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Primary Care Provider's Perspectives of
Integrating Public Health into the Prevention and
Management of Type II Diabetes Mellitus in
Rural Nebraska

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Abstract

Through the 2011 Community Health Needs Assessment, the Four Corners Health Department has identified type II diabetes mellitus as one of the communities top concerns within their communities. The goals of this project were: to develop a survey to assess the state of current practices of primary care providers on type II diabetes mellitus in the health department district, to identify primary care providers views on prevention, treatment, and management of type II diabetes mellitus in the health department district, and to examine primary care providers and local health department's views on how primary care and public health can be integrated. In order to accomplish these goals, a survey was developed to collect and disseminate data on primary care provider's perspectives on type II diabetes mellitus to the appropriate stakeholders. A literature review was conducted to determine how primary care and public health could collaborate on diabetes mellitus management interventions. This project was indicated by the Four Corners Health Department as a priority for the communities within their district. The results of the project may provide data for the primary care clinics, health department, and communities to improve the diabetes mellitus prevention, treatment, management, and referral efforts.

Introduction

Placement Site

The Four Corners Health Department (FCHD) served as the site for service learning activities. FCHD offers services and programs that emphasize promotion of health, prevention of disease, and serve the health needs of the population of their communities as a whole. They also offer public health activities that change with variations in technology and social values but the

goals remain the same: to reduce the amount of disease, premature death, and disease-produced discomfort and disability in the population.

Service learning activities performed from April 2016 to June 2016:

1. Assisted FCHD staff with health fairs in the community.
2. Assisted FCHD with health screening assessments at worksites.
3. Provided educational resources at worksites.
4. Created educational materials for FCHD in community.
5. Created public health press releases for communities in FCHD districts.
6. Assisted in Diabetes Prevention Program Education.
7. Educate community and follow-up on high radon readings in community households.

Problem Statement

Serving the Seward, York, Butler, and Polk counties since 2003, the Four Corners Health Department (FCHD) conducted a community health needs assessment in 2011 which indicated that type II diabetes mellitus represents one of the communities' top concerns. In addition, FCHD leadership identified pre-diabetes as a priority to address. Presently, FCHD conducts the Diabetes Prevention Program in partnership with different organizations to address pre-diabetes.

While primary care providers play a critical role in the diagnosis and management of patients with pre-diabetes, FCHD leadership indicated that little is known about primary care provider's knowledge and use of existing pre-diabetes public health resources available within the FCHD's service delivery area. To address this gap in the literature/knowledge, the specific aims of this study were to examine:

1. The current status of primary care providers views on prevention, management, and referral practices of patients with pre-diabetes and type II diabetes mellitus in the health

department district

2. The primary care provider's views on partnerships between primary care clinics in FCHD in diabetes prevention activities and other health promotion activities

Community Oriented Primary Care (COPC) is a model of the integration of public health and primary care in a community setting aiming to improve the health of a defined population. The model is employed by defining who the community is (i.e. FCHD community members living within any of the four districts), prioritizing the needs of the community, creating a detailed problem assessment, planning and implementing an intervention, evaluation of the intervention, and reassessment of needs of the community. COPC represents a framework through which to integrate primary care and public health services to address diabetes in the FCHD service delivery area.

Importance of Proposed Project

Diabetes mellitus has created a burden to the U.S. population with 30.3 million people or 9.4% of the population having been diagnosed with the disease (CDC, 2015). The diabetes mellitus epidemic is continuing to grow in the U.S. even though it is a preventable disease. There are multiple comorbidities that are associated with diabetes mellitus, including: hypertension, hyperlipidemia, heart attacks, stroke, kidney disease, blindness, neuropathies, and amputations (ADA, 2015). Each of these complications and comorbidities could be addressed by public health initiatives to be prevented in the first place. There are programs conducted by rural health care departments focusing on diabetes prevention, such as FCHD's Diabetes Prevention Program initiative. This project is aimed at providing new information on ways in which primary care clinics can collaborate with public health departments to address the diabetes mellitus epidemic.

Gaps in the Literature

There are gaps in the literature on how public health and primary care could collaborate to address the prevention of diabetes mellitus. This project could identify the most effective ways that public health may communicate and share information with primary care providers about other topics in addition to diabetes mellitus.

Literature Review

Prevalence of Diabetes Mellitus

According to the Centers for Disease Control (CDC), the prevalence of diabetes mellitus in the U.S. in 1980 was 5.5 million people and increased to 30.3 million people or 9.4% of the U.S. population in 2014 (CDC, 2015). Diabetes mellitus is a complex chronic disease that requires continual maintenance and care to avoid the comorbidities and complications that often accompany it. Diabetes mellitus occurs when a patient's blood glucose remains elevated above the normal limit. Type II diabetes mellitus, also known as noninsulin-dependent diabetes (Mayo Foundation, 2015), will be the focus of this study. Insulin helps regulate the uptake of blood glucose into cells throughout the body so the cells in the body can use it for energy. In type II diabetes mellitus there may still be insulin secreted from the pancreas but there is a resistance to the effects of insulin; or there could be a decrease in the production of insulin due to destruction of beta cells in the pancreas (Mayo Foundation, 2015). Type II diabetes mellitus is the most prevalent type of diabetes in the U.S. (Forjuoh et al., 2014). There is also the diagnosis of pre-diabetes, which is diagnosed when there is an elevation of blood glucose but not to the level of diagnostic criteria for diabetes mellitus (ADA, 2015; Aroda & Ratner, 2008; Twigg et al., 2007). Pre-diabetes is diagnosed when there is an impaired fasting glucose (IFG) and/or impaired

glucose tolerance (IGT) test (ADA, 2015). Pre-diabetes and type II diabetes are preventable diseases and include risk factors that can be reduced to prevent the development of diabetes. Patients placed at a greater risk of developing pre-diabetes or type II diabetes include: family history of diabetes, advancing age (i.e. >45 years old), overweight or obese (i.e. BMI >25 kg/m²), central adiposity, inactivity, or have a history of polycystic ovarian syndrome or gestational diabetes (ADA, 2015; Aroda & Ratner, 2008). Additional risk factors that may contribute to complications of diabetes (i.e. cardiovascular disease) include hypertension, hyperlipidemia, reduced high-density lipoproteins, and smoking. One of the greatest risk factors for developing pre-diabetes or diabetes is obesity. According to the Centers of Disease Control (CDC) 34.9% of the U.S. adult population is obese while 17% of children and adolescents ages 2-19 are obese (CDC, 2015). The obesity epidemic is alarming as it places children at risk for developing diabetes at a young age.

Diagnosis of Diabetes Mellitus

There are different types of diagnostic criteria to meet the diagnosis of diabetes mellitus. To make the diagnosis of diabetes there must be two separate occasions of elevated blood glucose. One diagnostic test that could be performed is to measure the hemoglobin A1C. A measurement of greater than or equal to 6.5% is diagnostic for diabetes mellitus. Fasting blood glucose greater than or equal to 126 mg/dl is another diagnostic criteria for diabetes mellitus. A third diagnostic criteria is a two hour postprandial blood glucose greater than or equal to 200 mg/dl using a 75 gram glucose load. The final common diagnostic test used to diagnose diabetes mellitus is a random blood glucose greater than or equal to 200 mg/dl with symptoms of hyperglycemia (e.g. excessive urination or thirst) (ADA, 2015). According to the American

Diabetes Association the recommendation for screening patients for diabetes should begin at age 45 and possibly earlier in patients that are overweight or obese (BMI greater than or equal to 25 kg/m²) (ADA, 2015). If screening tests are within normal limits for blood glucose, the ADA recommends testing to continue a minimum of every three years. Pre-diabetes is diagnosed using the same screening tests as diabetes and is confirmed when fasting blood glucose levels are at or above 100 mg/dl but below 126 mg/dl or a two hour response to 75g oral glucose tolerance test of at least 140 mg/dl but less than 200 mg/dl (Aroda & Ratner, 2008). It can also be diagnosed with hemoglobin A1C at 5.7-6.4% (ADA, 2015).

Importance of Pre-Diabetes and Diabetes Mellitus

Diabetes mellitus remains an important topic that many communities are addressing due to the continual burden placed on their communities and their community members. According to the CDC, in 2014 there were approximately 8.1 million people in the U.S. that had diabetes mellitus that were undiagnosed (CDC, 2015).

The comorbidities and complications that coincide with diabetes mellitus can have a devastating impact on the patient's life. Such comorbidities and complications include: hypertension, hyperlipidemia, coronary heart disease, nephropathy, retinopathy, and peripheral artery disease, and neuropathy (ADA, 2015). Treating and managing these complications are critical to achieving a high quality of life for patients with diabetes mellitus and reducing the effects of microvascular and macrovascular complications (Forjuoh et al., 2014). According to Aroda & Ratner (2008), 7.9% of study participants with pre-diabetes had findings of diabetic retinopathy, while 12.6% of participants with diagnosed diabetes had findings of diabetic

retinopathy. This is an example of why it is critical to identify patients with pre-diabetes early on in their disease course to try to limit the complications of diabetes.

Primary care providers are the target of disease management interventions as they make up the majority of the providers taking care of patients with type II diabetes and not a specialist (Forjuoh et al., 2014; Shera et al., 2002). This is especially true in the rural communities in which there is a limited availability of specialists (Thepwongsa et al., 2014).

Literature Review – Specific Aim #1:

“Examine the current status of primary care providers views on prevention, management, and referral practices of patients with pre-diabetes and type II diabetes mellitus in the health department district”

Pre-Diabetes Management Recommendations

Once diagnosed with pre-diabetes the ADA recommend referral to an intensive diet, physical activity, and behavioral counseling program (ADA, 2015). The goal of these programs (e.g. DPP) is to reduce body weight by 7% and increase moderate intensity physical activity to 150 minutes per week (ADA, 2015; Twigg et al., 2007). Pharmacotherapy is also sometimes recommended for patients with pre-diabetes even though the Australian Diabetes Society recommends that 6 months of lifestyle intervention be trialed prior to pharmacotherapy (Twigg et al., 2007). Metformin is the drug of choice for pharmacotherapy for pre-diabetes patients, particular if they have a BMI $>35 \text{ kg/m}^2$, younger than 60 years old, or women with prior gestational diabetes (ADA, 2015; Aroda & Ratner, 2008; Twigg et al., 2007). A minimal of annual screening tests is then recommended for patients with pre-diabetes (ADA, 2015). The ADA recommends screening asymptomatic patients that are overweight or obese (BMI >25

kg/m²) for pre-diabetes, particularly at 45 years old (ADA, 2015). This is where primary care providers can play a vital role in identifying patients with pre-diabetes through screening tests and ensuring these patients with pre-diabetes are referred to the appropriate programs.

Approximately 3-10% of patients diagnosed with pre-diabetes will continue on the spectrum and develop diabetes (Twigg et al., 2007). Even after the diagnosis of pre-diabetes the ADA reviewed three large studies of pre-diabetes patients that underwent lifestyle interventions and found that there was a reduction in the transformation of pre-diabetes to type II diabetes (ADA, 2015). There were 43% reductions in both the 7-year Finnish Diabetes Prevention study and the 20-year Da Qing study and a 34% reduction in the 10-year U.S. Diabetes Prevention Program Outcomes study (ADA, 2015; Aroda & Ratner, 2008). In addition to the reduction of conversion of pre-diabetes to diabetes they also found the lifestyle interventions to be cost-effective, particularly the community group interventions.

Diabetes Mellitus Management Recommendations

Diabetes mellitus management is a complicated road that involves a lifestyle change including eating a healthy diet and maintaining an exercise regime, consistently monitoring blood glucose levels, and taking oral or injectable medications (Ayalon et al., 2008). There are a number of resources providing recommendations and protocols for care but one of the most well known is from the American Diabetes Association (ADA). The ADA's Standards of Medical Care in Diabetes provides health care providers, researchers, patients, and insurance companies the resources to be well informed on the proper care and management of diabetes and treatment goals (ADA, 2015). This resource is updated annually based on literature reviews of the most up-to-date information in the field. The ADA recommends a comprehensive diabetes evaluation for

patients with diabetes mellitus. It includes a thorough medical history, physical exam, laboratory evaluation, and referrals if need be. According to the ADA it is recommended that regular laboratory testing is critical in patients with diagnosed diabetes mellitus. It is recommended to perform a hemoglobin A1C at least twice per year in patients that are meeting their treatment goals and have a stable glycemic control. For patients with poor control of the blood glucose and are not meeting treatment goals it is recommended to have a hemoglobin A1C completed every three months. It has remained a general consensus that glycemic control with a hemoglobin A1C below 7% has shown reductions in microvascular (i.e. retinopathy, nephropathy, and neuropathy) and macrovascular (i.e. cardiovascular disease) complications. Drass et al. (1998) and Shera et al. (2002) found that primary care providers were most concerned with achieving target blood glucose and hemoglobin A1C values as the top priorities for treatment goals.

Diabetes mellitus can lead to further medical issues besides elevated blood glucose. It is essential to obtain a comprehensive exam of each patient to evaluate for potential complications. Some of the referrals that may be required are to ophthalmologists for annual dilated eye exams, registered dietitians for medical nutrition therapy, mental health practitioners, or possibly a podiatrist for foot neuropathies.

Diabetes Self-Management

Another key foundation to care the ADA recommends is to refer all patients with diabetes to take diabetes self-management education (DSME) and support (DSMS) classes. The education piece is aimed at helping patients build the skills to make well-informed self-management choices about their care and lifestyle behaviors. This includes medical nutrition therapy, physical activity education, smoking cessation, and psychosocial care. The diabetes self-management support

piece incorporates services they many need to sustain their care and behaviors they have already established.

It is reported that the DSME can have a tremendous influence on the well-being of patients with diabetes but only one-third to one-half of patients with diabetes participate in DSME (Peyrot et al., 2009). Among patients who did receive DSME there have been studies indicating an improvement in their treatment goals (i.e. target hemoglobin A1C [40.7% vs. 39.5%] and high-density lipoprotein cholesterol levels [58.8% vs. 50%]), knowledge (78 vs. 67.3 on the Diabetes Knowledge Test), readiness to change, goal setting, and empowerment to better their lives (based on the Diabetes Empowerment Scale) (Siminerio et al., 2005).

There are other diabetes mellitus management recommendations that come from other organizations. These organizations include: American Association of Clinical Endocrinologists/American College of Endocrinology (AAACE/ACE) Comprehensive Diabetes Management Algorithm, Veteran's Health Administration, World Health Organization, Indian Health Service, Center for Medicaid and Medicare Services.

Use of Diabetes Mellitus Management Guidelines

There have been other studies that had common aims as the current study. Forjuoh et al. (2014) created a survey that became the core of this capstone survey, with the author's permission. The survey created by Forjuoh et al. (2014), was distributed to primary care providers hoping to collect information on their perceptions of diabetes mellitus treatment protocols, barriers they faced while providing care, and referral diabetes programs. Their study had mixed results in regards to the diabetes treatment protocols and the referral programs. There was a general agreement that diabetes treatment protocols had a positive impact on the quality of

care of patients with diabetes mellitus (Forjuoh et al., 2014). There was also agreement that the protocols would save the primary care providers time with providing care. One particular aspect of the Forjuoh study that could be addressed with further research is that a large portion of the primary care providers were unaware of the self-management programs offered for patients with diabetes mellitus. Only one third of the providers indicated they were familiar with the programs and of those approximately 70% prescribed or referred patients to these programs. It was recommended that diabetes educators continue to promote their programs to primary care providers to raise awareness about the availability that is offered in their own communities. Drass et al. (1998) conducted a survey and found that only 9% of the 370 survey respondents stated they used treatment algorithms for diabetes.

Thepwongsa et al. (2014) conducted a survey of approximately 200 general practitioners in rural Australia about their knowledge, perceptions and attitudes of type II diabetes mellitus. They found that over two-thirds of the general practitioners used a clinical guideline, from Diabetes Australia, for a protocol for managing type II diabetes in their patients. They also found that those that used the guidelines did not have a higher level of knowledge of diabetes management compared with those that did not use guidelines. On the contrary, Khan et al. (2011) found that the general practitioners that did follow clinical guidelines had higher knowledge, practice, and attitude scores compared to those that did not follow guidelines.

Current Diabetes Prevention Interventions

There have been studies conducted that show lifestyle interventions can play a crucial role in preventing complications in patients with diabetes or preventing the development of diabetes in those with risk factors for developing diabetes (ADA, 2015). One of the most successful lifestyle

interventions in preventing diabetes is the U.S. Diabetes Prevention Program (DPP). The Centers for Disease Control (CDC) coordinate the DPP that is aimed at bringing a cost-effective and evidence-based lifestyle intervention to communities throughout the country.

Satterfield et al. (2003) conducted a literature review of community-based and clinical-based interventions for prevention of type II diabetes. In all of the identified interventions but one combined physical activity and healthy eating into their intervention. Some of the activities within the interventions included: grocery store tours, cooking demonstrations, recipe exchanges, development of exercise programs (e.g. exercise classes and running clubs) and facilities. Marlow et al, (1998), studied a group of adolescents on a Nebraska Indian reservation while they were integrated into a culturally appropriate education program to improve physical activity and healthy eating. They found eight of the nine adolescents improved their diabetes knowledge score on the post-test. Simmons et al. (1998) conducted a diabetes prevention intervention in New Zealand, which included a Western Samoans population within two churches. One church population was the intervention group which consisted of physical activity and exercise sessions, diabetes awareness sessions, and cooking demonstrations. The other church served as the comparison group and did not partake in any interventions. Pre and post-assessments were retrieved from both groups. These assessments included blood glucose levels, anthropometric measurements, and a diabetes knowledge questionnaire. The post-assessments revealed the intervention group maintained weight unlike the comparison group who gained weight, took part in regular exercise, reduced waist circumferences, and increased diabetes knowledge. These are prime examples of how public health practitioners and community health workers could become involved with the prevention of pre-diabetes and type II diabetes.

Healthcare Provider Perceived Barriers

According to Forjuoh et al. (2014) the greatest barriers for primary care providers faced while providing care for patients with diabetes mellitus was the time and competing demands of the clinic and also the patient noncompliance. The Drass study also found that patient noncompliance was the most commonly faced barrier primary care providers faced while providing care for patients with diabetes (Drass et al., 1998). Interestingly, House et al. (1986) found, through a patient and physician survey, that the perception of the noncompliance to dietary lifestyle changes differed between the patient and physician. The majority of the physicians' perception of the dietary lifestyle change noncompliance was the lack of motivation. The patients on the other hand, perceived their noncompliance as a mixture of environmental causes (i.e. job, family, or economic conditions), physiologic factors (i.e. the physical inability to cook their own food), and motivational problems (House et al., 1986). Other important barriers providers face that are worth noting include: inadequate reimbursement for their care, inadequate time with the patient, lack of properly trained staff, lack of collaboration between providers for consultations (Aujla et al. , 2013; Drass et al., 1998). Additional barriers primary care providers in rural communities are faced with are the limited access to nurse or diabetes educators, allied health professionals, and other specialists that could assist them with their care and management of patients with type II diabetes mellitus (Thepwongsa et al., 2014). Lack of staff capacity was a major barrier for primary care providers mentioned in a study conducted by Aujla et al. (2013). In addition to patient perceived barriers, physicians faced barriers in providing an adequate referral to a mental healthcare provider due to limitations within their referral system (Beverly et al., 2011). Beverly et al. (2011) also found that some physicians themselves felt overwhelmed and anxious trying to care for the emotional difficulties their patients brought to them due to time

constraints and just pure exhaustion of dealing with the matter. All of these factors could place these primary care providers at risk for burnout.

Diabetes educators also face barriers in providing DSME. In a survey of diabetes educators by Peyrot et al. (2009), diabetes educators indicated the most important barrier they face in providing DSME is that many physicians do not express the importance of DSME to their patients. Diabetes educators view physicians as a key resource in emphasizing the importance of DSME to their patients. Physicians reported they found DSME to be effective and would refer more patients if there were more classes available or the referral process was more user-friendly (Peyrot et al., 2009). This indicates an importance for diabetes educators and primary care providers to have continuous communication about each other's efforts so there is ease in the referring process.

Recommendations for Improved Diabetes Mellitus Care

The ADA recommends a comprehensive patient-centered approach to diabetes care that includes their personal and culturally preferences and meets their needs based on health literacy (ADA, 2015). To accomplish this they recommend community involvement along with a team-based approach to diabetes care and management. Another vital aspect of diabetes care and management is staying up-to-date on current recommendations for care. One such resource is the National Diabetes Education Program (NDEP), which is an online program that provides information on the most updated diabetes care. To create an effective collaboration between public health and primary care, public health departments and practitioners could act as the bridge of the updated diabetes care information from resources, such as NDEP, and link them to health care providers on a regular basis.

Considering there are approximately 8.1 million people living in the U.S. that have undiagnosed diabetes it was recommended by Janssen et al. (2008) to hold regular proactive screening programs for undiagnosed patients living with diabetes. This could also be implemented with the collaboration of public health practitioners.

Bayer and Fiscella (1999) found positive results when they implemented a reminder system in the electronic medical records to alert providers and office staff when a patient was due for a preventive screening or other service. This could easily be implemented into health care settings to eliminate relying on the primary care providers to remember to conduct a screening test (e.g. hemoglobin A1C) on a patient. In a discussion paper by Nobel (2006) he discussed the potential for a sophisticated computer information system that could assist the healthcare workforce in their care for patients with diabetes and other chronic conditions. The benefits of the computer information system include identifying patients within a registry that are not meeting treatment goals, implementing reminders within the system to prompt health care providers to act on a patient's care, and create performance and outcome measures to track a patient's progress and care (Nobel, 2006; Renders et al., 2001). Nobel (2006) also discussed the potential for implementing different strategies to improve the care of patients while they are at home. These strategies include interactive websites for the patients disease condition, video-conferencing, biometric measuring devices that each patient could incorporate into their daily lives, and nurse case managers to manage the everyday concerns of patients.

To address some of the barriers patients face when trying to access DSME, it has been suggested that DSME be offered in a variety of settings including: community-based settings, via telephone or even computer. Peyrot et al. (2009) also found that patients were open to the use of media sources as a way to provide DSME, which was underestimated by the diabetes educators

and physicians.

Literature Review – Specific Aim #2:

“Examine the primary care provider’s views on partnerships between primary care clinics in FCHD in diabetes prevention activities and other health promotion activities”

Collaborations Between Primary Care and Public Health

In the randomized controlled COACH trial by Allen et al. (2011), the researchers discussed how community health workers and nurse case managers are becoming an asset in managing patients with chronic disease conditions (i.e. cardiovascular disease risk factors) in specific high-risk populations. They followed two groups of patients with cardiovascular disease, type II diabetes, hypercholesterolemia, or hypertension for one year to compare the reductions in cardiovascular disease risk factors. The intervention group received a comprehensive management plan from a nurse practitioner and community health worker team and the control group received the usual care managed by their primary care provider. This study focused on community based participatory research (CBPR) where they involved the community on the decisions made for interventions and research. The researchers found that the intervention group, with the nurse practitioner and community health worker team, had better outcomes in patient satisfaction and healthcare service utilization. Renders et al. (2001) found that nurses played a vital role in improving patient and process outcomes with regular follow-up.

Increasing community involvement can lead to positive influences on patients seeking assistance with lifestyle modifications. In the study by Plescia and Groblewski (2004), there were multiple community activities that engaged its members in healthy lifestyle, including: farmer’s markets, healthy menu labeling in schools and restaurants, and more community events through

the local YMCA.

There is evidence of community interventions and collaborations playing a vital role in managing patients with type II diabetes mellitus (Plescia & Groblewski, 2004; Bayer & Fiscella, 1999). Coinciding with community interventions is the model of Community Oriented Primary Care (COPC). According to Gofin (2010), COPC is defined as, “the practice of primary care with population responsibility, oriented to the health improvement of a defined community served by the health service, with the progressive participation of the community and in coordination with all services involved with the health of the community or its determinants”. According to Plescia and Groblewski (2004), COPC is a community intervention that uses public health in a primary care setting to improve the health of a defined and specific population. The model was created by Sidney and Emily Kark in the 1940s in Pholela, South Africa (Gofin & Gofin, 2010). There are five COPC principles that are essential to the process. These principles include responsibility for the health and health care of a defined population; health care based on identified health needs at the population level; prioritization of those health needs; interventions covering all stages of the health-illness continuum of a selected condition; and community participation (Gofin & Gofin, 2010). COPC is a process that includes six steps including community definition and characterization, prioritization, detailed problem assessment, intervention planning and implementation, evaluation, and reassessment (Gofin & Gofin, 2010).

The Four Corners Health Department has already addressed the first two steps of the COPC model, including defining the community and prioritizing the problem that is of utmost importance to the defined community. The defined community consists of the community members of all ages living in the Butler, Polk, Seward, and York counties that took the 2011 Community Health Assessment. This project and paper specifically addressed the detailed

problem assessment step of the COPC model. The COPC steps including intervention planning, evaluation and reassessment could be addressed in further projects and study.

There have been other COPC studies (Bayer & Fiscella, 1999) that have implemented the entire COPC process with success. The Bayer and Fiscella study took place at a medical practice in Rochester, NY and began with defining and characterizing the community then followed with the prioritizing of the community's healthcare needs. They used the assistance of the patients and healthcare providers to develop strategies to address their healthcare needs and finally concluded with the evaluation of their interventions. The researchers found that with the involvement of the community and patients they had statistically significant improvements in a variety of clinical measures including the improvement of controlling diabetes in patients (77% up from 56%), increased immunization status in children (97% up from 78%), mammogram screening (86% up from 56%), and papanicolaou smears (71% up from 46%). They believe without the assistance of the community and the patients the intervention would have not been as successful as they were.

In a COPC study addressing cardiovascular disease and diabetes Plescia and Groblewski found community members that got to express their input about an intervention were more likely to participate due to feeling invested in the project (Plescia & Groblewski, 2004). The resources that the COPC intervention brought to the community, in the North Carolina healthcare system, included classes for exercise and smoking cessation, grocery store tours, and diabetes case management by a diabetes case manager. With studies such as those mentioned above, COPC has shown to be an effective model for interventions to improve the health of the involved communities.

Research Methods

The purpose of this study was to develop a survey to assess the state of current practices of primary care providers on type II diabetes mellitus in the FCHD district, to identify primary care healthcare providers views on prevention, treatment, and management of type II diabetes mellitus in the FCHD district, and to examine primary care providers and local health department's views on how primary care and public health can be integrated. Institutional Review Board (IRB) approval was obtained prior to the beginning of this survey study at the University of Nebraska Medical Center.

Research Questions

1. What is the current status of the primary care provider's views on prevention, management, and referral practices of patients with pre-diabetes and type II diabetes mellitus in the health department district
2. What are the primary care provider's views on partnerships between primary care clinics in FCHD in diabetes prevention activities and other health promotion activities?

Participants

The participants of the survey will consist of primary care providers within the FCHD district.

Data Collection & Study Design

This is a cross-sectional survey with a convenient sample of 49 primary care providers in the FCHD district of which 24 primary care providers responded to the survey. The response rate was 48.98%. The self-report survey was conducted through the UNMC Rural Health Education Network's Survey Monkey account. The survey was emailed to all primary care providers within the FCHD district. Prior to emailing the link to the survey, I personally made phone calls and/or a

site visit to the primary care clinics to introduce the project and myself in an attempt to obtain a greater response rate. After initial responses to the emailed survey, I delivered paper copies of surveys to health care providers to each of the clinics in an attempt to increase response rate.

Data Analysis

To answer the research questions, descriptive statistics were used to summarize the survey results. Counts and percentages were used for categorical data; means, minimums and maximums were used for continuous data.

Results

The results for this survey will be described with descriptive statistics due to the format of the survey. The survey consisted of a 25-question survey with 24 respondents out of the 49 providers in FCHD districts (See Appendix A). Twenty-four respondents started the survey with 22 completing the entirety of the survey.

Demographics

Of the survey respondents 54.17% (13) were male and 45.83% (11) were female. Of those 52.17% (12) were physicians, 47.83% (11) were physician assistants and 0% were nurse practitioners, physical therapists, or residents. The healthcare providers that responded, 21.74% (5) had 0-5 years experience practicing medicine; 21.74% (5) had 6-10 years; 21.74% (5) had 11-15 years; 8.70% (2) had 16-20; and 26.09% (6) had over 20 years experience. Of the healthcare providers that responded to the survey 39.13% (9) worked at York Medical Clinic; 21.74% (5) at Henderson Health Care; 17.39% (4) at Seward Family Medical Center; 13.04% (3) at Butler County Clinic; 13.04% (3) at Stromsburg Medical Clinic; 4.35% (1) at Prairie Creek Family Medicine; 4.35% (1) at Annie Jeffrey Family Medicine; 4.35% (1) at Urgent Care of York; and

Witter Family Medicine, Shelby Clinic, Milford Family Medical Center, Utica Family Medical Center had zero respondents. Of all the healthcare providers that responded 100% (22) specialized in family medicine; there was one open response with “urgent care” as the provider’s specialty.

Results – Specific Aim #1:

“Examine the current status of primary care providers views on prevention, management, and referral practices of patients with prediabetes and type II diabetes mellitus in the health department district”

The healthcare providers were asked to estimate the percentage of their patients who have been diagnosed with diabetes and the mean was 19.89% with a minimum of 5% and maximum of 40%. They were asked the same question for prediabetes and responded with a mean of 14.74% with minimum of 5% and maximum of 40%. Of those diagnosed with diabetes, 95.45% of the providers relied on formal clinical protocol (e.g. American Diabetes Association Standards of Medical Care) whereas 4.55% did not rely on a protocol. Of those that did rely on a protocol(s), 90% relied on American Diabetes Association (ADA) Standards of Medical Care, 15% relied on American Association of Clinical Endocrinologist/American College of Endocrinology (AACE/ACE) Diabetes Management Algorithm; 5% on the Center for Medicaid and Medicare Services and 0% on Veteran’s Health Administration, World Health Organization, Indian Health Service. There were also two open responses for clinical protocols relied on: United States Preventive Task Force (USPTF) and a clinic designed protocol.

The healthcare providers were asked to estimate the percentage of their patients with diabetes who: effectively manage their medications, effectively manage their diet, required

hospitalizations for this condition in the past year, visited an emergency room because of this condition in the past year, with responses of 53%, 30%, 7%, 9% respectively.

Of the healthcare providers that responded to the survey, 100% stated they made referrals to formal disease management program (e.g. Diabetes Prevention Program or Diabetes Self-Management Education) diabetes, 71.43% made referrals to such programs for pre-diabetes, and 38.10% made referrals for other co-morbidities.

Of those that made referrals: 66.67% (14) referred patients to Outpatient Diabetes Education and Self-Management Program, 42.86% (9) to Diabetes Prevention Program, 95.24% (20) to Diabetes Educators, 100% (21) to Registered Dietitians, and zero percent to Four Corners Health Department Resource Directory; <http://resourcedirectory.fourcorners.ne.gov/>.

Of the interventions offered for pre-diabetes and Type II Diabetes Mellitus: 86.36% (19) were aware of Outpatient Diabetes Education and Self-Management Program, 59.09% (13) were aware of Diabetes Prevention Program, 95.45% (21) were aware of Diabetes Educators, 95.45% (21) were aware of Registered Dietitians, and 9.09% (2) were aware of Four Corners Health Department Resource Directory; <http://resourcedirectory.fourcorners.ne.gov/>.

Of those interventions mentioned, 86.36% (19) would prescribe Outpatient Diabetes Education and Self-Management Program to their patients with pre-diabetes and Type II Diabetes Mellitus; 77.27% (17) for Diabetes Prevention Program; 100% (22) for Diabetes Educators; 95.45% (21) for Registered Dietitians; and 31.82% (7) for Four Corners Health Department Resource Directory; <http://resourcedirectory.fourcorners.ne.gov/>.

The healthcare providers also had recommendations on other interventions or programs they would recommend or prescribe for their patients with Type II Diabetes Mellitus, including: “dietary education, exercise, prescribed diet and exercise, gym, exercise specialist,

wellness/exercise regimen, exercise specialty consultation and/or exercise classes, exercise or wellness program, 20 minutes of exercise per day, group therapy, none”.

After the referrals to the programs or interventions their providers follow-up with: 95.45% (21) having an in-person follow-up appointment, 18.18% (4) making a phone call, 4.55% (1) sent a letter, and 0% sent an email.

Once patients were diagnosed with pre-diabetes, 100% (22) of the providers promoted a healthy, well-balanced diet, 100% (22) encouraged regular physical activity, and 40.91% (9) started an oral medication for diabetes (e.g. metformin).

The following were the perceived barriers the providers encountered when managing a patient with diabetes. Of the providers that responded 100% found non-compliance to be a perceived barrier; 40.91% found loss to follow-up as a barrier; 100% responded patients lack of self-efficacy to change their lifestyle; 90.91% perceived poor motivation as a barrier; 72.73% responded the patient lacked knowledge of their disease; 36.36% responded their patients had adverse effect of medications which led to a barrier for the patient; personal financial issues was perceived as a barrier by 77.27% of the providers; 18.18% of the providers perceived poor access to healthcare services as an additional barrier; only 4.55% of providers perceived lack of community-based services a barrier; and 45.45% perceived lack of family support a barrier.

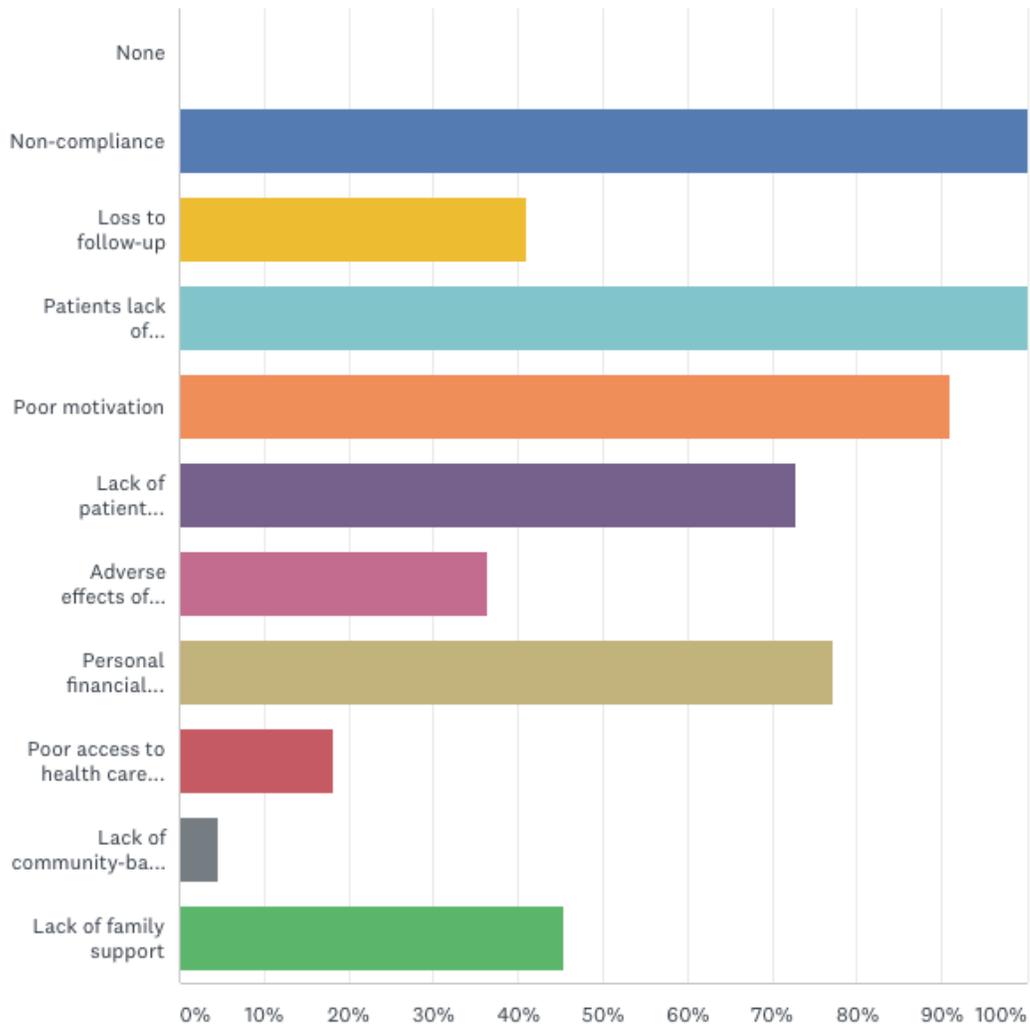


Figure 1: Perceived Barriers by Primary Care Providers. (Survey Monkey, 2017)

Results – Specific Aim #2:

“The primary care provider’s views on partnerships between primary care clinics in FCHD in diabetes prevention activities and other health promotion activities”

There were multiple avenues of communication that were suggested in the survey for the public health staff to best communicate with the healthcare providers about keeping them informed about diabetes prevention and management research and programs. The results were as

follows: 65% of the providers were open to email as means of communication; 0% were interested in receiving a text message; 20% were open to a phone call to office/nurses; 15% were open to the public health staff attending hospital staff meetings with 35% open to clinic staff meetings; 30% were open to receiving health alerts; and 55% were open to receiving written materials; finally there was an open comment of: “brief presentations over lunch” for means of communication.

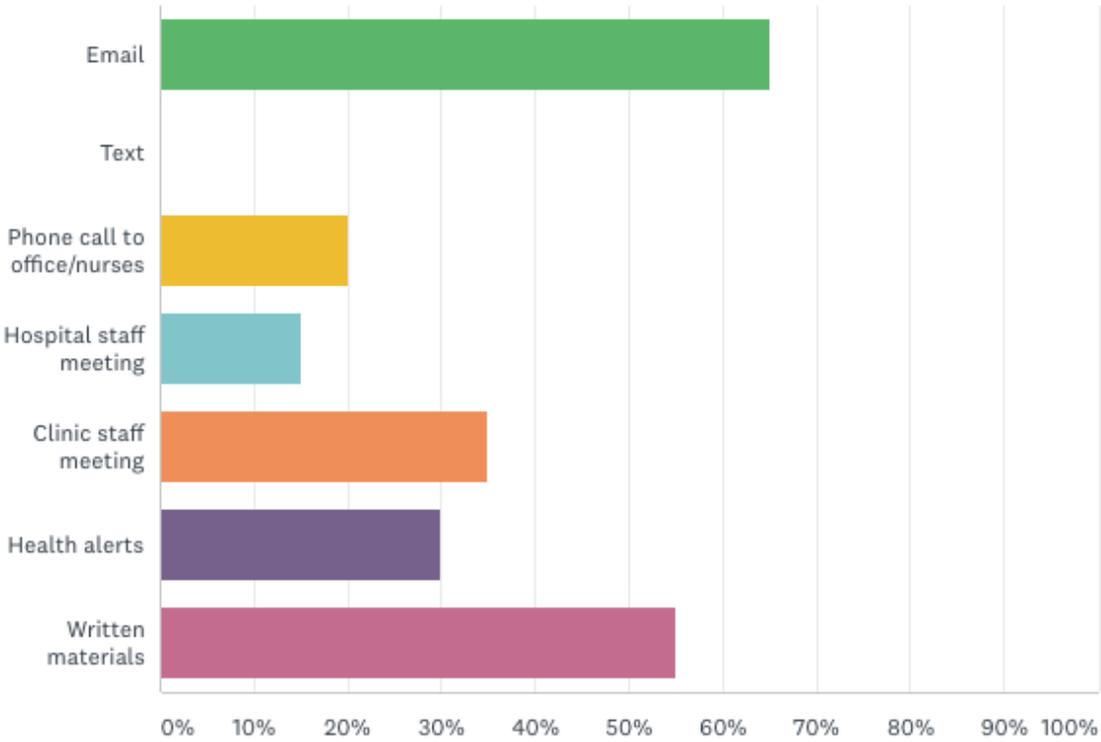


Figure 2: Communication Recommendations. (Survey Monkey, 2017)

The survey asked how the Four Corners Health Department could provide assistance and collaboration with the medical clinics and the following were the responses. 80% of the providers responded they would like FCHD to serve as a referral and resource for providers in search of community public health services for their patients. 55% responded FCHD could provide

educational classes for the primary care clinic patients on public health topics. 25% of the providers responded FCHD could serve as a liaison to other primary care clinics in the FCHD district. 65% responded that FCHD could serve as an advocate for improving the health of the communities within the FCHD district. Finally, 60% of the providers responded FCHD could serve as a partner with the primary care clinic in local events (e.g. local health fairs, community events, etc.)

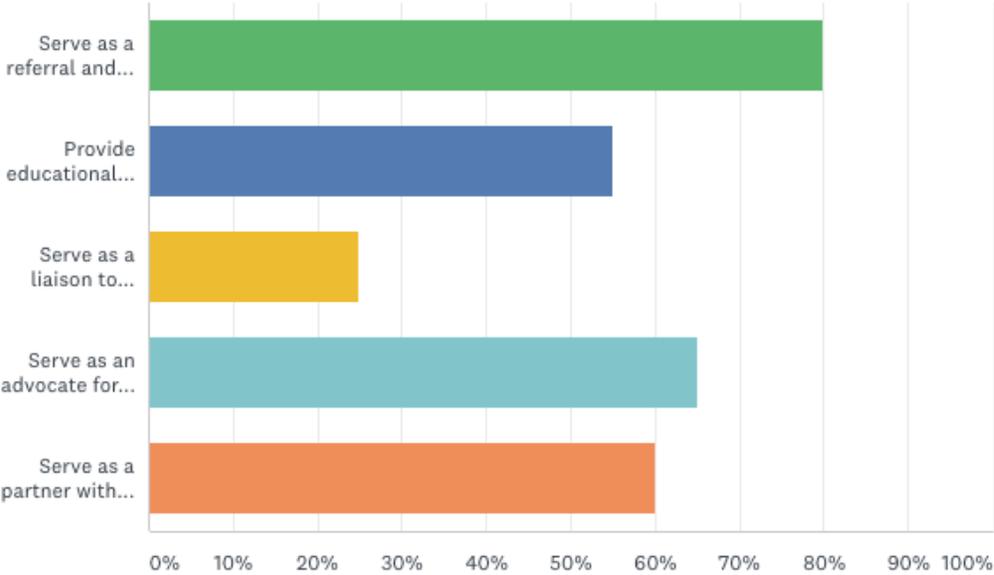


Figure 3: Four Corners Health Department Collaboration. (Survey Monkey, 2017)

There were multiple programs offered at Four Corners Health Department and the following were the responses in regards to if the healthcare providers were aware of the programs offered: only 22.73% were aware of the Diabetes Prevention Program and Training and Coordination; Reportable disease surveillance and investigation (90.91%); Every Woman Matters (90.91%); Community Health Worker (9.09%); Public Health Nurse Case Management (27.27%); Tobacco cessation support and classes (36.36%); Investigation of Environmental concerns (40.91%); Radon testing (31.82%); PH Education (Professional Health Education) (40.91%);

Community health presentations (36.36%); Emergency Preparedness/Disaster Planning (36.36%); Medication Assistance (9.09%) Tai Chi or Stepping on Classes (9.09%); Take Heart Live Smart – Four Corners Worksite Wellness Program for area businesses (9.09%); Worksite health screening/education; Healthy Baby – Home visits (27.27%); Oral Health Clinics at WIC Clinics (13.64%); Fecal Occult Blood Test (FOBT) kit distribution and education (27.27%); Flu shots (59.09%)

Of the providers that responded if they would be interested in partnering with the Four Corners Health Department on potential collaborations for diabetes screening, prevention, and education programs, 55% (11) indicated “Yes” and 45% (9) indicated “No”. Of those that suggested a potential collaboration with FCHD the following were potential suggestions: coordinate services to avoid redundancy; education on various topics; working on all types of health promotion in the community. Of those that indicated they did not see a partnership the barriers to such collaboration were as follows: “retiring soon”; “we have a program here at our facility”; “I don’t have enough time in my life”; “time”.

Other Results

Providers were then asked their opinion on how much does the use of diabetes clinical protocols by physicians, physician assistants, and nurse practitioners contribute to the following: (5 = a great deal, 4 = much, 3 = somewhat, 2 = little, 1 = never) and their responses are seen in Table 1.

	5	4	3	2	1	Total	Weighted Avg
Saves time for	0% (0)	31.58%	36.84%	31.58%	0% (0)	19	2.32

healthcare providers		(6)	(7)	(6)			
Gaining or retaining medical certification	5.26% (1)	0% (0)	47.37% (9)	31.58% (6)	15.79% (3)	19	2.58
Contributes to patient's quality of care	15.79% (3)	57.89% (11)	26.32% (5)	0% (0)	0% (0)	19	1.84
Contributes to the efficient use of professional resources	15.79% (3)	52.63% (10)	26.32% (5)	5.26% (1)	0% (0)	19	1.89
Benefits a clinics quality	10.53% (2)	68.42% (13)	15.79% (3)	5.26% (1)	0% (0)	19	1.95
Helps capture information that can increase reimbursement	5.26% (1)	36.84% (7)	42.11% (8)	5.26% (1)	10.53% (2)	19	2.21
Benefits your clinic financially	0% (0)	22.22% (4)	50% (9)	16.67% (3)	11.11% (2)	18	2.39
Provides measures for quality indicators	11.11% (2)	61.11% (11)	27.78% (5)	0% (0)	0% (0)	18	1.89
Increases patient's satisfaction with care	5.26% (1)	26.32% (5)	42.11% (8)	26.32% (5)	0% (0)	19	2.21

Table 1: Use of Diabetes Clinical Protocols (Survey Monkey, 2017)

Discussion

Discussion - Specific Aim #1:

“Examine the current status of primary care providers views on prevention, management, and referral practices of patients with pre-diabetes and type II diabetes mellitus in the health department district:

We found that of the providers surveyed, 19.89% of their patient panel have diabetes and 14.74% have pre-diabetes. When comparing to national averages, the CDC 2017, estimates that 9.4% of the US population has diagnosed diabetes with another estimated 23.8% that has undiagnosed diabetes. Another 33.9% of US adults 18 years and older had pre-diabetes in 2015 (CDC, 2017). Based on these statistics, the healthcare providers are seeing the patients that are diagnosed with diabetes and are estimating it to be at 19.89%, which is higher than the 9.4% of the US population that has diabetes. This could be due to the fact that even though there is a higher percentage of patients with diabetes in the FCHD districts and the providers are diagnosing some of the patient’s in the “23.8% undiagnosed category”.

The majority of health care providers (95.45%) depended on a formal protocol to manage their patients with type II diabetes (primarily using the American Diabetes Association Standards of Medical Care).

There can be improvement in the management of diabetes as it was reported that only 53% effectively manage their medications, only 30% effectively manage their diet, 7% required hospitalization for a complication of their diabetes and 9% had an emergency department visit due to diabetes. These numbers are alarming as only 53% manage their medications effectively and only 30% adequately manage their diet which could likely contribute to the hospitalizations

and emergency department visits for complications of diabetes. With proper management of diabetes and referral to education programs some of these patient's could better manage their diabetes.

The general consensus of the health care providers was it was standard of care to make referrals for diabetic patients to diabetes management programs at 100% and another 71.43% making referrals for patients with pre-diabetes. With the referrals, 100% of the providers utilized registered dietitians, 95.24% utilized diabetes educators, 66.67% utilizing outpatient diabetes education and self-management programs, and 42.86% utilizing the Diabetes Prevention Program.

If there was a referral made, the majority (95.45%) of health care providers preferred follow-up on the intervention with an in-person follow-up appointment opposed to a phone call, letter, or email. This makes the follow-up more personable and will possibly keep the patient more accountable with follow-up if they are aware they have to follow-up with their healthcare provider in person.

The general theme of diabetes management was to take a comprehensive approach to diabetes management with suggestions such as exercise and a wellness program also be implemented to give the patient a well-rounded approach to improving their diabetes.

Once a patient was diagnosed with pre-diabetes the two suggested interventions were to promote a healthy, well-balanced diet and encourage regular physical activity (100% of the providers recommended for each of the interventions) with only 40.91% recommending starting an oral medication for diabetes (i.e. metformin).

The three largest barriers healthcare providers faced while managing patients with diabetes were non-compliance, patient's lack of self-efficacy to change their lifestyle, and poor motivation.

There were no providers utilizing the Four Corners Health Department Resource Directory even though 9.09% were aware of the directory but 31.82% would recommend the utilization of these services.

Discussion – Specific Aim #2:

“The primary care provider’s views on partnerships between primary care clinics in FCHD in diabetes prevention activities and other health promotion activities”

The healthcare providers were open to the FCHD collaborating and providing assistance to the clinics via: serving as a referral and resource for the providers in search of community public health services for the patients, serving as an advocate for improving the health of the communities within the FCHD district, serving as a partner with the clinics in local events (i.e. local health fairs), and providing educational classes for the clinics on public health topics.

The best ways for the public health staff to communicate information regards to diabetes prevention to healthcare providers was suggested via email, written materials, then clinic staff meetings.

We found that healthcare providers did show some interest in future collaborations with FCHD for diabetes screening, prevention and education programs with 55% responding they would be interested, whereas 45% saying they were not interested.

Limitations

One particular limitation to this study is I used a convenient sample due to focusing this survey on the primary care providers in the FCHD district. This could lead to not being able to generalize the findings to any population.

Another limitation is the majority (39.13%) of the respondents of the survey were providers from the York Medical Clinic. This could have produced a bias considering I was also completing my Physician Assistant school clerkship with the clinic and may not be a representative sample.

Conclusions

The use of formal protocols for managing patients with diabetes helps provide consistent, efficient, evidence-based medicine for patient's with diabetes from one clinic to the next and from provider to provider. In addition, the National Diabetes Education Program (NDEP) could be promoted by the primary care providers for patient's already diagnosed with diabetes. This could lead to a collaboration between public health and primary care, public health departments and practitioners could act as the bridge of the updated diabetes care information from resources, such as NDEP, and link them to health care providers on a regular basis and to offer the services through other avenues such as online, telephone, and community-based settings. Of those already diagnosed with diabetes the use of DSME could have a substantial impact on the patients live by helping the patient reach their blood glucose and cholesterol goals, knowledge of diabetes, goal setting and empowering their lives. The rates of referral to these programs could increase as only one-third to one-half of patients with diabetes participates in DSME (Peyrot et al., 2009).

Further considerations could be to refer all patients with pre-diabetes to the Diabetes Prevention Program or other programs as there is a strong presence in the FCHD districts.

In order to address the barriers the providers faced while managing patients with diabetes, the providers could refer patients to registered dietitians, diabetes educators, management programs, and develop support groups so patients have a place to share their struggles and

triumphs. Bayer and Fiscella (1999) also recommended implementing a reminder system in the electronic medical records to alert providers and office staff when a patient was due for a preventive screening that way patients were less likely to get lost to follow-up or be non-compliant or lack motivation.

This survey conveyed that there is interest for primary care clinics and the healthcare providers to collaborate with public health efforts to better the delivery of care of patient's with pre-diabetes and diabetes. Even though there is interest in public health collaboration there are obstacles to overcome in order to achieve this collaboration. The time that the primary care clinics and health care providers have to collaborate may be limited and there needs to be a set form of communication between the public health officials and primary care clinics and healthcare providers.

The public health officials could establish pre-set presentations at monthly clinic staff meetings to create a more personal approach to the public health and primary care clinic collaborations. They could also create weekly or monthly emails to update the local clinics on public health efforts in areas of potential collaboration. The clinics and public health department could collaboratively work together to create written material for the collaborative efforts.

Also considering there are approximately 8.1 million people living in the U.S. that have undiagnosed diabetes there could be regular proactive screening programs for undiagnosed patients living with diabetes by the public health practitioners (Janssen et al., 2008).

The results of this survey covering the diabetes prevention, management, referral processes and public health collaborations in the FCHD four districts could be used as a pilot project for a state-wide collaboration with primary care clinics and public health professionals and departments.

Overall, pre-diabetes and diabetes has created an ever-increasing burden on the healthcare society and the patients diagnosed with it. Current diabetes management recommendations (e.g. ADA Standards to Diabetes Care) are continually updated to provide information on evidence-based medicine to healthcare providers. There is evidence to support how community collaborations between public health and primary care can have a positive effect on preventing diabetes. The COPC framework may lay the foundation for these potential collaborations to take place. It is critical primary care providers and public health practitioners collaborate to create effective diabetes prevention interventions to benefit the communities at risk.

Service Learning/Capstone Experience Reflection

Four Corners Health Department was my primary site for my service learning and capstone project. FCHD is located at 2101 N. Lincoln Avenue in York, Nebraska. FCHD provides a wide array of services for the surrounding communities that I was unaware of prior to completing my project with their organization. The services they provided that astonished me the most included: reportable disease surveillance and investigation, Every Woman Matters, Diabetes Prevention Program training and coordination, community health workers, public health nurse case management, tobacco cessation support and classes, investigation of environmental concerns, radon testing, Public Health Education (Professional Health Education), community health presentations, emergency preparedness/disaster planning, medication assistance, Tai Chi or Stepping On Classes, Take Heart Live Smart – Four Corners Worksite Wellness Program for area businesses, worksite health screenings/education, home visits to pregnant or new moms, offering education and support. (i.e. not home health), oral health clinics at WIC Clinics, fecal occult

blood test (FOBT) kit distribution and education, flu shots for businesses as requested. I also was astonished by the wide array of services that FCHD offered to the community.

Within the FCHD their staff consists of: executive director, public health nurses, community education coordinator, immunization coordinator, emergency response coordinator, environmental health, special projects coordinator, program assistant, administrative assistant, and office manager.

Prior to starting the service learning, capstone experience I imagined the survey response rate would have been higher than it was initially. I sent reminders to providers and made in person appearances to encourage providers to complete survey.

The service learning activities I completed included: health fairs, education on fecal occult blood test for colon cancer screening, creation of community public health press releases, diabetes and healthy lifestyle education at Diabetes Prevention Program meetings, grocery store tours for shopping of healthy foods, worksite wellness screenings and education, public health education at community festival, diabetes education with individual patients, creation of public health education displays (i.e. colon cancer and breast cancer screenings), radon testing phone calls. The FCHD provided all of the supplies, resources, and support to accomplish each of these service learning activities.

I believe the most valuable contribution I was able to make during my service learning activities was my interactions with the patients with diabetes and pre-diabetes enrolled in the Diabetes Prevention Program. I was able to connect with the patients on an interpersonal level by sharing experiences, challenges, and triumphs in their journeys to lead a healthier lifestyle. The greatest challenge I faced during my service learning experience was time management as I was

completing both service learning and my physician assistant school family medicine clerkship. I was able to balance both obligations by planning in advance with an organized schedule.

The most important insight I gained from my service learning and capstone experience was the complexity and effort that must be put forth by both public health practitioners and health care providers to allow for collaboration to occur. There are many obstacles to overcome while coordinating a public health effort and it is critical to have effective communication between all stakeholders.

My views of public health were impacted by my service learning capstone experience by allowing me to realize that there are often great ideas to improve our community's health but the logistics can often complicate the scenario and place barriers in the way of accomplishing these improvements in health. My SL/CE project required me to collaborate with the public health department, primary care clinics, registered dietitians, Diabetes Prevention Program staff, community members, and space available for activities for SL/CE.

My public health education prepared me to address obstacles and barriers to delivering public health services and also the evaluation of those services to ensure they are adequate. It also blended well with my physician assistant studies, as there are public health education opportunities in nearly every patient encounter. It allows me to take a comprehensive approach to the patient and not only manage the patient on a medical level but also assist in any socioeconomic, psychological, or emotional needs in the patient's life.

Acknowledgements

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- Four Corners Health Department Staff: Laura McDougall, Vicki Duey, Christine Blanke, Val Tvrdy, Christine Lauwrence, Angel Dale,
- RHEN (Rural Health Education Network) for allowing me to use their Survey Monkey account

Appendices

Appendix A

Healthcare Provider Survey Type II Diabetes Mellitus Prevention Study

As part of my Service Learning-Capstone Project for the University of Nebraska Medical Center's Master of Public Health Program and a partnership with the Four Corners Health Department we are asking all healthcare providers in the Four Corners District to fill out a brief survey. This study is covered under the UNMC IRB #098-16-EX. We would like to learn more about your diabetes-related caseload, as well as your familiarity with the use of current diabetes management protocols (e.g. American Diabetes Association). This information is valuable in identifying strategies that can help the Four Corners Health Department better serve the Four Corners Health Department district.

This survey consists of 25 short questions and should take approximately **5 minutes** to complete. Your participation is completely voluntary. Although the survey includes some demographic data, these data will not be used in any way to identify you or your responses individually. You may skip any questions you do not wish to answer. If you have questions about your rights as a survey participant, you may call Emma Frost-Briley at 402-690-4063 or email at emma.frostbriley@unmc.edu.

By completing the survey is implied consent.

For descriptive purposes, we would like to know a little about you. Please note that none of your information will be used to identify your responses individually.

1. Are you:
 - a. Male
 - b. Female
2. Are you a:
 - a. Physician
 - b. Physician Assistant
 - c. Nurse Practitioner
 - d. Physical Therapist
 - e. Resident
 - f. Other (Please specify):
3. Years of practice (Please choose one):
 - a. 0-5 years
 - b. 6-10 years
 - c. 11-15 years
 - d. 16-20 years
 - e. Over 20 years
4. Which clinic do you work at? (Please select all that apply):
 - a. Annie Jeffrey Family Medicine
 - b. Butler County Clinic
 - c. Witter Family Medicine
 - d. Shelby Clinic
 - e. Prairie Creek Family Medicine
 - f. Stromsburg Medical Clinic
 - g. Milford Family Medical Center
 - h. Seward Family Medical Center
 - i. Utica Family Medical Center
 - j. Henderson Health Care Services
 - k. Urgent Care of York
 - l. York Medical Clinic
 - m. Other (Please specify):
5. What is your specialty?
 - a. Family Physician
 - b. Internal Medicine
 - c. Other (Please specify):
6. Estimate the percentage of your patients who have been diagnosed with diabetes. (Please enter a number 0-100; e.g. 33):
 - a. _____
7. Estimate the percentage of your patient who have been diagnosed with pre-diabetes (Please enter a number 0-100; e.g. 33):
 - a. _____
8. For a diabetes diagnosis, do you rely on a formal clinical protocol (e.g. American Diabetes Association Standards of Medical Care)?
 - a. Yes
 - b. No

9. If yes, please check the protocol (Please check all that apply):
 - a. American Diabetes Association (ADA) Standards of Medical Care
 - b. American Association of Clinical Endocrinologist/American College of Endocrinology (AAACE/ACE) Diabetes Management Algorithm
 - c. Veteran's Health Administration
 - d. World Health Organization
 - e. Indian Health Service
 - f. Center for Medicaid and Medicare Services
 - g. Other (Please specify):
10. In your opinion how much does the use of diabetes clinical protocols by physicians, physician assistants, and nurse practitioners contribute to the following: (5 = a great deal, 4 = much, 3 = somewhat, 2 = little, 1 = never)
 - a. Saves time for healthcare providers
 - b. Gaining or retaining medical certification
 - c. Contributes to patient's quality of care
 - d. Contributes to the efficient use of professional resources
 - e. Benefits a clinic's quality
 - f. Helps capture information that can increase reimbursement
 - g. Benefits your clinic financially
 - h. Provides measures for quality indicators
 - i. Increases patient's satisfaction with care
11. Please estimate the percentage of your patients with Type II Diabetes Mellitus who (Please enter a number 0-100; e.g. 33):
 - a. Effectively manage their medications _____
 - b. Effectively manage their diet _____
 - c. Required hospitalization for this condition in the past year _____
 - d. Visited an ER because of this condition in the past year _____
12. Do you make referrals to any formal disease management program (e.g. Diabetes Prevention Program or Diabetes Self-Management Education) for: (Please check all that apply):
 - a. Diabetes
 - b. Pre-diabetes
 - c. Other Co-morbidities
13. If yes, what resources do you utilize? (Please check all that apply):
 - a. Outpatient Diabetes Education and Self-Management Program
 - b. Diabetes Prevention Program
 - c. Diabetes Educators
 - d. Registered Dietitians
 - e. Four Corners Health Department Resource Directory;
<http://resourcedirectory.fourcorners.ne.gov/>
 - f. Other (Please specify):
14. Are you familiar with the following interventions for pre-diabetes or Type II Diabetes Mellitus? (Please check all that apply):
 - a. Outpatient Diabetes Education and Self-Management Program
 - b. Diabetes Prevention Program
 - c. Diabetes Educators

- d. Registered Dietitians
 - e. Four Corners Health Department Resource Directory;
<http://resourcedirectory.fourcorners.ne.gov/>
15. Would you recommend or prescribe the following interventions for your patients with pre-diabetes or Type II Diabetes Mellitus? (Please check all that apply):
- a. Outpatient Diabetes Education and Self-Management Program
 - b. Diabetes Prevention Program
 - c. Diabetes Educators
 - d. Registered Dietitians
 - e. Four Corners Health Department Resource Director;
<http://resourcedirectory.fourcorners.ne.gov/>
16. What other interventions or programs would you recommend or prescribe for your patients with Type II Diabetes Mellitus?
- a. _____
17. If a specific referral is made, what type of follow-up is done with the patient? (Please check all that apply):
- a. Phone call
 - b. Email
 - c. Letter
 - d. Follow-up appointment
 - e. Other (Please specify):
18. When a patient is determined to be have pre-diabetes, what are your recommendations to that patient? (Please check all that apply):
- a. Promote a healthy, well-balanced diet
 - b. Encourage regular physical activity
 - c. Start an oral medication for diabetes (e.g. metformin)
 - d. Other (Please specify):
19. What barriers do you encounter when managing a patient with Type II DM? (Please check all that apply):
- a. None
 - b. Non-compliance
 - c. Loss to follow-up
 - d. Patients lack of self-efficacy to change their lifestyle
 - e. Poor motivation
 - f. Lack of patient knowledge of their disease
 - g. Adverse effects of medications
 - h. Personal financial issues
 - i. Poor access to health care services
 - j. Lack of community-based services
 - k. Lack of family support
 - l. Other (Please specify):
20. How can public health staff best communicate with you to keep you informed about diabetes prevention and management research and programs (Please check all that apply)?
- a. Email
 - b. Text

- c. Phone Call to office/nurses
 - d. Hospital Staff meeting
 - e. Clinic staff meeting
 - f. Health Alerts
 - g. Written materials
 - h. Other (Please specify):
21. How could the Four Corners Health Department provide assistance and collaboration with your medical clinic (Please check all that apply):
- a. Serve as a referral and resource for providers in search of community public health services for their patients.
 - b. Provide educational classes for the primary care clinic patients on public health topics.
 - c. Serve as a liaison to other primary care clinics in the FCHD district.
 - d. Serve as an advocate for improving the health of the communities within the FCHD district.
 - e. Serve as a partner with the primary care clinic in local events (e.g. local health fairs, community events, etc.)
 - f. Other (Please specify):
22. Are you aware of these programs at Four Corners Health Department? (Please check all that apply):
- a. Reportable disease surveillance and investigation
 - b. Every Woman Matters
 - c. Diabetes Prevention Program Training and Coordination
 - d. Community Health Worker
 - e. Public Health Nurse Case Management
 - f. Tobacco cessation support and classes
 - g. Investigation of Environmental Concerns
 - h. Radon Testing
 - i. Public Health Education (Professional Health Education)
 - j. Community health presentations
 - k. Emergency Preparedness/Disaster Planning
 - l. Medication Assistance
 - m. Tai Chi or Stepping On Classes
 - n. Take Heart Live Smart – Four Corners Worksite Wellness Program for area businesses
 - o. Worksite health screenings/education
 - p. Healthy Baby – Home visits to pregnant or new moms, offering education and support. (i.e. not home health)
 - q. Oral Health Clinics at WIC Clinics – Dental Hygienist provides screenings and fluoride treatments
 - r. Fecal Occult Blood Test (FOBT) kit distribution and education
 - s. Flu shots for businesses as requested
23. Would you be interested in partnering with the FCHD on potential collaborations for diabetes screening, prevention, and education programs?
- a. Yes
 - b. No

24. If yes, please suggest potential collaborations with the FCHD:

25. If no, please indicate the barriers to potential collaborations with the FCHD:

Thank you for completing this brief survey on diabetes prevention. Your input is highly valued.

This survey was adapted by a survey created by Forjuoh et al. (2014).

Forjuoh, S. N., Bolin, J. N., Vuong, A. M., Helduser, J. W., McMaughan, D. K., & Ory, M. G. (2014). Primary care physicians' perceptions of diabetes treatment protocols. *Texas medicine, 110*(1), e1-e1.

Appendix B: SLCE Activities

- Creation of Public Health Press Releases – alcohol screening and awareness, men’s health, women’s health, hydration, summer safety, water and firework safety
- Creation of Health Fair Displays - breast cancer awareness and colon cancer awareness
- FCHD representative for health fairs in FCHD service area – education on fecal occult blood test for colon cancer screening
- Delivery of diabetes prevention and healthy lifestyle education at Diabetes Prevention Program meetings
- Conducted Grocery Store Tour
- Worksite Wellness Screenings and Education – blood pressure screening, body mass index, heart healthy exercise and eating, and introductions to the Steps to Wellness Program
- Public Health Education at Community Festival
- Diabetes Education with individual patients

- Organization of comprehensive patient education at York Medical Clinic
- Individual patient education about diabetes mellitus, lifestyle change, medications
- Conducted Radon Testing Follow-up Calls – on homes with elevated levels
- Volunteer recruitment phone calls for household hazardous waste collection day in Butler and Polk counties
- Scribe for Veteran’s family focus group in Shelby
- Create survey, delivery survey, collect data from survey, analyze data from survey, disseminate data to stakeholders

Appendix C: Goals and Objectives

1. Goal #1 (Capstone): Conduct research in an ethical manner.
 - a. Objective #1: Take ethics into consideration while conducting research.
 - i. Activity #1: Prepare and submit research proposal.
 - ii. Activity #2: Prepare and submit research proposal to IRB.
 - iii. Activity #3: Obtain IRB approval.

2. Goal #2 (Capstone): Develop a survey to assess the state of current practices of primary care providers on type II diabetes mellitus in the FCHD district.
 - a. Objective #1: Design and develop a survey.
 - i. Activity #1: Collaborate with Liz Lyden to develop a survey.
 - b. Objective #2: Collect data on primary care providers perspectives on Type II Diabetes Mellitus regarding prevention, treatment, management, and referrals in the FCHD district.
 - i. Activity #1: Conduct a short survey to all primary care providers in the

FCHD district.

- c. Objective #3: Identify areas of interest and collaboration between the health department and primary care clinics to address diabetes prevention, treatment management, and referrals to incorporate the principles of COPC into primary care clinics within the FCHD district.
 - i. Activity #1: Conduct survey of primary care providers within FCHD district and discuss potential collaborations with FCHD staff.
 - d. Objective #4: Disseminate results of survey to the primary care clinics and the health department for self-assessment.
 - i. Activity #1: Report data collected to the stakeholders for their use in the clinics, health department, and communities.
3. Goal #3 (Service Learning): Increase awareness of healthy lifestyle changes for patients diagnosed with type II diabetes mellitus and those with pre-diabetes.
- a. Objective #1: Educate patients with type II diabetes mellitus about lifestyle modifications.
 - i. Activity #1: Conduct group and individual educational sessions with patients facing type II diabetes mellitus.
 - ii. Activity #2: Create resources and educational handouts for patients with type II diabetes mellitus.
4. Goal #4 (Capstone): Examine the integration of public health into primary care using the COPC framework.
- a. Objective #1: Identify appropriate roles for public health workers in primary care clinics and the community for chronic disease prevention, specifically diabetes.

- i. Activity #1: Use literature review and data collected to provide recommendations on methods of potential roles public health workers could partake in within the healthcare realm.

5. Goal #5 (Service Learning/Capstone): Finalize SL/CE Paper and Presentation

- a. Objective #1: Prepare final SL/CE paper
- b. Objective #2: Prepare final SL/CE presentation.

	January	February	March	April	May	June	July-Dec 2017
Goal #1: Conduct research in an ethical manner.							
Objective #1	X	X	X				
Goal #2: Develop a survey to assess the state of current practices of primary care providers on type II diabetes mellitus in the Four Corners district.							
Objective #1		X	X	X	X		
Objective #2				X	X	X	X
Objective #3					X	X	X
Objective #4				X	X	X	X
Goal #3: Increase awareness of healthy lifestyle changes for patients diagnosed with type II							

diabetes mellitus.							
Objective #1				X	X	X	
Goal #4: Examine the integration of public health into primary care using the COPC framework.							
Objective #1	X	X	X	X	X	X	
Goal #5: Finalize SL/CE Paper and Presentation							
Objective #1						X	X
Objective #2						X	X

Ethics

To address the potential issue of privacy and confidentiality, all data collected was not linked to a particular primary care clinic or provider. Data remained de-identified so data cannot be traced back to a particular primary care clinic or provider. All data from the survey remained in the UNMC Rural Health Education Network’s Survey Monkey account until data analysis was conducted. Only the committee team and myself conducted the data analysis. I have no conflict of interest with this Service Learning/Capstone Experience.

Application of Public Health Competencies

Core/Cross-Cutting Domains		
<u>Competency:</u> Biostatistics – 1.C: Interpret results of statistical analyses in	<u>Reflection:</u> Survey was developed in a timely manner with	<u>Committee Assessment:</u> __ Not Competent __ Somewhat Competent

<p>public health studies.</p> <p><u>Activity/Application:</u></p> <p>Develop a survey, conduct statistical analyses, and interpret results of primary health care provider's perceptions of type II diabetes mellitus prevention and management.</p>	<p>collaboration from committee.</p> <p>After in depth discussion with committee is was agreed upon that descriptive statistics would be most beneficial for this study. Interpretation of survey results was through evaluation of the descriptive statistics.</p>	<p><u>Competent</u></p> <p><u>Highly Competent</u></p> <p><u>Uncertain</u></p>
<p><u>Competency:</u></p> <p>Foundations of Public Health – 6.C: Communicate accurate public health information with professional and lay audiences.</p> <p><u>Activity/Application:</u></p> <p>Conduct group and individual educational sessions about type II diabetes mellitus and lifestyle changes. Create educational handouts for</p>	<p><u>Reflection:</u></p> <p>This was a fantastic experience as I was able to take part in the Diabetes Prevention Program and see the challenges and triumphs the patients experienced.</p>	<p><u>Committee Assessment:</u></p> <p><u>Not Competent</u></p> <p><u>Somewhat Competent</u></p> <p><u>Competent</u></p> <p><u>Highly Competent</u></p> <p><u>Uncertain</u></p>

<p>patients with type II diabetes mellitus.</p>		
<p><u>Competency:</u></p> <p>Leadership, Advocacy, and Community-Building – 8.B: Identify different levels of community engagement and participation.</p> <p><u>Activity/Application:</u></p> <p>Conduct a survey of primary care providers in regards to perspectives of type II diabetes mellitus and public health collaboration. Report data from survey back to stakeholders.</p>	<p><u>Reflection:</u></p> <p>The survey was conducted and results from data collection were reported to stakeholders.</p>	<p><u>Committee Assessment:</u></p> <p><input type="checkbox"/> Not Competent</p> <p><input type="checkbox"/> Somewhat Competent</p> <p><input type="checkbox"/> Competent</p> <p><input type="checkbox"/> Highly Competent</p> <p><input type="checkbox"/> Uncertain</p>
<p>Overall Assessment of Core/Cross-Cutting Domains (completed by Committee Chair with input from Committee Members)</p>		
<p>Comments regarding student’s progress and professional growth in the above core competency areas, including current strengths/weaknesses:</p>		

Concentration Domains		
<p><u>Competency:</u></p> <p>The Community Dimension in Health Care – 1.C:</p> <p>Demonstrate understanding of the role and value of primary health care in promotion of community health as an integral component of the health care system.</p> <p><u>Activity/Application:</u></p> <p>Report data from survey back to stakeholders so they can use the data to better population health in a way they see fit.</p>	<p><u>Reflection:</u></p> <p>Data was reported to stakeholders for their use to make improvements as they see fit.</p>	<p><u>Committee Assessment:</u></p> <p><input type="checkbox"/> Not Competent</p> <p><input type="checkbox"/> Somewhat Competent</p> <p><input type="checkbox"/> Competent</p> <p><input type="checkbox"/> Highly Competent</p> <p><input type="checkbox"/> Uncertain</p>
<p><u>Competency:</u></p> <p>Community Oriented Primary Care (COPC) – 2.B: Define a community for the purpose of clinical care at the community</p>	<p><u>Reflection:</u></p> <p>Conducted survey as described above. Diabetes prevention within the FCHD assessment was addressed</p>	<p><u>Committee Assessment:</u></p> <p><input type="checkbox"/> Not Competent</p> <p><input type="checkbox"/> Somewhat Competent</p> <p><input type="checkbox"/> Competent</p> <p><input type="checkbox"/> Highly Competent</p>

<p>level; and plan an assessment of health needs using available data for the collection and analysis of health information.</p> <p><u>Activity/Application:</u></p> <p>Conduct survey of primary care providers in the FCHD district. Analyze the FCHD community health assessment to address any additional community needs.</p>	<p>with this survey.</p>	<p><u>Uncertain</u></p>
<p><u>Competency: Community Oriented Primary Care, Health Information, and Health Disparities – 3.A: Assess the organizational needs for the collection of health information and identify appropriate sources for monitoring and evaluating of COPC services.</u></p>	<p><u>Reflection:</u></p> <p>Collaborated with York Medical Clinic for organizational needs. Also collaborated with clinics through survey and how FCHD could be integrated into their clinics.</p>	<p><u>Committee Assessment:</u></p> <p><u>Not Competent</u></p> <p><u>Somewhat Competent</u></p> <p><u>Competent</u></p> <p><u>Highly Competent</u></p> <p><u>Uncertain</u></p>

<p><u>Activity/Application:</u></p> <p>Collaborate and communicate with the primary care clinics and FCHD to meet organizational and community health needs.</p>		
<p><u>Competency:</u></p> <p>Values in Community Oriented Primary Care – 4.B: Explain and demonstrate how community involvement in COPC could be a step in community development.</p> <p><u>Activity/Application:</u></p> <p>Address the concept of COPC to the primary care clinics and FCHD. Express the concept of COPC to primary care clinics and health departments.</p>	<p><u>Reflection:</u></p> <p>COPC concept was addressed with the York Medical Clinic particularly considering I was completing my family medicine physician assistant school rotation with York Medical Clinic.</p>	<p><u>Committee Assessment:</u></p> <p><input type="checkbox"/> Not Competent <input type="checkbox"/> Somewhat Competent <input type="checkbox"/> Competent <input type="checkbox"/> Highly Competent <input type="checkbox"/> Uncertain</p>

<p><u>Competency:</u></p> <p>Community Oriented Primary Care (COPC) – 2.A: Describe, analyze and integrate the conceptual framework and principles of COPC.</p> <p><u>Activity/Application:</u> Collect and analyze data on patients with type II DM and on community collaborations to address prevention efforts of DM. Integrate information from data into planning of proposed COPC interventions.</p>	<p><u>Reflection:</u></p> <p>Data was collected in regards to care of patients with type II DM and how there could be community efforts to aid in prevention and management of diabetes.</p>	<p><u>Committee Assessment:</u></p> <p><input type="checkbox"/> Not Competent</p> <p><input type="checkbox"/> Somewhat Competent</p> <p><input type="checkbox"/> Competent</p> <p><input type="checkbox"/> Highly Competent</p> <p><input type="checkbox"/> Uncertain</p>
<p>Assessment of Concentration Competencies (completed by Committee Chair with input from Committee Members)</p>		
<p>Comments regarding student’s progress and professional growth in the above concentration competency areas, including current strengths/weaknesses:</p>		

References

- Allen, J. K., Himmelfarb, C. R. D., Szanton, S. L., Bone, L., Hill, M. N., & Levine, D. M. (2011). COACH trial: a randomized controlled trial of nurse practitioner/community health worker cardiovascular disease risk reduction in urban community health centers: rationale and design. *Contemporary clinical trials*, 32(3), 403-411.
- American Diabetes Association. (2015). Standards of medical care in diabetes—2015. *Diabetes care*, 38(Supplement 1), S1-S93.
- American Diabetes Association. (2015). Statistics on Diabetes. Retrieved from <http://www.diabetes.org/diabetes-basics/statistics/> on December 21, 2015.
- Aroda, V. R., & Ratner, R. (2008). Approach to the patient with prediabetes. *The Journal of Clinical Endocrinology & Metabolism*, 93(9), 3259-3265.
- Aujla, N., Stone, M. A., Taub, N., Davies, M. J., & Khunti, K. (2013). Identifying people with type 2 diabetes and those at risk: Lessons from the Measure Your Waist (MY-WAIST) mixed-methods study in UK primary care. *Primary care diabetes*, 7(4), 261-267.
- Ayalon, L., Gross, R., Tabenkin, H., Porath, A., Heymann, A., & Porter, B. (2008). Determinants of quality of life in primary care patients with diabetes: Implications for social workers. *Health & social work*, 33(3), 229.

Bayer, W. H., & Fiscella, K. (1999). Patients and community together: A family medicine community-oriented primary care project in an urban private practice. *Archives of family medicine*, 8(6), 546.

Beverly, E. A., Hultgren, B. A., Brooks, K. M., Ritholz, M. D., Abrahamson, M. J., & Weinger, K. (2011). Understanding Physicians' Challenges When Treating Type 2 Diabetic Patients' Social and Emotional Difficulties A qualitative study. *Diabetes Care*, 34(5), 1086-1088.

Centers for Disease Control. (2015). Adult Obesity Facts. Retrieved from <http://www.cdc.gov/obesity/data/adult.html> on January 22, 2016.

Centers for Disease Control. (2015). Childhood Obesity Facts. Retrieved from <http://www.cdc.gov/obesity/data/childhood.html> on January 22, 2016.

Centers for Disease Control. (2015). National Diabetes Statistics Report Card. Retrieved from <http://www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf> on December 21, 2015.

Centers for Disease Control and Prevention. (2017). National Diabetes Statistic Report. Retrieved from <https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf> on October 5, 2017.

Centers for Disease Control. (2015). Number (in millions) of Civilian, Non-Institutionalized Persons Diagnosed with Diabetes, United States, 1980-2014. Retrieved from <http://www.cdc.gov/diabetes/statistics/prev/national/figpersons.htm> on December 21, 2015.

Drass, J., Kell, S., Osborn, M., Bausell, B., Corcoran, J., Moskowitz, A., & Fleming, B. (1998). Diabetes care for Medicare beneficiaries: attitudes and behaviors of primary care physicians. *Diabetes care*, *21*(8), 1282-1287.

Forjuoh, S. N., Bolin, J. N., Vuong, A. M., Helduser, J. W., McMaughan, D. K., & Ory, M. G. (2014). Primary care physicians' perceptions of diabetes treatment protocols. *Texas medicine*, *110*(1), e1-e1.

Four Corners Health Department. (2012). 2011 Community Health Assessment; 2012 Community Health Improvement Plan.

Gofin, J., & Gofin, R. (2010). *Essentials of global community health*. Jones & Bartlett Learning.

House, W. C., Pendleton, L., & Parker, L. (1986). Patients' Versus physicians' attributions of reasons for diabetic patients' noncompliance with diet. *Diabetes Care*, *9*(4), 434-434.

Janssen, P. G., Gorter, K. J., Stolk, R. P., & Rutten, G. E. (2008). Do characteristics of practices and general practitioners influence the yield of diabetes screening in primary care? The

- ADDITION Netherlands study. *Scandinavian journal of primary health care*, 26(3), 160-165.
- Khan, A. T., Lateef, N. A., Khamseen, M. A. B., Alithan, M. A. A., Khan, S. A., & Ibrahim, I. (2011). Knowledge, attitude and practice of ministry of health primary health care physicians in the management of type 2 diabetes mellitus: A cross sectional study in the Al Hasa District of Saudi Arabia, 2010. *Nigerian journal of clinical practice*, 14(1).
- Marlow, E., Melkus, G. D. E., & Bosma, A. M. (1998). STOP diabetes! An educational model for Native American adolescents in the prevention of diabetes. *The Diabetes Educator*, 24(4), 441-450.
- Mayo Foundation for Medical Education and Research. (2015). Diabetes. Retrieved from <http://www.mayoclinic.org/diseases-conditions/type-2-diabetes/basics/definition/con-20031902> on December 21, 2015.
- Nobel, J. (2006). Bridging the knowledge—action gap in diabetes: Information technologies, physician incentives and consumer incentives converge. *Chronic Illness*, 2(1), 59-69.
- Peyrot, M., Rubin, R. R., Funnell, M. M., & Siminerio, L. M. (2009). Access to Diabetes Self-management Education Results of National Surveys of Patients, Educators, and Physicians. *The Diabetes Educator*, 35(2), 246-263.

- Plescia, M., & Groblewski, M. (2004). A community-oriented primary care demonstration project: refining interventions for cardiovascular disease and diabetes. *The Annals of Family Medicine*, 2(2), 103-109.
- Renders, C. M., Valk, G. D., Griffin, S. J., Wagner, E. H., & Assendelft, W. J. (2001). Interventions to improve the management of diabetes in primary care, outpatient, and community settings a systematic review. *Diabetes care*, 24(10), 1821-1833.
- Satterfield, D. W., Volansky, M., Caspersen, C. J., Engelgau, M. M., Bowman, B. A., Gregg, E. W., ... & Vinicor, F. (2003). Community-based lifestyle interventions to prevent type 2 diabetes. *Diabetes Care*, 26(9), 2643-2652.
- Shera, A. S., Jawad, F., & Basit, A. (2002). Diabetes related knowledge, attitude and practices of family physicians in Pakistan. *diabetes*, 52(465).
- Siminerio, L. M., Piatt, G., & Zgibor, J. C. (2005). Implementing the chronic care model for improvements in diabetes care and education in a rural primary care practice. *The Diabetes Educator*, 31(2), 225-234.
- Simmons, D., Fleming, C., Voyle, J., Fou, F., Feo, S., & Gatland, B. (1998). A pilot urban church-based programme to reduce risk factors for diabetes among Western Samoans in New Zealand. *Diabetic Medicine*, 15(2), 136-142.

Thepwongsa, I., Kirby, C., Paul, C., & Piterman, L. (2014). Management of type 2 diabetes: Australian rural and remote general practitioners' knowledge, attitudes, and practices. *Rural and remote health, 14*(2449).

Twigg, S. M., Kamp, M. C., Davis, T. M., Neylon, E. K., & Flack, J. R. (2007). Prediabetes: a position statement from the Australian diabetes society and Australian diabetes educators association. *Medical journal of Australia, 186*(9), 461.

Widyahening, I. S., van der Graaf, Y., Soewondo, P., Glasziou, P., & van der Heijden, G. J. (2014). Awareness, agreement, adoption and adherence to type 2 diabetes mellitus guidelines: a survey of Indonesian primary care physicians. *BMC family practice, 15*(1), 72.