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IMPLEMENTATION OF AN EDUCATIONAL WORKSHOP ON THE USE OF EVIDENCE-
BASED LIFESTYLE MANAGEMENT PROGRAMS TO PREVENT DIABETES

by

Angela Leinenbach

Paper submitted in partial fulfillment of the

requirements for the degree of

Doctor of Nursing Practice

University of Louisville

School of Nursing

Date Finalized



Signature DNP Project Chair

8/7/19

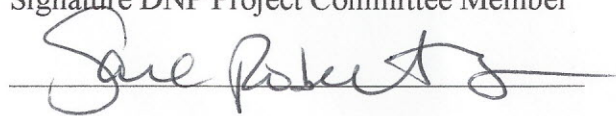
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Signature DNP Project Committee Member

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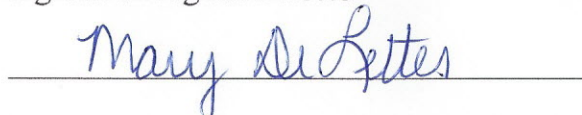
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Table of Contents

Manuscript Title Page.....	1
Acknowledgments.....	2
Manuscript Abstract.....	5
Manuscript.....	6
Recommended Practice Change.....	7
Review of the Literature.....	8
Conceptual Framework.....	9
Setting and Organizational Assessment.....	10
Purpose.....	11
Intervention.....	11
Participants	12
Data Collection/Ethical Considerations.....	13
Measurement.....	14
Results.....	14
Discussion.....	15
Interpretation.....	15
Limitations.....	15
Conclusion.....	16
References.....	17
Appendix A: Cause and Effect Diagram.....	20
Appendix B: ICD 10 Code Description.....	21
Appendix C: How to Refer to DPP.....	22

Appendix D: Project Survey.....23

Appendix E: Budget.....24

Abstract

Prediabetes does not have to lead to type 2 diabetes. Lifestyle management programs (LMPs) have been shown to reduce the risk of conversion to type 2 diabetes (Diabetes Prevention Research Group (DPRG), 2002), however, research suggests providers refer to LMPs less than 10% of the time (Shiffman et al., 2009). The purpose of this project was to improve prediabetes management by increasing primary care (PCP) referrals to a local Diabetes Prevention Program (DPP) through the use of an educational intervention to increase knowledge of DPP, prediabetes documentation, and steps for DPP referral. The ACE Star Model of Knowledge Transformation guided project design from discovery of knowledge to integration in clinical practice. Outcome measures included number of DPP referrals and prediabetes ICD 10 codes pre and post-education of PCPs and survey responses on barriers to referral. The Wilcoxon Signed Rank test determined statistical significance in change pre and post educational intervention. DPP referrals increased from zero to four post intervention ($p=.157$) and ICD-10 codes increased from 41 to 43 in the post intervention group ($P=.655$). The post intervention survey found cost and lack of insurance coverage to be the most common referral barriers. While there were increases in post intervention referrals and ICD10 codes, the results were not statistically significant. This increase, however, warrants further investigation by means of a larger study. Over 50% of patients met criteria for Medicare (45/84). If certification was sought to become a Medicare DPP provider, DPP could be offered at no cost, alleviating referral barriers.

Keywords: Adults, prediabetes, lifestyle modifications, diabetes prevention program.

Implementation of an Educational Workshop on the Use of Evidence-Based Lifestyle Management Programs to Prevent Diabetes

Prediabetes affects over 86 million U.S. adults yet over 90% of adults are unaware of meeting the criteria for this condition (Centers for Disease Control and Prevention (CDC), 2017). The condition is diagnosed by one of three tests; a hemoglobin A1C between 5.7-6.4%, a fasting blood sugar test between 100 – 125 mg/dL, or a glucose tolerance test between 140-199 mg/dL (CDC, 2017). Prediabetes frequently leads to type 2 diabetes, a condition that not only is associated with increased risk of stroke and heart disease but was the seventh leading cause of death of U.S. citizens in 2015 (CDC, 2017). Diabetes also carries a significant economic burden to the U.S. healthcare system. In 2017, diagnosed cases of diabetes had estimated costs of \$237 billion in direct medical costs and \$90 billion in indirect costs, such as loss of productivity, (American Diabetes Association, 2018).

Research has shown that DPP, which includes weight loss and increased physical activity, reduced the risk of conversion to type 2 diabetes by 58%, a number significantly greater than medication alone (Diabetes Prevention Program Research Group (DPRG), 2002). Findings such as these lead researchers with the Community Preventive Services Task Force (CPSTF) to recommend the use of these programs to people at risk for type 2 diabetes (Pronk et al., 2015). Despite the CPSTF recommendation, research suggested that providers spoke with their patients about problems related to being overweight (a precursor to diabetes) less than half of the time and referred to formal weight loss programs less than 10% of the time (Shiffman et al., (2009). Providers also missed opportunities to refer patients to evidence-based programs proven to reduce the risk of conversion to diabetes.

Within a hospital network located in the Southeastern United States, PCPs frequently refer patients to diabetes self-management courses, however, the vast majority of prediabetes management course referrals come from outside the network via patient self-referral. The recommended change of practice was for PCPs to refer patients with prediabetes to a local DPP in order improve care and reduce the risk of type 2 diabetes. DPP is a one-year, structured life style management program that was developed for people with prediabetes to lower the risk of conversion to type 2 diabetes (CDC, 2018). The program is recognized by the CDC and was developed to guide people to make changes toward healthy eating habits, increased physical activity, and stress reduction (CDC, 2018).

The intervention related to this quality improvement project was the delivery of an educational session for PCPs in private practice in a large metropolitan city in the Southeastern United States. This educational session utilized recommendations from the “Prevent Diabetes Stat” toolkit developed by the American Medical Association (AMA) and the Centers for Disease Control and Prevention (CDC) (2015) which included tools for screening for prediabetes, patient handouts on risk for diabetes, commonly used diagnostic codes for prediabetes, and how to refer patients to a local community based DPP program.

The goals of the session were to increase provider knowledge about the efficacy of the DPP and to increase provider referrals. The educational session contained a Power point presentation and handouts addressing the efficacy of DPP in reducing risk for type 2 diabetes, tools to screen for prediabetes, ICD-10 codes for documentation, and information on how to refer to local DPP programs.

Articles used in the educational component of the intervention were assessed according to a modified rating system for the Hierarchy of Evidence (Guyatt, & Rennie, 2002). The first article from the DPRG (2002), published findings of a multi-centered randomized controlled trial evaluating lifestyle modifications or the use of metformin in the reduction of incidences of type 2 diabetes in pre-diabetic adults versus a control group. Over 3000 participants were randomized to placebo, 850 mg of metformin, or life style management programs (LMP) with the goal of at least a seven percent weight loss and the addition of 150 minutes of physical activity per week. The researchers found that LMP reduced the risk of type 2 diabetes in pre-diabetic patients by 58% (95 percent confidence interval, 48 to 66 percent) compared to placebo (DPRG, 2002); also demonstrating that the risk of type 2 diabetes can be lowered with modest weight loss and increased physical activity.

Ali, Echouffo-Tcheugui, and Williamson (2012) evaluated the effects of lifestyle modifications in adults at risk for type 2 diabetes. This systematic review and meta-analysis researched intervention programs derived from DPP and included DPP target goals: seven % weight loss through calorie restriction, and 150 minutes per week of physical activity. Utilizing mean percentage weight loss from baseline as the primary outcome measure, Ali et al. (2012) found programs derived from the DPRG yielded significant weight loss (-3.99%). Also, interventions led by lay educators yielded similar results to those of medical professionals (-3.15% vs. -4.27%).

Four additional randomized controlled trials investigated lifestyle modification interventions adapted from DPP on the mean percentage weight loss from baseline or progression to type 2 diabetes as primary outcome measures (Bernstein et al., 2014; Katula et al., 2011; the Look Ahead Research Group, 2014; and Weber et al., 2016). In the Katula et al.

(2011) study, LMP participants observed lower blood glucose (-4.3 vs. -0.4 mg/dL, $p < 0.001$) versus usual care participants, lower insulin resistance (-1.9 vs. -0.8, $p < 0.001$ in the homeostasis model assessment of insulin resistance), and weight (-7.1 vs. -1.4kg; $p < 0.001$). In Weber et al. (2016), a statistically significant difference in the decreased development of diabetes was found in patients who participated in LMPs over those participants who did not (34.9% in the control group vs. 25.7% in the intervention group, $p = 0.014$). The researchers in Bernstein et al. (2014) trended toward improvement in outcomes, however, the data did not reach statistical significance. The Look AHEAD Research Group (2014), evaluated the eight-year weight losses of over 5,000 overweight/obese participants randomized to either LMPs or usual care of diabetes support and education (DSE). At year eight, 50.3% of the LMP participants lost greater than five percent of initial weight and 26.9% of participants lost greater than 10% of initial weight, a significantly greater amount than the DSE group ($p < 0.001$). The authors in this study as in the previous studies reviewed, concluded that LMPs such as DPP produce significant weight loss in overweight/obese patients across an ethnically and racially diverse population and reduce the conversion of prediabetes to diabetes.

The ACE Star Model of Knowledge Transformation served as the conceptual framework to guide this project through the stages of development and translation of knowledge into practice. In 2004, the ACE Star Model, with its simple five-point design, demonstrated the five major stages of knowledge transformation (Stevens, 2004). The five points of the star, or model steps are: 1) Discovery of knowledge; 2) Evidence summary; 3) Translation into practice recommendations; 4) Integration into practice; and 5) Evaluation with the focus of quality improvement (Milner, 2016).

The ACE Star Model served as the framework for the major stages of this project. The first stage of knowledge discovery revealed the numbers of people who met the criteria for prediabetes yet were unaware of this condition as well as the low numbers of provider referrals to DPP. The second stage of the framework addressed the summary of evidence. The review of the literature revealed the success of DPP in reducing the risk of prediabetic patients converting to type 2 diabetes. The third stage of the ACE Star Model was the translation of evidence-based research into practice. The research was reviewed and guidelines were researched to develop an educational program to disseminate recommendations to providers. In the fourth stage, the educational intervention and the toolkit were presented to PCPs in hopes of making a practice change to utilize DPP in their practices. The fifth and final stage evaluated the success of the project and any barriers to implementing the change into practice.

Setting and Organizational Assessment

The intervention took place in two medical practices where PCPs were employed within a comprehensive network of providers in private practice in a large metropolitan area in the Midwestern United States. Permission to participate in the project was given via email from the office managers of the two medical practices. The network has a diabetes education department which includes a DPP program recognized by the CDC. The cause and effect diagram in Appendix A illustrated the process of identifying issues within prediabetes management prior to the implementation of the project.

Purpose

Despite U.S. Community Preventive Services Task Force recommendations to utilize LMPs to reduce risk of diabetes (Pronk et al., 2015), research suggested that providers spoke with their patients about problems related to being overweight (a precursor to diabetes) less than half of the time and referred to formal weight loss programs less than 10% of the time (Shiffman, et al., 2009). This data suggested that providers are failing to address the complications of this potentially devastating condition and they are missing opportunities to refer patients to evidence-based programs proven to reduce the risk of conversion from prediabetes to diabetes.

The purpose of this quality improvement project was to improve prediabetes care in a community-based clinic setting. Objectives included: a) development of an educational workshop that could be used in a community-based clinic settings to improve provider knowledge about DPP and increase comfort around the conversation of prediabetes and weight management, b) pilot the developed resource in community clinics, and c) assess for change in practice for prediabetes management by tracking diagnostic codes associated with pre-diabetes and the number of referrals to DPP.

Intervention

Prior to the educational sessions, a member of the medical records team conducted a query from the electronic medical records (EMR) of four PCPs to assess how many of their patients met the inclusion criterion for prediabetes (40 years of age or greater, a BMI of 25 or greater, or a history of gestational diabetes) and had ICD10 codes (see Appendix B for a complete list of ICD10 codes) reflective of prediabetes during a predetermined eight-week period. Patients were excluded from data if they had a diagnosis of type 2 diabetes or if they had

hypoglycemic agents listed in their medication list. Another query was run by the manager of the diabetes education department to see how many referrals were made from the four PCPs during the same eight-week period.

In the second part of the project, educational lunch and learn sessions lasting approximately 20 minutes were conducted for the PCPs. The sessions included a PowerPoint presentation and handouts on epidemiology of prediabetes, efficacy of DPP in stopping the conversion of prediabetes to type 2 diabetes, and current guidelines supporting screening for prediabetes. Providers and staff were shown how to refer to the local DPP through their electronic medical record or a handout was given for patients and staff with phone numbers and information about referrals (See Appendix C for the Diabetes Management Program Handout). During the eight-week period after the educational session, reminder messages were delivered to providers and staff by the principle investigator. These reminders included laminated diagnostic codes specific to prediabetes, handouts with examples of DPP core curriculum, and handouts on how to refer to DPP.

After the eight-week collection period, copies of the qualitative survey (See Appendix D for a copy of the survey) were left for the PCPs to complete. The office managers assisted with collecting the surveys and the principal investigator compiled the results. Additional queries of ICD 10 codes and DPP referrals were also run after the collection period.

Participants

PCPs were recruited from a list of network providers who had previously referred to the local diabetes self-management program through the diabetes education department. All PCPs met the inclusion criteria of greater than one year of employment in their current position and a

practice focused solely on primary care of adult patients. The principle investigator sent emails requesting participation in the project and called providers directly requesting project participation. Six PCPs agreed to participate in educational sessions, however, two declined further participation due to lack of ability to report and collect data from their EMR. Letters were obtained from the practice managers stating willingness to participate in the program.

Data Collection/Ethical Considerations

A member of the EMR team assisted with conducting the pre and post intervention data report by collecting criteria specific ICD-10 codes for prediabetes patients. Members of the local diabetes education department assisted in providing numbers of referrals to DPP before and after the intervention. There were no patient identifiers on any of this information. The qualitative surveys were collected by the principal investigator after the eight-week data collection period and feedback was compiled. All written documentation, including the provider key, was secured in a locked file cabinet in the principal investigator's home and the investigator is the only person with a key. All HIPPA procedures were followed and as there were no patient identifiers confidentiality and anonymity will be maintained.

There were no risks to the patients whose charts are reviewed and there was very minimal risk to providers and staff who participated in the educational session. The minimal risk related to earlier recognition of disease and the potential to initiate earlier interventions. The project was approved as a quality improvement initiative by the University of Louisville Institutional Review Board. See Appendix E for project budget.

Measurement

The project was a mixed methods design which utilized quantitative data analysis to assess practice change following an educational intervention session and qualitative data assessing the feasibility of provider DPP referrals after the project implementation. Quantitative data from the chart reviews identified the ages of patients, the number of referrals to DPP and ICD10 codes reflecting either a diagnosis of prediabetes or risk factors related to prediabetes. See Appendix D for the qualitative survey.

Results

Quantitative data was entered into IBM SPSS for analysis by the primary investigator. The comparison of pre and post intervention ICD-10 diagnostic codes and number of DPP referrals were analyzed using the non-parametric Wilcoxon Signed Rank test due to the small sample size ($n=4$) and the inherent nature of count data not being normally distributed. While the pre and post intervention number of referrals to DPP (zero versus two ($p=0.157$)) and the number of ICD10 codes (41 versus 43 ($p=0.655$)) related to prediabetes were greater post intervention, the differences between pre and post intervention were not great enough to rule out an increase due to chance. The small sample size inhibits the ability to detect statistical significance. Questionnaires administered after intervention assessed potential barriers to screening and referral to DPP. All of the providers utilized the American Diabetes Association guidelines recommendations for screening for prediabetes. Two out of the four PCPs had never heard of DPP prior to the intervention and all providers reported either lack of insurance coverage or cost was a barrier to DPP referral.

Discussion

Interpretation

Referrals to DPP increased after the educational intervention. It is difficult to say if this is due to the intervention itself, however, the fact that providers referred patients to DPP suggests that they believe it may benefit patients. There was also an increase in the number of patients with ICD 10 codes related to prediabetes which may or may not be due to the intervention. It is important to note the significant differences in the number of patients with prediabetic ICD10 codes between providers. More research needs to be done to see if the providers are seeing prediabetic patients but not utilizing codes reflective of the diagnosis or if there is a difference in patient population. Calculating a rate of prediabetic code utilization compared to calculating the total number of codes, may yield a more accurate statistic.

Limitations

It is clear from the survey that PCPs list the greatest barriers of referral as cost and insurance coverage. Currently, there is one commercial insurance carrier that covers the local DPP program and the overwhelming majority of current DPP participants are members of this insurance. Over 50% (45/84) of patients in both the pre and post intervention of the study were over the age of 65. Medicare reimburses DPP for beneficiaries who enroll in Medicare DPP (MDPP) with providers who are Medicare DPP suppliers (Royer, 2018). While the local DPP has completed the first step of CDC recognition, the program has not sought the Medicare supplier status. Seeking this status could result in increased referrals to DPP.

Small sample size was also a major limitation to the project. During the PCP recruitment phase one of the most common reasons for not participating was the time commitment to the study. It is possible that more PCPs would have participated in the intervention if the content

was provided during monthly network provider meetings or in the quick format of an online module.

Conclusion

This quality improvement project included the following: 1) a literature review identifying interventions to prevent the conversion of prediabetes to type 2 diabetes, 2) the implementation of an educational workshop to increase provider knowledge and comfort level with discussing the benefits of lifestyle changes and ultimately increasing referrals to local DPP programs, 3) data analysis of pre-intervention and post-intervention mean scores to assess increased documentation of diagnostic codes, and referrals to DPP, 4) and an evaluation and summary of the results of the intervention as well as barriers to the adoption of the quality measures addressed in the educational session. The project showed increased referrals and increased ICD 10 codes reflective of prediabetes assessment on a small scale warranting further investigation by means of a larger study. It also yielded valuable information on how to improve and further increase referrals the local DPP program.

Providers play a significant role in early intervention to reduce the devastating effects of obesity and the heavy burden of chronic conditions such as diabetes. As they frequently have limited time to deliver complex information about disease management in an office setting, DPP offered in a community setting may give them a tool for aiding patients with weight reduction, chronic disease prevention, and change the way they approach the treatment of this complex condition.

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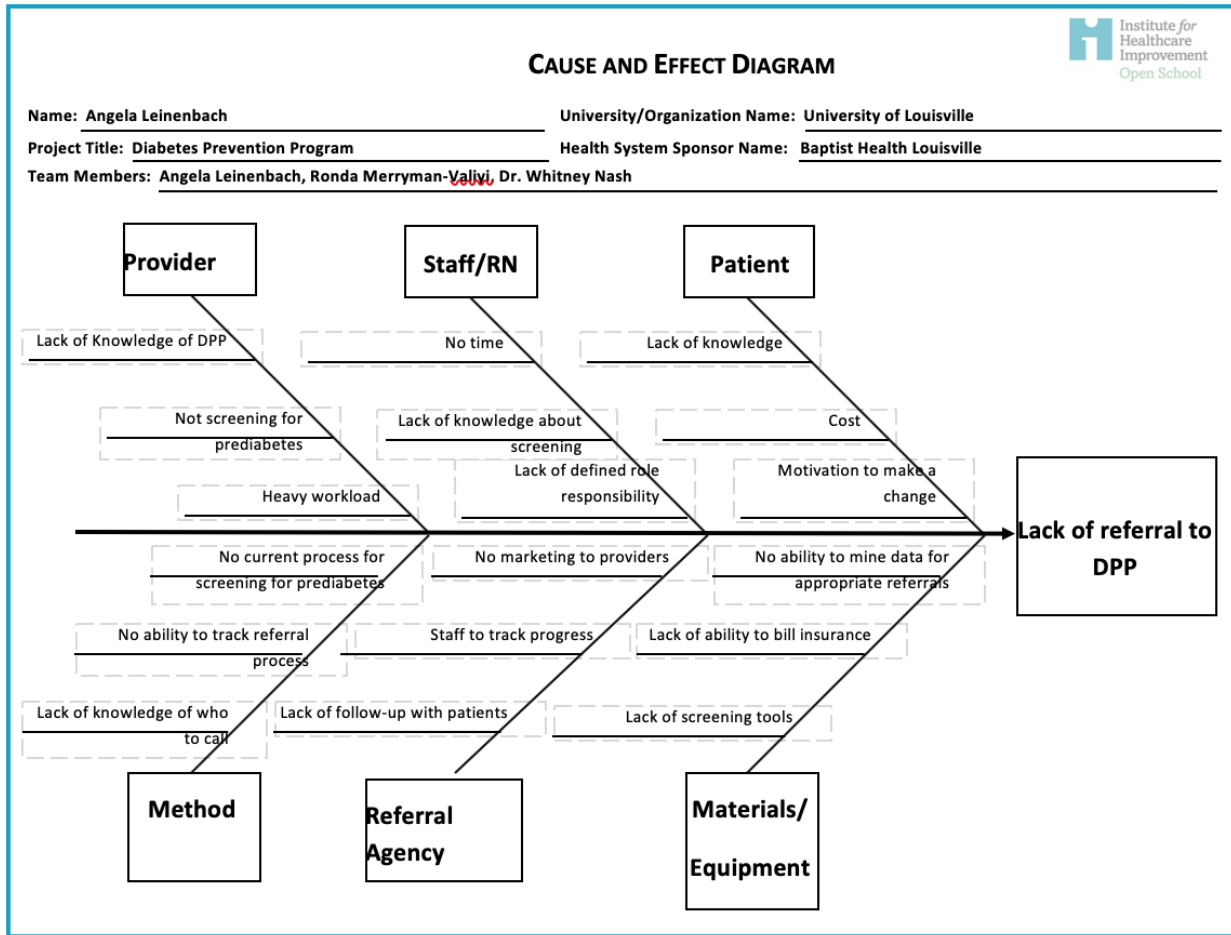
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Appendix A



Appendix B

ICD-10 Code	ICD-10 Code Description
Z13.1	Encounter for Screening for Diabetes Mellitus
R73.09	Other abnormal glucose
R73.01	Impaired fasting glucose
R73.02	Impaired glucose tolerance (oral)
R73.03	Prediabetes
E66.01	Morbid obesity (excessive calories)
E66.09	Other obesity (excessive calories)
E66.8	Other obesity
E66.9	Obesity, unspecified
E66.3	Overweight
Z68.3x	BMI 30.0-39.9
Z68.4x	BMI =/> 40

Appendix C**Diabetes Prevention Program (DPP):**

- National Program created by the CDC (Center for Disease Control)
- Coached by registered nurse/diabetes educator, that has been trained as a Lifestyle Coach for the DPP
- Focuses on lifestyle changes – healthy eating and increased physical activity to prevent Type 2 Diabetes
- Course consists of 16 weekly sessions, transitioning into every-other week, finishing with 6 monthly sessions – this is a one year long course
- Participants are weighed weekly
- Food & Activity tracker completed by the participant and turned in to the Lifestyle Coach on a weekly basis
- Groups of 12-20 people, all with pre-diabetes
- Goal is to achieve 5-7% body weight loss during program and increase physical activity to a minimum of 150 minutes throughout the duration of the program

There is an established guideline to determine participant eligibility:

- All must never have been diagnosed with diabetes
- All must be 18 years or older AND have a BMI equal to or greater than 24 (if Asian, 22); if they fit the criteria and have also been diagnosed with pre-diabetes through one of the following:
 - Fasting glucose of 100 to 125
 - A1C of 5.7 to 6.4
 - Glucose Tolerance Test results of 140 – 199
 - Clinically diagnosed Gestational Diabetes during previous pregnancy (may be self-reported)
- Without a blood-based test or history of GDM, someone may take CDC pre-diabetes screening test and score 9 points or higher, indicating high risk for diabetes

The cost for the program is \$429 and is not covered by insurance, except for Anthem KEHP Members.

11/2018

Appendix D**Study # 18.1146****The Use of Lifestyle Interventions for the Prevention of Diabetes**

This quality improvement project evaluates the effects of an educational session on referrals to lifestyle modification programs such as the Diabetes Prevention Program. Your participation is voluntary; data are anonymous and confidential. Thank you for your participation.

1. How long have you been in your current medical practice?

2. Do you currently utilize U.S. Preventative Services Task Force/ADA guidelines to screen patients for prediabetes? Yes No

If you do, which one do you prefer?

3. Prior to the educational session in this project, had you heard of the national Diabetes Prevention Program? Yes No

4. What were the barriers to screening patients for prediabetes?

5. What were the barriers to referring patients to the Diabetes Prevention Program?

6. What changes would you suggest the investigator make to facilitate evidence-based practice change?

Appendix E

Evidence-Based Workshop:
Prediabetes and Lifestyle Modification
Leinenbach DNP Project Expenses

Direct Expenses

	Actual
Printing and Copying	\$40
Lunch for provider and staff (\$10 per plate for an average staff of 15 = \$150) x 5 sessions = \$750)	\$154
Subtotal of Direct Expenses	\$194

Indirect Expenses

Workshop space (provider office)	\$0
Provider and staff time 15 members x 5 offices (donated lunch time)	\$0
Subtotal Indirect Expenses	\$0

Total Project Budget **\$194**