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Reducing IV Infiltrates in the Neonatal Population

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Clinical Leadership Theme

The clinical leadership theme for my project is focusing on improvement of patient safety and improving quality of patient care. Reducing the IV infiltrate rate in the neonatal population in the Neonatal Intensive Care Unit (NICU) is a valuable area to focus improvement of care. Lake and Beecroft (2010) say that of patients having IV therapy approximately 10% to 20% will have IV infiltrate complications. It is important to develop strong core values and competencies that are going to help mold and support this project which include communication, teamwork, decision making, research process, conflict management, staff development and mentoring. (Nursing Times, 2013) The contribution of the role the leadership and competencies will provide is a structured framework and consistent data collection and project approach which will help with the success of the project outcome. “Competent nursing and effective leadership are fundamental to the provision of high-quality care” (Nursing Times, 2013).

Statement of the Problem

Infiltrates are a rising problem in our neonatal population in the Neonatal Intensive Care Unit (NICU). Wilt & Huey (2016) states that the Institute of Medicine (IOM) “aims of safe, efficient, effective, and patient-centered care by focusing on improvement efforts in the pediatric patient receiving IV therapy.” The NICU, including myself, formed an auditing committee to identify reoccurring problems that may account for infiltration. Prior to the IV infiltrate auditing committee the NICU experienced twenty-one out of the fifty-four infiltrate occurrences from actively running IV lines making the rate at almost 39%. A few questions that our auditing committee has included are: Are IV infiltrates being documented correctly? What are the reasons IV infiltrate rates are at 39%? Is there an opportunity for staff education and development? What

changes can be implemented to decrease infiltrates? What outcomes and results do we anticipate or would like to see?

Project overview

The major goal of the project is to reduce the number of IV infiltrates and reduce the severity of each of the infiltrates by auditing all running IV lines, infiltrates and IV management and infiltration documentation. This goal aims to improve patient safety and the quality of care given to the patient. “Infiltration is the most common complication associated with PIV use in infants, accounting for 23-78% of complications.” (Driscoll, MD, Langer, Burke, & El Metwally, MD, 2015) The NICU developed an auditing committee that will be conducting auditing of all running IV therapy lines and all IV infiltrates. This auditing will be used to formulate accurate data as to the common causes of infiltrates in the neonatal population. After approximately a year of auditing changes formulated to the causes will be developed and implemented. After the implementation of the changes, auditing will continue to monitor if improvement is seen.

When our project began our auditing data was inaccurate due to under documentation and errors in staging the infiltrates. According to Lo (2014) correct documentation results in improved patient safety. Due to the inaccuracy in our data our team has had to provide bedside training and education to all staff members with emphasis on the nurses that experienced infiltrate occurrences. The NICU auditing committee is focusing on a few key elements to add to our project, these include: where is the IV located? How long has the IV been in place? What was running through the line and at what rate?

The specific aim statement is to reduce IV infiltrates rates and severity of infiltrates in the neonatal population. A reduction of 20% or more from the baseline of 2.12 to decrease to a

rate of 1.70 incidents of infiltrate in the first six months through auditing all therapeutic IV lines and infiltrate occurrences. The specific aim statement is similar to the global aim statement as it narrows down a goal and objective from the global statement. My global aim statement focuses on the improvement of patient safety and quality of care given to our neonates.

Rationale

The NICU's Clinical Nurse Specialist (CNS) started receiving data on one of our unit's problems in patient safety revealing that IV infiltrate rates began to rise and the grades of infiltrates were getting worse. "PIV catheter is the most used vascular access device for the administration of medications in hospitalized neonates" (Beall, Hall, Mulholland, & Gephart, 2013). This new data sparked the NICU's administration to formulate a committee of volunteers NICU nurses to gather together and find out what is causing the increase in rates. In just a few short months the CNS discovered that there was a significant jump in the severity of infiltrates resulting in severe skin necrosis that required in-depth treatment for our already critical neonates.

Before our auditing began our unit had ten grade 1, eight grade 2 and three grade 3-4. The month of January the data resulted at two grade 1 eight grade 2 and five grade 3-4. The month of March resulted in twelve grade 1, five grade 2 and fifteen 3-4. The rates have fluctuated since the project has begun and a definitive cause has yet to stir the group into making any changes based on our data.

There are four different grades and each are dependent on site and degree infiltration. Grade one includes pain at the site but is not accompanied by swelling or erythema. Grade two includes pain at the site and limited swelling. Grade three includes pain at the site, moderate swelling, cool skin and skin blanching. The last and most severe grade four includes pain at the

site, severe swelling, cool and blanching skin, decreased or absent pulses, increased capillary refill and skin breakdown or necrosis. (Massey & Clinical Practice Committee, 2010)

The projected cost analysis is wage for all ten staff included in the auditing. See Appendix A for a projected cost analysis. The staff is paid in addition to their normal work shifts and each meeting lasts approximately two hours and is roughly held six times a year. If each nurse makes approximately \$32 an hour and this meeting is overtime, it makes the wage time and a half equaling out to \$48 an hour. If ten nurses are paid at least two hours of overtime at six times a year and the project is estimated three years that would put our total at approximately \$17,280.

The staff education and training that is provided as well as all auditing is accomplished while each committee member is working their normal shift. This eliminates the extra cost in data collection and staff development. There will however, be future cost for the changes that will be implemented once the evaluation process is done. There are costs that will be saved if the project is a success and the infiltration rates decrease. Major and Huey (2016) states that an approximate IV infiltrate cost is \$500 per patient per incident. The unit will also save in treatment such as Hyaluronidase- a medication to decrease the fluid that infiltrated into the skin- which costs our facility \$40 per dose to administer. The unit will have a decrease in costs of supplies such as heat packs to reduce the swelling, needles and syringes to administer the Hyaluronidase. See Appendix B for the Root Cause Analysis (Fishbone Diagram). See Appendix C for the Process Map (Flow Chart). See Appendix D for the SWOT Analysis. See Appendix E for the Stakeholder Analysis.

Methodology

The approach being taken is to audit the IV lines to narrow down causes of the infiltrates. After the causes are narrowed down, then the process will be to develop a plan of action and changes that should be implemented. The objective with auditing gives us the ability to have real and current data and statistics for our infiltrate rates.

The committee is focusing on a few key elements to add to our auditing these include: where is the IV located? How long has the IV been in place? What was running through the line and at what rate? “Vesicants are substances capable of causing inflammation, pain, and blistering of tissues leading to tissue death and necrosis” (Lake & Beecroft, 2010). Is the nurse doing hourly checking and how is the checking being completed? Lastly, how is the site secured? All of these questions will help us narrow down what might be some of the top concerns that the committee might focus on.

The change theory that has can be closely followed with what we are doing is Lewin’s Change Theory. The first step is preparing the change that is about to take place or “Unfreezing.” The preparation of the staff for change was implemented last year before the auditing committee first began. The second step is “Change” the process the project is currently in with the auditing and finding possibilities for change. The last and final stage is “Refreeze” where the changes are implemented and stability is attempted. (MindTools, 2016)

Since the project is currently still in the process of being audited and there have not been changes that have been implemented, it will not be clear if the project is completely effective. The data that is currently being gathered is showing that there is a growing amount of numbers of all staging of IV infiltrates. However, this may be due to the staff education and training that is being provided on the correct documentation and staging of infiltrates.

Currently the committee is gathering the results of the data to try and see a reoccurring pattern of issues for causes of infiltrates. If common causes of infiltrates can be identified, then the group can begin to focus on the development of ideas for change. After change has been made the results will come when the infiltrate rates begin to improve and the infiltrate become less severe.

One way to check if the change that has been implemented had any effect would be finding a decrease in the IV infiltrate rates and the severity of the infiltrate when they do occur. My prediction is that our infiltrate rates will decrease and the severity of each infiltrate will get better. However, due to the fragile nature of the neonate's vascular system I do feel that it will be nearly impossible to completely eliminate the less severe grades completely. IV sites can infiltrate so quickly and if the nurse is assessing the site appropriately and frequently the site might already have infiltrated as soon as the nurse checks the site. The goal of the project is to reduce the infiltrates and damage to the neonate.

Data Source/Literature Review

The focus of the study is to improve patient safety and improve patient care. It was found that "95% of PIV catheters are removed due to complications" (Beall, Hall, Mulholland, & Gephart, 2013). This can prove that if an IV was left in and a complication was not caught, then how many potential complications might this cause the patient? Our team felt that auditing would provide us with the best data and statistics to formulate our conclusions on. Once the conclusions are formulated than change that is specified for the problem areas can be developed.

The materials that were used in my project outline aided in supporting the importance of focusing on reducing infiltrates, correct staging and suggested changes such as various securement devices. Wilt & Huey (2011) states that staff education and training helped with the

success rate of decreasing infiltrates by almost 8% in the first 24 hours and an improvement of almost 53% over a three-month span.

Since we are auditing the length of time the IV has been in place there have been studies that show that a length of over 72 hours increases the risk of skin necrosis and breakdown. (Garland, Dunne, Havens, Hintermeyer, Bozette A., et al., 2002) Studies also show that “extravasation of fluid, a common complication of IV therapy, can cause significant and long-lasting sequelae...” (Khan et al., 2014).

The concern is damage to the nerves since neonates have a fragile vascular system and nervous system if the infiltrate is severe enough it might cause lasting damage. According to Beall, Hall, Mulholland & Gephart (2013) “Infiltration and extravasation are one of the most destructive complications to the neonate’s fragile skin”. According to Irving (2001) common IV sites include: the dorsum in the hand and foot, basilica or cephalic veins, dorsal venous arch and the lateral marginal vein. Irving (2001) goes on to say these sites the most common for ease of access for viewing and ease of starting. However, these sites can cause the most tissue damage or damage to the nerves or tendons possibly causing long term damage and or loss of joint movement.

My PICO statement includes: P- Neonatal population which includes neonates that range from 23 weeks corrected gestational age and older. “The preterm and sick neonate is more susceptible to skin injury and complications from extravasation injury than their mature, healthy counterparts” (Beall, Hall, Mulholland & Gephart, 2013) I- Auditing and monitoring IV lines in the neonates to develop changes to decrease infiltrates. C- Currently there are high infiltrate rates with varying grades of severity to the neonate. O- The desired outcome is to decrease infiltrate rates, decrease harm to the neonate and improve the quality of care and safety given to the

neonate. “Serious complications are not entirely preventable, but following recommended standards of IV therapy is the best approach for avoiding complications” (Beall, Hall, Mulholland & Gephart, 2013). All of the literature supports the PICO statement by showing the importance of maintaining a safe and patent IV line.

Timeline

There are several grades for this project to be complete. The project start date is March of 2015 and there is roughly three years of planning, auditing, change implementation, staff education and evaluation.

The first stage was to identify the problem and need. The second stage is to audit for accurate data pertaining to the infiltrates. The next step is to interpret the data collected and formulated ideas that can be implemented. The last stages include implementing the changes, educating the staff on the new changes and re-evaluating if the changes that took place improved the rates. See Appendix F.

Since the problem was already identified the project moved to the auditing stage. The timeline for auditing is a least one year. The project goal is to have accurate infiltrate data including correct staging of the infiltrate, correct and complete documentation and staff education and training. The reason our auditing committee agreed on a longer timeline was due to the lack of knowledge in the staff for correct documentation, infiltrate staging and recognizing that an infiltrate is occurring. For these reasons our group wanted to audit and provide staff education with a re-evaluation during the research process.

Expected Results

It is expected that after the auditing stage is complete and a plan is set to that infiltrate numbers will decrease. Currently, our data is showing that there are some problems in location

and securement of the IV and the fluids that are running through the line. The belief is that once these problems are addressed it can have a huge impact on IV infiltrates.

Nursing Relevance

It is strongly believed that this will help not only with our other units in our facility but with other facilities as well. Our IV auditing is currently branching out into other units and other facilities want to know what changes we make so they might implement those changes in their facilities. Other units in our facility have contacted the NICU asking if the committee would begin auditing all other units because the infiltrate rates are increased facility wide. There is currently no specific data that was given to the NICU's auditing committee to support an increased rate. Each unit has their data and will provide it to the NICU within the next few months after auditing comes to a close in the critical care. This project could potentially make a positive impact on not only our NICU but other units and other facilities.

Summary Report

During this project to decrease IV infiltrates in the neonatal population I was actively involved in monthly meetings with the committee by presenting auditing data, sharing ideas for changes and assisting in the development of the committee. I completed continuous auditing during my shift as a bedside RN and during my practicum hours. I provided education and training to all bedside nurses that experienced an infiltrate as well as assisted with proper infiltrate staging and documentation. I am participating in the trials of the new IV securement dressing that we are implementing.

The specific aim statement is to reduce IV infiltrates rates and severity of infiltrates in the neonatal population. A reduction of 20% or more from the baseline of 2.12 to decrease 1.70 incidents of infiltrate in the first six months through auditing all therapeutic IV

lines and infiltrate occurrences. The specific aim statement is similar to the global aim statement as it narrows down a goal and objective from the global statement. My global aim statement focuses on the improvement of patient safety and quality of care given to our neonates.

The population that was involved in this project included 23 weeks gestational age and older in the Neonatal Intensive Care Unit (NICU) at Valley Children's Hospital.

Prior to the auditing process beginning we prepared the staff that a committee would be monitoring and become involved in IV infiltrates. After we prepared the staff the committee we began nightly auditing and monthly meetings. Recently, a new securement dressing is being introduced to assist in supplying stability and visibility to the IV site. The hope is that a uniformed and standardized dressing will eliminate the inability to see the site or the variations in IV securement with each nurse having their own way to secure the site. Since the new securement dressing has just been introduced we do not have any data that shows any improvement with this change.

The NICU's baseline data prior to the start of the project showed ten grade 1, eight grade 2 and three grade 3- 4. This data results in high grade 1 and 2 and lower grade 3 and 4 showing the need to reduce these incidents.

A few members from the committee made poster boards to be taken to the bedside for training and education for the staff. The boards included each grade of infiltrate, pictures of each grade, methods to reduce infiltrate such as hourly checking, treatments for infiltrates and what documentation needs to be filled out if an infiltrate does occur. This board acts as a resource for each nurse who might have questions about IV site management or infiltrate management. It has helped with increasing awareness to the staff with visual and verbal education.

Currently, the NICU is not meeting the goal of a 20% reduction from the baseline. The data collected from March 2016 showed that the infiltrate/extravasation rate per 1000 patient days was 9.66 and our projected goal was 1.70 for grades 3 and 4. March has a total of thirty-two infiltrates which resulted in twelve grade 1, five grade 2, fourteen grade 3 and one grade 1. See Appendix G for our evaluation tools and data collected during the project.

The plan to provide sustainability includes continuing the auditing process to insure the change that was implemented with the new securement dressing will improve infiltration rates. Sustainability also needs continued training and education to staff that cover how to provide proper IV management, grading infiltrates and proper documentation. Another plan our committee has suggested is providing resources, other than the educational boards, such as nurses and policy changes to help provide information or feedback to staff with questions to help maintain a standardized level of care. The goal of providing the staff with support, resources and continual education and training is to maintain ongoing development and to insure that policy and standardization is up held. Once a permanent change has been proposed, standardized and implemented sustainability is obtained through repetition and a strong support system. Quality improvement is key focus and with a reduction in IV infiltrates this can be reached.

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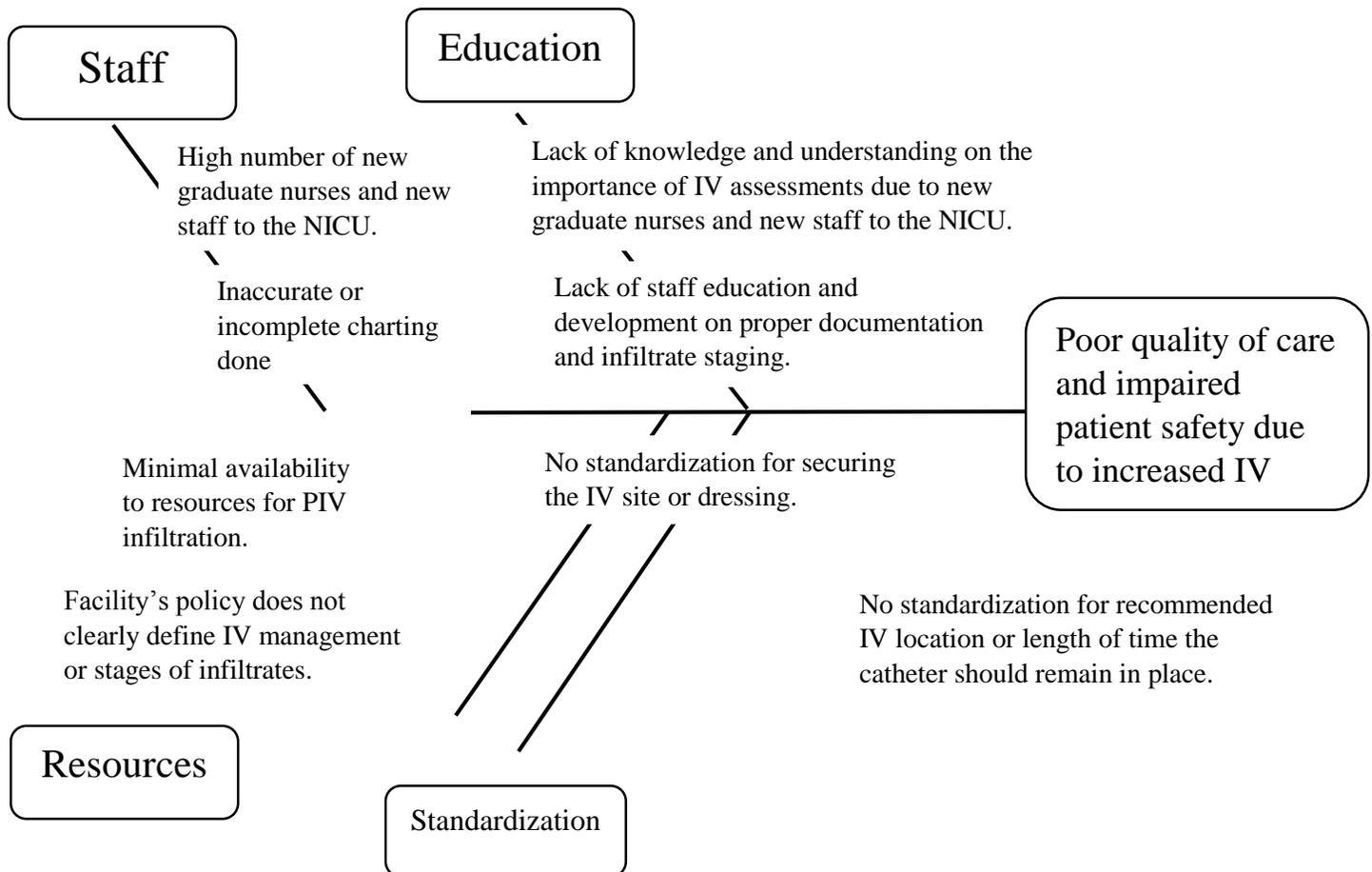
Appendix A

Cost Analysis

<p>Major and Huey (2016) states that an approximate IV infiltrate costs \$500 per patient per incident. The unit will also save in treatment such as Hyaluronidase, a medication to decrease the fluid that infiltrated into the skin, which costs our facility \$40 per dose to administer.</p>	<p>Per Nurse \$32/hr for regular shift in the NICU \$48/hr for overtime \$96 per meeting of 2 hours. \$576 for six meetings a year \$1728 for the projected three years For ten nurses this would be \$17,280</p>
<p>Cost Analysis</p>	
<p>Future cost for the changes that will be implemented once the auditing process and data collection is done.</p>	<p>Staff education and development would be conducted by the group while they were working a normal shift.</p>

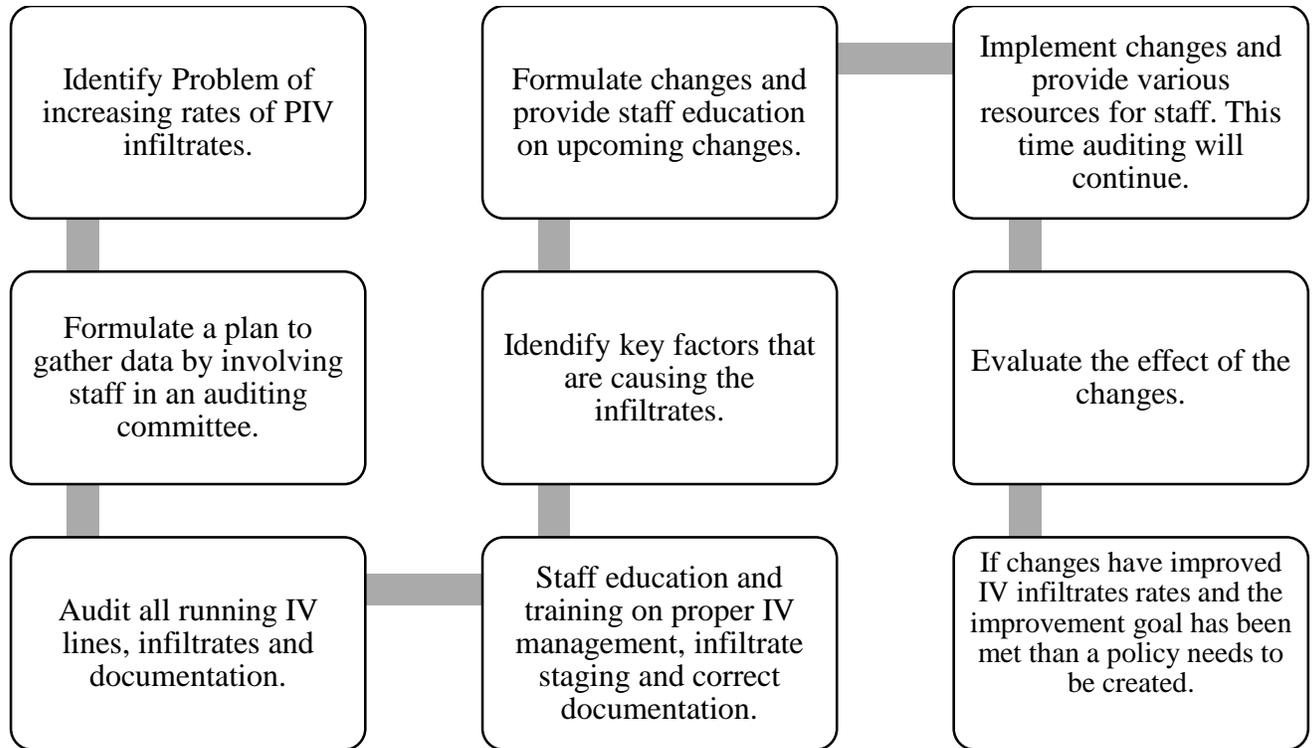
Appendix B

Root Cause Analysis (Fishbone Diagram)

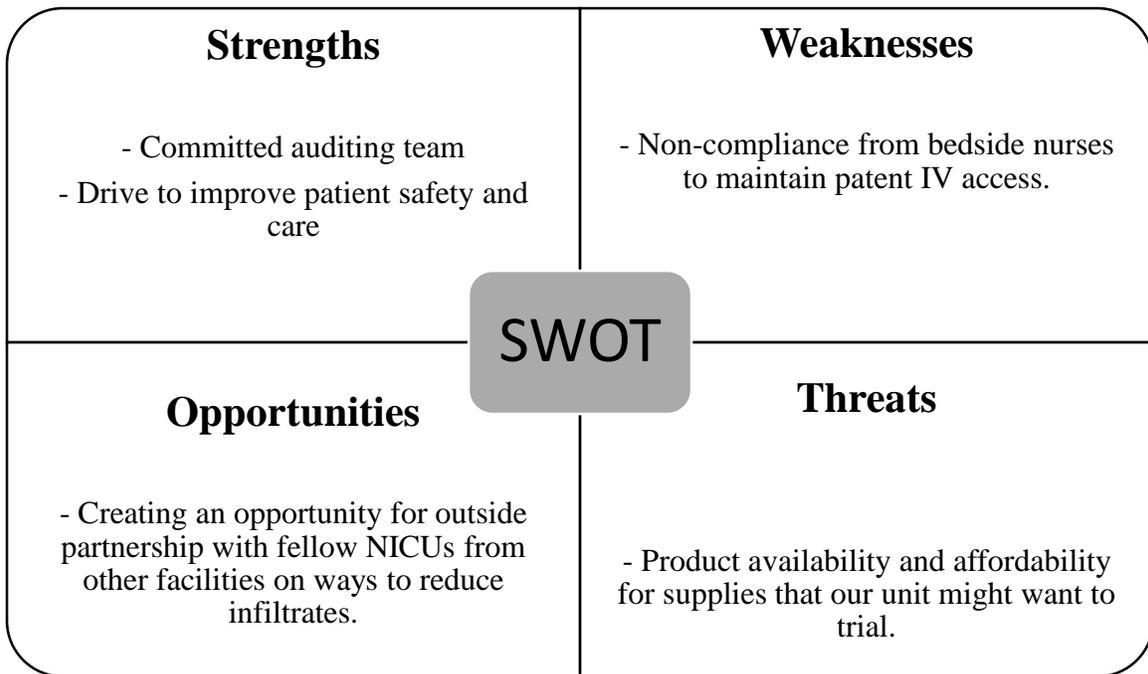


Appendix C

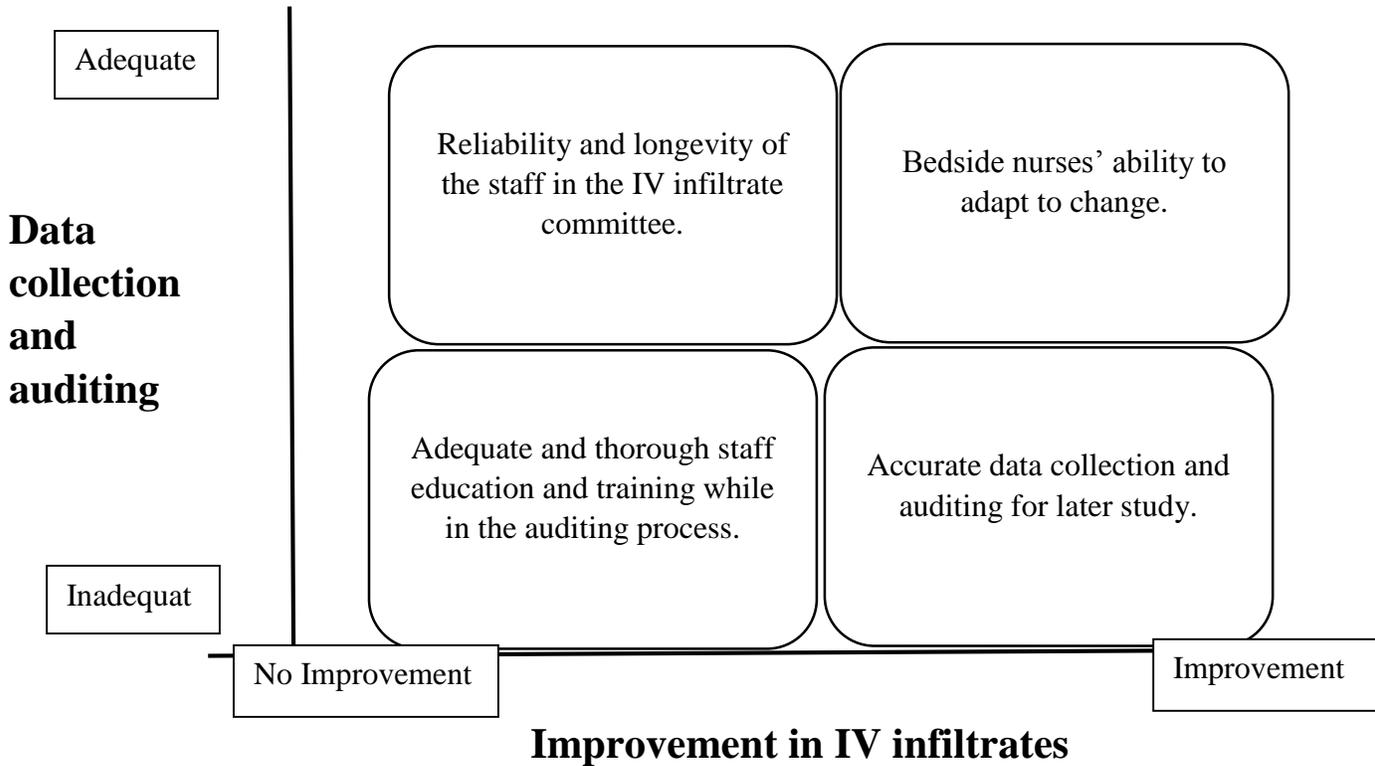
Process Map (Flow Chart)



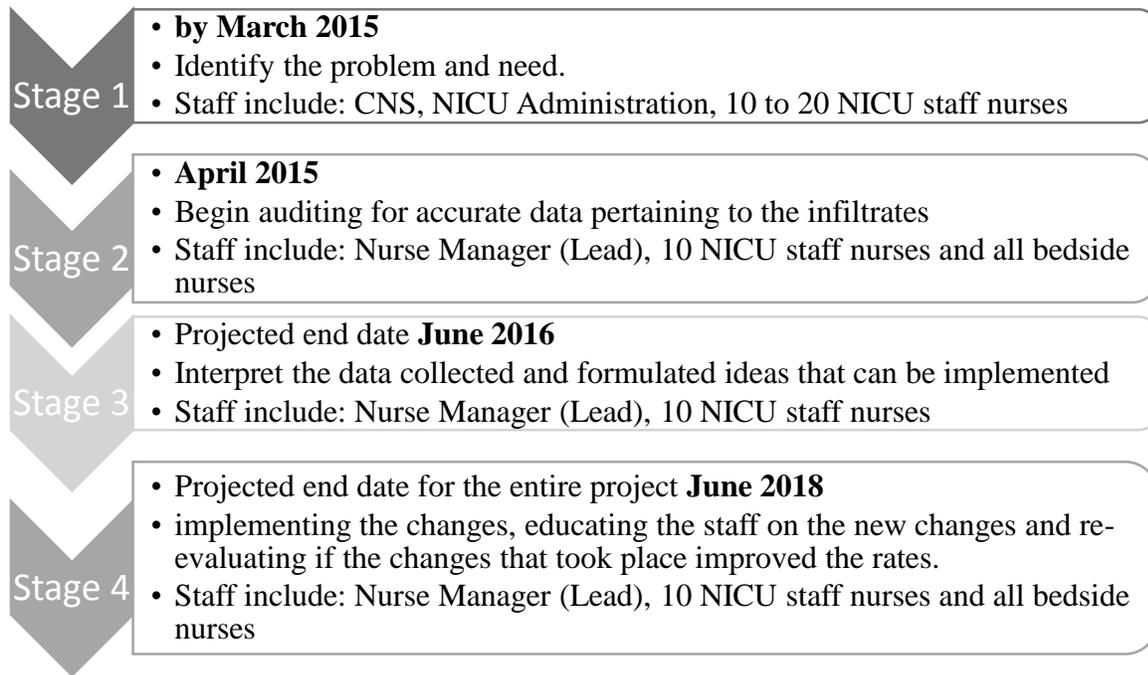
Appendix D
SWOT Analysis



Appendix E
Stakeholder Analysis



Appendix F
Projected Timeline



Appendix G

Evaluation Tools and Data Collected

