

## Alcohol Based Handrub versus Traditional Hand Scrub as Surgical Hand Disinfection in a Tertiary Eye Teaching Hospital in Iraq

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### Abstract

**Aim of the study:** To compare alcohol-based handrub solutions and standard surgical scrub in preoperative hand disinfection.

**Methods:** Single center, blinded, controlled study performed over a period of 4 weeks in the Ibn Al Haithem hospital. Surgeons, seniors and residents (with more than 2 years of experience) volunteered for inclusion in this study by taking their fingerprints on blood agar before and after hand disinfection.

The two methods of disinfection were the following:

**A:** Alcohol-based handrub with sterillium. The solution is applied to the hands for 1.5 min and then left to dry. The fingertips and thumb prints are then taken on blood agar plates.

**B:** The hands are washed with soap and water using a gentle brush for 5 min and then left to dry. The fingertips and thumbprints are then taken on blood agar plates.

**Results:** One hundred samples were collected twice. Fifty volunteers were in each group, and samples were collected before and after washing the hands.

The mean reduction in colony counts was 104.6 ( $P < 0.001$ ) in the alcohol group.

The mean reduction in colony counts was 18.6 ( $P > 0.001$ ) in the standard scrub group.

**Conclusion:** In preoperative hand disinfection, alcohol-based handrub significantly reduces the bacterial colony counts compared with standard surgical scrub.

**Keywords:** Alcohol rub; Scrub; Preoperative hand disinfection

### Introduction

Endophthalmitis is a serious medical condition with a high morbidity rate. The source of infection usually cannot be identified with certainty. The flora of the eyelids and conjunctiva are the most frequent infection source, including contamination via incisions in the early postoperative stages. Other potential infection sources include contaminated solutions and instruments, environmental air and the surgeon and the other operating room personnel. Because the skin cannot be sterilized, it must be properly prepared [1].

Despite significant advances in glove manufacturing techniques and developments in surgical instrument design, glove perforation rates have been reported to be as high as 17%, which emphasizes the importance of good hand antisepsis [2].

In the main tertiary teaching eye hospital (Ibn Al Haithem) in Iraq, the traditional hand scrubbing technique using water and soap with a brush had been standard practice for many years; however, in recent

years, alcohol sanitizing preparations became available in the hospital. Some surgeons have continued to use the traditional scrub technique, whereas others have changed to alcohol-based handrub. This comparative study between the two methods was designed and performed.

### Methods

This was a single center, blinded, controlled study performed over a period of 4 weeks in the Ibn Al Haithem hospital. Surgeons, seniors and residents (with more than 2 years of experience) volunteered for inclusion in this study.

Each day before performing any surgeries, the study participants had their fingertips and thumbprints taken on blood agar plates (insuring that the nails make prints on the agar); the volunteer then blindly selected a sealed blank envelope enclosing a paper with either letter A or B indicating the structured protocol for preoperative hand disinfection. Neither the participants nor the sample collector nor the lab staff knew which method was used.

The standard preoperative hand disinfection methods used were:

**A:** Alcohol-based handrub with sterillium. The solution was applied to the hands for 1.5 min and then left to dry. The fingertips and thumbprints were then taken on blood agar plates.

Sterillium (propan-2-ol 45 gm + propan-1-ol 30 gm + mecetronium ethylsulfate with glycerol 85%, tetradecan-1-ol, fragrance, patent blue v, 85% and purified water) was used. As a standard protocol, it was recommended that the participant cleaned the hands with water and soap only if visibly soiled hands, such as hands with mud on them, were present. If soap and water was used, the hands were then allowed to dry. The alcohol-based handrub was then applied for 1.5 min ensuring that hand is wet during the 1.5 min time, as recommended by Hartman industry [3]. However, during the process of sample collection in this study, none of the volunteers had dirt or mud on their hands; thus, washing the hands before using the alcohol rub was not needed.

The technique for hand rub performed according to the WHO is illustrated in Figure 1.



**Figure 1:** Alcohol-Based Handrub technique according to WHO guidelines.

**B:** Standard surgical scrub was performed according to the WHO and the APIC (Association for professionals in infection control) [4,5].

**B:** The hands are washed with soap and water using a gentle brush for 5 min and repeated at least three times, including brushing the

fingernails, and then left to dry. The fingertips and thumbprints are then taken on blood agar plates.

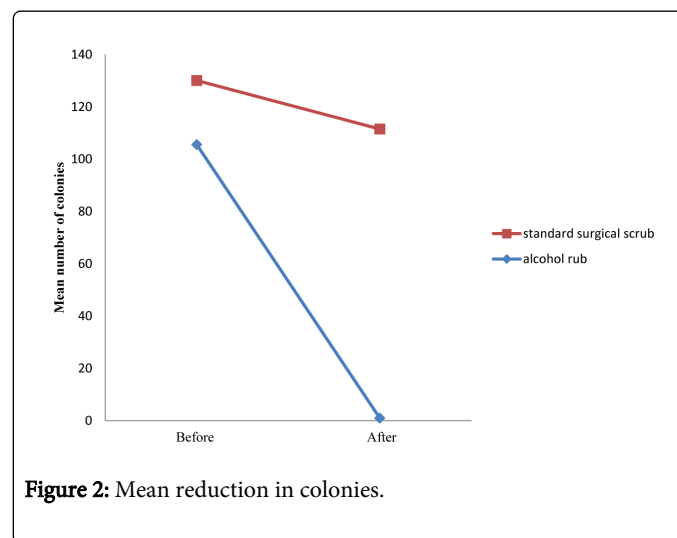
Blood agar plates were prepared in the Ibn Al-Haithem Hospital laboratory. To ensure that there was no contamination, the plates were incubated for 24 h and then taken to the theatre under supervision. The plates were labeled as before or after washing the hands in a coded manner so that the laboratory personnel responsible for counting the colonies would not know which method the sample represents. After 24 h of incubation at 37°C, the plates were examined under magnification for counting the number of colonies for each sample. The results were tabulated and analyzed. The paired sample t-test statistical analysis was conducted using Microsoft excel 2010 and SPSS version 18. P values of less than 0.05 were considered significant.

## Results

One hundred samples were collected twice. Fifty volunteers were in each group, and samples were collected before and after washing the hands. The alcohol rub group had 41 samples that showed zero growth post-rub; the remaining 9 samples showed a statistically significant decrease in growth. The mean reduction of colony counts was 104.6 ( $P < 0.001$ ) (Figure 2).

### Standard surgical scrub group

Only 4 samples showed zero growth post-scrub. The other 22 samples showed a statistically insignificant decrease in growth. Two samples showed no change in growth on the agar plates. Twenty-two samples showed an increase in growth after scrubbing. The mean reduction in colony counts was 18.6 ( $P > 0.001$ ) (Figure 2).



**Figure 2:** Mean reduction in colonies.

## Discussion

Standard surgical scrub has been the main preoperative disinfection technique for many years. The introduction of alcohol-based solutions for disinfection has opened possibilities for more sophisticated and cost effective disinfecting techniques.

In our study, alcohol-based hand rub was found to be significantly more effective in preoperative hand disinfection than standard surgical scrub.

Sigler et al. showed that alcohol-based solutions had a greater antimicrobial effectiveness than traditional surgical scrub and povidone iodine surgical scrub. A similar result was found in a study performed in Singapore by Kah Weng Lai et al. [6,7].

Alcohol-based handrub was found to be superior to traditional surgical scrub in reducing the risk of surgical site infections in France by Parienti et al. [8].

A Rouen University Hospital study [9] showed that surgical handrub had immediate efficacy similar to surgical hand scrub and had more lasting effect and was more cost-effective (by 67%).

Al-Naami et al. found that alcohol-based solutions are preferred in regards to surgeon skin tolerance [10].

Dabare et al. concluded that among five different surgical scrubbing agents, alcohol-based handrub was superior to the other techniques [11].

At a study performed at the University of Sao Paulo, Brazil by Karen de Jesus Gonçalves et al., it was concluded that surgical hand antisepsis using alcohol preparations are effective and have benefits related to cost reduction, water saving, lower application time, lower skin damaging effects, and ecological gains [12].

Based on our results and the results pooled from other studies, it is recommended that alcohol-based hand rubs be included in the operating theatre as an alternative to traditional surgical scrub for surgical hand disinfection.

## Conclusion

In preoperative hand disinfection, alcohol-based handrub significantly reduces the bacterial colony counts compared with standard surgical scrub.

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