

Diabetes is a common chronic disease affecting millions of Americans. An upward trend in the incidence of diabetes has occurred over the past thirty years and it has been predicted that an ever-increasing percent of the population will become diabetic, especially with the trend of increasing obesity in the United States (US) (American Diabetes Association, 2011; Center for Disease Control and Prevention (CDC) 2011; Agency for Healthcare Research and Quality (AHRQ), 2011). In addition, an unequal distribution in the prevalence of diabetes by race ethnicity and socio-economic status exists (ADA 2011;AHRQ, 2009). Use of evidence-based clinical practice guidelines alone have underachieved targeted benchmarks, with an even greater gap existing for vulnerable populations. Diabetes is a chronic and complex disease requiring a comprehensive multifaceted approach to care to improve processes and outcomes, and reduce healthcare disparities. Nurse practitioners are often the providers for some of the most vulnerable people and thus increase access to care for this population.

## **Background**

Due to the co-morbidities and complications of diabetes, this chronic disease has become the seventh leading cause of death in the United States (CDC, 2011). The prevalence of diabetes in the US for adults eighteen years of age and older has increased from 5.1 percent in 1997 to 9 percent as of January 2010 (CDC, 2011). And, because of the increasing number of young to middle-aged adults who are obese, and of minority race and ethnicity, this cohort group has resulted in an increased number of persons who are diagnosed with type 2 diabetes as well as an increase in the number of complications due to long-term diabetes (Smith, Drum,

Miernik, Fogelfeld, & Lipton, 2008). Poor people also experience disparities in health leading to differences in morbidity and mortality, and are twice as likely as high-income people to report inabilities or delays in receiving needed healthcare (AHRQ, 2010).

The AHRQ (2011) tracks outcomes and receipt of recommended services for diabetes that decrease morbidity and mortality and reduce complications. From 2005-2008, the percent of diabetics who achieved HbgA1c, blood pressure and cholesterol goals were 54, 58 and 65 percent respectively. Based on a benchmark set by the top four top state achievers of 51.4 between the years 2002 to 2007, the percent of diabetic patients who obtained follow-up of HbgA1c blood levels, dilated eye exam and foot inspection decreased from 43.22 to 37.5 percent (AHRQ, 2010). Additionally, in 2007, hospital admissions for short-term complications of diabetics ages 18-44 did not achieve the benchmark of 37.8 percent, having increased from 55.2 % in 2004 to 59.9% in 2007 (AHRQ, 2010).

The estimated cost for the care of diabetic patients in 2007 was 174 billion dollars (ADA, 2007). Therefore, diabetes and its complications is one of the leading contributors to the annual cost of healthcare in the US (AHRQ, 2010). In addition, cardiovascular disease and the resulting complications is the leading contributor to the costs of diabetes (ADA, 2011: AHRQ, 2010).

### **Significance**

Although clinical practice guidelines for the management of patients diagnosed with diabetes are available for healthcare practitioners, a gap between the prescribed standard of care, and achievement of process and outcome measures

exists (Nutting et. al 2007; National Committee of Quality Assurance (NCQA), 2011). According to the ADA (2011), best performances are realized when individual initiatives are “provided as components of a multifactor intervention and practices utilize more of the chronic care model” (S 48). Dissemination of evidenced-based guidelines alone can be unsuccessful in deeply influencing clinical practice (Allota et al., 2008). System changes in addition to the use of guidelines are necessary to achieve improved outcomes for the chronic care management of diabetes.

Healthcare for diabetes should also address the six areas identified from the Institute of Medicine (IOM, 2001), which calls for care that should be safe, effective, patient-centered, timely, efficient, and equitable. Specific to vulnerable populations, care should not vary because of ethnicity, geographic location or socioeconomic status (IOM, 2001).

## **Theoretical Framework**

### **The Chronic Care Model**

The Chronic Care Model (CCM), a systematic approach to the care of chronic illness, has been used as a framework to guide chronic illness care, in replacing the acute episodic, fragmented approach to care (Wagner, 1998). The six components of the CCM include: the health care organization, community resources, self-management support, delivery system design, decision support, and clinical information systems (Bodenheimer, Wagner, & Grumbach 2002a; Improving Chronic Illness Care, 2006-2011). The model provides a guide for system changes within ambulatory care practices to improve the quality of chronic illness care and outcomes (Bodenheimer, Wagner, & Grumbach 2002a). The CCM has been used as a

quality improvement tool and model for comprehensive chronic illness care. Of importance is the emphasis on collaboration between all team members to create new and improved systems and procedures that support patients and providers in the treatment and management of chronic illness (Kass, 2004).

### **Model for Improvement and Plan-Do-Study-Act**

The Model for Improvement is a tool for accelerating quality improvement and consists of two parts: the Improvement Model and the Plan, Do, Study, Act (PDSA) (Institute for Healthcare Improvement (IHI, 2011). The PDSA is a cyclical model for testing a change in a practice site and spreading the change on a larger scale and then to other practice sites (IHI, 2011).

### **Health Resources and Service Administration (HRSA) Health Disparities Collaboratives (HDCs)**

The HRSA and the CDC's Diabetes Prevention and Control Program partnered together to sponsor the HDCs, with community health centers (CHCs) to improve chronic illness care in minority and underserved groups of people and to reduce of healthcare disparities. CHCs are safety net providers for low-income, uninsured and ethnically and racially diverse groups of people (Kass, 2004). Goals established by the HDCs for diabetes care are based on ADA guidelines, expert consultation, (Kass, 2004) and providers in the CHCs.

### **Purpose of Study**

The purpose of this QI project was to create a sustainable QI program for type-2 diabetes and subsequently other chronic disease management. Following the

implementation of the QI program, process and outcome measures for type-2 diabetics in a nurse-led safety net clinic were evaluated.

The research questions were as follows:

1. Does using a systematic approach with multifactor interventions of care such as the CCM improve processes of care that are based on evidence-based guidelines?
2. How will use of the CCM in a nurse practitioner led safety net clinic support an ongoing quality improvement program?

The urban population for this safety net clinic is for individuals who are underserved, underinsured, of lower socio-economic status, and of varied race and ethnicity. Seventy-five percent of the clinic population is self-pay and 13 percent of the population is covered by Medicaid. This population is often referred to as a vulnerable population, which means that this population is at greater risk for health problems and poorer outcomes (Institute for Nursing Centers, 2008). In 2000 the Institute of Medicine (IOM) defined safety net providers as those who “organize and deliver a significant level of health care to uninsured, Medicaid and other vulnerable patients and offer access to services regardless of patient ability to pay” (p. 21).

Prior to the initiation of this QI project a formal QI program for diabetes or other chronic disease management did not exist. Practice guidelines based on the ADA standards of practice were listed on a chart form and all members of the team contributed to the completion. Although care for diabetes and other chronic illnesses had been comprehensive and inclusive of multiple components, it was not systematic nor did it follow any particular model of care.

## **Review of Literature**

### **The Chronic Care Model**

The six CCM components identified previously serve to create system changes in which “informed, activated patients interact with prepared, proactive practice teams” (Bodenheimer et al., 2002a, p. 1775). Studies have shown that the CCM improves the management of diabetes (Bodenheimer et al., 2002b). Studies reviewed containing any of the components of the CCM model demonstrated effectiveness in improving patient outcome measures and lowering costs for chronic disease (Mackey, Cole, & Lindenberg, 2005). Those studies utilizing the self-management component resulted in the most consistent improvement in process or outcome measures (Bodenheimer et al., 2002a).

Collaborative breakthrough series and implementation with the CCM improved clinical outcomes and care processes in an earlier study by Wagner et al. (2001a). Recommendations based on review of the literature supported patient-provider interactions, diabetes care and self-management support among underserved and minority populations, and implementation of chronic care management systems for diabetes care (Glasgow et al., 2001). According to Nutting et al (2007), greater practitioner use of the CCM was associated with higher patient behavioral and clinical care composite scores, and lower HbA1c when the primary provider was a nurse practitioner. Similar findings were found when a chronic care intervention group received significantly more recommended preventive services and patient education than the non-intervention group (Wagner et al., 2001).

Another study demonstrated consistency with the CCM resulted in a reduction of

modifiable risk of coronary heart disease in patients who attended smaller clinics (Parchman, Zeber, Romero, & Pugh 2007). Findings from a 2009 study, (Janson et al.) suggests that care given by an inter-professional team instructed on utilization of the CCM was effective in improving process and outcome measures for diabetes care.

**Chronic Care Model, Underserved and HRSA HDCs.** It is the combination of process and outcome measure sets and measurement in the context of systems change that can result in high-leverage change for diabetes (Camp & Dethlefs, 2008). These authors suggest that measurement for “quality improvement needs to fit into a broader model of change, impact population level of care and impact point of service care”(slide 13). They suggest with the CCM, the model for improvement, the rapid cycle process, achievement of outcomes measures and the HDCs a reduction of healthcare disparities should occur.

A study conducted by Chin et al. (2007) that used CHCs as a setting and the HDCs for diabetes care, noted improvements in processes of care occurred rapidly, however, the researchers noted it took four years before HbgA1c values decreased. The investigators (Chin et al.,) suggested the importance of “enduring commitments to the quality improvement interventions and long-term studies” (p.1142).

A systematic review conducted by Coleman, Austin, Brach, and Wagner (2009), found that organizations with higher achievement of diabetes outcomes were more likely to utilize the CCM. Coleman et al. (2009) reported the CCM provided immediate process improvement with a delay in clinical outcomes, as well as cost savings from improved disease outcomes. Results from another study

conducted by Piatt et al, (2006) improved clinical and behavioral outcomes for diabetic outpatients, when implementing the CCM in an underserved population.

A study by Hicks et al., (2006) studied the quality of care for groups known to receive low-quality care and found that the quality for CHCs was comparable to that delivered in other practices that provide services for underserved population but lower than documented care from commercial managed care organizations and the Veterans Administration system. Disparities by race and ethnicity were eliminated after adjustment for insurance status and it was also noted was that the HDCs might have a positive disproportionate effect on the uninsured, since this group has the greatest need for improvement. Findings from the initial Chronic Illness Breakthrough Series (BTS) (Wagner et al., 2001a), also suggests larger improvements were experienced by CHCs having the more challenging patient population and scarcer resources.

**Chronic Care Model and nurse practitioners.** Several authors explored the use of the CCM by NPs, especially those providing primary care to more vulnerable patients or those in safety net clinics. Dancer and Courtney (2010) encourage NPs to utilize evidence-based interventions that encompass each aspect of chronic care with the CCM. They also suggest that understanding type-2 diabetes management interventions within the CCM will enable the NP to more broadly identify gaps, define needs, and design and implement new healthcare strategies to improve patient outcomes. Dancer and Courtney (2010), and Fiandt (2007a, 2007b) call for NPs to assume a greater leadership role to improve chronic disease care and implement components of the CCM in their practices.

Boville et al., (2007) redesigned the nurse practitioner role in a practice setting to include proactive management through planned visits, intensification of treatment, collaboration with team members along with other components of the CCM. After the role redesign, Boville et al. (2007) reported improved outcomes in patient's glycemic control, lipid management and hypertension control. Fiandt (2007a) also maintains NPs need to take a leadership role in quality improvement and practice efforts, as well as apply research skills to support complex and comprehensive interventions.

Schram (2010) explored use of the CCM practice design for use with the Medicare Medical Home Demonstration Project. In comparison to the patient-centered medical home (PCMH), the CCM has provider-neutral language and also adheres to IOM definition of primary care, thus allowing NPs to be primary care providers. The author (Schram, 2010) also suggests the importance of meeting the requirement for patient-centeredness and support of self-management to improve outcomes.

### **Vulnerable Populations**

Several sources identify characteristics of vulnerable populations, which can assist in setting expected outcomes for quality improvements efforts. Participants in the HRSA HDCs for diabetes quality improvement outcomes include safety net practices from federally qualified health centers (FQHCs). These collaboratives focus on underserved safety net populations, but these patients may be at less risk for healthcare disparities than patients from nurse practitioner managed health clinics (NMHCs).

Patients receiving care in NMHCs are less likely to have any form of insurance (67%), more likely to have clinics in or near public housing units (38%), and twenty-five percent of NMHCs address needs of homeless people (Institute for Nursing Centers, 2008). The most frequently managed illnesses in NMHCs are chronic diseases. Based on statistics from the Institute for Nursing Centers (2008) patients are likely to be poor and represent varied ethnicity and most significantly have no form of insurance, which may put them at greater risk for chronic disease and poorer outcomes.

A group of investigators studied the characteristics of risk in patients of NMHCs over a five year time period (Fiandt, Doeschot, & Lanning, 2010). Of great importance is the finding that all NMHCs had a higher prevalence of very low socioeconomic status and included many more uninsured people. The NMHCs had the highest percentage of patients with diabetes. The findings of this study led the investigators to recommend that NMHCs “collect data in a structured and comprehensive way to document the complexity of patient needs, to determine baseline information for improved outcomes, to guide population-specific interventions, to demonstrate the impact of NPs and to inform payers and policy makers” (Fiandt et. al., 2010, p.478).

### **Program Implementation**

Six months prior to the beginning of the program, discussion at clinic staff meetings included chronic disease population of inclusion, chronic care model, HRSA collaboratives, and general principles of quality improvement. This project was presented to the administration prior to the initiation of a four-month

retrospective audit for type 2 diabetes measures. The hospital organization has Magnet recognition with strong support for advancing evidence-based practice and improving patient outcomes. Support was also achieved from numerous other hospital departments including the quality improvement and laboratory staff, coding and technology support staff, and the nursing research committee.

The importance of teamwork and the value of each team member's contributions were reinforced at all encounters. Team members supported having the CCM as the model to improve the care for patients with the goal of adding other diabetes measures and eventually other chronic illnesses. Core process and outcome measures and goals from the HRSA HDCs were adopted. The most important emphasis prior to the start of the project was creating a culture for practice where all team members valued providing care consistent with the CCM.

Immediately prior to the first ongoing data collection period there was orientation to the Model for Improvement and the PDSA cycles for rapid improvement. Bimonthly meetings for further staff education for both the CCM and quality improvement occurred, with the first meeting of each month reviewing results from the previous month's chart reviews. There were on-going PDSA cycles for selected interventions for improvement throughout this project. Staff education provided an opportunity for staff with minimal background in the area of quality improvement or models of care to not just learn, but also apply new approaches as active participants along with patients to achieve better health outcomes.

Each of the components for the CCM was reviewed and possibilities for change were determined. Initial focus on self-management support included

methods for engaging patients in their care with emphasis on how to support patients with goal setting. Principles for motivational interviewing have recently been included in staff meetings.

Delivery system design has occurred with some ease as the recent addition of the initial stages of the EMR has supported positioning staff for better patient flow and patient centeredness. All staff including practitioners, LPNs and MAs participate in activities related to the accomplishment of diabetes standards of care. From admission and throughout the visit, each staff encounter includes patient goal assessment and evaluation of accomplishment of all standards of care.

Decision support has included coordinating activities with experts from the hospital's diabetes institute and increasing collaboration along with other diabetes specialists. Six hour classes provided by the diabetes education department were offered for minimal or no cost to our diabetics, funded by the hospital foundation. Additional collaboration with the diabetes education department included working jointly with patients for consistent and meaningful goal setting. Attendance by clinic staff at the diabetes education classes increased awareness of content for reinforcement and consistency of patient teaching. All staff attended some formal diabetes education since identifying diabetes as an improvement project. Nurse practitioners from the clinic along with the diabetes NP are jointly reviewing standards of care for all areas related to the care of diabetes and its complications. Collaboration with an endocrinologist along with regular discussion groups for both clinic and diabetes NPs are currently in the development process. Chronic disease

evidence based best practices will be embedded with future phases of the EMR, along with the capability for chronic disease registries.

Recent participation in the community's Diabetes Alliance program has identified opportunities in the community for our diabetics. There are ongoing efforts to identify other community support opportunities.

In addition to bimonthly meetings, staff were given personalized packets with information to support learning. Another motivating opportunity for staff included participation in the Institute for Health Improvement's (IHI) open classroom, which gives staff further access to quality improvement process, safety, and leadership for change information. The IHI provided scholarship for the open classroom for the clinic staff. Administration approved paid time for staff to complete the eighteen and one-half hour continuing education program. This not only provided needed continuing education for our LPNs and MAs but also was very motivational for them. They have been very engaged in this process and have appreciated their significant roles as part of the team. Another IHI scholarship provided for attendance at a conference on transforming care to improve patient access and patient centeredness. Actual initiation of some of these interventions for the program did not occur until towards the end of the three-month project period, but are continuing to evolve. A constantly evolving effort continues to support the purpose of implementing a sustainable QI program based on the CCM in a nurse led safety net clinic

### **Methods for Quality Improvement Project**

Staff and administrative support and the initial phase of staff education preceded a retrospective assessment of use of select-evidenced based diabetes clinical practice guidelines. Second, a process improvement was implemented using select elements and related interventions of the Chronic Care Model, the Model for Improvement, and the PDSA model.

### **Setting and Sample**

Medical record audits were obtained from an urban inner city hospital-based nurse-led safety net clinic determined by provider ICD9 coding of patients who were diagnosed with type 2 diabetes at discharge for a four-month period prior to the quality improvement effort. Medical record audits for three one-month periods were obtained on all patients treated and discharged with ICD9 coding of type 2 diabetes. Core diabetes process and outcome measures from the HDCs were obtained from both the retrospective review and the ongoing medical record review period (Table 1).

The staff employed at this clinic includes: 1.6 FTEs family nurse practitioners, 1.6 FTEs licensed practical nurses, one FTE receptionist and one MA..

### **Consent**

Institutional Review Board (IRB) approval was received.

### **Procedures for Data Collection**

Charts were selected between the dates of December 1,2010 and March 31,2011 to determine historical attainment of diabetes process and outcome measures for all patients with type 2 diabetes identified with the ICD 9 code of 250.00. Core measures from the HDCs utilized included outcome measures for

average HbgA1c, blood pressure reading and LDL values. Process measures included documentation of self-management goals, prescription of aspirin, and the number of HbgA1cs obtained three months apart over the last year.

Ongoing medical record reviews were completed on a monthly basis for patients with appointments for diabetes care from June 1, 2011 to August 31, 2011. All staff used a copy of the diabetes core measure flow sheet in addition to the usual diabetic standards of practice flow sheet for all patients registered for appointments for type two-diabetes. Any patients during the on-going three-month quality improvement project having laboratory testing for HbgA1C with results of 6.6 or greater were scheduled for a diabetes follow-up visit (ADA, 2011). If this follow-up office visit occurred during the three-month data collection time period, they were then included in this improvement project. The diabetes flow sheet will be maintained for sustained quality improvement of diabetes patients, until the final phase of the hospital system electronic medical record is fully operative with registry capabilities. Outcomes were reviewed with the quality improvement team following each month of the audit periods.

### **Analysis**

Descriptive statistics were used to analyze the data.

### **Outcomes**

A retrospective review of 105 patient's medical records was completed. Ongoing medical record reviews were obtained for the month of June (n=35), July (n=25) and August (n=30). All core processes of care improved each month of the three-month ongoing QI improvement project and compared to the retrospective

data as shown in Table 1. The area of most noted improvement was the attainment of patient established self-management goals, reflecting the area of most intense staff focus.

### **Lessons Learned**

Although achievement of process measures of care improved over time, outcome measures for this time period were reflective of only one measurement per patient. Since most diabetics have one visit every three months, the data collection over the three one-month periods in total was reflective of one cycle of visits for the clinic diabetic population. Thus this measurement would not be the result of any intervention. The measurement of process attainment was realized over a three-month period of time, but a longer study period would have given a more sustained result, and provided an opportunity to examine the initial impact on outcome measures.

### **Discussion**

Results were consistent with studies showing that processes of care can occur quickly, although a longer period of time is required for meeting benchmarks for outcome measures (Allota et al., 2008; Chin et al., 2007).

A recommendation for the future includes the utilization of a chronic care assessment tool by staff and patients to measure the consistency of care with the CCM. Improvement over time could be used to evaluate the degree of a chronic illness care culture.

### **Implications for Nursing Practice**

Nurse practitioners providing care in safety net clinics are well prepared to provide for the complex needs of patients with diabetes and to impact policy on behalf of the needs of those most vulnerable to the development of diabetes and the long-term complications. The CCM is foundational to the patient-centered medical home, which has emerged most recently as a model to provide better outcomes and reduce disparities for people with chronic diseases. Thus, the use of the CCM can position nurse practitioner led clinics for future PCMH model utilization, especially in those states that currently do not have full independent scope of practice. Futuristically, nurse practitioner led clinics can benefit from the financial incentives of achieving PCMH recognition by the National Committee of Quality Assurance (NCQA), and attain needed financial sustainability and reduce health care disparities (Duderstadt, 2008; Institute for Nursing Centers, 2008).

## **Conclusion**

This diabetes quality improvement project in a nurse practitioner–led safety net clinic utilizing the CCM was effective in improving processes of care and in developing a sustainable and ongoing quality improvement program. This gradual transformation of care delivery in the context of a systems change was accomplished utilizing a multifaceted approach. Although this clinic is engaged in the earliest stages of transforming the culture for the delivery of chronic illness care with limited staff and resources, it serves as the foundation for sustained chronic care development and quality improvement.

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