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RESEARCH ARTICLE

TO EVALUATE AQUEOUS BASED CHLORHEXIDINE ANTISEPTIC SOLUTION 4% VS AQUEOUS BASED POVIDONE IODINE SOLUTION 10% FOR CENTRAL VENOUS CATHETER CARE

[1,*]Mr. Aejaz Ahmad, [2]Mr. Sagar Kulkarni and [3]Ms. Tejashri Ligade

[1]Symbiosis Institute of Health Sciences, Senapati Bapat Road, Pune 411004
[2]Vivo Healthcare, Pune
[3]Symbiosis college of Nursing, Pune

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ABSTRACT

Central venous cannulation (CVC) is an invasive procedure that is considered as a minor surgery requiring local anaesthesia. It can be also used where placement of peripheral IV cannula is difficult. Even though such catheters supply essential vascular access. Employment of these catheter takes patient into the risk of local and systemic infection complications including local site infection, catheter related bloodstream infections (CRBSIs), septic thrombophlebitis, endocarditis, and other metastatic infections.The infection caused by CVC is colligated with increased morbidity, mortality, duration of hospitalization and medical costs. To prevent catheter related bloodstream infectionsuse of antiseptic solutions for catheter insertion is used to dis-infect the skin. Povidone-iodine solution is the most frequently used agent for CVC. In some countries chlorhexidine is more used than povidone-iodine and is available in different formulations (0.5 - 4%) and can be taken single or in combined with other products like alcohol & cetrimide.

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INTRODUCTION

Catheterization of central venous vessels allows access for hemodynamic monitoring, administration of drugs, fluids and parenteral nutrition, Central venous cannulation is an invasive procedure that is considered as a minor surgery requiring local anaesthesia. It can be also used where placement of peripheral IV cannula is difficult. Even though such catheters supply essential vascular access, Employment of these catheter takes patient into the risk of local and systemic infection complications (Maintaining vascular access devices, 1998; Intravascular-catheter-related infections, 2017; Centers for disease Control and Prevention, 2001). Including local site infection, catheter related bloodstream infections (CRBSIs), septic thrombophlebitis, endocarditis, and other metastatic infections (Excess mortality in critically ill patients with nosocomial bloodstream infections Chest, 1991). The ICU patients are highly infected due to several factors such as age, severe illness, and latent disease conditions combined with a critical illness (http://www.thelancet.com/ journals/lancet/ article/ PII0140-6736(91)90479-9/abstract, accessed on 13-04-2017).

Corresponding author: **Mr. Aejaz Ahmad,**
Symbiosis Institute of Health Sciences, Senapati Bapat Road, Pune 411004.

The infection caused by CVC is colligated with increased morbidity, mortality, duration of hospitalization and medical costs (www.sciencedirect.com/science/ article/ pii/ 01966 553 9590 0020; O'Grady, 2017). To prevent CRIuse of antiseptic solutions for catheter insertion is used to dis-infect the skin (Parienti, 2017). Povidone-iodine solution is the most frequently used agent for CVC [9]. CVC used in intensive care units is general and is associated with possibility of significant infections[10]. Different antiseptic solutions are used like chlorhexidine or povidone-iodine with alcohol or aqueous based for catheter insertion at different sites[11]. The povidone-iodine solution was initially available in aqueous solution and more recently it is also available as an ethanol based solution (Betadine alcoolique) [12]. Presently, PVP-IA is considered to be chosen product for central venous catheter care[13]. In some countries chlorhexidine is more used than povidone-iodine and is available in different formulations (0.5 - 4%) and can be taken single or in combined with other products like alcohol & cetrimide[14].

MATERIALS AND METHODS

The study was be conducted in the Department of Anaesthesiolgy, Ratna Memorial Hospital It is a prospective double blind study of 1 year in which patients planned for CVC under local anaesthesia was randomly allocated in 2 groups of 30 each.

Inclusion Criteria

Either sex
Age group 18 – 65 years
All successive plan no tunneled CVC anticipated to stay in place for 3 or more days.

Exclusion Criteria

- Patient refusal,
- Patient with bleeding disorders or on anticoagulant therapy,
- Catheters placed beyond the ICU,
- In patients with a history of allergy to any of the antiseptic agents studied,
- Less than 3 days.

Patients thus selected were divided into two groups of 30 each GROUP I – chlorhexidine 4% antiseptic solution. GROUP II- 10 % povidone-iodine antiseptic solution. Detailed history, physical examination, ECG, blood pressure, oxygen saturation and routine investigations(CBC, Complete urine examination) was done. Fasting blood sugar or any other special investigation was done depending upon the disease process and was recorded in all cases preoperatively. A written informed consent was taken from all patients. Before & during dressing change & catheter insertion the similar antiseptic solution was used for skin disinfection. Trained physiciansinserted the catheters by using all aseptic precautions. Skin was dis-infected before placement of sterile drapes and again after placement of drapes, catheter was inserted after skin dis-infection is applied. After application of antiseptic solution allowed the skin dry for at least 30 seconds. The 20-cm-long, 7F, triple-lumen, unimpregnated PCVC was inserted percutaneously using the Seldinger technique. Sterile pad was applied for dressing after insertion and dressing was removed after every 72 hours or earlier. Dressing was changed by a nurse wearing a sterile gloves, mask and a cap. The site where the catheter was placed was checked for any indication of infection or inflammation, if infected it was cleaned with the more antiseptic solution and a new sterile pad was applied. Topical disinfectant or germicidal ointments and disinfectant filters were not used on any catheter in this study.

Once physician took decision to remove catheter, it was taken off by using all aseptic precautions. The lower 5cm of the catheter was cut off with sterile scissors and put in a sterile tube, which was directly taken to the microbiology lab. According to the standard methods of clinical microbiological lab, all cultures will were handled properly. CRBSI will be explained as the segregation of the same organism (i.e. the very species with similar disinfectant susceptibility).Patients with clinical presence of infection and no other visible source except the catheter colonization, at least 1 cultured PBS was taken 48 hours before and after catheter removal. Central venous catheter tip colonization was checked by application of semi quantitative culture method. A CVC-RI was explained as the existence of local indications of infection (pus, inflammation, or pain) or of widespread indications of infection together with confirmation for central venous catheter colonization or a ≥ 5-folds elevated bacterial count for the central venous catheter tip either for the interval of denary PBC, with voluntary decision within 48 hours of central venous catheter removal. Central venous catheter –related bacteremia will be explained as bacteremia onset 48 hours before and after central venous catheter removal.

RESULTS

A total of 60 patients were included in the study of which 50 were males (50%). The mean age of the patients was 42 years. In some countries chlorhexidine is more used than povidone-iodine and is available in different formulations (0.5 - 4%) and can be taken single or in combined with other products like alcohol & cetrimide [11]. Occurrence of catheter colonization is 50% less with the use of chlorhexidine base solution, when compared with povidone-iodine [13].

DISCUSSION

The use of a chlorhexidine-based solution for central venous catheter care was associated with a lower rate of colonization and a trend toward a lower rate of bloodstream infection than the use of alcohol-based povidone-iodine.

Table 1. Comparisons of mean counts of skin microorganisms before and after disinfection in each group

Time	PVP I		Chlorohexidine group		Independent t test	P
	Mean	SD	Mean	SD		
Before disinfection	166.27	24.2	163.40	23.13	0.08	0.93
After disinfection	15.31	8.75	48.29	14.17	1.97	0.049
Paired t test	6.11		4.74			
P	<0.001		<0.001			

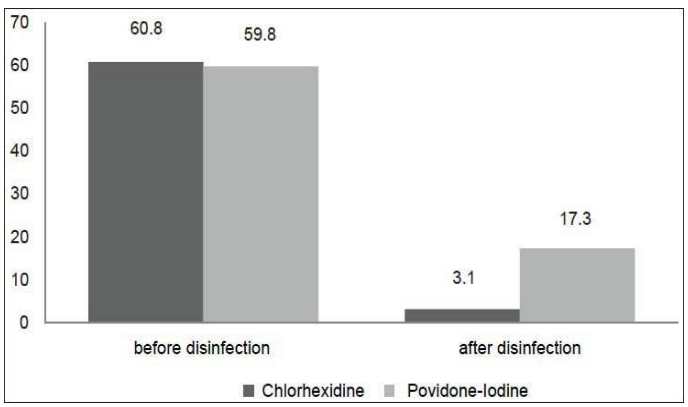

Figure 1. Percentage of positive skin cultures before and after disinfection with povidone-iodine 10% and chlorhexidine 2% solutions

Our findings of remarkably low incidence densities of catheter colonization and catheter-associated bloodstream infection associated with the use of a chlorhexidine-based solution (9.7 and 1.4 per 1000 catheter-days, respectively) were similar to rates previously reported with the same antiseptic solution (8 and 2 per 1000 catheter-days, respectively).By contrast, incidence densities of catheter colonization and bloodstream infection with povidone-iodine (18.3 and 3.4 per 1000 catheter-days, respectively) were slightly higher than those previously reported with the same method of catheter culture (15.2 and 1.1 per 1000 catheter-days, respectively). Our results are likely to be generalizable to a variety of chlorhexidine-based solutions and clinical settings according to the results of a meta-analysis comparing chlorhexidine and povidone-iodine for vascular catheter-site care.This meta-analysis included a variety of patient populations in different types of medical centers requiring peripheral, arterial, or central venous catheters and using different types of chlorhexidine-based solution for catheter care, including 0.5% or 1% chlorhexidine alcoholic solution, 2% chlorhexidine aqueous solution, and the mixture used in the present study. The magnitude of risk reduction for catheter colonization and catheter-related bloodstream infection was consistent across studies, regardless of the type of chlorhexidine-based solutions used or the setting in which care was provided.

Conflict of Interest: Nil

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