Decreasing Surgical Complications in Diabetic Patients

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Decreasing Surgical Complications in Diabetic Patients

Bandana Mahato

University of San Francisco, School of Nursing

Nurs-749A-F1: NP Qualifying Project: Manuscript Development

Professor Ricky Norwood

December 03, 2023
Executive Summary

Objective: The objective of this manuscript is to determine if controlling diabetes prior to undergoing low back surgery could decrease complications and disability.

Contexts: Despite the overwhelming information on the complications of uncontrolled diabetes, patients continue to have elevated HgA1C before having surgery. Furthermore, there are a plethora of data showing uncontrolled diabetic patients will have higher complication after surgery, yet patients continue to have elective surgery despite having unchecked diabetes. There are no clear guidelines for primary care providers or surgeons on when they should allow patients to have elective surgery. Therefore, it is vital that HgA1c needs to be assessed by primary care providers as a routine part of the medical clearance process.

Intervention: An educational program consisting of pamphlets, videos, and PowerPoint will be directed to primary care physicians and family nurse practitioners to educate them on surgical complications of uncontrolled diabetes. Second, the importance of utilizing HgA1c < 7 as part of medical clearance should be implemented.

Outcomes: The tool to measure outcomes to be measured will be a post-education survey to be completed by PCPs and FNPs. In addition, the Oswestry low back pain disability questionnaire will be given to PCPs and FNPs to ascertain what percentage of their patient had complications after implementing the new medical clearance guidelines. After implementing the new education program and the requirement of having HgA1C < 7, there are expected to be 20% fewer infections and complications.
DECREASING COMPLICATIONS IN DIABETIC PATIENTS

Introduction

National health expenditure in the United States is one of the highest worldwide, representing 19.7% of the U.S. gross domestic product in 2020 (Wiley et al., 2020). To curb high healthcare costs, Medicare and Medicaid services encourage healthcare providers to take appropriate measures to reduce 30-to-90-day readmission of patients discharged from hospitals. In 2004, more than 50% of patients who had undergone elective surgical procedures were readmitted or deceased, which cost Medicare an estimated $17.4 billion, and of which 90% of these visits were avoidable (Wiley et al., 2020). In 2010, the Centers for Medicare and Medicaid Services (CMS) began penalizing hospitals for any unplanned readmissions within 30 days of discharge. Reducing readmissions is a high priority for healthcare providers, as it is both an opportunity to reduce healthcare costs and improve the quality of care.

Diabetes management has been overseen by American Association of Clinical Endocrinology who has published updated guidelines every year. Current guidelines by American Association of Clinical Endocrinology Clinical Practice Guideline of 2022 have many recommendations on management of Diabetes. Current practice guidelines clearly state multiple treatment method from lifestyle changes to use of various pharmacological medication for treatment goal of HgA1c of less than 8 (Blonde et al., 2022). Despite volume of information which states tight glucose reducing the risk of macrovascular and microvascular complication the treatment target is not being met. Bryant et al., performed a retrospective study in outpatient clinic on diabetic patients and determined that 13% of type 1 and 30% of type 2 diabetes patients had HgA1c > 8 (Bryant et al., 2006). There are many causes for hyperglycemia even in modern days, however the main cause appears to be patient non-compliance. Patient commonly do not take enough insulin, injecting the wrong insulin or expired insulin, an issue with the injection or
deliberate noncompliance with medication are common cause of hyperglycemia. Another cause of hyperglycemia appears to be cultural as well. Venkatraman et al., performed a retrospective study from 1988 to 2020 which showed that Mexican American adults were less likely than non-Hispanic white adult to achieve glycemic control (Venkatraman et al., 2022). Therefore, in modern days education appears to still be lacking in certain groups of patients and primary care provider. Despite adequate there will always be group of patients that will be non-compliant with medication and recommendation from primary care provider. It is impossible to mandate patient to be compliant with medication and lifestyle. In many ways patients’ behavior is self-harming. As a primary care provider there are avenues that we can use to prevent further self-harm. We know that patients that have surgery with HgA1c > 8 will have higher complication rate. Consequently, this is one avenue where we can prevent patients from having elective surgery. Therefore, measuring HgA1c prior to surgery and making sure that patient understand that until their HgA1c is < 8, they cannot be medically cleared for surgery. This strict guideline does not exist. The guidelines for medical clearance prior to surgery is overseen by American Society of Anesthesiologist Task Force. Current guidelines published for primary care provider to medically clear patient for surgery have many parameters to be checked such as EKG, Cardiac markers if it indicated, chest radiography, pulmonary test if it indicated, Hemoglobin/ hematocrit level, coagulation studies, serum chemistries, urine testing, and pregnancy testing. However, there is no guidelines to check HgA1c level and to make sure that level is less than 8 should also be part of guidelines prior to medically clear patient for surgery.
**PICOT Question**

The PICOT question for the literature review was: For adult patients, how effective is controlling diabetes before undergoing low back surgery compared to patients whose diabetes is not controlled in reducing 90-day post-operative readmission rates? The main component that has been identified in patients who were discharged after low back surgery is wound infections. Diabetes has been well established to predict postoperative wound infections (Sharp & Clark, 2011).

**Search Methodology**

A systematic search of PubMed was performed using the keywords “diabetes,” “spinal surgery,” “complications,” and “disability.” The yield of 27 studies was narrowed to eight studies after excluding studies published before 2005, in languages other than English, or lacking direct comparisons of diabetic vs. non-diabetic or controlled diabetic. The eight studies were appraised for level and quality of evidence using the Johns Hopkins nursing evidence-based practice appraisal tools (Dearholt et al., 2012). See Appendix A for the Evidence Evaluation Table.

**Summary of Evidence**

Except for one study (Cho et al., 2012), the studies reviewed indicated higher complication rates in diabetes patients undergoing lumbar fusions than for non-diabetic patients. Several studies showed a higher rate of infection for diabetic than non-diabetic patients (Guzman et al., 2014), including pneumonia (Browne et al., 2007) and urinary tract infection (Phan et al., 2016).

Guzman et al. (2007) published a Level II C study that pooled data from many studies into a review. In this study, controlled diabetic and uncontrolled diabetic patients were compared
and evaluated in terms of complications. Uncontrolled diabetic patients had higher levels of pulmonary embolism, infections, longer hospital stays, and higher hospital mortality (Guzman et al., 2014). Browne et al. (2007) also published a Level II B review article that pooled data from many studies. The authors compared 11,000 diabetic patients and 186,461 nondiabetic patients and their complication rates. They determined that uncontrolled diabetic patients had higher rates of pneumonia and mortality in the hospital compared to non diabetic patients (Browne et al., 2007). Phan et al. (2016) performed a retrospective study comparing 260 diabetic patients and 171 nondiabetic patients. This Level III B study showed that diabetic patients had a higher incidence of urinary tract infection, reoperations, readmissions, and longer hospital stays compared to non-diabetic patients. Walid et al. (2010) performed a Level IIIB retrospective comparing diabetic and non-diabetic patients. In this study, diabetic patients had longer hospital stays than non-diabetic patients. Freedman et al. (2011) performed a Level III C retrospective study that compared 199 diabetic patients to 2206 nondiabetic patients. The authors found diabetic patients to have poorer outcomes than non-diabetic patients (Freedman et al., 2011).

Only the study by Cho et al. (2012) found no differences in complications in diabetic and nondiabetic patients. In this study, Cho et al. (2012) compared 23 diabetic patients to 23 nondiabetic patients.

**Rationale**

The conceptual framework guiding this project will be Health Promotion Model designed by Nola J. Pender (Marriner & Raile, 2005). The Health Promotion Model directs factors that motivate individuals to engage in health-promoting behaviors. This model encourages an active role that an individual can initiate and maintain for health-promoting behavior. There are three categories of health-promoting behavior: individual characteristics and experiences; behavior-
specific cognitions and affect; and behavioral outcomes (Marriner & Raile, 2005). This model also describes eight behavior-specific beliefs: perceived benefits of action, perceived barriers to activity, perceived self-efficacy, activity-related affect, interpersonal influences, situational influences, commitment to planning or action, and immediate competing demands and preferences (Marriner & Raile, 2005). Applying the Health Promotion Model to this project will encourage patients to actively participate in their health care to control their diabetes before having low back surgery.

Specific Aim(s)

The primary purpose of this project is to create an education program called *Decreasing Surgical Complication in Diabetes* that addresses the importance of having controlled diabetes before undergoing low back surgery. The aim is to reduce disability by decreasing the infection rate for diabetic patients who undergo low back surgery by 20% by May of 2024. This anticipated outcome will be achieved by providing family nurse practitioners (FNPs) and primary care physicians (PCPs) a four-part education program consisting of videos and pamphlets. In the first part of the education program, research articles that show complications rates in uncontrolled diabetic patients undergoing low back surgery will be used to develop the case for controlling diabetes prior to back surgery. The second part will present the pathophysiology of how patients with uncontrolled diabetes are at higher risk for complications after low back surgery. The third part will use guidelines from the American Diabetic Association to explain the importance of having a multidisciplinary approach to help diabetes patients control their blood sugar levels. Finally, the educational intervention will highlight the importance of PCPs and FNPs measuring Hg A1C and ensuring a HgA1c level of less than seven (HgA1c < 7) before medically clearing the patient to undergo low back surgery. The project
goals are to improve outcomes by decreasing readmission rates, decreasing the lengths of hospital stays, and decreasing post-operative infections.

Methods

Context

The main stakeholders in this project will be diabetic patients who undergo back surgery. From evidence in the literature, it is anticipated that implementing the multi-disciplinary educational intervention will decrease the complication rate in diabetic patients after low back surgery. A healthcare facility is another stakeholder. When patients have lower complication rates, hospital stays will be shorter, readmissions reduced, and the need for additional treatment within a healthcare facility will decrease. Healthcare professionals will also be essential stakeholders as they play an integral role in project implementation as the point of contact with patients. Other stakeholders will be insurance companies, as the cost of a diabetic patient undergoing low back surgery will potentially decrease.

Proposed Interventions

Sutter Medical Foundation has an extensive network of PCPs and FNPs that refer and medically clear patients who may need low back surgery to the Department of Neurosurgery. The education program will be directed to these practitioners and distributed to the family practice clinics where they work. The videos and pamphlets that make up the educational content will provide the educational foundation for reducing surgical complications. The educational videos will also have a multidisciplinary approach, addressing physicians, nurses, dieticians, psychologists, and social workers. A video will provide instructions on how nurses can use
PowerPoint and handouts to educate patients on the importance of having diabetes controlled before low back surgery. Many of the studies included in the review of literature for this project will be used as evidence to illustrate the importance of having controlled diabetes. The content will also stress the importance of having a dietician educate patients on nutrition and carbohydrate awareness, to have a social worker intervene with patients and their insurance provider to access available techniques to monitor and deliver medication, and for diabetic patients to have access to trained clinical and health psychologists. Finally, content will be included to encourage the PCP or FNP implement HgA1c < 7 screening as part of their medical clearance protocol.

**Gap Analysis**

It is well established in the literature that PCPs and FNPs recognize the long-term effects of diabetes, including damage to large and small blood vessels, heart attack, stroke, kidney problems, eyes, feet, and nerves (Clark et al., 2000). Given that PCPs and FNPs do not perform surgery, they have limited knowledge of factors such as uncontrolled diabetes that can contribute to surgical complications. Due to this lack of knowledge, there is a significant gap in protocols and practices for medical clearance of patients to undergo low back surgery. It is standard practice for the patient to have medical clearance from a PCN or FNP before undergoing elective low back surgery. The medical clearance that the PCP or FNP performs does not require the patient to have HgA1C < 7. Given the surgical complication rate of uncontrolled diabetes, HgA1C assessment should be part of medical clearance. The identified gap is the PCP or FNP failing to identify uncontrolled diabetes and control diabetes before giving medical clearance for surgery. This gap is attributed to a lack of knowledge by providers on the complications of
unchecked diabetes for patients who will undergo low back surgery. See Appendix B for the Gap Analysis.

**SWOT Analysis**

SWOT Analysis is one assessment tool used in this DNP project. The SWOT analysis has two internal factors, the strengths and weaknesses, and two external factors, the opportunities, and threats. This project has three strengths. The primary strength of this project is that a reduction in the complication rate of diabetic patients undergoing low back surgery over time is anticipated as an outcome. The second strength is that there may be a decrease in the readmission rate in a health care facility. Finally, the third strength of this project is that it may improve the quality of care and functional outcome for the patients.

There are some weaknesses to this project. The main weakness of this project is the delivery of the education program, *Decreasing Surgical Complication in Diabetes*, which will be by videos and pamphlets. Some health care providers may learn better through a different delivery method, such as classroom teaching or face-to-face training. Another weakness of this project is that health care providers are already overwhelmed with the number of patient visits. Participation in the educational intervention will add to their workload, and thus may be met with resistance.

As an opportunity, Sutter Health is a health care network that can support expanding this project from a small test of change to implementation at other Sutter Health facilities. The number one threat to the project is the potential for pushback as the medical provider may choose not to participate in the education program or choose not to accept required HgA1c <7 as part of medical clearance guidelines. See Appendix C for the SWOT Analysis.

**Work Breakdown Structure**
A Work Breakdown Structure (WBS) was created for this project. The project is divided into five different classification sections and subcategories. The first component is Initiation, which includes performing a literature review of the complication rate of diabetes compared to non-diabetes. Other tasks, such as the SWOT analysis, stakeholder identification, and defining the aim, goal, and objectives of this project are included in this phase. The second phase is Planning, which consists of creating an education program in videos and pamphlets. The third section is Execution, which involves coordinating with Sutter Clinic to disseminate the education videos and pamphlets to PCPs and FNPs. The post-education survey will be administered to Sutter Clinic project participants in this phase. The next section is Analysis, where data will be collected on the effectiveness of the educational intervention. Data will also be collected on whether PCPs and FNPs intend to adopt adding HgA1c as part of their medical clearance. Statistical analysis of the data will also be performed in this phase. Finally, the last phase is Closeout, where a conclusion will be drawn from this project and key findings reported to stakeholders. The stakeholders most likely to benefit from the project would be the patients, health care providers, and healthcare facility. See Appendix D for the Work Breakdown Structure.

Budget

There are approximately 12 Sutter Health Foundation family practice clinics. The education is approximately two hours at each facility, equating to approximately 24 hours. A nurse is paid $100 per hour, which equates to $2,400. The cost of ordering HgA1c is $28. The data analysis to see if the project was successful will cost approximately $1,300. The cost of creating educational material is approximately $1,230. The total cost of this project is approximately $4,900 (Appendix E).
GANTT Chart

To ensure project completion in a reasonable time, a GANTT chart was created. The first part of the project is the administration phase which will take approximately three months. It will entail contacting the stakeholder, creating education videos and pamphlets, and creating surveys. The second phase is implementing the project, which is to coordinate with the various clinics to disperse the video and surveys, which will most likely take another three months. The surveys will be analyzed, which will bring additional three months. The fourth phase will be analyzing the data, which entails statistically analyzing the data and reporting the data to the stakeholders. The final phase will be concluding the project by writing the manuscript. The proposed time that this project will be achieved in approximately one year. See Appendix F for the GANTT Chart.

Communication Plan/Matrix

A comprehensive communication matrix was created to facilitate timely communication between team members. See Appendix G for the Communication Plan/Matrix.

Proposed Outcome Measures

The Project will be conducted at Sutter Memorial Medical Center (SMMC) clinics. The intervention will be implemented in an outpatient clinic. To ensure data is collected promptly, various roles will be delegated to team members using the Responsible, Accountable, Consulted, Informed (RACI) data collection structure. See Appendix H for the RACI Matrix. The tool to measure outcomes to be measured will be a post-education survey to be completed by PCPs and FNPs. In addition, the Oswestry low back pain disability questionnaire will be given to PCPs and FNPs to ascertain what percentage of their patient had complications after implementing the new medical clearance guidelines. After the implementation of the new education program and the
requirement of having HgA1C < 7, it is expected that there will be 20% fewer infections and complications.

**Proposed Analysis**

Three tools will be used to analyze the project outcomes. The primary data will be from the post-education survey (Appendix I). This data will provide insight into the effectiveness the education program. The survey will also provide insight into the number of PCP or FNPs who intend to comply with new medical clearance guidelines. The Oswestry low back pain disability questionnaire is the second tool. This questionnaire comprises ten sections with various categories that the patient fills after surgery. The questionnaire is scored and is reported as a percentage: 1-20% minimal disability, 21-40% moderate disability, 41-60% severe disability, 61-80% crippled, 81-100% bed bound. The third tool used will be SPSS, a software package for statistical analysis of the data.

**Cost Benefit Analysis**

This project has a significant cost-benefit analysis (CBA), where the proposed intervention will significantly reduce the surgery cost. Hikata et al. showed that patients with HgA1c < 7 had a surgical site infection of 0.0%, while patients with HgA1c > 7.0 had a surgical site infection of 35.3% (Hikata et al., 2013). Approximately a third of patients that have uncontrolled diabetes will have an infection. Furthermore, the total surgery cost for a patient that does not have an infection is approximately $58,610, and for a patient that has an infection can be approximately $109,728 (Appendix J). Therefore, each infected patient can have an increased cost of $51,118. Consequently, preventing a single infection can dramatically reduce costs and benefit significantly. The cost benefit ratio for this project will be 10.43

**Ethical Considerations**
The American Nurse Association (ANA) Nursing Code of Ethics guides nurses to carry out responsibilities consistent with the quality of nursing care and the profession's ethical obligation (ANA, 2015). The main principle of ethics applied to this project is nonmaleficence. The principle of nonmaleficence is to select interventions and care that will cause the least harm to achieve a beneficial outcome. By choosing only patients that have their Diabetes controlled to perform low back surgery minimize unexpected harm that you may do to the patients. This project also follows one of the Jesuit values which is cura personalis, which means to take care of entire person and caring for the individual needs (Casalini, 2021)

Limitations

A limitation of this study is that the data obtained will be skewed due to the uniqueness of the population and setting for the test of change, and thus not be generalizable to other settings and populations. Another possible limitation is the potential for lack of cooperation from PCPs and FNPs to engage in the project implementation and adopt the proposed clearance protocol, thus making any data derived from the study inconclusive.

Conclusion

The outcome of this project will be important for patients and healthcare providers in both the short and long term. In the short time, it is anticipated that patients with low back surgery who have their diabetes controlled will have relatively minor complications, fewer infections, and lower readmission rates. Such outcomes would be consistent with the published research. Since these patients will have lower readmission rates, there will be less need for additional services or post-operative procedures. The long-term effect of this project is that controlled diabetic patients will have more active and longer lives.
References


DECREASING COMPLICATIONS IN DIABETIC PATIENTS

Health Administration, and American Association of Clinical Endocrinologists. *Clinical Therapeutics*, 22(8), 899-910.


World Health Organization.

## Appendix A

### Evidence Evaluation Table

<table>
<thead>
<tr>
<th>Author &amp; Date</th>
<th>Evidence Type</th>
<th>Sample, Sample Size &amp; Setting</th>
<th>Study finding that help answer the EBP Question</th>
<th>Limitations</th>
<th>Evidence Level &amp; Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phan et al., 2016</td>
<td>Retrospective Study</td>
<td>260 DM / 171 non DM</td>
<td>DM had increased UTI, Reoperations, readmission, hospital stay compared to non-DM</td>
<td>Stud is only limited to neck surgery</td>
<td>Level III B</td>
</tr>
<tr>
<td>Browne et al., 2007</td>
<td>Review</td>
<td>11,000 DM / 186,461 non DM</td>
<td>DM increased pneumonia and mortality in hospital</td>
<td>The data is pooled from a data base and therefore, the data is limited</td>
<td>Level II B</td>
</tr>
<tr>
<td>Walid et al., 2010</td>
<td>Retrospective Study</td>
<td>13.3% DM, 72.4% non DM, 14.3% unknown</td>
<td>DM had higher cost and length of stay</td>
<td>Patients in this study who had DM also had significant other medical conditions</td>
<td>Level III B</td>
</tr>
<tr>
<td>Freedman et al., 2011</td>
<td>Retrospective Study</td>
<td>199 DM, 2206 non DM</td>
<td>DM had poorer outcomes</td>
<td>There was no follow up on patients' glycemic control after surgery</td>
<td>Level III C</td>
</tr>
<tr>
<td>Cho et al., 2012</td>
<td>Retrospective Study</td>
<td>23 DM, 23 non DM</td>
<td>Same major and minor complications</td>
<td>Extremely small sample size</td>
<td>Level III C</td>
</tr>
<tr>
<td>Takahashi et al., 2013</td>
<td>Retrospective Study</td>
<td>41 DM, 124 non DM</td>
<td>Surgery not successful in 20% of DM vs 3% of non-DM</td>
<td>The patients are not matched, there are more non DM patients than DM patients</td>
<td>Level III C</td>
</tr>
<tr>
<td>Wikick et al., 2015</td>
<td>Review</td>
<td>285 million DM</td>
<td>Poorly controlled DM had negative impact on healing and had worst controlled than controlled DM</td>
<td>The study covers all orthopedic study and the data for spine surgery is very limited</td>
<td>Level IV B</td>
</tr>
<tr>
<td>Guzman et al., 2014</td>
<td>Review</td>
<td>Controlled DM vs uncontrolled DM</td>
<td>Uncontrolled DM had increased Pulmonary embolism, infection, hospital mortality and increased length of stay</td>
<td>The data is pooled from a data base and therefore, the data is limited</td>
<td>Level II C</td>
</tr>
</tbody>
</table>
### Appendix B

**Gap Analysis**

<table>
<thead>
<tr>
<th>Current State</th>
<th>Desired State</th>
<th>GAPS</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes can damage large and small blood vessels, heart attack, stroke, kidney problems, eyes, feet, and nerves</td>
<td>Diabetes also affects wound healing and therefore uncontrolled diabetes can lead to serious infection after surgery</td>
<td>There is lack of knowledge from Primary Care Provider and Family Nurse Practitioner regarding how much uncontrolled Diabetes can cause post op complications</td>
<td>Providing Education on post operative infection in uncontrolled Diabetes Patients.</td>
</tr>
<tr>
<td>Medical Clearance is performed by reviewing patients comorbidity, performing EKG, chest Xray, and obtaining basic labs. However it does not include HgA1C</td>
<td>The degree of Diabetes is controlled or not should also be evaluated</td>
<td>HgA1C is not routinely checked prior to providing medical clearance.</td>
<td>HgA1C should be routinely checked and should be part of Medical Clearance. Patients should only be cleared medically if HgA1C &lt; 7.</td>
</tr>
</tbody>
</table>
Appendix C

SWOT Analysis

<table>
<thead>
<tr>
<th>Favorable/Helpful</th>
<th>Unfavorable/Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td>• The project will decrease complication in diabetic patients</td>
<td>• The education program “Decreasing Surgical Complication in Diabetes” will be in a video and may not be the best method to learn by some Health Care provider</td>
</tr>
<tr>
<td>• There project would decrease the readmission rate in health care facility</td>
<td>• Health Care providers will have to restructure their medical clearance protocol which will demand more of their time</td>
</tr>
<tr>
<td>• The project will improve the quality of care and improve the functional outcome of the patients</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sutter is a health care network that is centralized and therefore it has the high opportunity of success of this project</td>
<td>• Medical provider may choose not to participate in the education program</td>
</tr>
<tr>
<td></td>
<td>• Medical provider may choose not to implement new guidelines in their medical clearance</td>
</tr>
</tbody>
</table>
## Appendix D

### Work Breakdown Structure

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
</table>
| Decrease complication after low back surgery. | 1.1 Initiation | 1.1.1 Literature Review of complications rate on diabetes vs nondiabetics  
1.1.2 SWOT Analysis of the Project  
1.1.3 Stakeholder Meeting  
1.1.4 Develop AIM/Goal/Objectives |
| 1.2 Planning | 1.2.1 Create an education video and pamphlet called “Decreasing Surgical Complication in Diabetes”  
1.2.2 Create post-education survey for the health care providers |
| 1.3 Execution | 1.3.1 Disperse the video and pamphlet to Sutter clinic  
1.3.2 Disperse post education surveys |
| 1.4 Analysis | 1.4.1 Collect and analyze data on complication after the protocol is established  
1.4.2 Perform statistical analysis of the data. |
| 1.5 Closeout | 1.5.1 Report statistics to stakeholders  
1.5.2 Discuss the conclusion and implement as appropriate |
### Appendix E

**Budget**

<table>
<thead>
<tr>
<th>Project Cost</th>
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<tr>
<td>Nurse Cost</td>
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<tr>
<td>Lab order</td>
<td>$28</td>
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<td>Data Analysis</td>
<td>1300</td>
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<td>Education Material</td>
<td>1230</td>
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<td><strong>Total</strong></td>
<td><strong>4900</strong></td>
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Appendix F

GANTT Chart

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<th>2022</th>
<th>2023</th>
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<td></td>
<td>Jun</td>
<td>July</td>
</tr>
<tr>
<td><strong>Administration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact all stakeholder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create education video</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create a pamphlet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create a budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create surveys</td>
<td></td>
<td></td>
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<tr>
<td><strong>Implementation</strong></td>
<td></td>
<td></td>
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<tr>
<td>Contact the PCP and FNP office</td>
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<td></td>
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<tr>
<td>Provide the education video, survey, and questionnaire</td>
<td></td>
<td></td>
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<tr>
<td><strong>Data Collection</strong></td>
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<tr>
<td>Collect all surveys</td>
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<tr>
<td>Collect the questionnaire</td>
<td></td>
<td></td>
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<tr>
<td><strong>Analysis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistically analyze the data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report the data to stakeholder</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Conclusion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First draft of the data</td>
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<td></td>
</tr>
<tr>
<td>Final Draft of manuscript</td>
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Appendix G

Communication Plan/Matrix

<table>
<thead>
<tr>
<th>Communication</th>
<th>Format</th>
<th>Frequency</th>
<th>Distribution</th>
</tr>
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<tbody>
<tr>
<td>Weekly Status update</td>
<td>Email</td>
<td>Once a Week</td>
<td>All project members</td>
</tr>
<tr>
<td>Follow-ups needed</td>
<td>Conference calls</td>
<td>Monday and Friday</td>
<td>All project members</td>
</tr>
<tr>
<td>Data Review</td>
<td>Conference calls</td>
<td>Monday</td>
<td>All project members</td>
</tr>
</tbody>
</table>
Appendix H

RACI for Data Collection

<table>
<thead>
<tr>
<th></th>
<th>Primary Investigator</th>
<th>Primary Team Member</th>
<th>Secondary Team Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect all the Survey and Questionaire</td>
<td>R / I</td>
<td>A</td>
<td>I / C</td>
</tr>
<tr>
<td>Analyze the Survey</td>
<td>R / I</td>
<td>A</td>
<td>I / C</td>
</tr>
<tr>
<td>Determine how many centers will implement the proposed medical Clearance</td>
<td>R / I</td>
<td>I / C</td>
<td>A</td>
</tr>
<tr>
<td>Determine the complication</td>
<td>R / I</td>
<td>I / C</td>
<td>A</td>
</tr>
</tbody>
</table>
Appendix I

Post-Surgery Survey from Primary Care

Post-Surgery Survey

Pre-surgery Hg A1C prior to clearing the patient for surgery?
   a. 5-6
   b. 6-7
   c. 7-8
   d. 8-9
   e. 9-10
   f. Above > 10

Length of hospital stay?
   a. 1-3 days
   b. 4-7 days
   c. 7-10 days
   d. Above > 10

Surgical site infection?
   a. Yes
   b. No

If patient has surgical site infection, How long was the patient on abx
   a. 6 weeks
   b. 12 weeks
   c. Greater than 12 weeks

Did the patient have additional Procedure performed
   a. Wound washout
   b. Removing hardware if hardware was placed in initial surgery
   c. Lumbar puncture to rule out infection

Additional Studies performed
   a. MRI
   b. CT
   c. Microbiology
   d. Labs

If patient was discharged, was the patient readmitted
   a. Yes
   b. NO

If patient was readmitted, how long was the hospital stay
   a. 1-3 days
   b. 4-7 days
   c. 7-10 days
   d. Above > 10

If patient was readmitted, were they in ICU
   a. Yes
   b. No

Did the patient have new neurologic deficit
   a. Yes
   b. No
### Appendix J
Cost to Benefit Analysis

<table>
<thead>
<tr>
<th>Cost in ($)</th>
<th>Patient without infection</th>
<th>Patient with infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of surgery</td>
<td>38,120</td>
<td>38,120</td>
</tr>
<tr>
<td>Each day of hospital stay</td>
<td>4,098</td>
<td>20,490</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>2,400</td>
<td>2,400</td>
</tr>
<tr>
<td>repeat Surgery</td>
<td>29,110</td>
<td>29,110</td>
</tr>
<tr>
<td>Total</td>
<td>58,610</td>
<td>109,728</td>
</tr>
</tbody>
</table>