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Intravenous Catheter Antiseptics to Prevent Infections

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Executive Summary

This benchmark project is based on the need of finding a solution to reduce the amount of central and peripheral line catheters in a hospital or an outpatient setting. For years there has been catheters in the health field and it has only increased in time especially in the critical care units. These catheter infections are a huge issue! Catheter infections are the most frequent, lethal, and costly complications of central venous catheterization. It causes an increase length of stay, increase cost and an increase mortality rate. In the past there have been ways to decrease the infection but it is still present today. The question is what can we do to prevent these infections and is this the correct antiseptic needed to prevent infections? Chlorhexidine (CHG) is the solution that needs to be used This project could be the answer to the question! In this project there will be a 2% CHG applicator that will be used before insertion, during maintenance, and on removal. The project will direct a big target on maintenance because this step is where bacteria is grown and introduced the most. There will be a daily maintenance cleaning as well with chlorhexidine. On removal we will also use a chlorhexidine antiseptic method.

Rationale for the Project

In patients how does using CHG compared to other antiseptic agents affect catheter-related infections. As stated above intravenous catheter related blood stream infections is one of the most frequent, lethal, and costly complications of central venous catheterization. This increases the length of stay, the mortality rate, and increases cost. The mortality rate is 12-15% of deaths. The length of stay has increase from 10-20 days of hospital stays. There are at least 250,000 CRBSI occurred every year in the US (Gahlot, Nigam, Kumar, Yadav, & Anupurba, 2014),. This is a lot of CRBSI that could be prevented possibly by one small step such as using a better antiseptic. Central venous catheters are at a greater risk of device-

related infections than any other medical device. They are also being used more frequently in critical care needs than before with the increase of modern technology. Central venous catheters are a main source of bacteremia and septicemia entry pathway for patients. If this costs us a lot of extra money not needed to be spent, preventable deaths, and decrease the length of stay we need to focus on the specific situation more. Moving our main focus to prevention and invest in a great antiseptic routine and solution. Another big point that we are focusing on is maintenance. 60% of CRBSI were caused by micro-organisms from the patient's skin (Gahlot, Nigam, Kumar, Yadav, & Anupurba, 2014),. In the healthcare field change is needed but sometimes this may not happen due to things being okay the way they are or it may cost a lot of money to change. Without change healthcare would not be evolving the way it needs to be to be successful. Change is an opportunity for growth and development within the company. Antiseptics that are still being used but are not as effective are povidone iodine (PVI), octenidine hydrochloride, isopropyl alcohol. Following Evidence Based Practice we can keep up with the new research and have the best outcomes.

Literature Discussion to Support Project

When reviewing the literature on many scholarly search engines in regards to catheter related infections and antiseptics there were many that showed using chlorhexidine reducing the amount of catheter related infections (CRI). All 12 articles that were chosen compared chlorhexidine and another antiseptic. The research included dressings, applicators, and used a wide range of patients from pediatrics to adults. Many researches looking to find one common goal; what antiseptic could decrease the number of catheter related infections. Pages et al. (2016) compared alcohol CHG and PVI for the prevention of CVC related infections. The results showed there was a lower incidence of CRI in 2% CHG than PVI. Marty Cooney et al. (2020) compared the

use of 3.15% CHG/70% alcohol hub disinfection to prevent central line blood stream infections (CLABSI). This project focuses more on the scrub time and of the hub during maintenance. They removed the 70% alcohol swabs and alcohol hub disinfectant caps. They then replace these with the 3.15% CHG/70% alcohol for disinfection. There was a decreased amount of CLABSI with 3.15% CHG/70% alcohol prior to accessing central line hubs and grafts. Wei et al. (2019) compared several trials that evaluated CHG-impregnated dressings to other dressings or no dressing for the prophylaxis of central venous catheter-related complications. The setting is on pediatric population. The results include significant benefits in reducing catheter colonization and a decreased amount of CRBSI. Biehl et al. (2016) research also focuses on the comparison of dressings containing CHG and non CHG-dressing to evaluate the rate of decreasing CRBSI. The results showed from non-CHG to CHG a rate of 17.3% to 10.4%. Paglialonga et al. (2014) compares 0.5% CHG/70 isopropyl alcohol, 5% PVI, 2% CHG/70% isopropyl alcohol dressings for the prevention of CRBSI in neutropenic patients. Neutropenic patients are at a higher risk for CRI, so prevention is important and finding the most effective antiseptic is important. The incidence of CRBSI in CHG was 2.6% in the chlorhexidine and 3.9% in the non-CHG dressing. Safdar et al. (2015) compares CHG dressings and conventional dressings in preventing CRBSI. This setting is in pediatric and adult patients. Catheter colonization and CRBSI was decreased in CHG dressings compared to conventional dressings. Sarani et al. (2018) presents a double blinded study that shows the comparison of alcohol, CHG, and alcohol/CHG in decreasing CRI. There was a decrease rate of infections in alcohol/CHG in comparison to alcohol and CHG separately. Kieran et al. (2017) research compares 2% CHG-70% isopropyl alcohol versus 10% povidone-iodine for insertion site cleaning in decreasing CRBSI in pediatric patients. However, this research did not find any difference between the two groups. It did find that there were more

infants in PVI that had thyroid dysfunction. Timsit et al. (2012), compares CHG dressing and highly adhesive hypoallergenic dressings for CRI and catheter colonization. Results founded that the CHG dressings was 67% lower than the adherent dressings. Yasuda et al. (2017) compares three topical antiseptics (0.5% CHG, 1.0% CHG, and PVI). There was no significant difference of incidence of CRBSI between groups. Catheter-tip colonization was 3.7, 3.9, and 01.5 events per 100 catheter-days in 0.5% CHG, 1.0% CHG, and PVI. Bilir et al. (2013) compares PI, CHG, and octenidine hydrochloride. In the CHG group 0% catheter related sepsis or colonization occurred. In PI 26.3% and 21.5% in octenidine hydrocholorodine group catheter colonization occurred. Mimos et al. (2015) is a two by two factorial trial that compares chlorhexidine-alcohol, povidone iodine alcohol. This also compares skin scrubbing and without skin scrubbing. Results showed a decrease for of CHG/alcohol was associated with lower incidence of catheter-related infection. There was 4 CFU vs 41 CFU. There was no significant difference in scrubbing verses non scrubbing.

Project Stakeholders

Stakeholders are ones that will be involved directly and indirectly in the project. They will be educated to be a leader for the project and also a team. There are many stakeholders directly and indirectly involved. Directly involved include the hospital units, nurses, physicians, nurse managers and supervisors, laboratory(microbiologists), patients and their families. Indirect stakeholders include senior hospital leaders (CEOs), CDC, project teams, hospital associations, researchers, and policymakers. It is very important for engagements of senior hospital leaders. Without leadership and a strong following this will be harder for success. The senior hospital leaders can lead the projects by following participating hospital results. There also needs a

visible and supportive physician and nurse champion as well to lead the rest of the team. A leader staying committed to the benchmark project can have a clear pathway to success.

Implementation

Implementing can take time. The major phases I am including in the evaluation plan is preparation, validation, comparative evaluation/decision making and translation/application and then the last step is the evaluation phase. At first we will educate the stakeholders the indirect and indirect team. Education is a big part because we will be there to give on-on-one education. There will be pamphlets and poster boards passed out. In an education class there will be a power point held. There also will be a check off for each employee directly involved and a checklist given to the employees to follow for reminder. If you are the inserter for the central venous line the site will be thought out. Placement does matter as well. This is a sterile technique so there will need to be a partner for insertion. Before inserting the site will need to be cleaned for 30 seconds and then dry for 30 seconds. If visibility soiled repeat this step. After insertion there needs to be new infusion lines and new infusion bags if needed at the time. Maintenance is a big step to be involved because the catheter line is at the greatest risk for bacteremia and septicemia at insertion point. When changing a dressing this is also sterile and you will need an extra person with you to assist you. Dressings will need to be changed every seven days and as needed with visibly soiled or if the dressing is not intact. The chlorhexidine applicator will be used in this process. Cleaning will need to be started from the inner part to the outer section. The site will need to be cleaned for at least 30 seconds. The drying time for this will need to be 30 seconds as well. If it does not dry before the dressing is applied this can be a cause for skin breakdown and a skin reaction. Please apply the initial and date to make sure the dressing is changed every seven days. In the database insert this information to keep record. This will be a time when infections

could occur. Look for infection daily. Maintenance cleaning will be needed to be done daily as well. Chlorhexidine wipes will be needed to be used and cleaned the arm of the catheter, the dressing and then the upper side of the body. The lines that are connected will needed to be cleaned as well. During removal remove the dressing and also clean the site with CHG

Timetable/Flowchart

This benchmark project has been formulating for a year now since the PICOT. This has been a thought-out project for quite a bit of time. Initially the project started out being based around foley catheter antiseptics to prevent CAUTI (catheter-associated urinary tract infections) infections. However, I did not find a lot of research in regard to foley catheter antiseptics. Speaking to faculty members it was best if I directed the project towards intravenous catheter related infections. From there I restarted my research from August-December 2019 and successfully found many researches in regards to catheter related infections. From January-May my research continued and formulated farther and I started focusing on how to deliver the project and how to come up with a plan. This summer semester (May-August) my project is a benchmark project and the plan is formulated. This project is currently still a benchmark project and will possibly in the future.

Data Collection Method

Research data collection has been selected from reviewing other projects that have been successful. Online surveys and evaluations are used for a lot of successful projects that have been implemented. Reviews will be made and from the feedback the project will be changed if needed. The web-based data system program will be implemented for the insertion of data. There will also be a two-way ANOVA will be used to measure the quantitative data of the controlled and uncontrolled aspects.

Discussion of Evaluation

The evaluation at this point can not be completed due to this not being a project that has been initiated and finished. Evaluation of the project would be at the end of the project. After the evaluation changes could and would be made and then the project would be implemented.

Costs/Benefits

The cost and benefit is a big selling point to the project. This at a low cost but a high reward. It could possibly decrease the amount of CRI and CRBSI. For the web-based data system it would cost \$50/year. The education portion of would be free. The pamphlets and surveys would cost approximately \$200. The chlorhexidine and application for a 3ml pack of 25 is \$85.38. For a pack of 5 it would cost \$425. I did add a miscellaneous charge for anything that could come up and that is \$300. A total for these charges would be \$975.

Conclusions/Recommendations

The CHG method will be used throughout the hospital once it is used on the unit it is being implemented on. For the a outside setting once successful it will be used and other outside clinics will be able to see the data and the success from that clinic. The pamphlets and educational packets will also be given to the neighboring clinics. The continuation of calls will be held monthly until completely completed. The calls will include interested clinics or hospitals that are interested in the research.

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