Chlorhexidine-Alcohol is Better Than Chlorhexidine and Povidone Iodine for Reducing Surgical Site Infection

Adelia Rochma, Carina Rega Utomo, Sanda Prima Dewi and Edy Purwanto
Department of Nursing, Universitas Airlangga, Mulyorejo, Surabaya, Indonesia
Adelia.rochma-2017@fkp.unair.ac.id, Carina.rega.utomo-2017@fkp.unair.ac.id, Sanda.prima.dewi-2017@fkp.unair.ac.id, Edy.purwanto-2017@fkp.unair.ac.id.

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Abstract: Background: Surgical Site infection (SSI) has been known as a hospital-acquired infection that need a proper and efficient treatment. SSI cause adverse impacts for clients and Hospitals, include length of stay, delayed recovery, those lead morbidity and mortality especially in developing country. This systematic review aims to compare the effectiveness of Chlorhexidine-alcohol, Chlorhexidine and povidone-iodine to reduce SSI. Method: Literature are obtained by searching the ScienceDirect, Scopus, PubMed and BMJ databases between the year 2013 and 2017. The literature inclusion criteria are those using Randomized Controlled Trial (RCT) design and comparing the use of Chlorhexidine-alcohol, Chlorhexidine and povidone-iodine as skin preparation to reduce SSI. Result: Chlorhexidine-alcohol concentration is mostly used and recommended to reduce SSI. Conclusion: Chlorhexidine-alcohol is more effective on reducing SSI than Chlorhexidine, and povidone-iodine.

1 BACKGROUND

Surgical Site Infections (SSI) categorized as global health problem nosocomial infections. The nosocomial infection is very detrimental to the patient and his family because of the increase of treatment time, emotional stress and financial burden. A European study mentioned that SSI can increase the average extension of hospitalization up to 9.8 days at a cost of 325 euro per day and the total cost from 1.47 to 19.1 million euros annually. Another study in the United States noted increase of hospitalization reached one million person / day and an additional charge of up to 1.6 million dollars. Most bacteria that cause wound infections in surgical wards are Pseudomonas sp.29.27%, 21.95% Staphylococcus epidermidis, Klebsiella sp.14.62%, 19.44% Escherichia coli, and Staphylococcus epidermidis 13.89%. Prevention in the incidence of SSI can be done with the use of antiseptic. Some types of antiseptic solution which has been used clinically and in experimental stages include hydrogen peroxide, povidone-iodine solution, chlorhexidine gluconate, hexachlorophene, sodium hipochlorite, benzalkonium chloride, and various types of solution containing alcohol. The most common use is chlorhexidine-alcohol. Some studies show the effect of the use of chlorhexidine-alcohol on the incidence of surgical site infection prevention. This systematic review aims to prove the effectiveness of the use of chlorhexidine-alcohol using 10 studies that have been published.

2 METHODS

Literature search is restricted to the use of chlorhexidine on preoperative skin preparation. Literature studied is that the English language in order to facilitate the review. The database used in the source literature search was Scopus, ScienceDirect, BMJ, and PubMed with the keyword “Chlorhexidine” AND “skin preparation” AND
"Preoperative" by year published between 2013-2017. Sorting article begins by using inclusion and exclusion criteria. Literature has been found then do grading to determine the validity of the quality of the article to be used.

3 RESULTS

The study found 11 journals published within the last 5 years between 2013-2017. The study was conducted abroad, namely Ireland, India, USA, Louisiana, Germany, Maryland, Madison, Philadelphia, Mexico, Melbourne, Taiwan, and South Korea. The research method was found in the article: Randomized controlled trial (n = 10). The study design the most is: Randomized controlled trial with 2992 respondents most respondents is found in one study 11.

3.1 Instrument

Overall article examined centers for Disease Control and Prevention criteria: SSI as a measuring tool to validate SSI occur. Measurements using the standards set by the Centers for Disease Control and Prevention criteria: SSI

3.2 Dose use of Chlorhexidine (CH)

Findings use of Chlorhexidine Gluconate 4% found in two studies. 2% chlorhexidine found in 8 studies 214 457169, 0.5% chlorhexidine found in three studies

3.3 Dose use of Povidon Iodine

Use of antiseptic found PI 7.5% IPA 0.7% was found in one study, 70% PI was found in two studies

4 DISCUSSION

Chlorhexidine is an antiseptic ingredient given to the client in an effort at preoperative skin preparation for SSI prevention. The higher concentrations in the use of chlorhexidine proven effective in preventing the occurrence of surgical site infection compared to use of povidone iodine 14. Chlorhexidine 2% is the most widely used products in the research and even almost a whole. Chlorhexidine is characterized as a strong base with a cationic composition. There are two basic free and stable salt formed by a white or yellowish sightings. Diguclonate chlorhexidine, chlorhexidine gluconate (CHG) and chlorhexidine solution of chlorhexidine phosphanilate is a colorless, odorless and has an extreme salty taste. Chlorhexidine is an effective broad spectrum biocide against gram-positive, gram-negative bacteria and fungi. Chlorhexidine inactivates microorganisms with a broader spectrum than other antimicrobials (eg antibiotics), and has an kill more rapidly than other antimicrobials (eg Povidone-Iodine). Chlorhexidine also have a bacteriostatic mechanism (inhibits bacterial growth) and bactericidal (killing bacteria), depending on the concentration. Chlorhexidine kills by means of disrupting the cell membrane. In vitro application, can kill 100% gram-positive and gram-negative within 30 seconds. Since chlorhexidine formula could destroy the majority of microbes, the less risk the possibility of infection. How it works is to apply in topical chlorhexidine, which has a unique ability to bind directly in human tissue proteins such as skin and mucous membranes with limited systemic or physical absorption. Protein-bound chlorhexidine will escape slowly hanging from prolonged activity. This is called substantivity and extends the duration of antimicrobial action against a broad spectrum of bacteria and fungi. In fact, the antimicrobial activity has been documented approximately 48 hours the skin. It doesn’t like povidone iodine, chlorhexidine is not affected by the total body fluids. Chlorhexidine is also applied to medical procedures such as dental installation, vascular catheters and others. Chlorhexidine when applied to medical, it can kill the organism and protection from microbial colonization.

4.1 Implications for Nursing Practice

The usage of Chlorhexidine in skin preparation provides prevention of surgical site infection. The concentration and the client's skin condition into consideration in the application of Chlorhexidine. So far there are no studies suggest long-term use side effects and a higher concentration in the skin or tissue. Study or research need to be developed by comparing Chlorhexidine with a higher concentration of the effective time for an efficient and effective usage of Chlorhexidine

5 CONCLUSION

The aim of this systematic review is understand the effectiveness of Chlorhexidine on preoperative skin
preparation. 2% Chlorhexidine-alcohol findings more widely used in research and applied in general. One study combines chlorhexidine with povidone iodine. But it needs for further research into the long-term use with a higher concentration.

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