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# Benefits of Patient-Centered Education for Type 2 Diabetes Mellitus

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# Benefits of Patient-Centered Education for Type 2 Diabetes Mellitus

by

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**Abstract**

Type 2 diabetes is a chronic, lifelong illness that affects millions of individuals in the United States. The rate of diabetes has doubled over the last 20 years in America and has climbed to be the seventh leading cause of death amongst Americans. The purpose of this project was to determine if participants in the target community demonstrated increased knowledge and awareness of diabetes after receiving education. A pre-intervention and post-intervention survey was given to determine if the education was effective. Data collected revealed an increased awareness and knowledge regarding the prevalence of type 2 diabetes, lifestyle, and diet modification.

*Keywords*: type 2 diabetes, lifestyle modifications, blood sugar, education.

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## Introduction

Diabetes is a chronic disorder that impacts millions of lives. This disorder is characterized by abnormal insulin production and the body's inability to regulate blood sugar. There are two types of diabetes, type 1 and type 2; each has its own distinct etiology and management strategies.

## Problem Recognition

Type 2 diabetes mellitus (DM) is a chronic condition in which the body cannot process sugar efficiently due to a malfunction in the pancreas. This leads to higher glucose levels within an individual's body which leads to higher blood glucose (Durham Neighborhood Compass, 2020). Type 2 DM can lead to further comorbidities and chronic conditions which include but are not limited to neuropathy, cardiovascular disease, and kidney issues. Diabetes mellitus type 2 affects more than 130 million people in the United States (US Department of Health and Human Services [USDHHS], 2022). The rate of type 2 diabetes doubled over the last 20 years in America as weight and age increase and is the seventh leading cause of death in the United States (Centers for Disease Control [CDC], 2022). Medical costs and lost work/wages for diabetics combined are over $300 million yearly (CDC, 2022).

In a small town in western NC, type 2 diabetes is in the top eight leading causes of death, weighing in at 35.3 deaths per 100,000 (Frye Regional Medical Center, n.d.). These numbers are significantly more than the average of 26.9 deaths per 100,000 in North Carolina or 24.8 deaths per 100,00 in the country (Frye Regional Medical Center, n.d.). Type 2 diabetes is a chronic condition that can have detrimental effects on someone's health if not managed properly. Some people affected by type 2 diabetes

achieve glycemic control with lifestyle modifications, while others need medications to help achieve this.

### Problem Statement

Will providing an educational session to individuals within a rural western North Carolina community on diabetes mellitus type 2, dieting, and lifestyle modifications increase knowledge and awareness of the disease?

## Literature Review

### Lifestyle, Diet, and Exercise

Hashim and Mustafa (2021) completed a cross-sectional questionnaire study that pertained to researching what effect lifestyle factors such as diet and exercise had on diabetes. The tool used to help determine the effectiveness of said changes was The Diabetes Score questionnaire which was used in a clinical setting (Hashim & Mustafa, 2021). Sixty participants with type 2 diabetes were interviewed using the provided questionnaire. A higher diabetes score correlated with better glycemic control, which indicated a positive change after implementing lifestyle changes such as better nutrition and exercise (Hashim & Mustafa, 2021).

Copeland et al. (2023) completed a study after implementing an 8-hour diabetes education program pertaining to glucose control and weight. Topics covered during this session included behavioral changes, physical activity, and a well-balanced diet. This study provided participants with a better understanding of the pathophysiology of chronic illness, medications, and the importance of a modified diet, exercise regimen, and spiritual well-being (Copeland et al., 2023).

Katangwe et al. (2019) completed a systematic review to examine the effect of comprehensive lifestyle modifications on patients newly diagnosed with type 2 diabetes in order to determine which may have the most beneficial outcome. This review consisted of seven studies in which healthcare professionals proposed modifications such as education, exercise, and altering diet. Results divulged that education and dietary changes effectively controlled blood sugar without the use of medications (Katangwe et al., 2019).

García-Molina et al. (2019) completed a search of databases and randomized controlled trials that included dietary modifications as a way of managing type 2 diabetes. This study aimed to find ways to improve clinical outcomes of diabetes and how these methods were successful. Results concluded individualized and group-based training, hemoglobin A1C levels, as well as physical weight, were lower after implementation of lifestyle changes.

**Education Tools**

Akiboye et al. (2020) implemented and researched the impact a Diabetes Inpatient Care and Education (DICE) program had on managing inpatient type 2 diabetes, preventing, and reducing mortality and readmission to the hospital. The program's research included an enhanced diabetes team and novel training for doctors regarding diabetes. It was noted that implementing patient-centered care and education on diabetes decreased hospital stays and mortality rates associated with type 2 diabetes (Akiboye et al., 2019).

Olesen et al. (2020) aimed at researching the effectiveness of person-centered diabetes self-management education which targeted type 2 diabetics. This study included a review of 22 publications, which found people who were educated and more engaged in

self-management had a better chance of initiating and sustaining changes and behaviors needed to manage their diabetes outside the clinical setting (Olesen et al., 2020). Patients who are engaged in their care reported better clinical outcomes, a higher quality of life, and healthier behaviors.

**Patient-Centered Education**

Andersson et al. (2019) aimed their sights on examining if group education would be beneficial for people with type 2 diabetes in a primary care setting with the use of a didactic model and its four principles. Focused group interviews and reflection notes were the main source of information which was analyzed by interviewers. Researchers found it is important to create a trusting relationship with patients and provide safety, and support by using a tactful and open approach (Andersson et al., 2019). Andersson et al. (2019) concluded future research is not only needed but extremely beneficial in understanding those with diabetes and their lifetime. Huang et al. (2020) found individualized education may improve the clinical outcome of patients with type 2 diabetes. Efficacy was measured in each patient by evaluating blood pressure, waist circumference, body mass index, lipids, as well as fasting blood glucose (Huang et al., 2020).

Hailu et al. (2019) completed a study on the effectiveness of diabetes self-management education (DSME) in patients with type 2 diabetes. The education provided included knowledge about diabetes by way of illustrations and fliers, along with self-care behaviors such as dieting, exercise, and foot checks. Conclusions of this study showed significant improvements in participants' knowledge of diabetes, increased adherence to recommendations, and self-efficacy (Hailu et al., 2019).

### Importance of In-House Diabetes Educator

Vitale et al. (2020) evaluated the impact of having onsite diabetes educators and teams within primary care. Results supported the role of a diabetes educator and a dietitian in primary care settings by evidence of increased adherence to diabetes guidelines and recommendations. These recommendations include dietary and lifestyle changes, and routine visits with foot checks for ulcerations or sores (Vitale et al., 2020).

## Needs Assessment

### Targeted Population

The targeted population for this project included a convenience sample of individuals within the target population. The population included men and women over the age of 18. Individuals must be able to provide consent for project participation.

### Available Resources

Available resources for this project included a local church. The church was equipped with a conference room. Within the conference room, there were projectors to allow the project leader to share the educational presentation.

### Team Selection

The DNP project team consisted of the DNP project leader, DNP project chair, and pastor of the church of the project implementation site. The DNP project leader is a registered nurse (RN) enrolled in a doctoral program. The DNP project chair is a doctorate-prepared nurse practitioner and professor. The practice partner is the pastor of the site of implementation, who has a master's degree in divinity.

### Desired and Expected Outcomes

The desired outcome was to increase awareness and knowledge among those within the target community on lifestyle modifications to help control type 2 diabetes. The expected outcome was an increase in knowledge that was reflected in the results of the pre- and post-implementation survey.

### Scope of Project

Research revealed the target community had a higher level of individuals with type 2 diabetes than the national average. An educational session was developed by the project leader, which included a pre-intervention and post-intervention survey. The patient-centered lifestyle education was provided to the target population in order to bring awareness on other ways to control high blood sugars besides medication(s).

## Objectives

The objectives of this project were:

- Participants will have increased knowledge and awareness of type 2 diabetes.
- Participants will have increased awareness of the importance of lifestyle modifications in controlling type 2 diabetes.
- Participants will have increased knowledge of the importance of lifestyle modifications in controlling type 2 diabetes.

## Theoretical Framework Nursing Theory

Utilizing nursing theories as a support and guide to a project is vital. Nursing theories supported the framework and provided guidance for achieving optimal results for this project. The theory which best supported the foundation and goals of this project was Watson's theory of human caring.

Watson's theory of human caring comprises 10 caritive factors which include but are not limited to faith-hope, help-trusting relationships, creative problem-solving, and supportive environment (Zaccagnini & Pechacek, 2021). Two of Watson's major concepts she hoped to achieve through her theory of human caring are the intentional attempt to connect with another person through caring and utilizing caring-healing modalities, which include intentional actions, words, behaviors, and communication (Zaccagnini & Pechacek, 2021). Watson's theory supported the purpose of this project which was to connect with the target population and provide vital education. The project leader created meaningful relationships with each participant during the educational sessions by applying caring speech, intentional actions, words, and behaviors in encounters with participants. The caring behaviors shown by the project leader positively affected a participant's perceived health status by creating rapport and a supportive, trusting relationship with project participants. Watson's theory of human caring provided a framework for the project leader to follow and implement in order to promote a caring environment and relationship with those in a local community affected by type 2 DM.

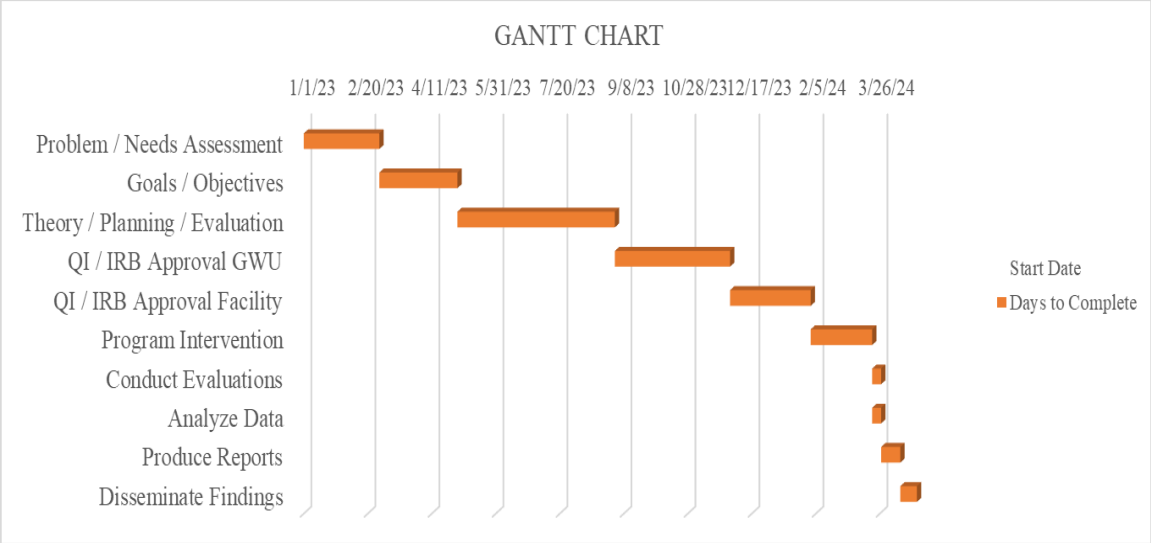
## Working Plan

### GANTT Chart

A Gantt chart (Figure 1) was used for this project.

**Figure 1**

*Gantt Chart*




## Cost-Benefit Analysis

This cost-benefit analysis (Table 1) displays the fixed and variable costs of this project, as well as the projected revenue after the implementation of this project. The fixed cost included the cost of the handout supplies printed for the participants. Potential revenue was calculated using the ranges of prices on common medications and supplies for the management of type 2 diabetes from the most recent data.

**Table 1**

*Costs and Benefits*

| Item | Cost per Unit | Projected Units | Total ($) |
|---|---|---|---|
| | *Fixed Costs* | | |
| Handout supplies (printer paper and ink) | $40 | 1 | $40 |
| | *Variable Costs* | | |
| Glucose monitoring Kit | $20-$50 (*Walmart*, 2023). | 1 | $20-$50 |

| Item | Cost per Unit | Projected Units | Total ($) |
|---|---|---|---|
| Insulin | $35-$190 per vial (GoodRx, 2023a). | 1 | $35-$190 |
| Insulin Syringes | $20 per pack of 100 (GoodRx, 2023a) | 1 | $20 |
| Oral Anti-diabetics (Glucophage / Metformin) | $4 (GoodRx, 2023b). | 1 | $4 |
| | *Benefits* | | |
| Yearly diabetes financial burden (per person) | $16,000+ (ADA, 2018) | 1 | $16,000+ |
| Hospitalizations (relating to complications from diabetes) | $60,000 (ADA, 2022). | 1 | $60,000 |
| Rehab / Nursing Facility | $60,000 (ADA, 2022). | 1 | $60,000 |
| *Potential Revenue* | | | $135,696 -$135,881 |

According to the American Diabetes Association (ADA), the average hospital stay related to or directly caused by type 2 diabetes in 2022 was around $60,000 (ADA, 2022). There is the potential after a hospital stay for the need of a rehabilitation or nursing facility, which can also hover around $60,000 per stay (ADA, 2022). In 2018 the ADA reported the yearly financial burden from type 2 diabetes and its complications was over $16,000, which did not include hospital bills (ADA, 2018).

## Evaluation Plan

The outcome of this project was to obtain quantitative data from participants to determine the efficacy of the educational session on diabetes. Each response was

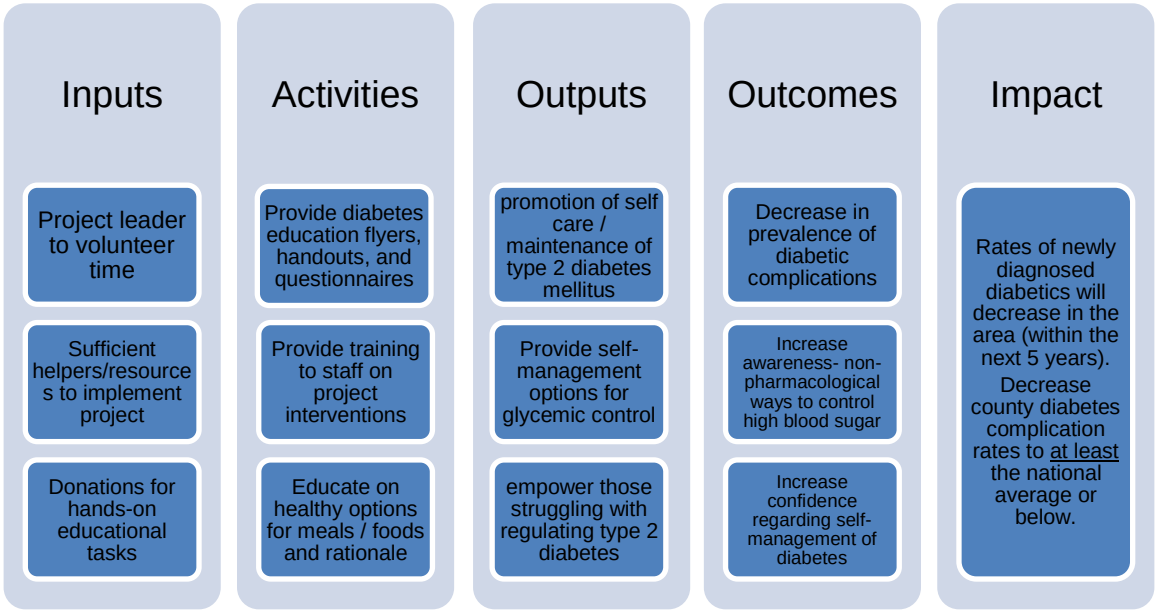
analyzed and put together for dissemination. Data collection included a pre-and post-session survey which was used to determine each participant's knowledge and confidence in non-pharmacological and lifestyle modifications to control high blood sugar before and after the educational session. The pre-and post-survey consisted of five questions developed by the project leader.

**Logic Model**

A logic model (Figure 2) was used in this project.

**Figure 2**

*Logic Model*




**Threats and Barriers**

Threats and barriers are key factors in implementing and evaluating the success of a project. Threats and barriers identified for this project included scheduling conflicts for attendees. Technology mishaps were a possible threat to not being able to display the PowerPoint presentation for participants. A barrier to this project was the inability to check the blood glucose of the participants.

### Monitoring of Implementation

The project leader was in communication with the practice partner and project chair leading up to project implementation. Advertising for the educational session was completed within the community. A one-time educational session was implemented. The surveys were created by the project leader and approved by the project chair. The project leader oversaw the project's progression, implementation, and closure.

### Project Closure

Upon project closure, participants were given time to ask questions. Participants were asked to complete the post-intervention survey. Following the closure of the project, the project leader gathered all data for analysis. The pre-and post-intervention surveys of each question were evaluated to determine if participants had increased knowledge and awareness of type 2 diabetes.

## Interpretation of Data

### Project Outcomes

Quantitative data was collected for this project via pre- and post-session surveys, which were constructed by the project leader and the project chair. A total of 25 participants completed the educational session and all 25 completed both the pre- and post-session surveys. The survey consisted of five multiple-choice questions:

- Question one: Diabetes can lead to what other health problems? Select all that apply.
- Question two: Diabetes is responsible for ____ deaths per 100,000 individuals nationally each year.

- Question three: Type 2 diabetes is caused from the body not producing any insulin?
- Question four: Which of the following is a risk factor for developing type 2 diabetes? Select all that apply.
- Question five: A large apple juice has more grams of sugar than a serving of orange juice?

The surveys were used to determine the effectiveness of the education brought forth by the project leader. Each question and its corresponding answer(s) were analyzed (Table 2). Overall, an increase in knowledge and awareness was noted by participants after receiving the educational session on diabetes.

**Table 2**

*Survey Results*

| Question # | Pre-Session Survey % Correct | Post-Session Survey % Correct |
|---|---|---|
| Question 1 | 18% | 100% |
| Question 2 | 27% | 100% |
| Question 3 | 27% | 91% |
| Question 4 | 36% | 91% |
| Question 5 | 9% | 100% |

The outcomes of this project included increasing a small rural community's knowledge and awareness of diabetes, what this disease is, and how to best manage it with lifestyle and other non-medication options. When analyzing the quantitative data received and averaging pre- and post-session survey percentages, which represent the

knowledge growth of participants throughout the session, there was an increase from 23.4% representing pre-session knowledge of participants to 96.4% overall understanding and knowledge post-educational session implementation. One hundred percent of participants voiced this educational session was beneficial and helped increase their knowledge regarding the overall impact diabetes has on their community, as well as non-pharmacological interventions on how to manage diabetes and blood sugars with diet and exercise.

## Implications for Practice

The impact of this project was represented by the calculable increase (in percentage) of knowledge available and educating a small rural community on type 2 diabetes, where the county average for diabetes complications and death rates are higher than the state and national average. The total impact was represented by an overall 73% increase in knowledge and awareness regarding what type 2 diabetes is, risk factors, and associated complications, as well as how to control blood sugar without medication(s). Additional communities would benefit from diabetes education as diabetes affects millions of individuals within the United States.

### Project Sustainability

This project will be sustained by those who attended the educational session and project implementation. The knowledge gained by participants from this educational session will be passed along from community members to community members. It can further be sustained by the project leader working with the community leader to continue to provide educational sessions within the target community.

## Conclusion

Diabetes is a chronic condition affecting many individuals. Education on increasing one's knowledge of diabetes as well as the importance of lifestyle modifications was provided to the target community. Positive outcomes were noted with an increase in knowledge and awareness as evidenced by the survey results. Overall, the education was beneficial in increasing awareness and knowledge of type 2 diabetes. Continual education is key to helping bring awareness to diabetes and lifestyle modifications to have a positive impact on the community.

## References

Akiboye, F., Adderley, N. J., Martin, J., Gokhale, K., Rudge, G. M., Marshall, T. P., Rajendran, R., Nirantharakumar, K., & Rayman, G. (2020, February). Impact of the diabetes inpatient care and education (DICE) project on length of stay and mortality. *Diabetic Medicine: A Journal of the British Diabetic Association*, *37*(2). https://pubmed.ncbi.nlm.nih.gov/31265148/

American Diabetes Association (ADA). (2018, March 22). *Economic costs of diabetes in the U.S. in 2017*. https://diabetesjournals.org/care/article/41/5/917/36518/Economic-Costs-of-Diabetes-in-the-U-S-in-2017

American Diabetes Association (ADA). (2022). *The costs of hospitalization for people with diabetes*. https://diabetes.org/advocacy/costs-hospitalization-people-diabetes#:~:text=The%20Journal%20of%20the%20American,over%20the%20following%20hree%20years

Andersson, S., Berglund, M., Vestman, C., & Kjellsdotter, A. (2019). Experiences of specially trained personnel of group education for patients with type 2 diabetes- A lifeworld approach. *Nurse Open*, *6*(2), 635-641. https://doi.org/1002/nop2.248

Centers for Disease Control and Prevention (CDC). (2023, April 4). *Diabetes quick facts.* https://www.cdc.gov/diabetes/basics/quick-facts.html#:~:text=More%20than%2037%20million%20people,(and%20may%20be%20underreported)

Copeland, M., Whitted, K., Renales, F., & Lennen, N. (2023). The impact of diabetic education on diabetes management. *Journal of Christian Nursing, 40*(1), 42-47. https://doi.org/10.1097/CNJ.0000000000001018

Durham Neighborhood Compass. (2020). *Diabetes (adult population), 2019.* https://compass.durhamnc.gov/en/compass/DIABETES_TOTAL/tract/

Frye Regional Medical Center. (n.d.). *Catawba County, NC community health needs assessment*.

García-Molina, L., Lewis-Mikhael, A.-M., Riquelme-Gallego, B., Cano-Ibáñez, N., Oliveras-López, M.-J., & Bueno-Cavanillas, A. (2019). Improving type 2 diabetes mellitus glycemic control through lifestyle modification implementing diet intervention: A systematic review and meta-analysis. *European Journal of Nutrition*, *59*(4), 1313–1328. https://doi.org/10.1007/s00394-019-02147-6

GoodRx. (2023a). *How much does insulin cost? Here's how 31 brands and Generics Compare*. GoodRx Health. https://www.goodrx.com/healthcare-access/research/how-much-does-insulin-cost-compare-brands

GoodRx. (2023b). *Type 2 diabetes: What you need to know*. GoodRx Health. https://www.goodrx.com/conditions/diabetes-type-2

Hailu, F. B., Moen, A., & Hjortdahl, P. (2019). Diabetes self-management education (DSME) - Effect on knowledge, self-care behavior, and self-efficacy among type 2 diabetes patients in Ethiopia: A controlled clinical trial. *Diabetes Metabolic Syndrome Obesity*, *29*(12), 2489-2499. https://doi.org/10.2147/DMSO.S223123

Hashim, M. J., & Mustafa, H. (2021, November 1). Directory of open access journals. *Dubai Diabetes and Endocrinology Journal*. https://doaj.org/article/48a94ac9689841d5b0b02413b6617333

Huang, L., Guo, H., Xiu, L., & Wang, H.. (2020). *Efficacy of individualized education in patients with type 2 diabetes mellitus: A randomized clinical study protocol.* Medicine (Baltimore). https://doi.org/10.1097/MD.0000000000023625

Katangwe, T., Bhattacharya, D., & Twigg, M. J. (2019). A systematic review exploring characteristics of lifestyle modification interventions in newly diagnosed type 2 diabetes for delivery in community pharmacy. *International Journal of Pharmacy Practice*, *27*(1), 3–16. https://doi.org/10.1111/ijpp.12512

Olesen, K., Folmann Hempler, N., Drejer, S., Valeur Baumgarten, S., & Stenov, V. (2020, June). Impact of patient-centred diabetes self-management education targeting people with type 2 diabetes: An integrative review. *Diabetic Medicine: A Journal of the British Diabetic Association, 37*(6), 909-923. https://pubmed.ncbi.nlm.nih.gov/32124483/

US Department of Health and Human Services (USDHHS). (2022). *National DPP customer service center*. Retrieved September 27, 2022, https://nationaldppcsc.cdc.gov/s/article/CDC-National-Diabetes-Statistics-Report

Vitale, M., Xu, C., Lou, W., Horodezny, S., Dorado, L., Sidani, S., Shah, B. R., & Gucciardi, E. (2020, February). Impact of diabetes education teams in primary care on processes of care indicators. *Primary Care Diabetes, 14*(2), 111-118. https://pubmed.ncbi.nlm.nih.gov/31296470/

Walmart.com. (2023). *Lancets and strips*. https://www.walmart.com/c/kp/lancets-and-strips

Zaccagnini, M. E., & Pechacek, J. M. (2021). *The Doctor of Nursing practice essentials: A new model for advanced practice nursing* (4th ed.). Jones & Bartlett Learning.