SANITIZER LOTION IN THE OPERATING ROOM

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Hand disinfection using 4% chlorhexidine gluconate or natural soap during hand scrubbing followed by hand-based 1% chlorhexidine gluconate hand sanitizer

Materials and Methods

Abstract

Objective: Hand hygiene using either 4% chlorhexidine gluconate or natural soap during hand rubbing, followed by alcohol-based 1% chlorhexidine gluconate sanitizer lotion in the operating room was compared to assess bacterial reduction, skin moisture, skin texture and hand hygiene using qualitative questionnaires and in vivo measurements. Approach: A cross-over study with 36 professional nurses at two medical centers was performed to compare the microbial load on the hands of 24 participants using 4% chlorhexidine gluconate followed by alcohol-based 1% chlorhexidine gluconate sanitizer lotion, the Waterless method, with a natural soap followed by an alcohol-based 1% chlorhexidine gluconate sanitizer lotion, the Waterless method, after a period of 10 days of use. The study completely blinded and randomized. Results: There was no significant difference in bacterial reduction based on the bacterial colony forming units between the two methods. The skin moisture and skin roughness scores were not significantly different between the two methods. The Waterless method was significantly better than the alcohol-based soap regarding "quality", "quantity", and "longevity" (P<0.001, P<0.001 and P<0.001, respectively), but "disappearance" was significantly better by the Two-stage method (P=0.0095) during washing and rubbing. Conclusion: The Waterless method using natural soap during handwashing followed by alcohol-based 1% chlorhexidine gluconate sanitizer lotion is as effective as the Two-stage method of 4% chlorhexidine gluconate followed by alcohol-based 1% chlorhexidine gluconate sanitizer lotion.

Introduction

Micro-pathogens and organisms that may cause surgical site infections, SSIs, come from a variety of sources within the operating room, including the surgical members’ hands. Members of the surgery team wear sterile gloves to prevent the transmission of bacteria from their hands to patients. Surgeons, however, it is necessary to keep the hands pathogen-free. This is accomplished by cleansing the hands immediately before wearing sterile gloves prior to performing surgical procedures. Handwashing removes transient microorganisms, which may be further maintained by resident microorganisms, thereby minimizing the risk of a patient developing an SSI (1). Surgical hand preparation plays an essential role in the prevention of SSIs, which are reported in 2-5% of inpatient surgical procedures in the United States (2). Colonization of the causative pathogenic bacteria of SSIS leads to wound chronicity if the pathogens are not controlled properly (3). SSIs are a risk factor for death and are considered to increase healthcare costs (4). Colonization of the causative pathogenic organisms, biosafety level 2, and emerging viruses (5), in the operating room can cause hospital-acquired infections (6). A povidone iodine solution was demonstrated to be superior to soap and water washing over 6 months in 50 healthcare workers, hand rubbing significantly reduced the microbiological load more than handwashing in the palms and the back of the hands (7). Immediate after washing and rubbing, the Waterless method was significantly better regarding "tightness", "quality", "quantity", and "longevity" whereas the Two-stage method was significantly better regarding "sickness" (P<0.014, P<0.001 and P<0.0095, respectively).

Methods

- Sampling was performed according to the partially modified EN12791 method. Sampling fluid was plated on the spot, and all intervals between sampling and plating did not exceed 30 min. All cultures were plated within the same day.
- For pre-handwashing or hand scrubbing, each hand was soaked in 10 ml of Trypsin Soy Broth (TSB, Nissui Pharmaceutical Co., Ltd., Tokyo, Japan) for 1 minute, and 100 μl of the solution was placed onto a petri dish over Trypsin Soy Agar (TSA, Nissui Pharmaceutical Co., Ltd.) at 37°C. Immediately after handwashing, the left hand was soaked in 10 ml of 0.9% sodium chloride solution for 1 minute. A 10 μl aliquot of the solution was placed onto TSA at 37°C as test sites. Post-surgery, the same solution was soaked, and the solution was placed onto the same way as the left hand immediately after handwashing.
- TSA plates were incubated at 37°C in a 5% CO2 incubator for 24 to 48 hours until colony forming units, CFU, were calculated. After further incubation for 24 to 24 hours, the plates were recounted, and the greater value was used. The RF, which was calculated as log10(CFU hand washing/CFU hand rubbing) was used to evaluate with hand rubbing with plain soap and water. Based on the RF, hand rubbing was measured. To assess the culture system, before and after washing/sanitizing on the left hand and before and after surgery on the right hand were evaluated.

- The log10(CFU/mL) was calculated as follows:
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  \log_{10}(\text{CFU/mL}) = \log_{10}(\text{Counts}) - \log_{10}(\text{Sample Size})
  \]
  - The weighted mean CFU per mL
  - The CFU counted on plates for calculation
  - The volume of inoculum on the plate in mL
  - The dilution factor corresponding to the sampling fluid

Results

- There were no significant health problems or serious adverse events among the participants in this study. The nurses, surgeons, other healthcare professionals, patients and investigators, no patients developed SSIs and there were no infections in the surgical ward for up to 2 months postoperatively. The study was uneventful, and subject to data storage and analysis.

Conclusions and Key Findings

- The Waterless method was significantly better than the Two-stage method regarding "quality", "quantity" and "longevity" (P<0.001, P<0.001 and P<0.001, respectively), but "disappearance" was significantly better by the Two-stage method (P=0.0095) during washing and rubbing. Immediately after washing and rubbing, the Waterless method was significantly better regarding "tightness" and "quality", whereas the Two-stage method was significantly greater regarding "sickness" (P<0.014, P<0.001 and P<0.0095, respectively) (Table 1).

References