Chlorhexidine-alcohol versus povidone-iodine

Although it is intentioned that surgical procedures remain sterile around 5% result in infection; infected surgical sites are the leading cause of iatrogenic infection among surgical patients (Kalb, Lefevre, Dididze, & Levi, 2013). Current practice aiming to reduce infection is comprised of cleansing the skin with a prepping agent and covering the patient with sterilized drapes and towels. Surgical site infection results in harm to the patient, delay in patients returning to previous function, strain on staff, and negatively affects a hospitals ability to be financially compensated. As infections can be caused by microbiota on the skin, cleansing the site prior to incision is an imperative step in infection prevention. There are various cleansing agents used in existing practice; however, many hospitals, including the authors, do not have a standard practice in choosing a prepping agent. The myriad of sterile preparation solutions at this institution are betadine (10% povidone iodine), hibiclens (chlorhexidine gluconate), and chlorhexidine alcohol. Current pre-operative skin preparation with one of these solutions is largely dictated by what is available, in close proximity, or surgeon preference. The 1999 Center for Disease Control (CDC) recommendations for surgical site infection prevention contains the use of antiseptic solution (Jarral, McCormack, Ibrahim, & Shipolini, 2011); moreover, no solution has been identified as preferred. Despite the hospital’s compliance with the CDC, standardizing practice may result in better patient outcomes and reduced cost.

Review of literature suggests some solutions may have benefits over others regarding infection prevention. Bazzi et al. (2016) found patients that receive alcohol based chlorhexidine solution were 30% less likely to suffer from a surgical site infection (SSI) when compared to povidone iodine. Post

application chlorhexidine has also been shown to have a sustained release action in its antiseptic properties, and, in 2002, the CDC urged hospitals to consider it first line. It is worth noting that solutions should not be used in conjunction as chlorhexidine can be inactivated by iodine and that iodine does not have the sustained antiseptic properties and is harmful to open wounds. Solutions may be contraindicated in the event of an allergy or high risk of harm such as burning, neuro-, or ototoxicity; neonates are at high risk of adverse event when using chlorhexidine. The AORN (2016) suggests all female surgical candidates provide a urine hgc pregnancy test to mitigate possibilities of harm to a fetus.

Hospitals that utilize solutions that come in a multiple use option are often at higher risk for error; this risk for error can be attributed to the human component as there may be a lack of training and differences in technique. This risk is further complicated by solutions often needing to be mixed, mixing a solution under poor or varied technique can lead to improper concentration and, thus, more infection. This risk associated with human error can be mitigated by implementing the use of one time use measured applicators. The single use system has an additional benefit of delivering solution deeper in the epidermis with application and removes direct patient touch reducing possible cross contamination. The multi-use option does provide an economic incentive on the front end; however, a possible increase in preventable SSIs would end up costing more money. As such, transitioning to a single-use applicator system both decreases risk of infection by removing potential human error and is a financially savvy option.

STAKEHOLDER

When undergoing a potential practice change involving both policy and product change a team of stakeholders need be gathered to address effectiveness, patient outcomes, and financial burden. Stakeholders will work as a team to acquire necessary information, pilot, and implement change. The stakeholder task force for the proposed change will include representation from the surgery teams, hospital board, and infection control. Infection control and surgery teams will work together to pilot a practice change regarding single use chlorhexidine; infection control is necessary because they are responsible for helping reduce risk of infection including SSIs, the surgery team (nurses, surgeons, techs, etc.) are needed as they implement and practice change. This pilot phase will aim to reduce SSIs and homogenize application technique. After the pilot phase is completed, and if it has shown to decrease SSI in piloted areas findings will be presented to hospital administration to analyze and make a final decision on practice and product change and possibly implementing system wide.

EVIDENCE BASED SUMMARY

This topic was chosen as standardized practice often leads to better patient outcomes. The author works on an inpatient transplant surgical unit. Transplant recipients are pharmacologically immunosuppressed placing them at higher risk for infection. Having a great practice model and ideal equipment is paramount in reduction of this risk.

Title #1: Chlorhexidine-Alcohol versus Povidone-Iodine for Surgical Site Antisepsis. This article provided by the New England Journal of Medicine gave

a study of surgeries and related surgical site complications with Chlorhexidine-Alcohol versus Povidone-Iodine. The article provided both pros and cons to each used and the findings consistent with using the chlorhexidine-alcohol prep for surgical cases. Title #2: Comments on review of preoperative skin prep study. This article is from the AORN and is information from surgeons and surgical nurse’s opinions and finding or results on preferred surgical site prep solutions. Title #3: Pre-Application Evaporation of Surgical Preparation Solutions: Does It Matter? This study was to confirm that surgical prep solutions that contain alcohol were better at eliminating microorganisms. The CDC does not have any antisepsis guidelines regarding how long surgical prep solutions can be left out in open air prior to surgery. Samples in the study were taken at an initial set up time, 30 minutes, 60 minutes, and 120 minutes of the time the solution was set out in open air. The Alcohol Iodine solution showed a large decrease in the amount of alcohol content of the solution in only 30 minutes. The Alcohol Chlorhexidine solution had only a marginal drop over the 120 minute interval. The end conclusion of this study was that it had a recommendation for surgical prep solution to be used immediately after pouring and that alcohol chlorhexidine did not have a significant loss of alcohol concentration if it was set out prior to the surgical case. Title #4 Should Surgeons Scrub with Chlorhexidine or Iodine Prior to Surgery? This study is a meta-analysis study that questioned whether chlorhexidine was equal to or a better surgical hand scrub than povidone iodine. The study researched 593 papers. The study was found to reveal that even though both solutions reduce that bacterial count post scrubbing, the chlorhexidine was in fact better to use and longer lasting. In order to determine this, the studies determined how

many colonies of bacteria were reduced after the use of each different hand scrub. The studies also measured bacterial colony counts for a number of days post-surgery. The clinical bottom line was that chlorhexidine and povidone iodine both had a reduction in bacterial counts immediately after scrubbing but the chlorhexidine had a greater reduction. Povidone iodine showed a lack of residual activity when compared to the chlorhexidine. Title #5: The use of Anti-Septic Solutions in the Prevention of Neurosurgical Site Infections. This is a cohort study that sampled recent meta-analysis to evaluate the different methods of surgical pre solutions used at different institutions across the US. The solutions being evaluated were betadine, Dura prep, chloraprep, and the possible combination of the three. The study used 128 surgical departments and the departments were to provide surgical site infection percentages. It was the conclusion of this study that even though research literature supported the use of chloraprep over betadine and Dura prep, the majority of the surgical institutions continued to use the betadine solution.

RECOMMENDATION

The goal for any type of surgical cleanse solution will be to reduce any instance of surgical infections in a safe, cost effective, and complete manner. The hospital will choose the right product that is cutting costs, being most effective, saving surgical time, and has the safest results for the patient. The cost by the initial purchase of the prefilled solution applicators might be slightly more than multi use bottles, but the money will be saved by providing a prep that is less messy, applied quicker, more efficient, and improves drape adhesion. These are all benefits that will prevent the sterility

of the patient’s surface from being compromised (Parson, 2003). As the hospital develops a standardized protocol for a surgical cleanse solution, the cost saving measures can be visualized through buying the one cleanse in bulk and the patient safety numbers for a reduction in infection rate. Based on the reviewed literature, it is recommended that the hospital change to a standardized chlorhexidine solution and use a povidone iodine solution in those cases where a patient could be allergic to chlorhexidine or if chlorhexidine is contraindicated in a particular surgery. The surgery department will also set new standards on preparation of the chlorhexidine and iodine solutions based on the research completed. Both of the prep solutions will not be prepared by the OR tech until the patient is on the operating table. The solution used will be used from unopened containers and any excess in the bottles will be discarded as waste to ensure adequate alcohol concentrations of the solution.

PRACTICE CHANGE MODEL

The facility with use the Eight Step change model proposed by Kotter; the desired outcome is successful implementation of the practice change with few delays. The initial step creates urgency and necessity for change; infection control and surgical departments will collect data on current infection rates. Subsequently, stakeholders will find staff that agrees with the change and has a desire to carry the change forward. Unit councils and word of mouth from employees to their peers will show change is need and there is general support for the practice change. During the third step a formalized vision and strategy for change will begin to circulate. The strategy will involve emails, flyers in staff viewing areas, and discussion at every staff

meeting. The vision will circulate on all surgical units simultaneously to encourage organic support. After the vision is clearly established then communication from management, administration, and perceived staff leaders will relay the importance of the practice change. Kotter’s fifth step will include destruction of potential kickback and barriers to change. Kickback can include resistance to change, old materials still available, and old policies still accessible. These barriers can be undermined by updating policy and removing any supply that is out of compliance with the practice change. Conversely, the next step includes positive reinforcement and reward for short term achievable goals. This includes a stepped approach at compliance and acknowledging staff for their work and desire to do what is best for the patient. Step seven builds on step six, but cautions too much reward to early; rewards should not be used as motivation or signal completeness. Rewards a necessary; however, they are to be used as progress markers. Anchoring the practice change as the stauts quo is the final step in implementation. The change must have support of staff and administration and become the only standard of care. (Schmidt & Brown, 2012). F1 and F2All operating rooms must be meticulously sterile and safely maintained; this attention to detail is essential for hospitals wishing to provide quality care and prevent possible infection. Infections at the surgical sire are dangerous for patients and damaging to hospitals. The dangers to patients include delayed healing and readmission; hospitals suffer a financial loss. In addition to financial loss, the institutions reputation cn be affected potentially leading to fewer people seeking out care at the facility resulting in increased strain on other hospitals and delay of patient care. Education leaders at the facility till set up in-service opportunities to provide staff with

appropriate knowledge and procedures for implementing change. The hospital will set new SSI goal rate, information about the new solution, and stressing the importance of wasting opened unused solution and materials. Elsewaisy, Ameen, & Sydenham, (2012) suggests using professional resources from the manufacture to provide proper education. During the first week of the implementation of the new solution, there will be extra staff in the operating rooms in assisting with proper application for prepping the surgical patients. Data will be collected at intervals of change week, at two weeks post change, one month post change, three months post changes, and six months post change. This data will be measured to determine if the goal of decreasing surgical site infection rate was achieved.

BARRIERS

Research, evidence-based practice, and practice change invariably meet resistance when challenging the status quo. As the proposed project change will rely heavily on staff nurses, it is necessary to both involve staff in the development stage and provide succinct easily digested rationale to encourage ownership of the practice change. Various reasons can prevent bedside nurses from becoming vested in a practice change from lack of knowledge or training in interpreting and applying research to being focused on their respective daily tasks and care of the patient. The administration and stakeholders must make the practice changes goals attainable and show the end-user (nurses) the benefits both to their workflow and the safety of the patient. To combat potential resistance administration should support and encourage the nursing staff to ask questions and provide insight into how practice change will flow smoothly; presenting the practice change as

an opportunity to grow and provide better care with encourage many staff nurses to get on board with the change. The hospital discussed provides several resources for nurses and other staff to perform their own research. As the change is relatively simple and straightforward after initial resistance is discussed many barriers dissipate; making the practice change the new normal makes training easier as new staff will only be trained in one method contributing to a paradigm shift in groupthink. Remaining barriers include cost and vendor problems. As previously discussed the upfront cost is greater than current practice; however, successful implementation will decrease SSIs, thus decreasing costs and justifying upfront expenses. Vendor problems and supply chain interruption could hinder implementation in the future; moreover, these are problems outside of the organizations control.

Before change a starting point to be used as a frame of reference is imperative to determine the gap from current to desired practice. This reference point can be used to identify any other barriers that could arise, and will signal stakeholders the appropriate amount of education and time to prepare for full practice change. This can be done with focus groups, online questionnaires, and staff observation. Assessing and listening to the concerns and needs of the staff will mitigate any barriers the organization will face in its practice change.

ETHICAL IMPLICATIONS

The range of possible ethical implications in this proposed practice change is veritably limited. One could stretch a line of thinking proposing that key drivers in the practice change also have financial ties to companies that

could possibly receive contracts due to these practice changes; however, such speculation is fanciful and out of line. Utilizing a cost benefit analysis, one could argue that it might be unethical to not move forward with a practice change, as the practice change suggests lower rates of SSI and therefore potentially decreases overall cost. As the practice change involves a trial period, all patients will be informed and asked to give consent before partaking in the trial phase. Because the proposed change does not single-out any specific group of patients complies with HIPAA regulations minimally ethical considerations will surround patient privacy. It appears the only concern for unethical outcomes related to this practice change would be gross negligence or intentional violation of the law.

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