

Evaluation of Nurses Competency about Surgical Hand Scrubbing

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ABSTRACT

Objective: Hands play a significant role in organism transmission. Poor hand hygiene practices in health care settings lead to nosocomial infection. Aseptic practice is the cornerstone of current surgery, thus rigid adherence to prescribed sterile techniques in the operating room is essential. The objective of this study was to evaluate nurses' competencies regarding surgical hand scrubbing.

Material and Methods: Cross sectional observational design was used. The study was conducted in operating rooms in a tertiary care hospital, Lahore, Pakistan. This setting contains total seven operating rooms with 250 registered nurses. Sample size calculated through Slovin's formula. Sample size was 154. Convenient sampling technique was used. An adopted checklist was used for observing the nurses' practices of hand scrubbing. Data was analyzed in Statistical Software of Social Sciences (SPSS) version 25.

Results: Majority of nurses (72.7%) were between 21-30 years age group. Only 38.3% participants wore a face mask and surgical cap correctly and 61.7% did not wear correctly. Majority participants, 76% had short nails. All participants (100%) removed nail polish, artificial nails, and jewelry before scrubbing. Majority of participants applied a proper amount of Povidone iodine.

Conclusion: Operational hand scrub is very vital component of operative procedure. Results of this study showed inadequate practices of nurses in the operating room, which was overall 77%. There is a need to improve nurses' practices so, periodically audit, manager supervision and feedback, workshops should be organized.

Key Words: Operating Room, Nurses, Sterile Technique.

Abbreviations: SSI: Surgical Site Infection. CDC: Center for Disease Control. ENT: Ear Nose and Throat.

INTRODUCTION

Surgical site infection (SSI) is most common cause of health care associated infection and it is a common complication of any surgery. Globally, SSI rates in developing countries ranged from 2.5 to 41.9 per cent with extremely higher rates.¹

Hands play a significant role in organism transmission. Poor hand-hygiene procedures in hospitals leads to nosocomial infection.² The Center for Disease Control (CDC) estimated that hand washing correctly decreases nosocomial infections by 30%.³ Hand scrubbing is an extension of the washing hands before surgery with antimicrobial soap and

water.⁴ In 1860s, Joseph Lister's surgical team first introduced the cleaning of hands and arms with antiseptic solution, which used hand-disinfected carbonic acid.³

Jewelry and nails can cause bacterial spread therefore, it is necessary to remove jewelry and keeps nail short before surgical hand scrubbing.⁵ The nurse of the operating room should wear facemask, cap, perform surgical hand scrubbing and sterile gowning or gloving to minimize the risk of SSIs.⁶ Standard hand antiseptic includes of an aqueous wash with or without a brush using detergent based on Povidone iodine or chlorhexidine.⁷

With respect to scrub time, it is suggested that the first scrub is longer i.e. at least 5 minutes (300s) between consecutive clean operations than any later scrubs i.e. at least 3 minutes (180s).^{8,9} Aseptic procedure is the cornerstone of advanced surgery, so rigid adherence to prescribed sterile techniques is essential for both patient safety and operating room personnel.¹⁰ The aim of this research was to examine nurses' practices of hand scrubbing before surgery.

MATERIAL AND METHODS

Study Design and Sampling

A Cross sectional observational design was used. The study was conducted in operating rooms in a tertiary care hospital, Lahore, Pakistan. The study duration was from December, 2019 to March, 2020. This setting contains total seven operating rooms with 250 registered nurses. Registered nurses of each operating room are as follows: emergency operating room (N = 60), Gynae (N = 30), Ortho and urology (N = 40), surgical (N = 40), Eye (N = 30), ENT (N = 20) and neurosurgery (N = 30). Sample size calculated through Slovin's formula = $N / (1 + N(e)^2)$. Sample size was 154. Convenient sampling technique was used.

Inclusion Criteria

Operating Room Registered Scrub Nurses age from 21 – 60 years, job experience from 1 year to more than 30 years, and minimum education general nursing diploma and higher education master in nursing.

Exclusion Criteria

Registered Nurses were working in other departments of the hospital, who were not present at the time of observation, Surgeons, anesthesia consultant and technicians.

Data Collection

An adopted checklist was used for observing the nurses' practices of hand scrubbing.² Instrument contains two sections: first section contains demographic characteristics and second section contain an observational checklist with 'Yes' or 'No' questions which contain three parts. First part is 6 items of Scrub Pre requisites, second part is 15 items of scrub process and third part is 1 item of scrub time. Each item rated Yes for '1' and No for '0' scored. The total score was 22 which were explained as: adequate (> 85%) and inadequate (< 85%).¹¹

Data Analysis

Data was scrutinized on Statistical Software of Social Sciences (SPSS) version 25. Data was analyzed in the form of frequency and percentage.

RESULTS

Age Incidence

Table 1 shows that the majority of nurses (72.7%) were fall in 21 – 30 years age group. About half of the observations (50%) were complete in the morning shift.

Table 1: Distribution of Demographic Characteristics.

Demographic Characteristics	Frequency	Percentage
Age		
21-30 Years	112	72.7
31-40 Years	38	24.7
41-50 Years	4	2.6
51-60 Years	0	0
Education Level		
General Nursing Diploma	113	73.4
BS Nursing Post RN	39	25.3
BSN (Generic)	2	1.3
Master in Nursing	0	0
Job Experience		
1-10 Years	103	66.9
11-20 Years	44	28.6
21-30Years	7	4.5
>30 Years	0	0
Work Shift		
Morning	77	50
Evening	39	25.3
Night	38	24.7

Table 2 shows that only 38.3% participants wore surgical cap and face mask correctly. Majority participants 76% had short nails. All participants (100%) removed nail polish, artificial nails, and jewelry before scrubbing. Some participants were sure about availability of scrub items. 77.3% participants applied a proper amount of Povidone iodine.77.3 percent of the participants scrub right palm over left hand back and vice versa with interlaced fingers. 79.2% participants rub palm to palm, finger interlaced and remaining participants did not do it. 74% participants done rub fingertips on the palms for both

hands and remaining participants did not perform it. Participants 58.4% continued their rotational action against the elbow arms for 1 minute. 80.5% participants did not move their arm back and forth in the water. Water was not splattered onto the dress by the 74.7% respondents. 69.5% participants completed the first scrub in 5 minutes and consecutive scrub in 3 minutes.

Table 2: *Observational Checklist of Surgical Hand Scrubbing.*

S#	Items	Yes	No
	Basic requirement Items		
1.	Surgical attire(cap, mask)	59 (38.3%)	95 (61.7%)
2.	Short nails	117 (76%)	37 (24%)
3.	Remove all jewelry or nail polish	154 (100%)	–
4.	Availability of scrub items	74 (48.1%)	80 (51.9%)
5.	Wash hands when visibly soiled	135 (87.7%)	19 (12.3%)
6.	Count scrub time	86 (55.8%)	68 (44.2%)
	Items of Scrub Process		
7.	Use correct amount (5ml) of scrub solution	119 (77.3%)	35 (22.7%)
8.	Rub one palm on back of other hand and vice versa	119 (77.3%)	35 (22.7%)
9.	With finger fused, rub hand to hand	122 (79.2%)	32 (20.8%)
10.	Rub forward and backward in rotational manner	123 (79.9%)	31 (20.1%)
11.	Rotary rubbing of both thumbs	118 (76.6%)	36 (23.4%)
12.	Use palms to wipe tips of finger	114 (74%)	40 (26%)
13.	Clean in rotational action continuously	90 (58.4%)	64 (41.6%)
14.	Wash hands and arms in one direction	134 (87%)	20 (13%)
15.	Don't push your arms back by the water	124 (80.5%)	30 (19.5%)
16.	Avoid water splash on kit	115 (74.7%)	39 (25.3%)
17.	Hands above the elbow at all the times	129 (83.8%)	25 (16.2%)
18.	Pick sterile towel and move away from sterilized area	128 (83.1%)	26 (16.9%)
19.	Dry one hand with one side of towel	136 (88.3%)	18 (11.7%)
20.	Dry other hand with use of other side of towel	140 (90.9%)	14 (9.1%)
21.	Do not repeat to dry area	154 (100%)	–
	Item of Scrub Time		
22.	First scrub 5 minutes and consecutive scrub 3 minutes	107 (69.5%)	47 (30.5%)

DISCUSSION

Operational hand scrub is very vital component of operative procedure. Improper hand scrub leads to infection, so surgical hand scrubbing is very important to protect contamination by surgical site. This research shows inadequate practices of nurses in the operating room which is overall 77%. A study was conducted to enhance the adherence with surgical hand scrubbing practices that showed low level of compliance in pre

intervention phase which increased after intervention.¹² The observed scrubs method had many flaws.

Some nurses wear caps and face mask correctly in this study. An association of perioperative registered nurses recommended (AORN) that head covers and face mask are an essential part of the operating room attire and should be worn all the time in OR premises. It is suggested that the head should be covered first to

prevent bacterial contamination before scrub. A face mask should be worn in such a way that the mouth and nose both covered properly.¹³ Loison, et al., (2017) conducted a multicenter study for surgical attire audit. Research found a lack of compliance among OR staff due to incorrect jewelry wearing and head caps.¹⁴

Majority participant had short nails and all participants removed jewelry or nail polish before scrubbing. A study found that few participants were completely complies with standard sterile techniques of hand scrubbing. During observations, it was observed that some participants did not remove nail polish and have long nails.¹⁵

Majority participants completed the first scrub of the day within 5 minutes and other consecutive scrub within 3 minutes in this study. Although the WHO recommends that the hand scrub times are at least 300 s for the first scrub and at least 180 s for subsequent scrubs. A research that calculated manual bacterial colony counts based on scrub time (120s, 240s, and 360s) found that upon longer the scrub time, bacterial count was lower.⁹ A study revealed that surgical hand scrub duration 2 minutes and 30 second and also found that surgical team scrubbed longer duration in complex procedures.⁴ Although over-scrubbing and under scrubbing could enhance the chance of skin damage, it is important to follow rules of scrubbing. Skin damage from scrubbing can also cause them to not scrub perfectly. Over-scrubbing also results in substantial water wastage.¹⁶

Previous researches have shown that better understanding of a rule would lead to higher agreement with it.¹⁷ Lack of information about hospital policies causes discrepancies in staff scrubbing.¹⁸ It was recommended that documented policy should be provided to operating room staff. It may progress the standard of scrubbing and then avoid infections after the surgery.¹⁹

CONCLUSION

This study detected the nurses' practices regarding surgical hand scrubbing. Result showed inadequate practices of nurses. There should be written protocols everywhere in the hospitals and hospital administration should make it mandatory. Scrubbing material like antiseptic solution and brushes should be available all the time. There is a need to improve nurses' practices so, periodically audit, manager supervision and feedback, workshops should be organized.

Ethical Consideration

Approval letter was obtained from Principal, Lahore School of Nursing, and The University of Lahore. Permission letter was received from the Nursing Superintendent of study setting. Data was collected only for research purpose. This study was not harmful for any participants. Participation was completely voluntary. The data was kept confidential.

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Additional Information

Disclosures: Authors report no conflict of interest.

Ethical Review Board Approval: The study was conformed to the ethical review board requirements.

Human Subjects: Consent was obtained by all patients/participants in this study.

Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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