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Midline Catheter Usage in the Neonatal Population

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Neonatal sepsis is associated with increased mortality and morbidities which include lengthy hospital stays (Smith & Benjamin, 2011). Initially, the neonate may present with subtle signs and symptoms that are nonspecific to sepsis such as lethargy, temperature instability, irritability, and feeding intolerance (Kendall & Karlsen, 2012). Due to the immaturity of the neonate's immune system, and the high susceptibility of sepsis-associated mortality, neonates are commonly administered empirical antibiotics in the neonatal intensive care unit (NICU). The most frequently prescribed therapeutics in neonates is the narrow-spectrum antibiotics ampicillin and gentamicin (Clark, Bloom, Spitzer, & Gerstmann, 2006).

Guidelines, recommendations, and standards point to the need for evidence-based practices (EBP) when selecting a vascular access device (VAD) for administering intravenous treatments (Moureau & Chopra, 2016). A midline catheter (MC) offers reliable access and provides better hemodilution versus a peripheral intravenous catheter (PIV) because the tip of the MC is placed in a larger diameter vein thus protecting the infant's future vessel health (Rosenthal, 2008).

According to Nelson, Batalden and Godfrey (2007), setting goals that are considered stretched require extending oneself to the limit to be actualized. This type of goal provides a higher standard of care to strive for. As leaders, we must advocate for our patients by selecting a VAD with the lowest risk that most effectively supports the infant's treatment plan based on available evidence and specified indications. This project intends to do just that by advocating for a MC when appropriate in lieu of multiple PIVs.

Clinical Leadership Theme

The Clinical Nurse Leader (CNL) is prepared for direct clinical leadership at the point of care (microsystem) to ensure that care delivery is safe, evidence-based, and targeted towards optimal quality outcomes for the cohort of clients they serve (Reid & Dennison, 2011). The CNL answers the call to rise above the disjointed stride of complex health care ensuring effective and safe care patient care (Porter-O'Grady, Clark, & Wiggins, 2010). CNLs are invaluable at the bedside and are prepared to oversee a team-based approach to patient care with an expanded knowledge base in clinical decision-making, risk assessment, quality and safety, and EBP (AACN, 2013).

The focus of this project is to reduce the number of PIV attempts on all neonates when empirical antibiotic therapy is needed by advocating for a MC as the appropriate VAD when a central line is not in use. It is essential for the CNL to promote health policy and advocacy by leveraging social change, promoting wellness, improving care outcomes, and reducing costs (AACN, 2013). As a Systems Analyst/ Risk Anticipator, it is necessary to perform a microsystem assessment, collect and analyze data in support of an EBP change then facilitate lateral integration. This type of forward thinking will aid in the facilitating of ongoing and evolving communication, collaboration, coordination, and evaluation among the multidisciplinary team. Promoting a sense of shared responsibility for patient outcomes is a key goal of the CNL (King & Gerard, 2016).

The global aim is to reduce the pain and suffering on behalf of the neonate and their families in the NICU. Nurses can advocate for their patients by identifying the need for a MC versus a PIV. Best practice can be achieved by developing a policy and procedure (P&P) that identifies qualifiers and processes for MC placement for neonates who may require antibiotic

therapy for more than 48 hours. The process begins with a review of the evidence-based literature to support the projected outcome of decreasing PIV attempts with the placement of a MC. The process ends with the completion of an evidence-based P&P that is approved by the Neonatal Joint Practice Committee. By working on the process, expectations are: (1) the number of PIV insertion attempts will be reduced, (2) increase nurse education, advocacy, and collaboration with the ordering physician, (3) reduce pain in the neonate, (4) improve patient (family) satisfaction, (5) decrease costs, (6) reduce complications. It is important to work on this now because neonates have difficult intravenous access (DIVA). By advocating for the most appropriate VAD we can preserve the infant's vessel health for future medical needs and reduce potential complications.

Statement of the Problem

Upon admission to the Mercy San Juan Medical Center's (MSJC) NICU, most neonates are presumed septic. With that being said, neonates are initially treated with ampicillin and gentamicin to prophylactically cover their immature immune systems. One of the performance improvement and benchmarking initiatives in the NICU is a data driven partnership with the California Perinatal Quality Care Collaborative (CPQCC) called the antibiotic stewardship collaborative (ASC). ASC recognizes the need to both preserve antimicrobial agents and increase antimicrobial resistance by using antibiotics appropriately. These guidelines are adapted by NICUs so that the appropriate antibiotic selection, dosing, route and duration of antibiotic therapy will be applied. The head of our Neonatology Department tracks a vast amount of pertinent data in an excel spreadsheet with regard to the CPQCC guidelines with one being the start and stop dates of antibiotic usage. Implementation of EBP for optimizing antibiotic use has been endorsed by the American Academy of Pediatrics, the Centers for

Disease Control and Prevention, the Society of Healthcare Epidemiologists of America, and the Infectious Disease Society of America (CPQCC, 2016).

Antibiotics are an essential treatment for sepsis in the neonate and the delivery of the medication is dependent upon the use of a VAD. The initial VAD of choice is a PIV for antibiotics unless a central line is placed. What prompted the attention of this project were the late preterm, term, or post-term neonates that were on full feedings and required antibiotic therapy for seven to fourteen days and only had a PIV as the primary modality. MCs have many advantages for use in intravenous therapy and medications. When inserted in a sterile environment and correctly monitored and maintained, they present lower rates of infection than previously suggested (Cummings, Hearse, McCutcheon, & Deuter, 2011). Moreover, there is not a gold standard or predominant recommendation for the most appropriate VAD. For example, Romesberg (2015) did not endorse the use of MCs in the NICU because there was a lack of sufficient evidence with regard to safety and efficacy. Additionally, Romesberg encourages the proliferation of randomized controlled trials to evaluate best practice for the reduction of infection rates and extravasation associated with VAD usage. Based on the number of neonates that required empirical antibiotics, potential benefits of the use of MCs, and the lack of a prevailing recommendation for use in the NICU, this problem warrants further investigation.

As a member of the peripherally inserted central catheter (PICC) team, I used the ASC excel spreadsheet to identify neonates that could have benefited from a MC due to DIVA, did not have a central line in place and were on antibiotics for an average of four to fifteen days. Direct observation was made when neonates required multiple PIV attempts to complete the intended antibiotic regimen. Nurse inquiry was obtained as to “why” these neonates did not have a more reliable VAD, such as a MC. The resounding answer was the nurse had not asked for the order

for a MC placement because they did not think to collaborate with the physician and vice versa. The lack of patient advocacy and nurse to physician collaboration prompted a root cause analysis (Appendix A).

Project Overview

MSJC's NICU is licensed for twenty-six beds. It is considered a level III NICU in the Sacramento region. It is equipped with the latest technology and specially trained staff to care for neonates who are seriously ill or born extremely premature (twenty-three-week gestation). The patient population of the NICU is composed of patients of high to moderate acuity and chronic complex neonates. The NICU has been a leader in caring for the smallest of newborns with documented favorable outcomes. The NICU actively participates in collecting and analyzing data for the Vermont Oxford Network which is a voluntary, international quality and safety consortium dedicated to improving the quality and safety of neonatal care (Vermont Oxford Network, 2014)

The healthcare professionals who make up the Level III NICU include seven board certified neonatologists, neonatal nurse practitioners, a neonatal nurse educator, registered nurses, respiratory care practitioners, developmental specialists, lactation consultants, dietitians, and pharmacists. The NICU is equipped to provide specialized care including invasive monitoring, conventional ventilation, surgery, transport service, inhaled nitric oxide and high-frequency oscillator ventilation and whole body cooling. MSJ's NICU also has a devoted neonatal transport team available twenty-four hours a day, seven days a week. The transport team does everything possible to be at the delivery for outlying facilities for the emergent situations. For 2016, the rate of admissions was 320 neonates. The admission rate for 2017 to-date is 204.

The project consists of reducing the number of PIV attempts on neonates by placing a MC for neonates requiring antibiotic therapy for greater than 48 hours and do not have a central line in place. The project's slogan is "You don't need an order to advocate." The goal is to empower nurses through education on the appropriate risks/benefits for use of MCs. The initial education will be an in-service to the nursing staff about the benefits of using a MC in the neonate who needs antibiotics for greater than 48 hours and does not have central line access. This will be done at the shift change huddle. Several relevant articles will be housed in a binder entitled MC articles. The in-service will continue by asking them to identify what VAD is in use currently, at their patient's bedside and to discuss the antibiotic treatment plan with the off going nurse. Based on the education provided, the question that must be identified by both nurses is "does my patient meet the criteria for a MC?" This ongoing educational piece will be deemed a "huddle and a hand-off" and will be done daily for two-weeks. Providing this education to the nursing staff will support the nurses' efforts and preparedness when collaborating with the physician about a potential change in the plan of care with regard to a VAD modification. This promotes patient advocacy.

Ineffective communication between the nurses and the physicians is a key factor in this project not succeeding. In one study, the results suggested that enhancing the preparedness of nurses is essential to preventing communication breakdown among the healthcare team. It further goes on to conclude that physicians need to reevaluate their personal attitude toward nursing practice in order to promote professionalism, responsiveness, and autonomy in the clinical setting (Farhadi, Elahi, & Jalali, 2016). By the end of the two-week in-services, the huddle and a handoff will continue to be in place and the nurses will engage the physicians by

collaborating with them with regard to their patient's VAD. This ongoing dialogue between the nurse and the physician will strengthen and enhance the patient experience.

The project attempts to diminish pain in the neonate by reducing the number of PIV attempts. Data in newborns suggest that recurrent exposure to multiple painful stimuli early in life can lead to deviations in both brain development and stress responses that continue through childhood (Bannister, 2016). Lastly, the project aims to preserve the infant's vessel health for the future. Vessel health preservation gives nurses more autonomy to advocate for the appropriate VAD for their patients and improved knowledge around pH and osmolality of intravenous drugs (Weston, Nightingale, O'Loughlin, & Ventura, 2017).

The specific aim of this project is to decrease the number of PIV attempts by 25% on neonates in the NICU by developing a P&P that identifies qualifiers and processes for MC placement for neonates who may require antibiotic therapy for more than 48 hours by December 2017. The specific aim parallels the goals of the global aim, which is to reduce the pain and suffering on behalf of the neonate and their families in the NICU.

Rationale

This project is geared toward prevention and preservation. The septic neonate receives antibiotic therapy for approximately 7-10 days or longer depending on the severity of the bacteremia. Within that timeframe, PIVs are assessed and documented on hourly as infiltrations are common in the neonate. Infiltration rates among neonates are as high as 57%–70% with extravasation occurring in 11–23% (Beall, Hall, Mulholland, & Gephart, 2013). Compared with adults, their immature skin structures, flexible subcutaneous tissue, small blood vessels and poor venous integrity makes this vulnerable population susceptible to skin injury due to venipuncture

and intravenous infusions that can lead to extravasations (Beall, Hall, Mulholland, & Gephart, 2013).

A premature or sick infant may require multiple venous cannulations during a prolonged stay in the NICU and often veins that have previously been used may need to be re-cannulated. The practice of using PIV can pose many complications such as re-occurring infiltration when infusing vesicants. Other potential risks resulting from of infiltration include increases in hospital-acquired harm, painful procedures, overuse of supplies, increased the length of stay, and nursing time; it threatens relationships essential in patient- and family-centered care (Wilt Major & Huey, 2016). An extravasation may lead to damage which may require surgical intervention, loss of function of the extremity at the site of injury and/or drawn out wound debridement (Hanrahan, 2013). According to the hospital charge masters, Office of Statewide Health Planning and Development, the charge per day for NICU care at Mercy San Juan Medical Center is approximately $12,877.00/day (OSHPD, 2016). A SWOT analysis reviews the strengths, weaknesses, opportunities, and threats that surround this project (Appendix B).

From the equipment supply and labor standpoint, per Goff (2013), the median cost of a single PIV attempt made by one nurse is approximately $41.00 and of that one attempt, 60% of nurses were successful. Seventy-two percent of neonates had a successful PIV inserted in one to two attempts and accounted for 53% of the total costs. However, 28% of neonates required more than or equal to three PIV attempts and had a cost range of $69 to more than $125 per attempt, which consumed 43% of the total IV costs (Goff, 2013). With regard to the retrospective chart audit that was dissected, based on the average of three infiltrations for a seven day course of antibiotics and labor costs for those replacement PIVs, this equates to approximately $300.00. If a MC was placed using an all-inclusive kit, the approximate pricing would be $160.00 once.

A MC provides for better hemodilution because the tip of the catheter resides in a larger diameter of the vein (Moureau & Chopra, 2016). The MC is also more reliable than a PIV because it allows for a longer dwell time (Rosenthal, 2008). From the data that was extrapolated from the ASC excel spread sheet, in 2016, there were twenty-three neonates that needed antibiotic therapy greater than 48 hours and only had PIV access. From the retrospective chart audit, it was unclear as to how many PIV attempts were made so the median number used for cost analysis was three infiltrations per seven days of antibiotic treatment. The cost to implement this project is approximately $65.00/hour for the CNL's time. It will cost approximately $130.00 per day for fourteen days to implement "a huddle and a handoff" which equates to $1,820.00 for the entire project to be implemented. There will be no additional hourly costs for the nurses as they are already scheduled to work. It is recognized that quality improvement projects can be costly therefore a cost analysis can help provide monetary data for stakeholders to evaluate (Appendix C). The costs analysis reflects an overall $20.00 savings to implement this project. It is clear that the project pays for itself by preventing a lawsuit due to one extravasation.

The price tag on an infant's pain is extremely hard to quantify. According to Bhalla, Shepherd, and Tobia (2014), neonates were initially thought to have inadequate responses to painful stimuli. It was demonstrated that the developmental immaturity of the central nervous system makes the neonate more likely to feel pain. Watterberg et al. (2016) also found that untreated pain can have long-lasting physiologic and neurodevelopmental consequences which have future costs that cannot be identified within this scope of the project.

Methodology

The goal of this project is to reduce the number of PIV attempts by 25% by the end of 2017. Recognition that any change can be difficult is an understatement, especially in healthcare. Kurt Lewin's (1951) Theory of Change identifies three stages through which change agents must proceed before change can become part of a system. The stages are: unfreezing (when change is needed); moving (when change is initiated); and refreezing (when equilibrium is established) (Mitchell, 2013) (Appendix D). It is with great hope that this project empowers nurses to advocate for a MC in lieu of a PIV. Working with the ordering physician will improve communication and collaboration with the healthcare team and empower the nurses while bringing about better patient outcomes for the neonates they care for.

Before the implementation process began, an assessment of the type of VAD used for neonates meeting the above qualifications was done. This process was done by retrospective chart audits from the ASC excel spread sheet. The use of implementing routine audits in clinical practice is an effective tool in the selection and management process of VADs (Ray-Barruel, 2017). Based on this data collection from June 2016 through June 2017, it was discovered that approximately 43 babies needed antibiotic therapy and only had PIV access versus a MC access. The audit also found gaps with inconsistent documentation of PIV attempts. Antibiotic stewardship is a coordinated program that endorses the appropriate use of antimicrobials, improves patient outcomes, reduces microbial resistance, and decreases the spread of infections caused by multidrug-resistant organisms (Patel & Saiman, 2012). This demonstrated the unfreezing portion of the project for change.

The first part of the implementation process will be to be placed on the agenda for the unit council meeting at the end of July 2017. The unit council is composed of nurses (that have been appointed to the group by vote), management and the neonatal nurse practitioner (NNP).

Nurses' decisional involvement and participation in a unit council may serve as a venue to best utilize EBP skills with the overall goal of improving care outcomes (Macyk, 2017). This is the moving or change phase of Lewin's change theory.

The third part of implementation is to draft an EBP P&P that is approved by the Neonatal Joint Practice Committee. Once a P&P is approved, I will require the nurses to read and sign the new P&P which will be kept in policy tech for continued review. There will also be an algorithm that clearly identifies which neonates meet criteria for a MC placement (Appendix E). This is the first part of instituting a newly acquired equilibrium.

The last stage of Lewin's change theory is to refreeze. The refreezing phase is to prevent communication breakdown among the healthcare team. I will meet with the doctors, pharmacist, nurse practitioner and charge nurse at the antibiotic stewardship timeout when there is an infant that meets the criteria for antibiotic therapy for greater than 48-hours. This checklist is initiated on any infant that meets criteria and is based on CPQCC guidelines. I will update the antibiotic 48 hour timeout check list to include a VAD section. If the VAD section is added to the checklist, a dialogue about which VAD is appropriate for the intended duration of antibiotic therapy will aid in a more effective collaboration with all of the healthcare team. The head of neonatology has acknowledged the need for this addition to the checklist.

For the evaluation portion of my project, I will use the individual checklists from each neonate that meets the project's MC criteria, by posing three questions to the physicians: 1) Is a MC reasonable for the intended antibiotic therapy for this infant? 2) Did the nurse ask for an order for a MC placement? 3) Was a MC placed? I will add three columns in the ASC excel spreadsheet to represent the three questions I posed (Appendix H). The title on the columns will be identified as "Q1, Q2, and Q3 and will use a simple "Y" or "N" for the three questions

respectively to see if my goal of a 25% reduction in PIV attempts has been made. This evaluation tool helps me to quantify nurse advocacy for those neonates that meet the MC criteria. The final evaluation will be to continue to chart audit those specific neonates that meet this criteria. Data triangulation is a powerful technique that will facilitate validation of data through cross verification from two or more sources. This is how I will evaluate the process and readdress education where needed by directly addressing individual nurses as I will be able to see from the checklist which baby is assigned to which nurse.

Data Source/Literature Review

The literature compiled for this project supports the concept of placing midline catheters in neonates that require empirical antibiotic therapy for greater than 48 hours when certain criteria are met. The following PICO was used:

- P: Neonates that are septic
- I: Use a MC in neonates who require antibiotic therapy for greater than 48 hours and do not have central line access.
- C: Using the MC in the neonatal population vs the current practice of using multiple PIVs for antibiotics greater than 48 hours
- O: Reduce the number of PIV attempts which will decrease pain in the neonate.

My initial literature search was “neonates and VAD” which generated more articles for central line access (e.g. peripherally inserted central catheter) versus midline access. I did have to look at some adult/pediatric population articles that I could transpose onto the neonatal population. I also thought of the other potential barriers that would transpire which would not make my CNL project successful which is the communication and collaboration between nurses and physicians. I was able to review many articles with regard to that issue. I also wanted to see

if my hypothesis was correct when using a MC in lieu of a PIV concerning a decrease in costs. That research was substantiated. I was also able to find specific articles regarding decreasing procedural pain in the neonate. The following literature review demonstrates the different strategies that support this project.

In a study by Adams, Little, Vinsant, and Khandelwal (2016), the authors compare VAD indications and complications by highlighting the use of midline catheters as a possible cost-effective and safe approach for a VAD. The average dwell time of a MC is reported as 7.69-16.4 days, which surpasses PIVs (2.9-4.1 days) and is comparable to PICCs (7.3-16.6 days). The cost of insertion of a MC has been cited as comparable to three PIVs, and their use has been associated with noteworthy cost savings. The MC is a useful VAD with a low complication rate, longer dwell time, and has a high rate of first-attempt placement.

In a study performed by Cummings, Hearse, McCutcheon, and Deuter (2011), MCs have many advantages for chronically ill patients needing up to six weeks of intravenous therapy. MCs that are inserted in a sterile environment and are monitored and maintained correctly have a significantly lower association of infection and thrombus than previously suggested studies. MCs were monitored for twelve months following the conclusion of the trial and infection rates continued to be below one percent and thrombus rates lower than two percent.

Hugill (2016) aimed to increase knowledge and understanding of issues relating to choosing and using VADs in the neonatal patient population. This article highlights the importance of appropriate device and insertion site selection, skin preparation, and aftercare. Paying due attention to these aspects is an essential component of the neonatal nurse's role and ensures that the risks of adverse events are minimized.

Moureau and Chopra (2016) summarize the work and recommendations of the panel for the Michigan Appropriateness Guide for Intravenous Catheters. The study advocates for patients with DIVA, to determining the VAD with the lowest risk that best meets the needs of the treatment plan is key. Specifically for MCs, recommendations for this VAD are suitable for patients with peripherally compatible solutions or medications where treatment is between six to fourteen days.

The study of Romesberg (2015), pertains to MC use in the NICU patient. This discussion includes information pertaining to the historical perspective of MC use, devices currently in use, common sites for placement, average dwell times, associated costs, and acceptable fluids and medications for infusion through MCs.

Rosenthal (2008) asserts that a single attempt at a MC can meet the infusion therapy needs of a patient who requires more than five days of intravenous therapy, has poor or limited peripheral access or needs reliable access. The patient doesn't have to be "stuck" multiple times for I.V. attempts which can be a frequent complaint on patient satisfaction surveys.

Timeline

The projected timeline encompasses a total of six months. The most time-consuming portion of the project is the retrospective chart audits. I accessed the ASC excel spreadsheet to gather data for a one year period. MSJs NICU started the antibiotic stewardship in June 2016. I wanted to have one year of data to review and am waiting for the June 2017 data to be entered so the data collection is ongoing.

The second part of the implementation process will be to be placed on the agenda at the unit council meeting at the end of July 2017. This is where the preliminary meeting with stakeholders involved can look at my data and add feedback. This is also the venue for more

data collection, brainstorming, and project planning to take place. This is in the form of a Gantt chart (Appendix F).

The third part of implementation is to draft an EBP P&P that is approved by the Neonatal Joint Practice Committee. This may take several attempts due to physician availability and physician treatment preferences. The projected date for the committee meeting is October 2017, however, this is flexible due to management turnover and physician availability. The biggest obstacle is the current turnover in upper and middle management. My timeline has been skewed due to this.

Expected Results

The expected goal of this project is to reduce the number of PIV attempts by 25% by the end of 2017. I have been able to implement the project's slogan "You don't need an order to advocate." The goal behind the slogan is to empower nurses through education on the appropriate use and risks/benefits of MCs. Implementation of the educational in-services to the nursing staff is on track. This will be done at the shift change huddle. The in-service will conclude by asking them to identify what VAD is in use currently, at their patient's bedside and to discuss the antibiotic treatment plan with the off going nurse. It is an expectation that the question will be asked by both nurses, "Does my patient meet the criteria for a MC instead of a PIV?" This "huddle and a handoff" will also be an expectation for the nurse to continue in their bedside practice for all neonates needing antibiotic therapy. This promotes patient advocacy. Other expectations of this project are to reduce pain in the neonate which will, in turn, improve patient (family) satisfaction, decrease equipment, and labor costs and to reduce complications due to infiltrations and/or extravasations. It is also my continued expectation that the RNs and

physicians will collaborate with each other for the betterment of keeping the infant as the center of care.

Nursing Relevance

There is a growing expectation among the public that the medical services available to them should be able to produce evidence of the fact that they are as good as those elsewhere (benchmarking). Satisfactory national data to underpin performance management and benchmarking remain somewhat difficult to quantify or qualify in the NICU. According to Wennberg (2010), as a standard rule, studies find wide variation in resource use and little relationship with patient outcomes; thereby challenging the belief that directing incrementally more resources at certain health care problems necessarily produces incrementally better results. More care is not always better.

Wirtschafter et al. (2011) opened a discussion about an aspect of NICU care for which evaluation and benchmarking are quite problematic. When infection is difficult to prove, such as in the case of culture negative sepsis, what constitutes overuse or underuse of antibiotics? That being said, my project relies on the question "to treat or not to treat". In the instance for treating neonates for sepsis with antibiotics for greater than 48 hours, my project is geared toward vessel preservation. It is of the utmost importance to provide the right VAD for the right patient at the right time. Advantages of a MC include, they provide longer indwelling time, up to 28 days according to the IV Nurses Society (2016), and provide IV access for neonates with DIVA (Moureau & Chopra, 2016), and decreased risk of infections compared to other central VADs (Moureau et al., 2015).

Summary Report

The specific aim again is to decrease the number of PIV attempts by 25% on neonates in the NICU by developing a policy and procedure that identifies qualifiers and processes for MC placement for neonates who may require antibiotic therapy for more than 48 hours by December 2017. This change must be approved by the Neonatal Joint Practice Committee. The Plan-Do-Study-Act (PDSA) worksheet is a useful tool for documenting a practice change. The tool includes developing a plan to test the change (Plan), carrying out the test (Do), observing and learning from the consequences (Study), and determining what modifications should be made to the test (Act) (IHI, 2017). Using the IHI model I identified what practice change I wanted to accomplish within my microsystem population, set a specific aim for the improvement with a specific time frame, created the direction in which I wanted my project to proceed, evaluate the expected results and then finally learn from any mistakes or modifications. The PDSA cycle is summarized in the below paragraphs (Appendix G).

In the planning stage of my project, I initially performed a retrospective chart audit based on the data in the ASC excel spread sheet. The admission rates into the NICU from 2016 and 2017 used as the denominator when calculating the percent of neonates that had multiple PIVs versus MCs as the appropriate VAD. The date is as follows:

- Admission rate for 2016 = 320 neonates

  23 neonates had multiple PIVs versus MCs as the most appropriate VAD = 7.5%

- Admission rate for 2017 (to date) = 204 neonates

  20 neonates had multiple PIVs versus MCs as the most appropriate VAD = 10%

The average PIV attempt was 2.5 however there were gaps in consistency with documentation of PIV attempts in the EMR thus data could not be fully verified.

Next, I was placed on the agenda for the unit council meeting to discuss my project at the end of July 2017. The unit council is composed of nurses (that have been appointed to the group by vote), management and the neonatal nurse practitioner (NNP). In this forum, my data can be presented and studies involving best practices can be discussed using the evidence that I have already discovered. Once I have buy- in from the unit council, I will move directly into in-servicing the nurses at the change of shift huddles.

The doing phase started with creating a slogan for the project entitled "You don't need an order to advocate" which brands the education segment of the project. This was done at the change of shift huddle. The goal was to empower nurses through education on the appropriate use of MCs. The educational portion was about the risks/benefits of using a MC in the neonate who needs antibiotics for greater than 48 hours and does not have central line access in lieu of a PIV. Several relevant articles were housed in a binder entitled MC articles and placed at the charge nurse station educational for re-enforcement.

In-services will continue by asking them to identify what VAD is in use currently, at their patient's bedside and to discuss the antibiotic treatment plan with the off going nurse. Based on the education provided, the question that must be identified by both nurses will be "does my patient need a MC?" This ongoing educational piece initiated in the shift change huddle will be deemed a "huddle and a hand-off." The goal for this phase is to support the nurses' efforts to advocate for a potential change in the plan of care with regard to a VAD modification when collaborating with the physician.

Studying and evaluating what went right and what went wrong with the project is an essential component of this project. This is the area by which modifications to the project can take place. I will use the neonate's individual antibiotic 48-hour timeout checklist that meets the

project's MC criteria. From this, I will pose three questions to the physicians: 1) is a MC reasonable for the intended antibiotic therapy for this infant? 2) Did the nurse ask for an order for a MC placement? 3) Was a MC placed? I will update my ASC excel spreadsheet in the columns identified as "Q1, Q2, and Q3 and will use a simple "Y" or "N" for the three questions respectively to see if my goal of a 25% reduction in PIV attempts has been made

Drafting an EBP P&P that is approved by the Neonatal Joint Practice Committee is the act in the PDSA cycle. Once a P&P is approved, I will require the nurses to read and sign the new P&P and will keep an electronic version of it in policy tech for continued review. There will also be an algorithm that clearly identifies which neonates meet criteria for a MC placement.

As of this date, the unit council has been disbanded however I did get permission from the head of the Neonatology Department to being with the "do" and the "study" portion of the PDSA cycle. The act portion which entails drafting an EBP P&P for MC placement will have to wait until the Neonatal Joint Practice Committee meets and approves the P&P. It is encouraging to know that there is already some physician buy-in. It was uncovered that not all of the neonatologists are participating in the antibiotic 48-hour timeout.

Conclusion

Neonatal sepsis is associated with increased mortality and morbidities which include lengthy hospital stays. The project attempts to address the way the healthcare team administers empirical antibiotics using the most appropriate VAD. By implanting this project to fruition, all members of the healthcare team can be empowered to advocate and collaborate with each other so that pain and suffering can be reduced by decreasing the number of PIV attempts which will lead to improving patient (family) satisfaction, decrease costs and preserve the neonate's future vessel health. Guidelines, recommendations, and standards of practice such as the creation of a

P&P for a MC is of the utmost importance and will provide a practice change to achieve the specific aim of reducing the number of PIV attempts in neonates by 25% by the end of 2017.

To be able to track the appropriate VAD used for antibiotic therapy, continued chart audits must be done. However, further education to the nursing staff will be needed for correct documentation in the EMR addressing the number of vessel cannulations performed with any VAD used. Data collection from the original retrospective chart audit uncovered inconsistent documentation in the EMR around the number of PIV attempted. An additional project isolating this gap is warranted.

The main take away of what I learned from this project is that nurses lack the confidence to collaborate with physicians. To accomplish the projects primary theme of patient advocacy, doing an anonymous pre-implementation questionnaire that encourages staff to be truthful as to their perceived knowledge, skills and confidence level in collaborating with physicians would greatly benefit this project and any future endeavors. By continuing this project it is my hope to encourage the nurses to become paladins which is defined as one who is a determined advocate or defender of a noble cause. This highly vulnerable population is in need of this type of nurse.

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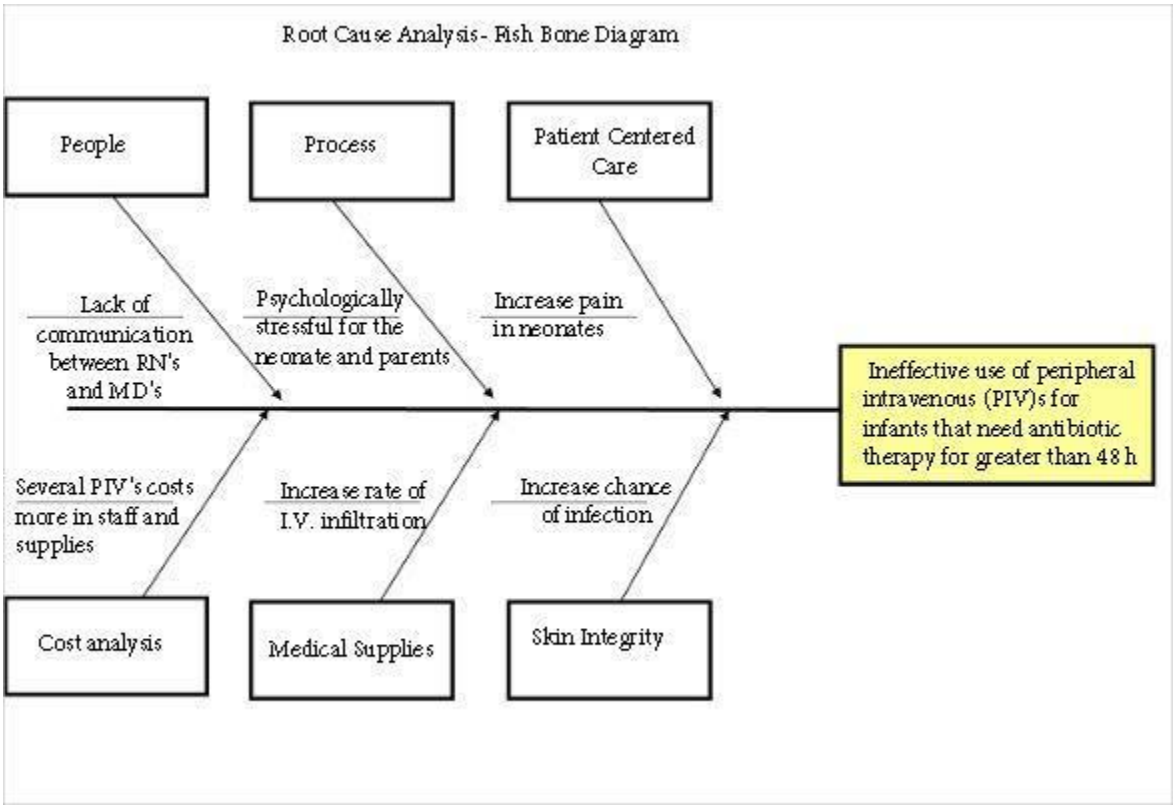
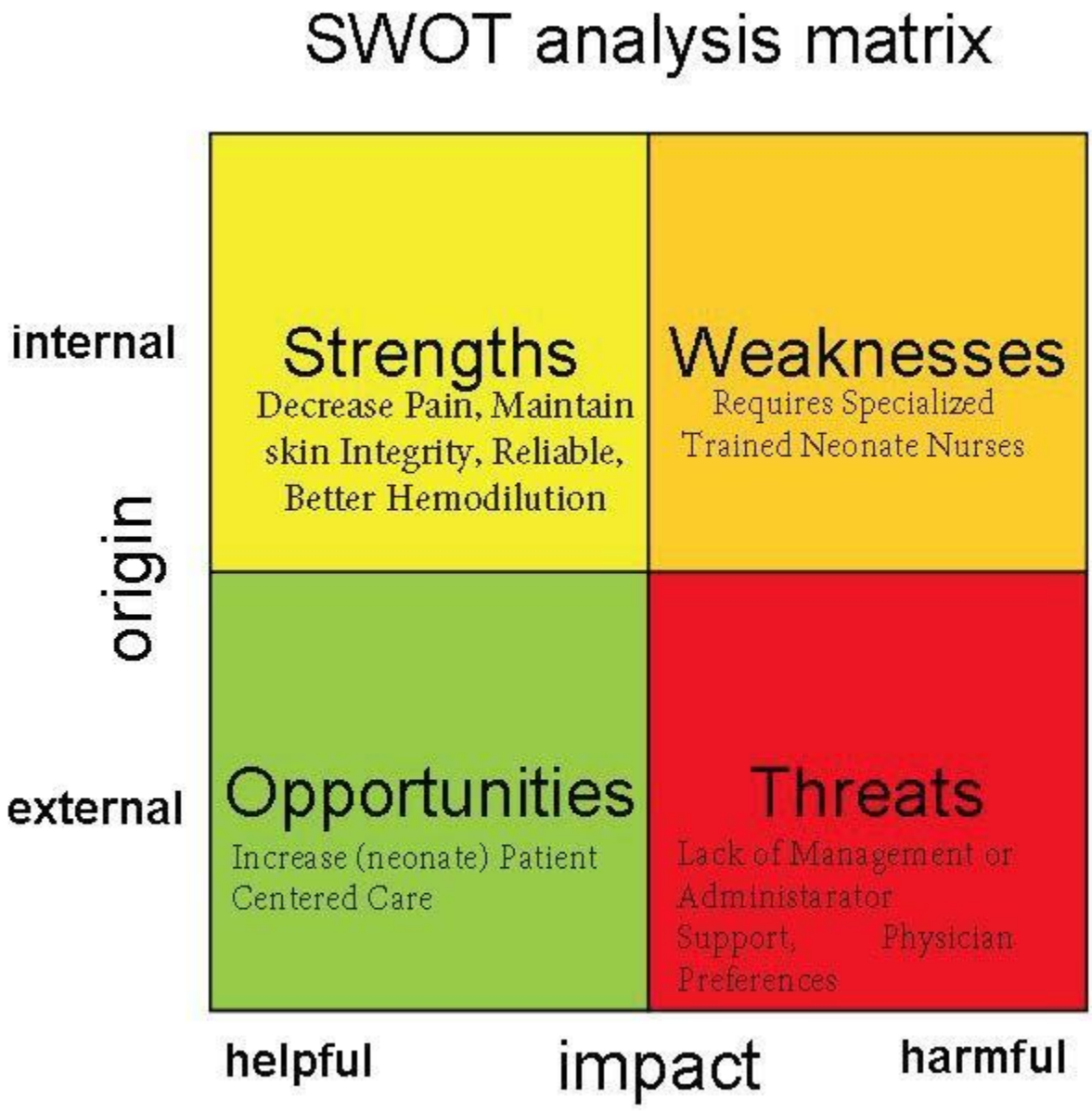
Appendix A

Root Cause Analysis- Fish Bone Diagram



Appendix B

SWOT Analysis



Appendix C

Cost Analysis

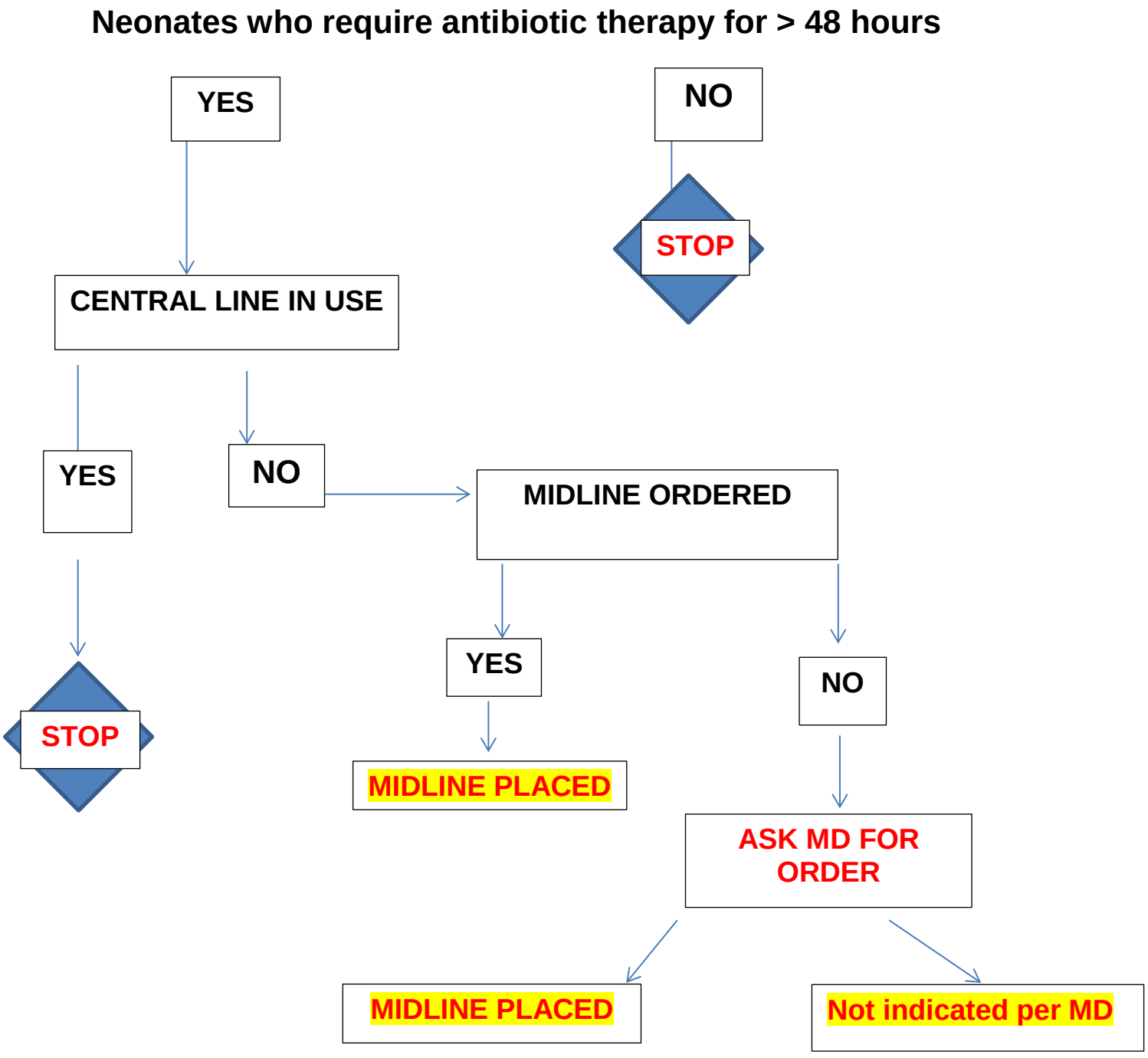
	Current PIV Intervention	Treatment of Extravasation
Price per unit	$40.00	
~3 infiltrations per 7 days	$120.00	
RN/hr (60.00/hr) x3 infiltrates	$180.00	
Total cost for PIV for 7 days	**$300.00**	
Hyaluronidase -		$105.00/dose
Surgical Intervention		2,500.00
Litigation		**$100, 000- $500,000+/case**
	Proposed Midline	
Price per unit	$160.00	
RN hr cost x1	$60.00	
Total cost for first attempt midline placement	**$220.00**	
Conclusion:		
Aug 2016 there was 23 neonates requiring antibiotic treatment greater than 48hrs and had a PIV (~3 infiltrations per 7 days	**$6,900.00**	
Proposed Midline intervention for 23 babies	**$5,060.00**	
Labor and costs savings	**$1,840.00**	
Project Cost	**$1,820.00**	

All costs are approximated

Appendix D

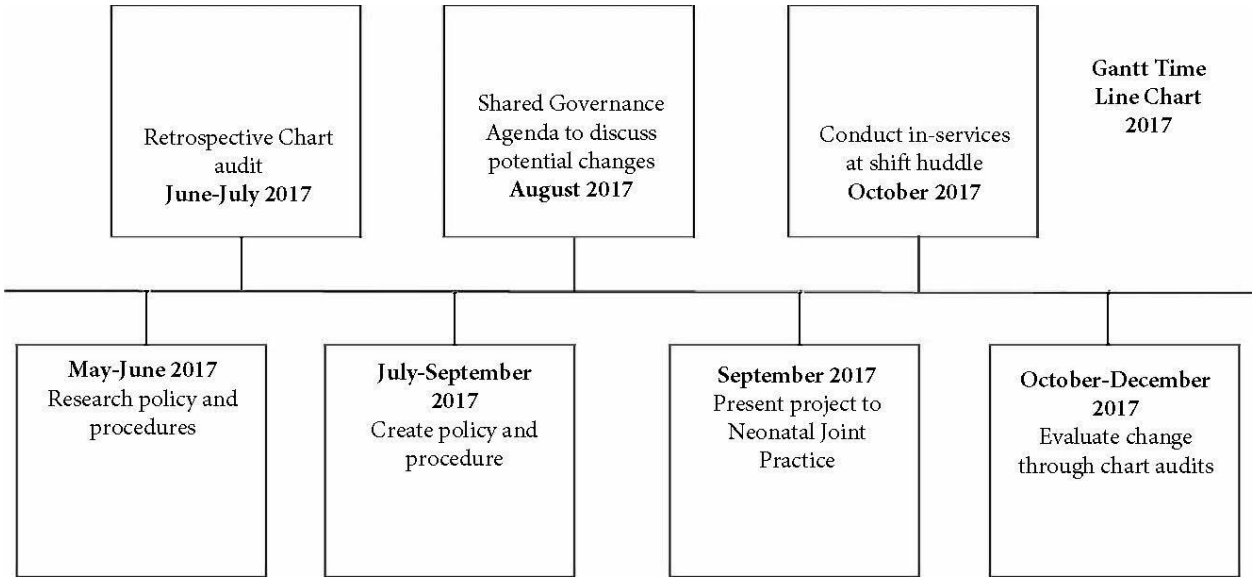
Lewin's Model of Change

Appendix E

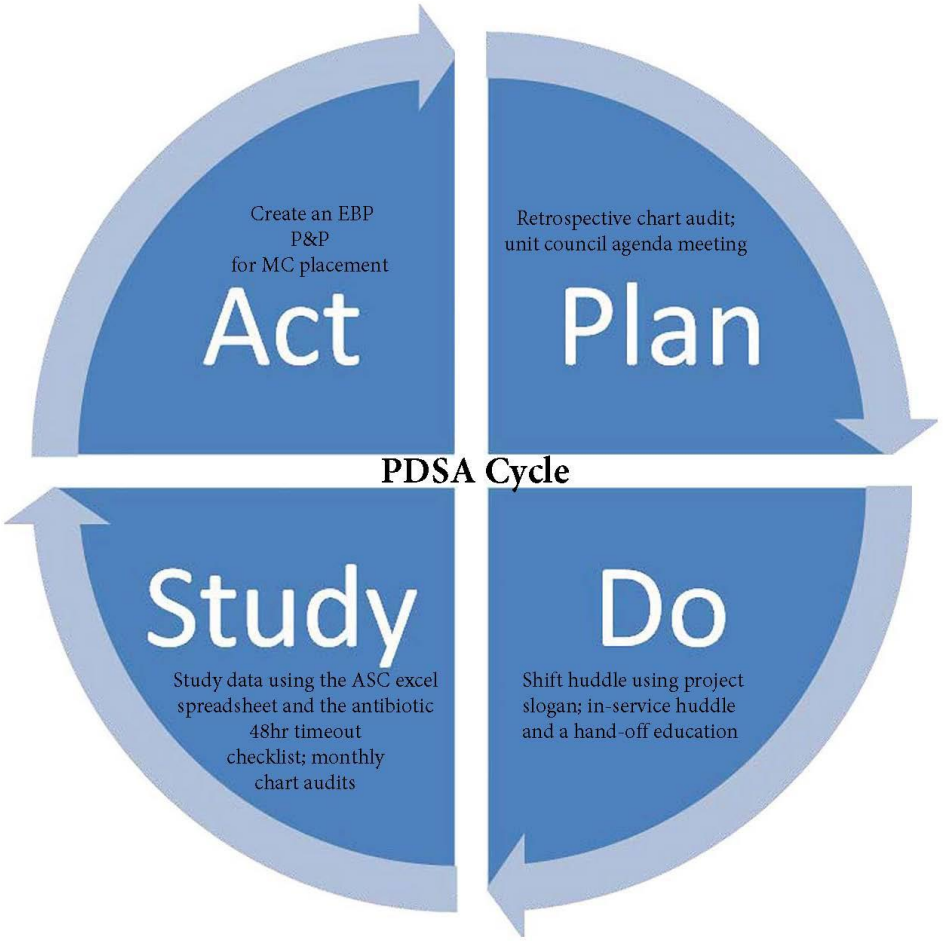

Neonates who require antibiotic therapy for > 48 hours
YES
NO
STOP
CENTRAL LINE IN USE
YES
NO
MIDLINE ORDERED
STOP
YES
NO
MIDLINE PLACED
ASK MD FOR ORDER
MIDLINE PLACED
Not indicated per MD

Appendix F

Gantt Timeline



Appendix G



PDSA Cycle

Appendix H

Antibiotic Stewardship Excel Spread Sheet

Patient Name	Medical Record #	Date of Birth	Gestational Age	Signs of Infection	Antibiotics started	Antibiotics Starting date	Antibiotic stopping date	Length of treatment	Q1	Q2	Q3