

CASE STUDY

Surgical hand hygiene compliance and its associated factors among medical staff at Hospital 199, Da Nang city, 2022

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ABSTRACT

Objectives: Assess the current status and identify factors relating surgical hand hygiene compliance among medical staff at Hospital 199, Da Nang City, in 2022.

Methods: A cross-sectional study was conducted on 52 medical staff participating in surgery with 156 observations. Use surveillance cameras and checklists (including 27 operating points and 3- time points) based on the Surgical Hand Hygiene Guidelines issued with Decision 3916/QD-BYT issued by the Ministry of Health.

Results: The overall compliance rate for surgical hand hygiene was 25% (39/156) based on 156 observations. Compliance rates for each step were: step 1, 89.7%; step 2, 46.2%; and step 3, 28.8%. Total surgical hand hygiene time exceeding 3 minutes was 63.5%, with fingernail brushing in step 1 exceeding 30 seconds at 89.7%. Notably, 12.8% of observations did not include step 3. Compliance rates among individual subjects varied: the nursing group showed a significantly higher compliance rate (47.1%) compared to the doctors' group (10.7%), with an odds ratio of 6.89 (CI 95% [3.05-15.56]). No other significant differences were identified.

Conclusion: Overall compliance with surgical hand hygiene was low. Step 1 surgical hand hygiene has the best compliance rate and time. But step 3 should be more noticed. Nurses have better compliance than doctors.

Keywords: Surgical hand hygiene, compliance procedures, medical staff, nurses, doctor.

INTRODUCTION

Surgical Site Infections (SSIs) are a prevalent and concerning type of hospital-acquired infection, accounting for 14-16% of nosocomial infections and affecting approximately 5% of surgical patients (1, 2). Enhanced surveillance strategies, including postdischarge monitoring, can increase the detection rate by up to 100%, highlighting the importance of meticulous infection control practices (3). Most SSI-causing microorganisms originate from contaminated surgical sites, including the

hands of healthcare personnel involved in the surgical procedure (1-3).

Although gloves during surgery provide a crucial layer of protection against infection, studies have demonstrated that a significant proportion of gloves are punctured during surgical procedures (1-6). Consequently, surgical hand hygiene (SHH) remains the most effective means of preventing SSIs. A well-established evidence-based guideline recommends that SHH be performed with proper technique and sufficient time to maximize its effectiveness (6).



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A seminal study by Semmelweis and colleagues (7) demonstrated a significant reduction in maternal mortality rates following mandatory hand disinfection with chlorhexidine solution. In Vietnam, several studies have investigated hygiene compliance rates among healthcare workers participating in surgical procedures. These studies have reported varying rates of compliance across different hospitals and localities, including 82% at Ninh Thuan Provincial General Hospital (2018), 79.3% at Vinmec Times City International General Hospital (2019), and 48.6% at Thu Duc Hospital in Ho Chi Minh City (2020). Factors such as age, education level, training program, and facility type have been found to influence compliance rates (8-10). Furthermore, the application of regulations on individual and collective financial sanctions has been shown to have a significant impact on compliance. The findings of these studies underscore the importance of implementing effective sanitation processes to prevent SSIs.

Hospital 199, a Class I general hospital under the Public Security Ministry, conducts an average of 100-150 surgical procedures monthly. The hospital's SSI incidence rate is 7.89% reported SSI cases (11). Our microbiological analysis of hand cultures from healthcare workers participating in surgery revealed that 25% of participants still harbored bacteria, including *Klebsiella spp*, *Staphylococcus aureus*, and non-Coagulase fermenting *Staphylococcus spp*, after practicing hand hygiene (12). One of the simple and effective interventions is to monitor compliance with the bacteriological hygiene process of medical staff participating in surgery to reduce the rate of bacteremia. Although the hospital has developed a Checklist of sanitation practices according to Decision 3916/QD-BYT dated August 28, 2017, of the Minister of Health, it only stopped recording the rate of compliance with the process on a few subjects. The monitoring process has yet to delve deeply into and thoroughly evaluated

the practice and factors affecting compliance with the import sanitation process.

Based on the existing evidence, we conducted a research study with the goal: "Assess the current status and identify factors relating to surgical hand hygiene compliance among medical staff at Hospital 199, Da Nang City, in 2022." to improve the hospital's infection control in general and surgical site infections in particular.

METHODS

Study design: The research was designed as a Cross-sectional study.

Study Subjects: Medical staff participating in surgery included: Chief and supporting surgeons, anesthesiologists/anesthesiologists, and instrument nurses who directly participate in program surgeries of Hospital 199.

Selection criteria: Medical staff directly participate in surgical teams of departments: Orthopedic surgery department, General surgery-obstetrics and gynecology department, Maxillofacial-ophthalmology department, Otolaryngology department, Cosmetic surgery department, and Anesthesiology and Intensive Care Department.

Exclusion criteria: Health workers take leave during the research period (vacation, maternity leave, etc.)

Study site and time: The study was conducted in the surgical area of the Anesthesiology and Intensive Care Department of Hospital 199; from December 2021 to October 2022.

Sample size and sampling method

Sample size

Medical staff: A sample of all medical staff participating in surgeries during the research period was selected, 52 medical staff (28 primary

and secondary surgeons, 7 anesthesiologists/ anesthesiologists, 17 instrument nurses) meets research inclusion criteria.

N^o SHH observation: The sample size was calculated according to the formula:

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

In which:

- n: Minimum sample size for the study
- Z: Statistical parameter with confidence $\alpha=95\%$, then $Z=1.96$
- p: 0.828 is the rate of compliance with SHH by washing hands with water and antibacterial soap, according to research by Nguyen Hoai Thu in 2019 (13).
- d: absolute precision required, $d = 0.05$

The calculated sample size is: $n = 152$. Each healthcare worker needs to be observed 3 times practicing surgical hand hygiene. The total number of observation opportunities across all subjects was 156 opportunities.

Sampling method: Based on the report of the General Planning Department at Hospital 199, the number of medical staff participating in surgery in the departments in 2021 is 52 medical staff. Each healthcare worker was randomly assigned three opportunities to observe SHH procedures during the data collection period. These observations were conducted in three different surgeries, ensuring that each participant underwent hand hygiene procedures. The timing of these observations was recorded, and the data was used to analyze the implementation of SHH procedures. The study was utilized the Hospital Information System (HIS) software to retrieve information on surgeries performed during the study period. This data was used to identify the number and timing of SHH procedures performed by each participant over a two-month period. A random

selection of three opportunities per medical staff was made, and video recordings of these observations were stored for subsequent review.

Research variables

Variables on general characteristics of research subjects: Age, gender, education level, department, working seniority and professional position

Variables regarding SHH practice with antibacterial soap solution: hand hygiene steps, hand hygiene operations, hand hygiene time, hand hygiene compliance

Techniques, tools and procedures for data collection

Data Collection: A total of three surveillance cameras were installed in the surgical area to monitor the SHH practices of medical staff. The cameras were strategically positioned to capture the entire handwashing sink area, where surgical hygiene is primarily observed, as well as the surrounding environment. Specifically, one camera was mounted at the entrance to the surgical area hallway to facilitate subject identification and observation of preparation activities prior to hand hygiene. The remaining two cameras were mounted above the handwashing sink in the surgical area to observe the implementation of SHH procedures by medical staff. The surveillance cameras were connected directly to the Infection Control Department and data was stored on Ezviz Studio software. Enumerators were able to observe and record the SHH practices in real-time, or review the recordings on a computer after the subject had completed the SHH process.

SHH Checklist: The checklist was built based on Decision 3916 of the Ministry of Health and the current SHH process of Hospital 199. The study only developed a checklist for surgical hand hygiene procedures using antibacterial

soap method. The checklist consists of 2 parts: (1) General characteristics of medical staff, SHH equipment and preparation before SHH and (2) Surgical hand hygiene practice checklist is built in 4 parts corresponding to 4 steps in the process with a total of 27 operations.

Data collection procedure: Extract camera data once a week from Ezviz Studio software. Observe SHH practices through extracted videos. After determining the subjects and times of SHH, fill in the checklist; SHH practice time is calculated based on the time displayed on the screen. After each completion of a checklist, check the surgical medical staff list to control the number of SHH opportunities; to ensure that each medical staff is observed practicing SHH three times in different surgeries. In cases that were not observed in time or were suspected, the extracted video were reviewed by 2 members of the research team to reach consensus on assessment.

Assessment standards

Compliance with required time of SHH: A standardized measurement of compliance with the surgical hand hygiene protocol was conducted by calculating the time elapsed from the initiation of hand hygiene steps (steps 1, 2, and 3) to the completion of the final handwashing step. A score of 1 point was assigned for each step completed within the prescribed minimum time interval. The total score was calculated by summing the points for each step, with a maximum possible score of 3 points.

Compliance with required steps of SHH: Each correctly performed step was assigned a score of 1 point, whereas incomplete or incorrect steps were scored as 0 points. To achieve maximum compliance, all steps within a given operation must be performed correctly, and the total time required to complete the step must not exceed the minimum prescribed time.

Overall compliance with SHH practices: Follow the standardized sequence of 4 steps (with 27 operations performed using antibacterial soap solution). The protocol required that each step be completed correctly and in its entirety, while also meeting the minimum time requirement for each step. A total score of 30 points was assigned, consisting of 27 points for accurate completion of the operations and 3 points for adherence to the time requirements for each step. Medical staff whose all 3 observations are assessed as complying with the procedure will be assessed as compliant.

Data analysis: Following each day of observation, a thorough examination of the collected data was conducted to ensure that all ballots contained complete and accurate information. The data were subsequently compiled and cleaned in Excel and analyzed using SPSS 20.0 software. Descriptive statistical analysis was employed to characterize the frequency and compliance rates of each operation within each step, as well as the overall compliance rate, in the SHH practice. Additionally, Chi-square tests were performed to examine the relationships between various factors and compliance with SHH protocol adherence.

Ethics approval: The study was conducted after being approved by the Ethics Council of Hanoi University of Public Health No. 127/2022/YTCC-HD3 dated May 10, 2022. The study was approved by the leadership of Hospital 199 and the leadership of the Department of Anesthesiology and Resuscitation when observing via camera. All personal information about research subjects is guaranteed to be kept confidential. The collected information is only for scientific research purposes.

RESULTS

Table 1. General characteristics of study subjects (n=52)

	Characteristics	N	%
Ages	≤ 30	15	28.8
	>30	37	71.2
Gender	Male	31	59.6
	Female	21	40.4
Department	Trauma surgery department	9	17.3
	General surgery - obstetrics and gynecology department	5	9.6
	Otorhinolaryngology department	4	7.7
	Dentistry – Ophthalmology department	5	9.6
	Cosmetic Surgery department	5	9.6
	Anesthesia and resuscitation department	24	46.2
Working seniority	<5 years	10	19.2
	≥ 5 years	42	80.8
Specialization	Primary/secondary surgeon	28	53.8
	Anesthesiologist/anaesthetist	7	13.5
	Nurses	17	32.7
Education level	Undergraduate and postgraduate	41	78.8
	College	8	15.4
	Vocational school	3	5.8

A total of 52 medical staff participated in the study, with 71.2% being 30 years or older. The distribution of participants by gender was as follows: 59.6% were male (n = 31) and 40.4% were female (n = 21). With regards to departmental affiliation, the majority of participants (46.2%) were employed in the Department of Anesthesiology and resuscitation, followed by the Department of Trauma Surgery (17.3%). In terms of

professional seniority, the majority of participants (80.8%) had 5 years or more of work experience. Furthermore, the distribution by role was as follows: primary/secondary surgeons accounted for the largest proportion (53.8%), anesthesiologists accounted for 13.5%, and nurses accounted for 32.7%. Lastly, the majority of participants (78.8%) held university and postgraduate degrees.

Table 2. Compliance rate with operations in SHH procedure by step (n=156)

N ^o	Operations in the procedure	Compliance	
		N	%
<i>Step 1 (4 operations + 30 seconds)</i>			
1	Wet your hands	149	95.5
2	Take 3-5 ml of antibacterial soap solution into the palm of your hand	149	95.5

N ^o	Operations in the procedure	Compliance	
		N	%
3	Clean between the fingernails of each left hand with a toothbrush for 15 seconds	149	95.5
4	Scrub between the fingernails of each right hand with a toothbrush for 15 seconds	149	95.5
Step 2 (10 operations + 1 minute 30 seconds)			
1	Wet your hands up to your elbows	156	100
2	Take 3-5 ml of antibacterial soap solution into the palm of your hand	156	100
3	Rub your palms together	156	100
4	Rub one palm over the back of the other hand and vice versa	156	100
5	Rub your palms together, rubbing your fingers firmly between them	154	98.7
6	Rub the back of these fingers on the palm of the other hand and vice versa (the back of the hand is cupped to match the palm)	148	94.9
7	Rub the thumb of one hand into the palm of the other hand and vice versa (palm embracing the thumb)	112	71.8
8	Rub the fingertips into the palm of the other hand and vice versa	113	72.4
9	Continue rubbing from the wrist and forearm up to 5cm above the elbow	155	99.4
10	Rinse your hands under running water in a sequence from fingertips to elbows, completely removing antibacterial soap from your hands	156	100
Step 3 (10 operations + 1 minute 30 seconds)			
1	Wet your hands up to your elbows	136	87.2
2	Take 3-5 ml of antibacterial soap solution into the palm of your hand	136	87.2
3	Rub your palms together	136	87.2
4	Rub one palm over the back of the other hand and vice versa	136	87.2
5	Rub your palms together, rubbing your fingers firmly between them	134	85.9
6	Rub the back of these fingers on the palm of the other hand and vice versa (the back of the hand is cupped to match the palm)	129	82.7
7	Rub the thumb of one hand into the palm of the other hand and vice versa (palm embracing the thumb)	96	61.5
8	Rub the fingertips into the palm of the other hand and vice versa	100	64.1
9	Continue rubbing from the wrist and forearm up to 5cm above the elbow	135	86.5
10	Rinse your hands under running water in a sequence from fingertips to elbows, completely removing antibacterial soap from your hands	136	87.2

The compliance rate for the operations in Step 1 was 95.5%. In Step 2, the percentage of correct scrubbing operations was as follows: scrubbing from the wrist to 5cm above the elbow (99.4%), rubbing the palms together (98.7%), and rubbing the fingers between the fingers (94.9%). The lowest compliance rate

was observed in rubbing the thumb of one hand on the palm of the other hand and vice versa, with a rate of 71.8%. The remaining operations achieved a 100% compliance rate.

In Step 3, the adherence to specific operations varied significantly. The compliance rate for

operations 1, 2, 3, 4, and 10 was 87.2%, followed by operation number 9 with a rate of 86.5%. Operations number 5 achieved a compliance rate of 85.9%, operations

number 8 had a rate of 64.1%, and Operation number 7 had the lowest compliance rate at 61.5%. These findings highlighted areas for improvement in the surgical cleaning process.

Table 3. Compliance rate of time to perform each step of SHH (n=156)

N ^o	Time	Compliance		
		Sufficient n (%)	Insufficient n (%)	Non-compliance Unfulfilled n (%)
1	Step 1: ≥ 30 seconds	140 (89,7)	9 (5,8)	7 (4,5)
2	Step 2: ≥ 1 minute 30 seconds	98 (62,8)	58 (37,2)	0 (0)
3	Step 3: ≥ 1 minute 30 seconds	50 (32,1)	86 (55,1)	20 (12,8)

The results indicated that the time compliance rate for Step 1 was the highest, with a rate of 89.7%. In contrast, the time compliance rate for Step 2 was significantly lower, at 62.8%. Furthermore, the time compliance rate for

Step 3 was found to be the lowest, at 32.1%. A notable observation was the presence of 20 cases where Step 3 was not performed, which accounted for 12.8% of the total cases.

Table 4. Compliance rate of SHH procedures (operation and implementation time) by step (n=156)

N ^o	Step in SHH procedure	Compliance	
		N	%
1	Step 1 (4 operations + 30 seconds)	140	89.7
2	Step 2 (10 operations + 1 minute 30 seconds)	72	46.2
3	Step 3 (10 operations + 1 minute 30 seconds)	45	28.8
Overall compliance		39	25

Compliance with a procedure was assessed based on the successful completion of all operations and adequate time allocation for each step. A total of 156 processes were observed, revealing that Step 1 exhibited the highest compliance rate, with 89.7% of

processes meeting this criterion. In contrast, Step 3 was frequently omitted, with only 28.8% of processes completing this step as intended. Step 2 showed a moderate compliance rate of 46.2%. Overall, the SHH procedure compliance rate is 25%.

Table 5. Compliance rate with SHH of each subject in the surgical group (n=156)

Compliance	Surgeon n (%)	Anesthesiologist n (%)	Nurses n (%)	Total n (%)
Step 1	74 (88.1%)	18 (85.7%)	48 (94.1%)	140 (89.7%)
Step 2	29 (34.5%)	12 (57%)	31(60.8%)	72 (46.2%)
Step 3	15 (17.9%)	4 (19.0%)	26 (51.0 %)	45 (28.8%)
Overall compliance	10 (11.5%)	4 (19.0%)	25 (49.0%)	39 (25%)

Surgeons had the highest compliance rate in step 1 (88.1%), followed by anesthesiologists/ anaesthetists in step 1 (85.7%) and instrument nurses in step 1 (94.1%). The lowest compliance rate was observed in step 3 among surgeons (17.9%), anesthesiologists/ anaesthetists (19.0%), and instrument nurses

(52.9%). The overall compliance rate for the import sanitation process was evaluated using a standardized scoring system, with a target score of 30/30 points. The actual compliance rate was 25%, indicating a significant gap between the target and actual performance.

Table 6. Association between medical staff characteristics and SHH compliance (n=52)

Characteristics	Non-compliance		Compliance		OR (CI 95%)	P	
	N	%	N	%			
Gender	Male	23	74.2	8	25.8	0.676 (0.31-1.48)	0.326
	Female	17	81.0	4	19.0		
Ages	≤ 30	11	73.3	4	26.7	0.759 (0.34-1.69)	0.498
	>30	29	78.4	8	21.6		
Working seniority	<5 years	7	70.0	3	30.0	0.636 (0.26-1.55)	0.317
	≥ 5 years	33	78.6	9	21.4		
Specialization	Doctor	31	88.6	4	11.4	6.89 (3.05-15.56)	<0.05
	Nurse	9	52.9	8	47.1		

The results showed that there was no relationship between age, gender and seniority with compliance with SHH ($p>0.05$). At the same time, the study showed that nurses had better compliance with SHH than doctors (OR=6.89; $p<0.05$).

DISCUSSION

This study aimed to assess the compliance of medical staff with SHH procedures

during surgical interventions. A total of 156 observations were conducted on 52 medical staff participating in surgery, three observations per staff. The overall compliance rate with SHH procedures was 25% (39/156), which was lower than that reported in previous studies by Nguyen Hoai Thu (82.8%) (9), Ngo Quoc Chien (94.8%) (8), and Nguyen Thi Hong (48.6%) (10). On the other hand, our study’s compliance rate was higher than that reported by Chu

Lan Anh (23.8%) (11). The variation in compliance rates can be ascribed to disparities in evaluation criteria. Previous studies have predominantly assessed compliance based on the successful execution of each step in the SHH procedure, without consideration for temporal sequencing. In contrast, our investigation utilized rigorous benchmarks, which encompassed the requirement for each step to be completed within specified time constraints and adherence to the prescribed sequence of implementation, as delineated in Decision 3916/QD-BYT dated August 28, 2017.

A total of 156 observations of SHH procedures were conducted, with a focus on three steps: (1) Brushing between nails, (2) rubbing hands with soap and water, and (3) rinsing hands with water (step 3). The compliance rate for step 1 was 89.7%, step 2 was 46.2% and step 3 had a compliance rate of 28.8%. Notably, a significant proportion of medical staff (12.8%) did not perform step 3. This finding is consistent with previous studies, such as those by Nguyen Hoai Thu (82.1%) (9), Chu Lan Anh (69.6%) (11), and Nguyen Thi Hong (68.1%) (10), which reported higher compliance rates for steps 1 and 2 but lower compliance rates for step 3. This discrepancy may be attributed to differences in evaluation criteria, as our study required compliance with both sufficient operations and minimum time standards for step 2, whereas other studies may have only considered sufficient operations. The findings of this study suggest that medical staff may prioritize efficiency over thoroughness during hand hygiene procedures, which can compromise the effectiveness of this critical practice.

SHH procedure compliance rates were assessed for each step. Step 1 achieved a compliance rate of 95.5%, lower than reported in previous studies (8, 9). The high compliance rate for Step 2 likely results from

the simplicity and familiarity of the operations, such as wetting hands to the elbow and rubbing palms together. Our findings align with those of a study at Thu Duc District Hospital (8), which used the same SHH method with chlorhexidine 4 antibacterial soap solution. In contrast, a study at Vinmec Times City International General Hospital (9) reported lower compliance rates due to the use of both SHH with alcohol and soap solution. Notably, some Step 2 operations, such as rubbing thumbs on palms, were frequently overlooked (71.8%) or performed infrequently (72.4%). Compliance with Step 3, which repeats Step 2 operations, was low (28.8%), with 20 cases not performed. This finding is concerning, as it exceeds that reported in Nguyen Thi Hong's study (10), which had only 7 cases. Habitual use of nail brushes or feeling time constraints may contribute to non-adherence to Step 3. These findings underscore the importance of emphasizing compliance with all SHH steps to ensure their effectiveness.

The compliance rates for the standard nail polishing time of 30 seconds or more in step 1 varied: 89.7% (140/156 observations), which is lower than the 91.5% reported by Dang Ngoc Lien (12) in a study on surgeons performing cesarean sections, but higher than the 59.03% reported by Nguyen Thi Hong (10) in a study on surgeons in different departments. This disparity may stem from differences in study populations. In contrast, compliance for step 3, requiring a second hand wash of 1 minute and 30 seconds, was notably lower at 32.1%, with 20 instances of non-compliance. This suggests that medical staff may be influenced by subjective beliefs regarding thorough hand washing. Overall compliance for the total SHH time of at least 3 minutes was only 63.5%, notably less than the 91% reported by Nguyen Hoai Thu (9) at Vinmec Times City hospital, where a stopwatch was used to enforce time standards. Variations in compliance rates between studies may be due

to differences in study design, methodology, and participant demographics.

The study found no statistically significant influence of gender on protocol compliance. This finding is consistent with the results of previous studies by Dang Ngoc Lien (2018) and Nguyen Thi Hong (2020) (10, 12), which may be due to the small sample size and limited power to detect intervention effects. However, our results indicate that older individuals tend to adhere to established habits and exhibit greater confidence in their previous experiences. This is consistent with Nguyen Thi Hong's findings (10), which showed that individuals over 40 years old had a higher compliance rate than those in other age groups. This may be due to the fact that older individuals have more experience and are less likely to accept change. Similarly, the results of our study are similar to those of other studies conducted at Thu Duc Regional General Hospital, Vinmec Time City International General Hospital, and ENT Hospital in Ho Chi Minh City (9, 10, 11), which may be attributed to the same factors. In terms of professional level, instrument nurses have better compliance rates than doctors. The difference may be due to the fact that instrument nurses regularly perform this procedure as part of their daily job and are more likely to take it seriously than other medical staff. While doctors may have a greater influence on the quality of surgery, they also have more responsibilities and tasks outside of surgery, which may limit their ability to focus on hand hygiene (12).

The study utilized camera observation to reduce errors associated with direct observation and evaluated the duration of hand hygiene procedures, a frequently overlooked factor. Nevertheless, the study is not without limitations. One limitation is that the study only evaluated the sequence of steps involved in SHH, without examining the

specific sequence of operations within each step. Additionally, the study did not assess the level of knowledge and attitudes of medical staff regarding SHH compliance, nor did it quantify the factors that influence or affect compliance with hand hygiene practices. Furthermore, the study did not consider the classification of surgeries in which medical staff participate, which may be an important factor in determining compliance with hygiene practices. The inclusion of this variable could provide valuable insights into the relationships between surgery type and hand hygiene compliance. Furthermore, the findings of the study are applicable solely to hospitals of similar characteristics and may not generalize to all hospital settings. Future research should aim to address these limitations by incorporating a more comprehensive evaluation of SHH practices and the factors that influence them.

CONCLUSION

The overall compliance rate for SHH was 25% (39/156) based on 156 opportunities to observe hand hygiene. The compliance rates for each step were as follows: step 1, 89.7%; step 2, 46.2%; and step 3, 28.8%. Furthermore, the compliance rate for total surgical hand hygiene time exceeding 3 minutes was 63.5%, with the highest compliance rate for fingernail brushing in step 1 exceeding 30 seconds at 89.7%. Notably, 12.8% of observations did not include step 3. When examining compliance with surgical hand hygiene among individual subjects, the highest compliance rate across all three observations was observed in the nursing group, at 47.1%, whereas the lowest compliance rate was observed in the doctors' group, at 10.7%. A statistically significant difference was found between the nursing group and doctors' group, with nurses having significantly better compliance (OR = 6.89, CI 95% (3.05-15.56)).

Recommendations: To enhance the effectiveness of surveillance activities, we propose establishing a regular surveillance schedule to ensure consistent monitoring. When conducting surveillance using camera technology, it is essential to record and provide immediate feedback to medical staff, particularly during critical steps and operations.

To further improve the quality of hand hygiene practices, we suggest equipping surgical hand hygiene stations with stopwatches to monitor the duration of hand hygiene practices.

To strengthen the evidence base for surgical hand hygiene practices, we recommend collaborating with the Microbiology Department to regularly collect and analyze samples of hand hygiene practices.

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