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The Relationship between Hand Washing and Hospital-Acquired Infections

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by

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Executive Summary

Hand hygiene is a hot topic all the time since it is a simple yet effective way to prevent infection. For the staff who work in the hospital, they need to perform hand hygiene thousands of times. Hospital-acquired infections are caused by viral, bacterial, and fungal pathogens. The most common types of infections are bloodstream infections, pneumonia, urinary tract infections, and surgical site infections. There are many articles that emphasize the benefits of hand hygiene and the decreasing rates of hospital-acquired infections. However, few of these articles focus on the education aspect of handwashing. This project focuses on education and emphasized strategies to educate staff. The article also synthesizes the relationship between hand hygiene and hospital-acquired infection. Therefore, the issues in practice support the PICOT question that guided the literature review: in hospital staff (P), how does hand washing education (I) compare to no handwashing education (C) affect the performance of hand washing and rate of hospital-acquired infections (O) within 3 months (T)? The evidence-based change project will be conducted at a hospital including the initial departments of cardiology, general surgery, operating room, and intensive care unit (ICU) departments. Education sessions represent a challenge for improving hand hygiene as educational sessions compete with staff productivity hours and direct patient care. This is an important barrier, and the intervention will strategically target the unique needs of the healthcare environment. Education sessions will last for 2 months to make sure the staff is well prepared to implement the intervention in the healthcare setting. Education will occur in a variety of ways including class offerings on different days, videos, posts, and even some sitcoms.

The author reviews the articles focus on the education, hand hygiene, and hospital-acquired infections. Searching for whether education has influence on the hand washing compliance and hospital-acquired infections and investigating how education influences hospital-acquired infection and hand washing compliance. As a result, synthesizing the different methods to educate staff would be helpful for the future research.

Rationale

The relationship between hand washing and hospital-acquired infections has gained a lot of attention, especially in light of COVID-19 and the international response to hand washing in the news media and social media. There is a strong link between hand washing and nosocomial infections, and the link needs to be in the minds of all hospital personnel. Hospital-acquired, or nosocomial infections, can lead to a series of negative influences on patients, such as poor wound healing, higher healthcare costs, and longer hospital stays. Continued improvements in patient safety depend on the understanding hospital-acquired infections and using interventions, importantly hand washing, as an evidence-based strategy. On any given day, about one in 31 hospital patients have at least one hospital-acquired infection (HAI). A 2015 survey identified 3% of hospitalized patients had one or more HAI. There were an estimated 687,000 HAIs in the U.S. acute care hospitals in 2015. About 72,000 hospital patients with HAIs died during their hospitalizations (Center for Disease Control and Prevention [CDC], 2020). A large scale cross-section survey of nosocomial infections in China showed that the incidence of hospital-acquired infections ranged from 3.22% to 5.22% in hospitalized patients, and the incidence of hospital-acquired lower respiratory tract infection was 1.76% to 1.94% (Huang et al., 2019). Thi et al. (2015) pointed out that hospital-acquired infection would be avoided by increasing compliance with hand washing. There are five indications for washing hands: before touching a patient,

before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient, and after touching patient surroundings (World Health Organization [WHO], 2019). Additionally, hand washing is indicated before or after eating and toileting.

Healthcare professionals' perception and knowledge of healthcare hygiene is not only the basis of hand washing, but it is also the key to performing hand hygiene. Without understanding the necessity of performing hand hygiene, it is difficult to keep staff compliant with hand washing. Therefore, the author wants to focus on hand hygiene education and to evaluation of the effects of education.

Literature Synthesis

The author chose three databases: PubMed, Web of Science, and EBSCOhost. Keywords were used in searching the databases and included " Hand Washing," " Hand hygiene," "Hand-washing," "Hospital-Acquired Infections," or "Hand washing compliance." These keywords were used to ensure that relevant literature was found. After reviewing the initial search results, the author narrowed the search by reviewing the abstracts for relevant information to support the PICOT. Articles about knowledge and perceptions are included as well. After reviewing the abstract, the articles suited for the topic were picked, then the full text was examined to find the key points and results related to the PICOT above.

Several studies were found to support the importance of education on hand washing. Oh (2018) did a cross-section multi-center study to assess the nurses' hand hygiene knowledge, perception, attitude, and self-reported performance. The results showed that receiving education within the past year were found to be related to knowledge, perceptions of hand washing. Oh (2019) pointed out specialized and well-structured hand hygiene education about enhancing the perception and attitudes of health care professionals should be conducted, which will contribute

to improving hand hygiene performance of health care workers. Mertz, Dafoe, Walter, Brazil, and Loeb (2010) did a cluster-randomized control trial and pointed out that with performance feedback, small group teaching seminars, posters, and education would increase the rate of hand washing compliance. A study was implemented by Paul, Kuszajewski, Davenport, Thompson, and Morgan (2019) in the operating room, and the study suggested that education and monitoring hand hygiene among anesthesia personnel providers in the operating room can improve hand hygiene compliance. Laskar et al. (2018) did a multimodal intervention to improve hand hygiene compliance in a tertiary care center, and significant improvements in hand hygiene compliance involving all types of health care workers were observed. Also, Graveto, Rebola, Fernandes, and Costa (2018) did a literature review and concluded that after training, nurses' adherence to hand hygiene improved. In general, strong evidence showed education plays an important role in hand washing compliance.

For the hospital-acquired infections, a research study showed that educating through verbal instruction can improve hospital-acquired infections by measuring catheter-associated bloodstream infection and catheter-associated urinary tract infection rates (Fox et al., 2015). Nakamura et al. (2019) investigated how education influences hospital-acquired infection and hand washing compliance by measuring central line-associated bloodstream infection (CLABSI) infections with *Staphylococcus* and *Enterobacteriaceae*. The results concluded that the scenario-based simulation health care education had a positive effect on hand hygiene and control of healthcare-associated infection. Also, Chhapola and Brar (2015) had a quasi-experimental design in a developing country neonatal intensive care unit (NICU). The study indicated that education with CDC guidelines about hand hygiene can serve as an economical and effective nosocomial infection control approach especially important in developing nations.

Project Stakeholders

Pandi-Perumal et al. (2015) stated that "those who are directly affected by program development . . . almost universally have a strong motivation to be involved in the planning and execution of new program changes" (p. 1). The key project stakeholder of this program is the staff who work in the hospital, patients, visitors.

The patients are important stakeholders. For each patient, the most important priority is safety. However, hospital-acquired infections result in a range of negative patient outcomes. Because positive health outcomes are so important, nurses have a duty to engage in proper hand hygiene to promote positive health outcomes in patients.

In the United States, the incidence of nosocomial infections is around 2 million per year, of which 500,000 cases happen in intensive care units. This means that about one-fourth of such infections take place in ICUs, indicating the importance of this ward in the matter of hospital infections (Yallew, Kumie, & Yehuala, 2016). Targeting hand hygiene education for ICU staff is vitally important to improving health outcomes and is an essential area to target for hand hygiene.

Hospital costs are extremely high, and healthcare expenses are a burden in the overall healthcare syste. When HAIs occur, this prolongs patient lengths of stay, and this increases costs. The extra cost is unnecessary since hospital-acquired infection should not occur. Hand hygiene is an important tool to reduce HAIs.

Healthcare staff have a responsibility to improve the patient outcomes. Performing hand hygiene is also a way to protect staff and visitors from the diseases that spread through contact. In light of the 2020 pandemic of COVID-19, it is even more important to provide education about hand hygiene and facilitate hand-hygiene campaigns in the healthcare environment.

Planned Implementation

This change project will be conducted at a hospital including the initial departments of cardiology, general surgery, operating room, and intensive care unit (ICU) departments. This project will be divided into three phases: preintervention phase (weeks 1-2), intervention phase (weeks 3-10), postintervention phase (weeks 11-12). During the preintervention phase, the author will collect data on the staff's handwashing performance, including the staff's knowledge and perceptions of hand hygiene by using the World Health Organization (WHO) Hand Hygiene Knowledge Questionnaires, 2009 revision of the World Health Organization (WHO) Hand Hygiene Perception Questionnaires. The numbers of performing hand hygiene will be collected by using the 2009 revision of the WHO Observation Form (WHO, 2019). Also, the hospital-acquired infection rates will be needed to collect as well. During the intervention phase, the education section will last for 8 weeks in order to make sure every participant will be well educated. A variety of ways will be used to educate staff. These methods include classes on different days, videos, posts, and even some sitcoms. Four educators will teach staff in these four departments. During week 3-8, they will teach staff the importance of hand hygiene, when and how to perform hand hygiene, and hospital-acquired infection rates. During week 9-10, they will remind the staff to wash their hands. During the postintervention phase, eight supervisors will be sent out to observe the staff. The same date will be collected as the preintervention phase.

Data Collection Methods

First, the questionnaires will be sent to each staff member working in the hospital in the four departments to assess their knowledge and perception of hand hygiene. Then the education program will be launched. The education program consists of educating and training staff,

reminding staff to wash their hands. Second, each department will have two observers collect data regarding staff performance of hand hygiene using the WHO observation form. Third, the data of hospital-acquired data will be collected from the administration of the four departments.

Planned Evaluation

This project includes several tools. The tools to evaluate handwashing performance include the 2009 revision of the World Health Organization (WHO) Hand Hygiene Knowledge Questionnaires, 2009 revision of the World Health Organization (WHO) Hand Hygiene Perception Questionnaires, 2009 revision of WHO Observation Form (WHO, 2019). The evaluation plan will be carried out as indicated below.

First, the number of hospital-acquired infections two weeks after the postintervention phase will be collected to calculate the hospital-acquired infection rates. The comparison between the before and after the intervention will be done to assess the influence of handwashing education. Second, the questionnaires will be sent out to collect the data of the staff's perception and knowledge. Also, the comparison will be done to evaluate if their knowledge has increased after the intervention. Third, the staff will be observed to collect the compliance with handwashing. Compliance rates are then calculated based on observed handwashing. A comparison of the compliance rates before and after the intervention is the basis for determining the effectiveness of the intervention. Finally, the brief survey/questionnaire will be given to the patients to receive some feedback on this project. Their satisfaction will be used to evaluate if the change has an impact on their perceived satisfaction and trust with the healthcare professionals. Because patient satisfaction is a way to measure the quality of nurses' caring, it is also a principle of each activity in the hospital.

Timetable

The project will be carried out for three months. The time will be divided into three phases as Table 1 shows.

Table 1

	Time	Work
Phase 1 (Pre-intervention Phase)	Weeks 1-2	• Collect the data on hospital-acquired infection rates in these four departments • Send out and collect the questionnaires, obtain the data of staff's hand washing knowledge and perceptions • Observe staff by using the observation form to obtain the data of the hand washing compliance
Phase 2 (Intervention Phase)	Weeks 3-10	• Training stage: Educating and training by using different methods (weeks 3-8) • Remind staff if they don't wash hands during these 5 moments (weeks 9-10)
Phase 3 (Post-Intervention Phase)	Weeks 11-12	• Send out and collect the questionnaires, obtain the data of staff's hand washing knowledge and perceptions

		• Observe staff by using the observation form to obtain the data of the hand washing compliance • Collect the data of hospital-acquired rate in these four departments and patients' satisfaction

Cost/Benefit Discussion

Four educators will teach and remind the staff to perform hand hygiene in the four departments, and eight supervisors will be sent to the four departments to observe staff to wash their hands before and after the intervention. One nursing staff member will be tasked with developing marketing information including the development of posts and videos. Four classrooms, hand sanitizers, printers, and the computers will be needed for the education section of the project. All of these supplies can be obtained directly from the hospital. The average cost of the education staff is $35 per hour. Each class is an hour in duration, and two classes are needed from Monday to Friday. Approximately $11,200 will be spent as the salary for these four educators. Supervisors will be sent out two weeks before the intervention and two weeks after the intervention. The average cost of the supervisor is $25 per hour. They will work for 2 hours each day from Monday to Friday. Approximately $8,000 will be spent as the salary of these eight superiors for the project duration. Incidental costs of $1,000 will be used to make posts, videos, and develop reminders in the hospital. Incentives totaling $2,000 will be used to encourage staff to participate and finish the education part. A total of $22,200 will be spent on this project.

The $22,200 program costs are justifiable in comparison to the cost of HAIs. Increasing hand washing and hand hygiene education is important to combat the costs of HAIs in the US. A meta-analysis, published in 2013, estimated the financial impact on the US healthcare system. Estimated costs were > $27 million for catheter associated urinary tract infections (CAUTI), > $1 billion each for central line associated bloodstream infections (CLABSIs) and *C. difficile* infections, and > $3 billion each for surgical site infections (SSIs) and ventilator associated pneumonia (VAP) (Bearman, Cooper, & Stevens, 2019). For this intervention, the benefits far outweigh the costs.

Conclusion

Hospital-acquired infections are a long-term problem, and it is hard to solve. Hand hygiene is an important focus area, especially in light of COVID-19. This project should improve the satisfaction of patients, shorten the hospital length of stay, and reduce medical costs. The literature review supports an intervention that educating facility staff will improve the staff's knowledge and perceptions of hand washing and hand hygiene. The evidence supports that this will improve the adherence and compliance of hand washing. The final consequence is to reduce hospital-acquired infection rates.

Recommendation

There are some recommendations for this project. Several studies support that educating patients can help staff know the importance of handwashing so that staff will perform handwashing. Educating facility staff should improve the adherence of handwashing and reduce hospital-acquired infection rates (Haverstick et al., 2017; Fox et al., 2015; Mertz et al., 2010; Nakamura et al., 2019; Oh, 2018). The education component is the key to improving the performance of hand hygiene. There are several educational modalities, including lectures,

scenario-based simulations, and videos. The scenario-based simulation for performance of hand hygiene is a new way to help the staff improve the awareness of handwashing and prevent HAIs **(**Nakamura et al., 2019). A combination of different ways to educate staff will carry costs associated with increasing hand hygiene compliance, however the benefit is significant.

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Appendix A

Perception Survey for Health-Care Workers

Period Number*

You are in direct contact with patients on a daily basis and this is why we are interested in your **opinion** on health care-associated infections and hand hygiene.

- It should take you about 10 minutes to complete this questionnaire.
- Each question has **one answer only**.
- Please read the questions carefully and then respond spontaneously. Your answers are anonymous and will be kept confidential.
- **Short Glossary:**

Alcohol-based handrub formulation: an alcohol-containing preparation (liquid, gel or foam) designed for application to the hands to kill germs.

Facility: health-care setting where the survey is being carried out (e.g., hospital, ambulatory, long-term facility, etc).

Handrubbing: treatment of hands with an antiseptic handrub (alcohol-based formulation).

Handwashing: washing hands with plain or antimicrobial soap and water.

Service: a branch of a hospital staff that provides specified patient care.

Ward: a division, floor, or room of a hospital for a particular category or group of patients (it corresponds to the smallest segmentation of the health-care facility; one service can include multiple wards)**.**

1. **Personal ID**:**
2. **Date:**
3. **Facility:**
4. **Service**:**
5. **Ward**:**
6. **City**:**
7. **Country**:**
8. **Gender:** ☐ Female ☐ Male

9. Age: ☐ years

10. Profession*:** ☐ Nurse ☐ Auxiliary nurse ☐ Midwife ☐ Medical doctor ☐ Resident

☐ Technician ☐ Therapist ☐ Nurse student ☐ Medical student ☐ Other

* To be completed by the data manager.
** **Optional**, to be used if appropriate, according to the local needs and regulations.
*****Technicians**: radiologist, cardiology technician, operating room technician, laboratory technician
Therapist: physiotherapist, occupational therapist, audiologist, speech therapist
Other: dietician, dentist, social worker, etc.

11. Department (please select the department which best represents yours):

☐ Internal medicine ☐ Surgery ☐ Intensive care unit ☐ Mixed medical/surgical

☐ Emergency unit ☐ Obstetrics ☐ Paediatrics ☐ Long-term/rehabilitation

☐ Outpatient clinic ☐ Other

12. Did you receive formal training in hand hygiene in the last three years? ☐
Yes ☐ No

13. Do you routinely use an alcohol-based handrub for hand hygiene? ☐
Yes ☐ No

14. In your opinion, what is the average percentage of hospitalised patients who will develop a health care-associated infection (between 0 and 100%)?

☐ % ☐ I don't know

15. In general, what is the impact of a health care-associated infection on a patient's clinical outcome?

☐ Very low ☐ Low ☐ High ☐ Very high

16. What is the effectiveness of hand hygiene in preventing health care-associated infection?

☐ Very low ☐ Low ☐ High ☐ Very high

17. Among all patient safety issues, how important is hand hygiene at your institution?

☐ Low priority ☐ Moderate priority ☐ High priority ☐ Very high priority

18. On average, in what percentage of situations requiring hand hygiene do <u>health-care workers</u> in your hospital actually perform hand hygiene, either by handrubbing or handwashing (between 0 and 100%)?

☐ % ☐ I don't know

19. In your opinion, how effective would the following actions be to improve hand hygiene permanently in your institution?
Please tick one “ ☐ ” on the scale according to your opinion.

a. Leaders and senior managers at your institution support and openly promote hand hygiene.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

b. The health-care facility makes alcohol-based handrub always available at each point of care.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

c. Hand hygiene posters are displayed at point of care as reminders.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

d. Each health-care worker receives education on hand hygiene.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

e. Clear and simple instructions for hand hygiene are made visible for every health-care worker.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

f. Health-care workers regularly receive feedback on their hand hygiene performance.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

g. You always perform hand hygiene as recommended (being a good example for your colleagues).

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

h. Patients are invited to remind health-care workers to perform hand hygiene.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

20. What importance does the head of your department attach to the fact that you perform optimal hand hygiene?

No importance ☐---☐---☐---☐---☐---☐---☐ Very high importance

21. What importance do your colleagues attach to the fact that you perform optimal hand hygiene?

No importance ☐---☐---☐---☐---☐---☐---☐ Very high importance

22. What importance do patients attach to the fact that you perform optimal hand hygiene?

No importance ☐---☐---☐---☐---☐---☐---☐ Very high importance

23. How do you consider the effort required by you to perform good hand hygiene when caring for patients?

No effort ☐---☐---☐---☐---☐---☐---☐ A big effort

24. On average, in what percentage of situations requiring hand hygiene do you actually perform hand hygiene, either by handrubbing or handwashing (between 0 and 100%)?

☐ %

Thank you very much for your time!

Follow-Up Perception Survey for Health-Care Workers

Period Number*

You are in direct contact with patients on a daily basis and this is why we are interested in your **opinion** on health care-associated infections and hand hygiene.

- It should take you no more than 15 minutes to complete this questionnaire.
- Each question has **one answer only**.
- Please read the questions carefully and then respond spontaneously. Your answers are anonymous and will be kept confidential.
- This questionnaire is in two parts: **part 1** includes the same questions that you may have answered during the a previous evaluation period; **part 2** includes some additional questions to find out your opinion of the strategies and tools being currently used to promote hand hygiene at your institution.
- **Short Glossary:**

Alcohol-based handrub formulation: an alcohol-containing preparation (liquid, gel or foam) designed for application to the hands to kill germs.

Facility: health-care setting where the survey is being carried out (e.g., hospital, ambulatory, long-term facility, etc).

Handrubbing: treatment of hands with an antiseptic handrub (alcohol-based formulation).

Handwashing: washing hands with plain or antimicrobial soap and water.

Service: a branch of a hospital staff that provides specified patient care.

Ward: a division, floor, or room of a hospital for a particular category or group of patients (it corresponds to the smallest segmentation of the health-care facility; one service can include multiple wards).

Part 1

1. **Personal ID**:**
2. **Date:**
3. **Facility:**
4. **Service**:**
5. **Ward**:**
6. **City**:**
7. **Country**:**
8. **Gender:** ☐ Female ☐ Male
9. **Age:** ☐ years

10. Profession*:** ☐ Nurse ☐ Auxiliary nurse ☐ Midwife ☐ Medical doctor ☐ Resident

☐ Technician ☐ Therapist ☐ Nurse student ☐ Medical student ☐ Other

* To be completed by the data manager
** **Optional**, to be used if appropriate, according to the local needs and regulations.
*****Technicians**: radiologist, cardiology technician, operating room technician, laboratory technician
Therapist: physiotherapist, occupational therapist, audiologist, speech therapist
Others: dietician, dentist, social worker, etc.

11. Department (please select the department which best represents yours):

☐ Internal medicine ☐ Surgery ☐ Intensive care unit ☐ Mixed medical/surgical

☐ Emergency unit ☐ Obstetrics ☐ Paediatrics ☐ Long-term/rehabilitation

☐ Outpatient clinic ☐ Other

12. Did you receive formal training in hand hygiene in the last three years? ☐ Yes ☐ No

13. Do you routinely use an alcohol-based handrub for hand hygiene? ☐ Yes ☐ No

14. According to your knowledge, what is the average percentage of hospitalised patients who will develop a health care-associated infection (between 0 and 100%)?

☐ % ☐ I don't know

15. In general, what is the impact of a health care-associated infection on patient's clinical outcome?

☐ Very low ☐ Low ☐ High ☐ Very high

16. What is the effectiveness of hand hygiene in preventing health care-associated infection?

☐ Very low ☐ Low ☐ High ☐ Very high

17. Among all patient safety issues, how important is hand hygiene at your institution?

☐ Low priority ☐ Moderate priority ☐ High priority ☐ Very high priority

18. On average, in what percentage of situations requiring hand hygiene do health-care workers in your hospital actually perform hand hygiene, either by handrubbing or handwashing (between 0 and 100%)?

☐ % ☐ I don't know

19. In your opinion, how effective would the following actions be to improve hand hygiene permanently in your institution?
Please tick one "☐" on the scale according to your opinion.

a. Leaders and senior managers at your institution support and openly promote hand hygiene.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

b. The health-care facility makes alcohol-based handrub always available at each point of care.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

c. Hand hygiene posters are displayed at point of care as reminders.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

d. Each health-care worker receives education on hand hygiene.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

e. Clear and simple instructions for hand hygiene are made visible for every health-care worker.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

f. Health-care workers regularly receive feedback on their hand hygiene performance.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

g. You always perform hand hygiene as recommended (being a good example for your colleagues).

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

h. Patients are invited to remind health-care workers to perform hand hygiene.

Not effective ☐---☐---☐---☐---☐---☐---☐ Very effective

20. What importance does the head of your department attach to the fact that you perform optimal hand hygiene?

No importance ☐---☐---☐---☐---☐---☐---☐ Very high importance

21. What importance do your colleagues attach to the fact that you perform optimal hand hygiene?

No importance ☐---☐---☐---☐---☐---☐---☐ Very high importance

22. What importance do patients attach to the fact that you perform optimal hand hygiene?

No importance ☐---☐---☐---☐---☐---☐---☐ Very high importance

23. How do you consider the effort required by you to perform good hand hygiene when caring for patients?

No effort ☐---☐---☐---☐---☐---☐---☐ A big effort

24. On average, in what percentage of situations requiring hand hygiene do <u>you</u> actually perform hand hygiene, either by handrubbing or handwashing (between 0 and 100%)?

Appendix B

Hand Hygiene Knowledge Questionnaire for Health-Care Workers

Period Number*

- The knowledge required for this test is specifically transmitted through the WHO hand hygiene training material and you may find the questions more difficult if you did not participate in this training.
- Tick **only one answer** to each question.
- Please read the questions carefully before answering. Your answers will be kept confidential.
- **Short Glossary:**

Alcohol-based handrub formulation: an alcohol-containing preparation (liquid, gel or foam) designed for application to the hands to kill germs.

Facility: health-care setting where the survey is being carried out (e.g., hospital, ambulatory, long-term facility, etc).

Handrubbing: treatment of hands with an antiseptic handrub (alcohol-based formulation).

Handwashing: washing hands with plain or antimicrobial soap and water.

Service: a branch of a hospital staff that provides specified patient care.

Ward: a division, floor, or room of a hospital for a particular category or group of patients (it corresponds to the smallest segmentation of the health-care facility; one service can include multiple wards)**.**

25. **Personal ID**:**
26. **Date:**
27. **Facility:**
28. **Service**:**
29. **Ward**:**
30. **City:****
31. **Country**:**
32. **Gender:** ☐ Female ☐ Male

33. Age: ☐ years

34. Profession*:** ☐ Nurse ☐ Auxiliary nurse ☐ Midwife ☐ Medical doctor ☐ Resident

☐ Technician ☐ Therapist ☐ Nurse student ☐ Medical student ☐ Other

35

* To be completed by the data manager.
** **Optional**, to be used if appropriate, according to the local needs and regulations.
*****Technicians**: radiologist, cardiology technician, operating room technician, laboratory technician
Therapist: physiotherapist, occupational therapist, audiologist, speech therapist
Others: dietician, dentist, social worker, etc.

Department (please select the department which best represents yours):

☐ Internal medicine ☐ Surgery ☐ Intensive care unit ☐ Mixed medical/surgical

☐ Emergency unit ☐ Obstetrics ☐ Paediatrics ☐ Long-term/rehabilitation

☐ Outpatient clinic ☐ Other

36. Did you receive formal training in hand hygiene in the last three years? ☐ Yes ☐ No

37. Do you routinely use an alcohol-based handrub for hand hygiene? ☐ Yes ☐ No

38. Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? (*tick one answer only*)

i. ☐ Health-care workers' hands when not clean

j. ☐ Air circulating in the hospital

k. ☐ Patients' exposure to colonised surfaces (i.e., beds, chairs, tables, floors)

l. ☐ Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients

39. What is the most frequent source of germs responsible for health care-associated infections? *(tick one answer only)*

a. ☐ The hospital's water system

b. ☐ The hospital air

c. ☐ Germs already present on or within the patient

d. ☐ The hospital environment (surfaces)

40. Which of the following hand hygiene actions prevents transmission of germs *<u>to the patient</u>*?

e. Before touching a patient ☐ Yes ☐ No

f. Immediately after a risk of body fluid exposure ☐ Yes ☐ No

g. After exposure to the immediate surroundings of a patient ☐ Yes ☐ No

h. Immediately before a clean/aseptic procedure ☐ Yes ☐ No

41. Which of the following hand hygiene actions prevents transmission of germs *<u>to the health-care worker?</u>*

i. After touching a patient ☐ Yes ☐ No

j. Immediately after a risk of body fluid exposure ☐ Yes ☐ No

k. Immediately before a clean/aseptic procedure ☐ Yes ☐ No

l. After exposure to the immediate surroundings of a patient ☐ Yes ☐ No

42. Which of the following statements on alcohol-based handrub and handwashing with soap and water are true?

m. Handrubbing is more rapid for hand cleansing than handwashing ☐ True ☐ False

n. Handrubbing causes skin dryness more than handwashing ☐ True ☐ False

o. Handrubbing is more effective against germs than handwashing ☐ True ☐ False

p. Handwashing and handrubbing are recommended to be performed in sequence ☐ True ☐ False

43. What is the minimal time needed for alcohol-based handrub to kill most germs on your hands? *(tick one answer only)*

q. ☐ 20 seconds

r. ☐ 3 seconds

s. ☐ 1 minute

t. ☐ 10 seconds

44. Which type of hand hygiene method is required in the following situations?

u. Before palpation of the abdomen ☐ Rubbing ☐ Washing ☐ None

v. Before giving an injection ☐ Rubbing ☐ Washing ☐ None

w. After emptying a bedpan ☐ Rubbing ☐ Washing ☐ None

x. After removing examination gloves ☐ Rubbing ☐ Washing ☐ None

y. After making a patient's bed ☐ Rubbing ☐ Washing ☐ None

z. After visible exposure to blood ☐ Rubbing ☐ Washing ☐

None

45. Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs?

aa. Wearing jewellery ☐ Yes ☐
No

bb. Damaged skin ☐ Yes ☐
No

cc. Artificial fingernails ☐ Yes ☐
No

dd. Regular use of a hand cream ☐ Yes ☐
No

Thank you very much for your time!

Appendix C

Observation Form

Facility:		**Period Number*:**		**Session Number*:**	
Service:		**Date:** (dd/mm/yy)	/ /	**Observer:** (initials)	
Ward:		**Start/End time:** (hh:mm)	: / :	**Page N°:**	
Department:		**Session duration:** (mm)		**City**:**	
Country:**					

Prof.cat		Prof.cat		Prof.cat		Prof.cat	
Code		Code		Code		Code	
N°		N°		N°		N°	

Opp.	Indication	HH Action	Opp.	Indication	HH Action	Opp.	Indication	HH Action	Opp.	Indication	HH Action
1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
2	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	2	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	2	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	2	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
3	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	3	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	3	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	3	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
4	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	4	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	4	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	4	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
5	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	5	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	5	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	5	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
6	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	6	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	6	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	6	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
7	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	7	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	7	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	7	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves

8	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**8**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**8**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**8**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves

* To be completed by the data manager.
** **Optional**, to be used if appropriate, according to the local needs and regulations.

General Recommendations

(refer to the Hand Hygiene Technical Reference Manual)

46. **In the context of open and direct observations, the observer introduces him/herself to the health-care worker and to the patient when appropriate, explains his/her task and proposes immediate informal feed back.**
47. **The health-care worker, belonging to one of the main four following professional categories (see below), is observed during the delivery of health-care activities to patients.**
48. **Detected and observed data should be recorded with a pencil in order to be immediately corrected if needed.**
49. **The top of the form (header) is completed before starting data collection (excepted end time and session duration).**
50. **The session should last no more than 20 minutes (± 10 minutes according to the observed activity); the end time and the session duration are to be completed at the end of the observation session.**
51. **The observer may observe up to three health-care workers simultaneously, if the density of hand hygiene opportunities permits.**
52. **Each column of the grid to record hand hygiene practices is intended to be dedicated to a specific professional category. Therefore numerous health-care workers may be sequentially included during one session in the column dedicated to their category. Alternatively each column may be dedicated to a single health-care worker only of whom the professional category should be indicated.**
53. **As soon as you detect an indication for hand hygiene, count an opportunity in the appropriate column and cross the square corresponding to the indication(s) you detected. Then complete all the indications that apply and the related hand hygiene actions observed or missed.**
54. **Each opportunity refers to one line in each column; each line is independent from one column to another.**
55. **Cross items in squares (several may apply for one opportunity) or circles (only a single item may apply at one moment).**
56. **When several indications fall in one opportunity, each one must be recorded by crossing the squares.**
57. **Performed or missed actions must always be registered within the context of an opportunity.**
58. **Glove use may be recorded only when the hand hygiene action is missed while the health-care worker is wearing gloves.**

Short description of items

Facility:	to complete according to the local nomenclature	
Service:	to complete according to the local nomenclature	
Ward:	to complete according to the local nomenclature	
Department:	to complete according to the following standardized nomenclature:	
	medical, including dermatology, neurology, haematology, oncology, etc.	surgery, including neurosurgery, urology, EENT, ophthalmology, etc.
	mixed (medical & surgical), including gynaecology	obstetrics, including related surgery
	paediatrics, including related surgery	intensive care & resuscitation
	emergency unit	long term care & rehabilitation
	ambulatory care, including related surgery	other (to specify)
Period N°:	1) pre- / 2) post-intervention; and then according to the institutional counter.	
Date:	day (dd) / month (mm) / year (yy)	
Start/end time:	hour (hh) / minute (mm).	
Session duration:	difference between start and end time, resulting in minutes of observation.	
Session N°:	attributed at the moment of data entry for analysis.	
Observer:	observer's initials (the observer is responsible for the data collection and for checking their accuracy before submitting the form for analysis.	
Page N°:	to write only when more than one form is used for one session.	
Prof.cat:	according to the following classification:	
	1. nurse / midwife	1.1 nurse, 1.2 midwife, 1.3 student.
	2. auxiliary	
	3. medical doctor	3.1 in internal medicine, 3.2 surgeon, 3.3 anaesthetist / resuscitator / emergency physician, 3.4 paediatrician, 3.5 gynaecologist, 3.6 consultant, 3.7 medical student.
	4. other health-care worker	4.1 therapist (physiotherapist, occupational therapist, audiologist, speech therapist), 4.2 technician (radiologist, cardiology technician, operating room technician, laboratory technician, etc), 4.3 other (dietician, dentist, social worker and any other health-related professional involved in patient care), 4.4 student.
Number:	number of observed health-care workers belonging to the same professional category (same code) as they enter the field of observation and you detect opportunities.	

Opp(ortunity):	defined by one indication at least	
Indication:	reason(s) that motivate(s) hand hygiene action; all indications that apply at one moment must be recorded	
	bef.pat: before touching a patient	aft.b.f: after body fluid exposure risk
	bef.asept: before clean/aseptic procedure	aft.pat: after touching a patient
		aft.p.surr: after touching patient surroundings
HH action:	response to the hand hygiene indication(s); it can be either a positive action by performing handrub or handwash, or a negative action by missing handrub or handwash	
	HR: hand hygiene action by handrubbing with an alcohol-based formula HW: hand hygiene action by handwashing with soap and water	Missed: no hand hygiene action performed

Observation Form – Basic Compliance Calculation

	Facility:						**Period:**			**Setting:**					
	Prof.cat.			**Prof.cat.**			**Prof.cat.**			**Prof.cat.**			**Total per session**		
Session N°	**Opp (n)**	**HW (n)**	**HR (n)**	**Opp (n)**	**HW (n)**	**HR (n)**	**Opp (n)**	**HW (n)**	**HR (n)**	**Opp (n)**	**HW (n)**	**HR (n)**	**Opp (n)**	**HW (n)**	**HR (n)**
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
Total															
Calculation	**Act (n) =** **Opp (n) =**			**Act (n) =** **Opp (n) =**			**Act (n) =** **Opp (n) =**			**Act (n) =** **Opp (n) =**			**Act (n) =** **Opp (n) =**		
Compliance															

Compliance (%) = $\frac{\text{Actions}}{100}$ x

Instructions for use

1. **Define the setting outlining the scope for analysis and report related data according to the chosen setting.**
2. **Check data in the observation form. Hand hygiene actions not related to an indication should not be taken into account and vice versa.**
3. **Report the session number and the related observation data in the same line. This attribution of session number validates the fact that data has been taken into count for compliance calculation.**
4. **Results per professional category and per session (vertical):**
   - 4.1 Sum up recorded opportunities (opp) in the case report form per professional category: report the sum in the corresponding cell in the calculation form.
   - 4.2 Sum up the positive hand hygiene actions related to the total of opportunities above, making difference between handwash (HW) and handrub (HR): report the sum in the corresponding cell in the calculation form.
   - 4.3 Proceed in the same way for each session (data record form).
   - 4.4 Add up all sums per each professional category and put the calculation to calculate the compliance rate (given in percent)
5. **The addition of results of each line permits to get the global compliance at the end of the last right column.**

Observation Form – Optional Calculation Form

(Indication-related compliance with hand hygiene)

	Facility:						Period:			Setting:					
	Before touching a patient			Before clean/ aseptic procedure			After body fluid exposure risk			After touching a patient			After touching patient surroundings		
Session N°	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
Total															
Calculation	Act (n) = Indic1 (n) =			Act (n) = Indic2 (n) =			Act (n) = Indic3 (n) =			Act (n) = Indic4 (n) =			Act (n) = Indic5 (n) =		

Ratio act / indic*					

Instructions for use

6. Define the setting outlining the scope for analysis and report related data according to the chosen setting.
7. Check data in the observation form. Hand hygiene actions not related to an indication should not be taken into account and vice versa.
8. If several indications occur within the same opportunity, each one should be considered separately as well as the related action.
9. Report the session number and the related observation data in the same line. This attribution of session number validates the fact that data has been taken into count for compliance calculation.
10. Results per indication (indic) and per session (vertical):
    4.1 Sum up indications per indication in the observation form: report the sum in the corresponding cell in the calculation form.
    4.2 Sum up positive hand hygiene actions related to the total of indications above, making the difference between handwash (HW) and handrub (HR): report the sum in the corresponding cell in the calculation form.
    4.3 Proceed in the same way for each session (observation form).
    4.4 Add up all sums per each indication and put the calculation to calculate the ratio (given in percent)

***Note:** This calculation is not exactly a compliance result, as the denominator of the calculation is an indication instead of an opportunity. Action is artificially overestimated according to each indication. However, the result gives an overall idea of health-care worker's behaviour towards each type of indication.

Part 2

11. Has the use of an alcohol-based handrub made hand hygiene easier to practice in your daily work?

Not at all ☐---☐---☐---☐---☐---☐---☐ Very important

12. Is the use of alcohol-based handrubs well tolerated by your hands?

Not at all ☐---☐---☐---☐---☐---☐---☐ Very well

13. Did knowing the results of hand hygiene observation in your ward help you and your colleagues to improve your hand hygiene practices?

Not at all ☐---☐---☐---☐---☐---☐---☐ Very much

14. Has the fact of being observed made you paying more attention to your hand hygiene practices?

Not at all ☐---☐---☐---☐---☐---☐---☐ Very much

15. Were the educational activities that you participated in important to improve your hand hygiene practices?

Not at all ☐---☐---☐---☐---☐---☐---☐ Very important

16. Do you consider that the administrators in your institution are supporting hand hygiene improvement?

Not at all ☐---☐---☐---☐---☐---☐---☐ Very much

17. Has the improvement of the safety climate (if actually improved in your institution as a result of the recent implementation of the hand hygiene promotion strategy) helped you personally to improve your hand hygiene practices?

Not at all ☐---☐---☐---☐---☐---☐---☐ Very much

18. Has your awareness of your role in preventing health-care-associated infection by improving your hand hygiene practices increased during the current hand hygiene promotional campaign?

Not at all ☐---☐---☐---☐---☐---☐---☐ Very much

Thank you very much for your time!