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Duration of surgical hand scrub in orthopaedic surgeries

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Abstract

A prospective study based at a tertiary hospital involving orthopedic surgeons. The study was aimed at assessing the required duration of surgical hand scrub to prevent infections. The surgeons scrubbed at sink equipped with timers, and used a scrub protocol based on existing guidelines. They were observed for the quality of their surgical hand scrubs for various types of surgeries and duration. Post-operatively hand swab culture of surgeon's hands was done and patients followed up for any surgical site infections. The average scrub time of the orthopedic surgeons was found to be 2mins 40 secs. It was observed that there was no growth on culture when surgical hand scrub time was more than 2minute 20seconds. There was just one incidence of infected implant and there was no evidence of infections post-operatively in all of the remaining patients. It was also noted that the surgeons scrubbed for a longer duration for more complex surgeries. In conclusion, it is our opinion that a surgical hand scrub for 2minutes and 30 seconds significantly reduced the risk of transmission of infective pathogens in orthopedic surgeries. There is a need for creating awareness and educating young surgeons with regards to the importance of surgical hand scrub.

Keywords: Orthopaedic surgeries, Hand scrub, scrub time

1. Introduction

The human hand is a small world in itself, playing host to a number of resident and transient microbiological organisms. The resident flora consists of the staphylococcus epidermidis, staphylococcus hominis, other coagulase negative staphylococci, coryneform bacteria and pityrosporum among the few. These resident floras are usually not associated with infections, but in a sterile cavity in the body they can result in dreaded infections. Whereas the transient flora is acquired by the surgeons when they come into contact with patients or objects colonizing them. These transient floras include S. aureus, gram negative bacteria or yeast, they are amendable to hand hygiene practices and can be a source of infection in the surgical field^[1]. Surgical site infection is one of the most dreaded complications following any surgery, especially orthopedic surgeries which involve metallic implants. Hand transmission is a critical factor for the spread of pathogenic organisms that cause disease and nosocomial infections in general. Studies show that the behavior of the surgeons regarding decontamination practices, hand hygiene/ antiseptics, and compliance with universal precautions, play a very important role in prevention of infections in surgical patients^[2]. Hand scrub remains the least expensive and most effective way for the prevention of nosocomial infections. All good surgeons believe and emphasize on the importance of surgical hand scrub. But the debate has always been open regarding the duration of a good surgical hand scrub. There have been various studies, some of which recommend a longer duration of scrub time and some which conclude that even 2 minutes of quality hand scrub is sufficient in preventing infections in a surgical patient^[3]. The purpose of our study was to assess the duration of hand scrub needed in order to prevent transmission of infective pathogens in orthopaedics surgeries

2. Method and material

The study was based at a tertiary care hospital and involved a single unit of orthopaedic surgeons. The study spanned for a period of 4 months.

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The surgeons scrubbed at sink equipped with timers, and used 7.5% povidone iodine or chlorhexidine based hand scrub. WHO hand scrub guidelines were followed. Pre-allotted observers for the quality of their surgical hand scrubs - duration, observed them and method of surgical hand scrub was noted. The surgeons then put on sterile surgical gloves and proceeded with their surgeries. The duration of the surgery was noted and post-surgery skin swab were taken from the surgeon's hands. The swab was then sent for aerobic culture to look for bacterial colonization and effectiveness of the hand scrub. The patients were then followed up at regular intervals to look for any signs of surgical site infection. The collected data was analyzed and the below opinion was formed.

3. Results

The study spanned for a period of 4 months and the orthopaedic surgeons were monitored for the duration of hand scrub for a total of 84 surgeries. Surgeon hand swab culture was attained in all the cases.

The average scrub time of the orthopaedic surgeons was found to be 2mins 40 secs. The average hand scrub time of senior consultant surgeons was 2mins 55sec, senior resident was 2mins 42 sec and junior resident was 2mins 20sec [FIGURE 1]. It was noted that the senior surgeons gave more importance to the surgical hand scrub and the hand scrub time in the junior surgeons were lesser. But all the surgeons practiced a good technique of had scrub. They also observed utmost precautions not to accidentally touch their surroundings following scrubbing.

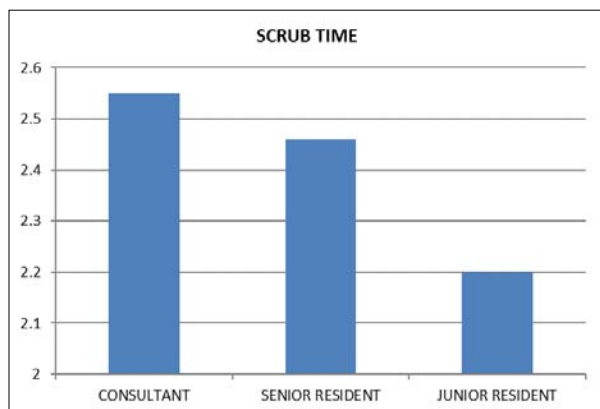


Fig 1: Scrub time relation to position held

The surgeon hand swab cultures were followed up. It was observed that there was no growth on culture in 83.3% of the cases when the surgical hand scrub time was more than 2minute 30seconds. On the contrary normal skin commensal was colonized on culture when scrub time was less than two minutes.

The scrub time also varied based on the type of surgery the surgeon was scrubbing for [FIGURE 2]. The average scrub time for a spine surgery was 3mins 18 secs, arthroscopic surgery was 2 mins 44 secs, Arthroplasty was 2 mins 50sec, Open reduction & internal fixation was 2min13sec and other miscellaneous surgeries was 2 min 24 sec. The hand scrub time was found to be higher in surgeries of spine and those involving metallic implants.

There was just one incidence of infected implant, where in the scrub time was found to be 1 min 47 sec. There was no evidence of infections in post-operatively in all of the remaining patients.

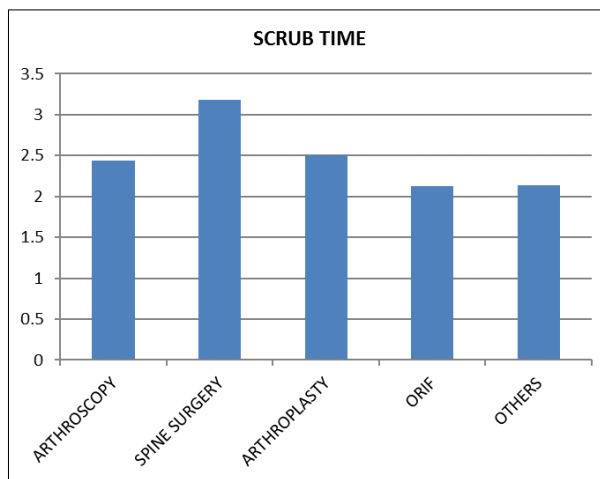


Fig 2: Scrub time relation to various surgeries

4. Discussion

A surgeon's hand is host to a variety of resident and transient organisms. Many of these organisms though harmless on surface of the skin are capable of causing surgical site infections. Especially methicillin resistant staphylococcus aureus which is acquired by the orthopaedic surgeons by contact to various hospital objects. But more importantly is that these are amendable to practice of hand hygiene and efficient surgical hand scrub [1].

The role of disinfection of hands prior to a surgery has been demonstrated was back in time. Joseph lister demonstrated that disinfection reduced the risks of surgical site infections. Over the years the methods of hand scrub have evolved. In 1894, the three-step hand scrub was suggested and later in 1939 a 7-min hand wash was suggested by Price. With time the surgical hand scrub time has reduced from about 10 minutes to 5 minutes.

There are studies that show that 2-minute surgical hand scrub was associated with higher, but not clinically significant, bacterial growth on the hands of surgeon compared to a 3-minute scrub.

Wheelock *et al* in their study on effect of surgical hand scrub time on subsequent bacterial growth noted that Scrubbing for three minutes produced lower mean log bacterial counts than scrubbing for two minutes [4].

Tanner *et al* in their study on surgical hand antisepsis to reduce surgical site infection observed that there is no firm evidence that one type of hand antisepsis is better than another in reducing surgical site infection. Chlorhexidine gluconate scrubs may reduce the number of CFUs on hands compared with povidone iodine scrubs; however, the clinical relevance of this surrogate outcome is unclear. Alcohol rubs with additional antiseptic ingredients may reduce CFUs compared with aqueous scrubs. They also observed that a 3-minute initial scrub reduced CFUs on the hand compared with a 2-minute scrub, but this was very low-quality evidence [5].

In our study, we observed that average 2 min 30 sec of hand scrub was sufficient to prevent risks of transmissions of infections intra operatively. There was no significant colonization of bacteria on the surgeon's hands when the scrub time was more than 2 minutes 30 seconds. We are of the opinion that a scrub time of two and a half minute was adequate in eliminating the transient flora and controlling the resident flora CFUs.

Another observation made was that the junior surgeons gave less importance to the duration of scrub time compared to the

senior staffs [Figure 2]. It was also noted that the surgeons scrubbed for a longer duration when scrubbing into complex surgeries and the scrub duration drastically came down while doing minor cases.

We are of the opinion that a good quality surgical hand scrub time for two and half minute was efficient reducing the risk of surgical site infection secondary to nosocomial infection for orthopaedics surgeries. But the scrub time required is based on the solution used for scrubbing as prescribed by the company of antiseptic used. We also emphasize on creating awareness among the surgeons on the importance of the surgical hand scrub irrespective of the type and duration of surgical intervention being done.

5. Conclusion

We observed that a surgical hand scrub for 2minutes and 30 seconds significantly reduced the risk of post-operative infections. There is a need for creating awareness and educating young surgeons with regards to the importance of surgical hand scrub. Hand scrub is one crucial step in eliminating post-surgical infections and equal importance should be given in propagating and practicing the same.

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