23845	0.2213759	-1.077138	0.2903

2) Overall Fixed Effects

When examining all five outcome measures without partitioning for random (clinician) effect the only significant improvement noted was in glycosylated hemoglobin (HgbA1c). Improvement in LDL cholesterol levels trended toward significant (see Table 6). This table clearly outlines the importance of using multilevel modeling as random (clinician) effects are submerged in the error term, making the results nonsignificant. The above noted tables provide clarity into the role of clinicians on the diabetes outcome measures, and how they are correlated with each individual marker.

Table 6

Paired Samples for Diabetes Outcome Measures

		t	df	Sig (2-tailed)
Pair 1	Total-Total 2	-1.594	5	0.172
Pair 2	LDL-LDL2	-2.049	5	0.096
Pair 3	BP-BP2	-0.166	5	0.875
Pair 4	A1c-A1c2	-2.596	5	0.048
Pair 5	Tob-Tob2	-1.372	5	0.228
Pair 6	ASA-ASA2	0.747	5	0.489

3) Overall Clinician (random effects) on all outcomes

There was a significant improvement in percent total composite outcome measures for all outcomes (see Table 7) from the beginning to the end of the project ($p= 0.01$). In addition, this correlation is moderately strong (-0.491) and has contributed to improving patient outcomes. This is reflected in Figure 2 which shows how the change in the composite scores improved.

Table 7

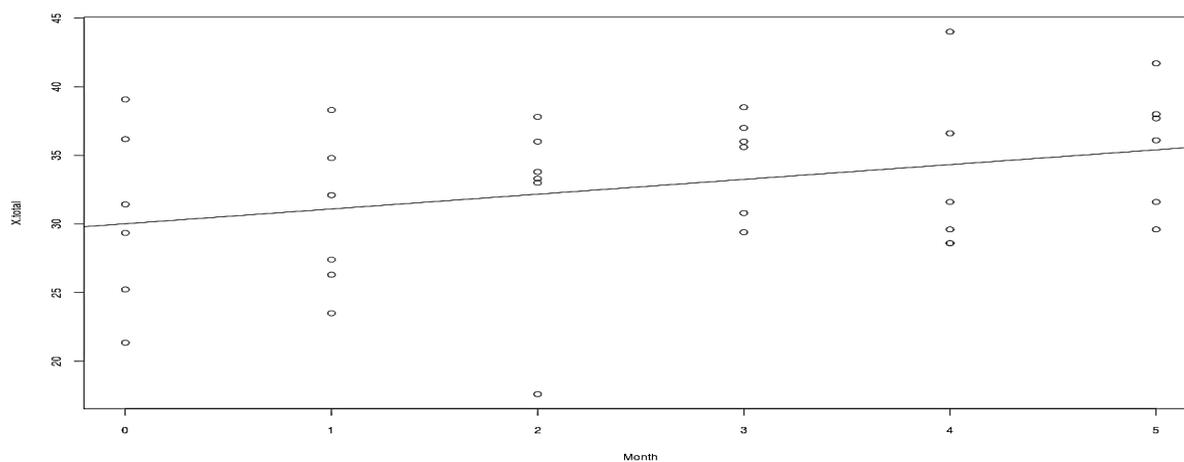
Effects of Clinicians (random effects) on composite outcome measures

Random Effects				
Group Name	Variance	Std Dev	Correlation	
Intercept	3.938193			
Monthly			-0.491	
Residual		4.019775		

Fixed Effects				
	Value	Std Error	t-value	p-value
Intercept	30.016667	1.9988907	15.016663	0.0000
Month	1.076667	0.3922898	2.744569	0.0103

Figure 2

Change in % Composite Outcome Measures



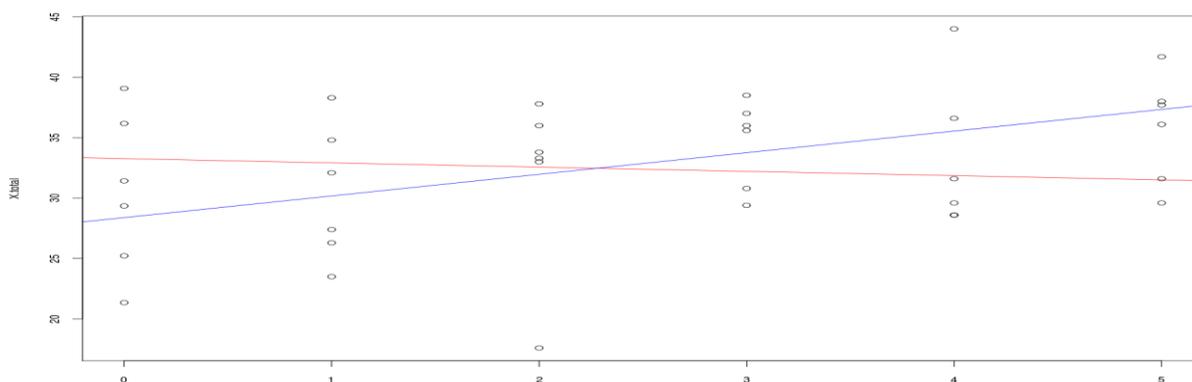
Note. Significance of change $p = 0.01$

Aim 2: Increase in Providers' Knowledge and Confidence

An open-ended question was administered to participants at the end of the project. Responses were analyzed for themes. Four of the six providers found the experience to be positive in terms of increasing their knowledge of diabetes management, improving diabetes outcome scores, and increasing their skill in utilizing the diabetes registry. One provider felt the project made little change in her care for patients with diabetes, but provided an opportunity to review current clinical practice guidelines. This response was labeled as neutral. Another provider did not feel the project was of any benefit to his practice and contributed no new information about diabetes or the use of the diabetes registry. This response was labeled as negative. Outcome and composite measures for all participating providers were compared according to whether their responses were positive (blue line) or neutral/negative (red line). There was a significant correlation between positive responses and improvement in percent composite outcome measure ($p=0.0075$) despite the fact that the providers with neutral/negative responses started out higher than those providers with positive responses.

Figure 3

Clinician's Attitudes and Composite Outcome Measures

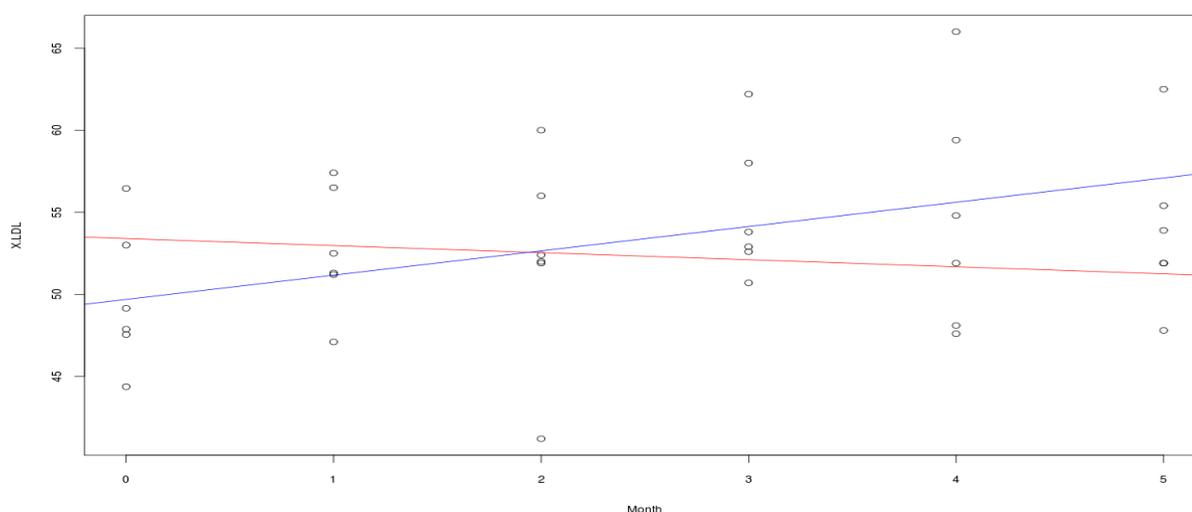


Note. % Composite Measure, ($p=.0075$) red=negative attitudes,

There was also a significant correlation between positive responses, and improvement in percent LDL less than 100 mg/dl ($p= 0.002$) despite the fact that the providers with neutral or negative responses started out higher in this variable as well.

Figure 4

Relationship between Attitude and LDL Outcome Measure



Note. % LDL >100 mg/dl, ($p=.002$) red=negative attitudes, blue=positive attitudes

Aim 3: Improve Health Team Processes

The final aim was to improve health team processes for the delivery of evidenced-based care to their patients with diabetes by more consistent use of diabetes registry data.

Data from responses to the open-ended question were subjected to thematic content analysis. Content was divided into four categories, changes in diabetes knowledge, use of the organization's diabetes systems, working with patients, and improved provider team relations. Responses were coded for each category from which overarching themes were then identified.

Improvement in knowledge of diabetes and diabetes management. Five of six providers noted some improvement in their knowledge of diabetes or diabetes related management issues. Two providers reported improved knowledge of diabetes and cholesterol

medications and one mentioned that the discussion of when to initiate insulin therapy was helpful. Three providers found the incorporation of protocols for diabetes and cholesterol management useful. Participants commented, “It was a help to work with you, especially to go over the diabetes medication and when to start insulin,” and “I found the clinic protocols were useful.”

Increased ability to work with the organization’s diabetes systems. The same five providers expressed increased understanding of the various aspects of the diabetes management systems currently in use by the organization. Four of the five specifically referenced improved use of the diabetes registry and one mentioned increased use of the diabetes education support systems. Participants reported, “I find it easier to track my diabetes patients and to use the diabetes workbench on a regular basis,” and “I did not know about the diabetes education program. I am sending some of my patients now.”

Working with their diabetes patients. Four of six providers felt the project improved their ability to work with patients and/or improve outcome measures for their patients. They expressed increased comfort with the visit process and more efficient use of their time which produced a more relaxed encounter. Comments included, “I think my patients did benefit from what I learned and my numbers got better,” and “[it was good to have]... time available to discuss the more difficult patients with someone who knew more about diabetes.”

One provider felt the project was of no benefit to him and did not change the way he practiced diabetes management. He felt he was already delivering good care and that some of his patients were particularly hard to treat. “I take good care of my patients, but I cannot make them do anything. They have to do that by themselves ... We should not be evaluated on what our patients do.”

Improved provider team processes. Four of the six providers felt the project improved how they worked with their clinical assistants to care for their diabetes patients. Most felt there was clarification of respective tasks and that the process of reviewing the reports each month was becoming easier. Changes in treatment and follow-up of patients were improved. A participant reported, “My nurse was able to help me more... I think we can work better to keep up every month.” Some participants indicated, “It was a good opportunity to talk with my CNA so we could develop a plan for how to better follow the patients,” and “My CNA was able to order lab work and leave reminders for me about what the patient needed.”

Chapter 5

Discussion

Diabetes is one of the most serious public health problems of the twenty-first century (Albright, 2007; Glasgow et al., 1999; Meeto, 2008). The rate of increase in the occurrence of diabetes, and its complications has placed a tremendous burden on the American health care system, and threatens to affect close to one third of the population in the next 30 years. Diabetes complications markedly reduce the quality and length of life, and contribute to enormous health care costs. Several large studies have shown that effective treatments and practices may substantially reduce the impact of diabetes (Herman, 2007,).

There has been significant progress in the last 15 years in the development of quality measures for diabetes care. Most of diabetes care occurs at the primary care level (Willens et al., 2011). This project was developed to pilot a facilitator model for system change using evidence based quality measures to improve diabetes outcomes in a small primary care clinic. The project aims were to a) improve diabetes outcome measures to a composite measure target of 38%; b) increase providers' knowledge and confidence in caring for their patients with diabetes; and c) improve health team processes for the delivery of evidence based care and more consistent use of registry data. Results indicated significant improvement in three of five diabetes outcome measures, and a significant improvement in composite measures for diabetes management.

Quality Measures and Diabetes Care

Performance measures for diabetes have been in place since the late 1990s. There is evidence that control of outcome measures such as LDL-cholesterol, blood pressure and HgbA1c has a positive impact on reducing the severity and progression of diabetes complications. Trend data in the last 20 years shows a reduction in death rates from hyperglycemia, hospital discharges

for lower limb amputations, and the incidence of diabetes related end-stage renal disease (Centers for Disease Control and Prevention, 2012). There is increasing evidence that improvements in these quality measures translates into significant health care cost savings over several years (Agency for Healthcare Research and Quality, 2008). The number of patients covered by health plan and state surveillance systems for diabetes quality care has also increased across a range of settings (Centers for Disease Control and Prevention, 2012). Improvement in process measures for diabetes (eye exams, dental exams, foot exams, diabetes education referrals, etc.) have been easier to maintain than improvement in outcome measures (Jamtvedt et al., 2010; Landon et al., 2007). Unfortunately, improvements in process measures do not relate to improvements in outcome measures (Mangione et al., 2006; Selby et al., 2007). Outcome measures are directly associated with risk factors. Adequate control of risk factors is strongly associated with improved clinical outcomes for cardiovascular disease, microvascular complications, and mortality (Albright, 2010).

Pay for performance initiatives have been used in multiple systems in an attempt to sustain positive quality changes. The effect of such initiatives remains controversial (Coleman & Hamblin, 2007; O'Connor, 2012). Several studies show that improvements decreased after incentives and feedback were removed, despite computer generated feedback support (O'Connor, 2012; Stolee et al., 2009). Incorporating a variety of quality improvement methods have produced the greatest improvement in outcomes, but do not necessarily guarantee that such improvements will continue over time.

From a provider perspective, the pay for performance system places a great deal of stress on the care delivery end of the process. Diabetes care occurs predominately in the primary care setting where providers are already challenged by heavy patient loads, understaffing, limited

reimbursement and an shortened time-frame in which to meet with patients. There is insufficient time allocated to help care providers understand the elements of quality improvement changes that will impact their daily practice. Tying reimbursement to production can disproportionately penalize those physicians who are working with underserved populations, low income groups or those patients with a high level of socioeconomic disadvantage. Weak leadership can also negatively impact how well providers do by not providing the support necessary to successfully manage the many elements of chronic disease care or maintaining an environment where quality of care is stressed.

In response to this added pressure, some providers have become adept at stacking their patient panels in a favorable direction by limiting access to those who are less ill and those with easier to manage chronic and acute illnesses. The variable income associated with pay for production has resulted in many care providers moving from primary outpatient clinics to the more predictable, salaried positions in specialty services or inpatient settings.

Improving the quality of care in diabetes and other chronic diseases is an important and essential task. The impact of system changes on those providing care must be taken into account and support systems developed and maintained to assist them on a daily basis. The facilitator model offers just such a support, not only to improve quality of care, but also to sustain the quality and provide much needed support to an overworked segment of the health care delivery system.

Issues with Quality Measures

The use of dichotomized quality measures is easy to understand and report, but selection of such measurement thresholds is challenging, subject to change, and does not allow for individualization of care. Reporting dichotomous measures does not take into account

improvements in measurement outcomes that have not been sufficient to achieve targeted levels, but still have a potentially significant impact on disease outcomes. There is also the implication that all patients above measurement targets need more aggressive management or additional pharmacotherapy which increases the risk of overtreatment. The benefits of increased treatment further diminish as patients approach the target measurement level while the risks of treatment related side effects and the cost of treatment increases.

The exclusive use of outcome measures as a means of measuring quality of care does not take into account the complexity of chronic disease management. Diabetes management covers many behavioral, organizational, and clinical determinants that are not accounted for by assessing outcome or composite measurements. There should be greater importance assigned to defining and measuring the relationship between care givers and patients. The partnership between patients, families, communities, and health care teams is a crucial component of care management and the development of successful plans of care. This aspect of care is difficult to assess and even harder to measure, but is an essential component of quality care.

Composite diabetes quality measures have been used as a means of improving the reliability of performance measurement and ranking quality within and between health care systems. Current composite scores tend to weigh each outcome measure equally which does not take into account the clinical significance of individual measures. Because such scores reduce a set of measures to a single dichotomous score for each patient there is a great deal of information that is missing. This results in a lack of sensitivity for distinguishing between plans or physicians and greatly reduces reliability (American Medical Association, 2010).

Patient Reports and Quality Measures

Self-management education is an essential aspect of diabetes care and requires active engagement on the part of patients and health care provider teams. Current quality measurement systems do not include the collection of patient reported information. Such information has a direct impact on the patient's understanding of disease processes and treatments, adherence to treatment plans, and disease outcomes. Patient reported information is essential to understanding patient preferences, and goals, decision making practices, self-care behaviors, psychosocial functioning, and risk factors, and patient-health system relations (Fox & Chesla, 2008). There is a need to develop a standardized set of behavioral and psychosocial patient-reported measures that can be incorporated into the electronic medical record and utilized as part of a more comprehensive quality performance measurement system.

There is great need for a tool that will elicit information related to how patients perceive their health and what their personal health goals may be. Providers need an opportunity to see how the treatment plan is being incorporated into patients' lives and what obstacles patients encounter as they work to achieve personal health goals. Especially in chronic disease, there is often a mismatch between patient expectations and those of health providers. This mismatch is never clearly identified and significantly handicaps both parties as they try to interact. Behavioral health has developed a simple, numbered scale to determine levels of depression. This tool is clear, and easy enough for patients to complete in three minutes during a clinic encounter. Scores from this scale are part of ongoing medical records and are currently used to measure response to treatment. A similar tool to measure response to chronic disease management would be an excellent way for patients and providers alike to determine progress toward individual health care goals and satisfaction with how care is delivered. Current quality measures are lacking in

this essential information. The current study did not assess patient self-reports. These data could potentially differentiate between the effect of providers' actions and the impact of patients' responses, and offer concrete ways to further effect positive change.

Advanced Practice Nursing and Quality Measures

Nursing at all levels plays a pivotal role in transforming the health care system and improving the quality of care. The Institute of Medicine report on the Future of Nursing (2010) strongly supports both the expansion of the advanced practice nursing role and the need for lifelong learning as an essential component of professional nursing. The role of practice facilitator provides an excellent opportunity for advanced practice nursing, especially those at the doctorate of nursing practice level, to expand the boundaries of practice, promote positive system change, advance the quality of health care, and place both the patient and health care provider team at the center of the change process. The multifaceted nature of practice facilitation requires a level of knowledge management and brokering that is dependent on a broad perspective and extensive experience in the health care system. Systems thinking and population management are essential skills that are part of the unique training of the doctor of nursing practice prepared advanced practice nurse. The ability to assess care processes, incorporate different sources of information and research, evaluate clinical outcomes and perform impact evaluations are necessary to achieving ongoing quality improvement. Intervention must be tailored to the unique settings of each clinical practice or health care system. The doctor of nursing practice advanced practice nurse is well placed as a clinical leader. Such a professional can promote evidence based practice and support the full potential of a high quality health care delivery system.

Limitations of the Project

The project showed a small, but significant improvement in outcome measures for LDL-cholesterol, glycosylated hemoglobin, and tobacco nonuse, and a small, but significant improvement in the composite measure for diabetes care. These results support findings from published studies using similar practice facilitation approaches. Since this was a pilot study these results should be interpreted with caution. The problem related to the small sample size of this pilot is a serious challenge and was insufficient to provide statistical power for the project question. Variation in delivery of facilitation services was unavoidable as the needs of different providers and time constraints of the clinic setting dictated the content of each session. The outcome measures and composite measures data used for analysis were accepted as both valid and reliable as they derived from the organization's diabetes registry. The outcomes data could not be verified since data on the diabetes registry were obtained from the organization's audits of the electronic medical records and laboratory data and were not directly obtained in a controlled setting for use in the project.

Four of the providers spoke English with a notable accent which potentially influenced the level of provider-patient communication. Patient understanding of and response to, plans of care are just as important as provider's actions to improve outcomes. As previously mentioned, several studies have identified the need for patient referenced feedback as an important component of improving quality of care (de Belvis et al., 2009; O'Connor, 2012). The challenges of communication issues between providers and patients could have contributed further to the variation in provider practice.

The systems change project was a prospective, mixed methods design pilot study. The intent was to integrate qualitative and quantitative data to better understand the impact and

response to a major change in clinical practice. An assumption at the outset was that any improvement in diabetes outcomes would have a greater likelihood of being sustained through understanding the response of providers to the change process. Changes in practice that are directed from the top down will be more likely to succeed if the change is tailored to the unique setting of each clinic and clinician and the subjective response to the change is taken into account. To this end, data were collected in a sequential manner with outcome and composite measures tracked through the course of the project, analyzed, and then compared to qualitative data from analysis of an open ended question at the end of the project. This approach was an efficient way to collect data as responses to the open ended question took more time to collect and analyze and would have added significantly to the complexity of the project if administered concurrently. Adding the question at the end, allowed the clinicians to have more experience working with a new system before giving a response. Unfortunately, sequential data collection did not permit any adjustment in the facilitation process during the course of the intervention. The short duration of the pilot and the lack of input from the clinical assistants further detracted from the amount of improvement that could have potentially occurred and the richness of the feedback obtained.

Recommendations

Practice Impact

The translation of research into practice through the use of evidence based guidelines is an essential, yet complex process. There continues to be gaps that are not adequately addressed by more conventional methods of continuing medical education, electronic alerts and reminder systems or decision making tools for providers. Improved outcome measures in diabetes have

had a positive impact on the quality of care and lead to a decrease in complications of diabetes. Improved outcomes also lead to substantial cost savings.

The use of practice facilitation to promote quality improvement needs further exploration, but appears to offer a creative means of enhancing the quality of patient care and offering support to health care team members. A recent meta-analysis showed that primary care practices were 2.76 times more likely to adopt evidence based guidelines through practice facilitation (Baskerville et al., 2012). Practice facilitation incorporates a hands-on, individualized approach that is seen as positive and enabling. Facilitation also brings multiple health team members together with a common focus and system support that has the potential for successful and sustained change and quality improvement.

Advanced practice nurses can play a critical role in facilitating evidence based practice. Knowledge brokering is a key aspect of the advanced practice role which can be leveraged to promote evidence based practice. Practice facilitation is an ideal opportunity for advanced practice nurses to utilize the specific knowledge and skills that are unique to their training and education.

Future Recommendations

Conceptual models for practice facilitation already exist (Dogherty et al., 2010; Fielden, Davidson, and Sutherland, 2009; Gallagher-Ford, 2012; Group Health's MacColl Institute for Healthcare Innovation et al., 2008). More large-scale, collaborative practice-based research is needed to understand how facilitation can further support the adoption of evidence based guidelines, the relationship between context and components of facilitation, sustainability, and the costs to the healthcare system.

As noted in Appendix A, the cost of implementing a practice facilitation project is relatively low. This project budget was just over \$13,000 which included temporary loss of productivity for the provider teams' participation in facilitation meetings. However, the return on investment for 4 months of coaching was 260%. The high return came from potential cost savings to the health plan from improved diabetes control. Improved control is expected to result in fewer short term complications, fewer medical procedures and a decrease in hospitalizations and emergency room visits for the one year period. Optimal diabetes control over a ten year period for the same number of patients would yield a savings to the health care system of \$125,154.

As Appendix B identifies, there are many additional benefits of the practice facilitation process that cannot be monetarily quantified. These benefits potentially improve efficiency and job satisfaction for providers and customer satisfaction for recipients of care. An increase in the retention of skilled health care professionals within a health system and more efficient patient care delivery reduces operating costs and by association, health care costs substantially.

Finally, the use of random effects modeling provided a more sensitive means of analyzing the influence of providers on changes in outcome measures. The more traditional form of analysis in biomedical research is the fixed effects model. Fixed effects modeling is based on averages and the assumption that a single true effect size underlies all study results (Polit & Beck, 2008). With fixed effects modeling observed estimates are thought to vary only as a function of chance. However, clinical outcomes are influenced by a variety of factors that must be accounted for in explaining the results. A random effects model does a better job of allowing for the influence of these factors on the outcome and permits the inclusion of potentially important data in the final assessment. Fixed effect modeling runs the risk of oversimplification

and the loss of important data. By controlling out context, fixed effect modeling effectively cuts out much of what is going on clinically that should have great importance to the investigator and reader alike. Random effect modeling is able to explain and reveal specific differences between higher level entities (Bell & Jones, 2012) and is therefore a better choice for clinical research. As demonstrated in this project, the influence of providers on outcome measures would have been completely missed with just a fixed effects model. This is a lesson to keep in mind for all clinical research.

Conclusion

Practice facilitation is a creative, cost effective way of improving the quality of patient care in diabetes. A practice facilitation model recognizes and supports the essential role of multidisciplinary health teams in collaboration with patients to advance health promotion to its highest level. Practice facilitators are potentially in an ideal position to not only initiate quality changes, but also sustain the improvements that occur. Nurses are in a unique position to continue research on practice facilitation as they traditionally have a perspective that contextualizes the patient experience and a record of working across disciplines to incorporate individualized approaches that maximize health outcomes. Facilitation is a completely different vehicle for spreading innovation and improving performance in primary care. There needs to be more resources devoted to the training and deployment of practice facilitators. Advanced practice nurses should position themselves at the front of this innovation, develop the skills and expertise to serve as practice facilitators, and continue the research to develop and evaluate a variety of models for practice facilitation. It is imperative to extend the work in practice facilitation to incorporate quality care measures in both diabetes and cardiac disease in more primary care outpatient settings.

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Appendix A

Return on Investment

Project Budget

Activity		Amount
Provider time x6	3 hours @ \$150.00 x6	\$2,700.00
Facilitator time (3 hours meeting + 2 hour prep for ea of 6 providers)	24 hours @ \$48.00	\$1,152.00
Nursing time x6	3 hours @ \$30.00 x6	\$540.00
Lost productivity (includes facilitator)	3 hours @ 150.00 each x6	\$2,700.00
	3 hours @ \$80.00 x6	\$1,440.00
	9 lab tests @ \$75 each x7	\$4,725.00
Total		\$13,257.00

Sidorov, et al. (2002) determined that comprehensive care for diabetes in a managed care program resulted in per month claims of \$394.62 for enrollees in the program versus per month claims of \$502.48 for those with diabetes not enrolled in the program. Utilizing these numbers and adjusting for 2012 using a conversion factor of 1.275 (Oregon State University, 2012) the claims for comprehensive care are \$503 per month and the claims for status quo care are \$640 or a cost savings of \$137 a month. Twenty-one additional patients achieved optimal diabetes

outcome measures by the end of the 4 month period. This is a savings of \$1,644 per patient per year for those with optimal outcomes measures. Using just the 21 patients in the project, the annual cost savings is \$34,524. Annual return on investment for 4 months of practice facilitation is 260%. If optimal control is maintained in just these 21 patients for a period of 10 years, the cost savings in 2012 dollars, using a conversion factor of 1.115 (Oregon State University, 2012) would be \$125, 154.

Appendix B

Benefits of Participation

- Improved efficiency in diabetes management activities
- Increased knowledge in diabetes management
- Improved diabetes outcome scores
- Enhanced understanding of health system goals
- Improved health team interaction
- Increased job satisfaction/retention
- More efficient use of diabetes tests, treatments, and surveillance options
(including increased number of OP visits)
- Decreased urgent care, emergency and hospital encounters
- Decreased diabetes complications
- Enhanced patient satisfaction
- Increased opportunity for P4P and QI bonuses
- Streamlined workflow and staff utilization