

## Hand hygiene practice among laboratory workers in selected hospitals in Saudi Arabia

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### ABSTRACT

One of the major challenges facing medical institutions is how to reduce healthcare-associated infections. The World Health Organization (WHO) (2009) observes that ignoring hand hygiene is the leading cause of nosocomial infections in various hospitals. Therefore, it is essential to address hand hygiene techniques that can be used to reduce incidences of healthcare-associated infections. This study aims to evaluate hand hygiene practices in Saudi Arabia as well as how it can be improved to reduce nosocomial infections within the institutions. This study finds that education has effectively improve the hospital laboratory workers hand hygiene practices. The study also holds that the leadership of the medical organizations also plays an essential role in supporting as well as promoting hand hygiene practices. As such, it is the finding of the current study that improving hand hygiene through the management is critical in facilitating reduction of hospital-acquired infections.

**KEY WORDS:** HAND HYGIENE, LABORATORY WORKERS, LEADERSHIP, MANAGEMENT, NOSOCOMIAL INFECTIONS

### INTRODUCTION

Increasing nosocomial infections is one of the major challenges facing the medical community. Magill et al. (2014) reported that hand contamination comprises of about forty percent of nosocomial infections among

immunocompromised patients. WHO estimates that close to 1.5 million individuals around the world suffer from infections acquired from medical institutions. Nosocomial infection is believed to be the leading cause of morbidity and mortality among hospitalized patients (Zingg et al. 2015). The most vulnerable of this group

is the neonates and patients with severe illness because of their intrinsic susceptibility to infections. Hospital laboratories stand as one of the main sources of cross contamination of pathogenic microbes. It is essential to realize that various common laboratory operations produce microbe-filled droplets, thus contaminating the working surface, workers hands, fingers as well as wrist (Sickbert-Bennett et al. 2016, Jones et al., 2017).

Once the hands have been contaminated in the laboratory, the worker can inadvertently carry the pathogens outside the laboratory. They may also accidentally transfer pathogens to other parts of their body such as eyes, mouth or nose. In as much as there are a number of safety standards proposed for laboratory procedures to help prevent infections, an effective engineering control preventing hand contamination is yet to be realized. Ellingson et al. (2014) observed that in the past, gloves have been used in laboratories to limit skin contact. However, the gloves are known to leak and in some cases, workers are likely to spread contamination to their hands as they remove the gloves. Smiddy, O'Connell and Creedon (2015) argue that there are categories of microorganism that can be found in the hands of a medical professional including transient flora and the resident flora. Transient flora is a microorganism that health care workers get from the external environment. According to Abdella et al. (2014), the microorganisms have the capability to survive on the human body or in some cases reproduce themselves. On the other hand, the resident flora is a microorganism that is represented by permanent microorganisms living on the skin surface or immediately under the skin surface of an individual (Al-Asmari and Nooh 2017).

Such microorganisms can survive on the skin of an individual and freely grow on it. It is also essential to observe that the resident flora have low pathogenicity as well as infection rate. Kapil, Bhavsar and Madan (2015) observes that they are some sort of protection from the colonization of other more pathogenic bacteria. Among such microorganisms is the Micrococci, Staphylococcus Pittosporum among many other microorganisms. It is essential to note that the objective of observing hand hygiene in laboratory settings is to remove the transient flora with effective and careful hand washing practices. Sansam (2016) argues that this can be achieved through the use of various kinds of soap such as antiseptics as well as alcohol-based gels. Whether hand washing practices meet their intended objective significantly depends on the worker's quality of hand washing performed.

According to Sakihama et al. (2016), the factors that influence the quality of the hand washing done include the scrubbing duration, amount of friction applied as well as the lathering of soap. It is essential to observe that among these factors the duration taken to scrub the

hands is the most essential given that the longer one takes to scrub their hands the higher the likelihood of them getting rid of a significant portion of the bacterial count from their hands. It is the objective of the current study to evaluate hand hygiene practices among hospital laboratory workers in various medical institutions in Saudi Arabia.

## MATERIAL AND METHODS

**Questionnaire design:** A list of questions designed to study a category. It is one of the most common search tools, also called poll. There are several common patterns of questions, including:• "Yes" or "No" questions, which were accompanied with the "maybe" option or the "do not know" option.• Optional questions: which include either one or several possible answers.• Evaluation questions of different scales. We designed our hand hygiene questionnaire from two work from the World Health Organization and Minnesota hospital association. We summarized our questionnaire objectives into four parts as follows:

Questions on hand hygiene education and practice using alcohol-based hand rub.

Questions on the medical laboratory workers' hand hygiene practices.

Questions on the workers' opinion on how effective various actions would be to improve hand hygiene permanently in their institution. The preference of workers regarding reminding them to perform hand hygiene. The first part contained two questions ("Yes" or "No" questions), the second part contained nine questions (Evaluation questions), the third part contained seven questions (Evaluation questions) and the fourth part contained one Optional question.

**Data analysis:** Figure 1 shows the methodology flow-chart, we divided it into three stages, Stage I focused on development our questionnaire, which had reliability analysis for selected questions. Cronbach's Alpha was 0.757 after we delete third question which belong to the second objective, then we applied correlation test between each objective and their questions. Stage II focused on sample selection and survey administration, we applied our questionnaire on 53 on medical laboratory specialist and technologist who worked in different hospital in Saudi Arabia. Stage III focused on data analysis and reporting, statistical analysis was performed using IBM SPSS Statistics for Windows, Version 22.0 software was used for statistical analyses. We applied Likert Scale analysis for all evaluation questions and the association between demographic characteristics and questionnaire results were analyzed using the Chi-square test of association with confidence interval 95%.

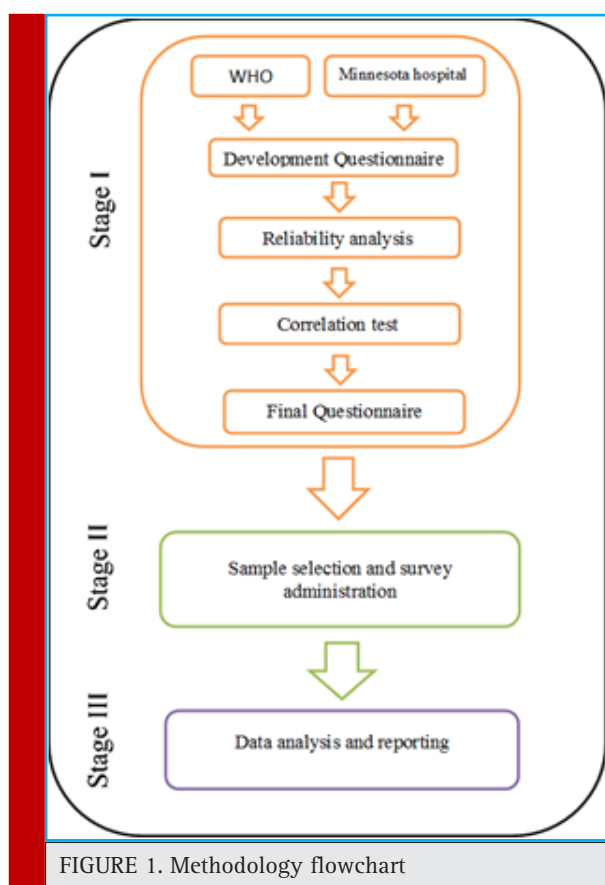


FIGURE 1. Methodology flowchart

**RESULTS**

Based on the objective of the current study, the instrument used for data collection was divided into three segments. The participant’s socio-demographic composition was first determined. This was followed by evaluating the participant’s personal experience with hand sanitation as well as the factors that influence their hand hygiene practices. Finally, the study evaluated the management influence in facilitating hand hygiene among their laboratory workers. As such, the current study utilized 53 workers drawn from various hospital laboratories in Saudi Arabia as participants to inform the study.

Of the selected workers, 33 were laboratory technologist while 20 were laboratory specialist making up 62.3% and 37.7 percent of the study participants respectively. It is also critical to note that the study participants were made up mostly of male occupying 71.7% of the participants involved in the research. Of the 53 workers, a majority of them were observed to be between the ages of 30-40 make up for about 56.6% of the study participants. Participants in the age group of 20-30 who made up about 38% of the total participants followed this closely (Table 1).

An analysis of the participant’s response reveals that a majority of the participants have received education in hand hygiene in the last three years of their profession. Satisfactorily, the study realized that all the participants involved in the study utilized alcohol-based hand rub for hand hygiene routinely (Table 2). Using the Linkert scale of 1-5, the study also realized that slightly over half the participants (56.6%) required limited effort to perform good hand hygiene. A majority of the participants also observed that hospital-associated infections were a major concern within their hospital as it negatively influenced the outcome of the patients. As such, 64.2% of the participants composed of 34 workers agree that hand hygiene is essential in preventing healthcare-associated infections. Hand hygiene among the institutions of the study participants is therefore considered as a primary priority that every employee within the institutions should is required to observe. Over half of those who participated in the study argue that hand hygiene is automatic to them and thus need to reminder to it. It was also pointed out by a majority of the participants that their patients, head of departments as well as colleagues placed significant importance on their hand hygiene practices (Table 3).

An analysis of the leader’s influence on hand hygiene among the participants reveals that their senior managers supported and openly promoted hand hygiene practices. This was achieved through various means such as the provision of alcohol-based hand rubs as well as the use of posters to remind the hospital personnel of

Table 1. Socio-demographic analysis

Parameter	Characteristics	Frequency	Percentage
Lab Position	Laboratory specialist	20	37.7%
	Laboratory technologist	33	62.3%
Gender	Female	15	28.3%
	Male	38	71.7%
Age	from 20 - 30	20	37.7%
	from 30 - 40	30	56.6%
	from 40 -50	2	3.8%
	from 50 -60	1	1.9%

Table 2. Questions on hand hygiene education and practice using alcohol-based hand rub.

Question	Yes (%)	No (%)
Have you received education in hand hygiene during the last three years?	51 (96.2%)	2 (3.8%)
Do you routinely use an alcohol-based hand rub for hand hygiene?	53 (100%)	0 (0%)

the significance of hand hygiene. The study also realized that the participant’s medical institutions provided training on hand hygiene as well as had clear instructions on the practice instilled in their employees. Despite the strides taken by the hospital management to enhance hand hygiene within their institution, the study realized that a number of the institutions rarely provide their employees with feedback on their hand hygiene performances. On the other hand, patients are rarely invited to remind medical professionals to perform hand hygiene. This the study can attribute to the fact that over half of the participants preferred to be reminded about hand hygiene by their managers followed closely by their peers (Table 4 and 5).

## DISCUSSION

In the current study, the frequency of the participant’s education regarding hand hygiene was evaluated. The

results show that a majority of the study participants regularly received education regarding hand hygiene. Rosenbluth et al. (2016) argue that educating medical professionals on the significance of hand hygiene plays an essential role in influencing them to observe and practice hand sanitation. As such, it becomes essential for every health practitioner to receive regular education on hand sanitation to avert the spread of hospital-acquired infections (Deyneko et al. 2016). From the study’s results, it was also realized that all the participants used alcohol-based hand rubs for hand hygiene. According to Li, Wang, Yan and Rao (2015), alcohol-based hand rubs is considered as the most effective form of maintaining hand hygiene within medical institutions.

From the findings of the present study, it is apparent that a majority of the participants are aware of the impact of hospital-acquired infections on the outcome of their patients. This is in line with Luangasanatip et al. (2015) assertion that hospital-acquired infections

Table 3. Questions on the medical laboratory workers’ hand hygiene practices.

Question	1	2	3	4	5
What effort is required for you to perform good hand hygiene?	30 (56.6%)	11 (20.8)	5 (9.4)	3 (5.7)	4 (7.5)
What is the impact of a health care-associated infection on a patient’s clinical outcome?	1 (1.9%)	0 (0%)	7 (13.2%)	16 (30.2%)	29 (54.7%)
What is the effectiveness of hand hygiene in preventing health care-associated infection?	1 (1.9%)	0 (0%)	4 (7.5%)	14 (26.4%)	34 (64.2%)
Among all patient safety issues, how much of a priority is hand hygiene at your institute?	2 (3.8%)	1 (1.9%)	6 (11.3%)	16 (30.2%)	28 (52.8%)
What importance does the head of your department attach to the fact that you perform optimal hand hygiene?	2 (3.8%)	1 (1.9%)	3 (5.7%)	20 (37.7%)	27 (50.9%)
What importance to your colleagues attach to the fact that you perform optimal hand hygiene?	1 (1.9%)	3 (5.7%)	6 (11.3%)	14 (26.4%)	29 (54.7%)
What importance do patients attach to the fact that you perform optimal hand hygiene?	3 (5.7%)	5 (9.4%)	5 (9.4%)	9 (17.0%)	31 (58.5%)
Is hand hygiene automatic or do you need to remember or be reminded to do it?	5 (9.4%)	3 (5.7%)	7 (13.2%)	10 (18.9%)	28 (52.8%)

Table 4. Question on the workers' opinion on how effective would various actions be to improve hand hygiene permanently in their institution.					
Action	1	2	3	4	5
Leaders and senior managers at your institution support and openly promote hand hygiene	0 (0%)	0 (0%)	9 (17%)	12 (22.6%)	32 (60.4%)
The health care facility makes alcohol-based hand rub always available at each point of care	0 (0%)	1 (1.9%)	7 (13.2%)	13 (24.5%)	32 (60.4%)
Hand hygiene posters are displayed at point of care as reminders	0 (0%)	1 (1.9%)	10 (18.9%)	17 (32.1%)	25 (47.2%)
Each health care worker receives education on hand hygiene	1 (1.9%)	1 (1.9%)	3 (5.7%)	11 (20.8%)	37 (69.8%)
Clear and simple instructions for hand hygiene are made visible for every health care worker	0 (0%)	0 (0%)	10 (18.9%)	16 (30.2%)	27 (50.9%)
Health care workers regularly receive feedback on their hand hygiene performance	0 (0%)	1 (1.9%)	5 (9.4%)	14 (26.4%)	33 (62.3%)
You always perform hand hygiene as recommended (being a good example for your colleagues)	1 (1.9%)	1 (1.9%)	3 (5.7%)	23 (43.4%)	25 (47.2%)
Patients are invited to remind health care workers to perform hand hygiene	12 (22.6%)	7 (13.2%)	16 (30.2%)	7 (13.2%)	11 (20.8%)

also referred to as nosocomial infection is one of the major challenges facing medical institutions. Yokoe et al. (2014) argue that a majority of healthcare-associated infections are as a result of medical professionals ignoring hand hygiene practices. Their observation is backed by the current study as over 64.2% of the participants agree that hand hygiene plays an essential role in preventing healthcare-associated infections. As such, hand hygiene is the leading priority among medical institutions looking to avert cases of nosocomial infections.

With a majority of the participants observing that hand hygiene is a leading priority in their institutions, it is apparent that their heads of departments consider it as an essential component in enhancing patient safety. Brewster et al., (2016) argues that departmental heads play a critical role in facilitating hand hygiene in medical institutions as they are the ones that influence and guide the operations of their departments. Apart from the departmental heads, it is also critical for patients as well as every other medical professional to observe adherence to optimal hand hygiene within the hospital

(Septimus et al., 2014). Based on the findings, of the study, it is apparent that the participant's colleagues, as well as patients, placed significance on optimal hand hygiene to reduce healthcare-associated infections. Having everyone involved in observing hand hygiene within the medical institution is critical as it helps reduce carriers and infection rate within the medical institutions (Jones et al., 2017).

In as much as every individual should be involved in ensuring hand safety within the medical institution, the management and senior executives within the hospitals also play an essential role in facilitating hand hygiene in their institutions. Banach et al., (2015) argue that leadership plays a critical role in enhancing hand hygiene given that they are the ones that determine and implement the policies used to guide the operations of the organizations. As such, the leadership of every medical institution should openly promote and support hand hygiene within their institutions to avert the increasing cases of nosocomial infections, (Smiddy et al., 2015). This assertion is proven in the present study as its findings indicate that the medical institutions have leaders and senior managers that support and promote hand hygiene.

To effectively support and promote hand hygiene in medical institutions, it is essential for the management of the institutions to ensure that alcohol-based hand rubs are available in almost every point of care (Nair et al., 2014). This is apparent in the study as the participants

Table 5. The preference of workers in regards to reminding them to perform hand hygiene.		
Who do you want to remind you to perform hand hygiene? (Multiple answers selected)		
Manager	Peer	Patients
46	40	24

indicate that the provision of such facilities plays an essential role in facilitating hand hygiene permanently in their institutions. Apart from providing alcohol-based hand rubs at each point of care, Kirk et al. (2015) also note that hand hygiene can be promoted through the use of posters displayed at points of care. Such posters act as reminders not only to medical professionals but to their patients as well to observe and maintain hand hygiene to avert the spread of nosocomial infections, (Thoa et al. 2015). This assertion is proven in the study as over 60% of those who participated in the study agree that posters at points of care play a critical role in reminding them to maintain and encourage hand hygiene in their institutions.

Chassin et al., (2015) state that it is also essential to have clear and simple instructions for hand hygiene made visible for every healthcare worker. Like the posters, the instructions are meant to remind and encourage the medical professionals to observe and maintain hand hygiene. The current study affirms this as a majority of the participants agree that having clear instructions visible for them assist them in improving hand hygiene permanently in their institutions. Shlomei et al., (2015) also demonstrate that for executives to enhance hand hygiene in their institutions, their employees need to receive feedback on their hand hygiene performance regularly. This helps them realize the areas that they need to improve on as well as those that they need to maintain. From the findings of the current study, it is apparent that feedback helps the participants realize their performance regarding hand hygiene thus proving why it is essential in promoting the practice.

## CONCLUSION

One of the major challenges facing the medical industry is nosocomial infections also referred to as healthcare-associated infections. The primary cause of these infections has been observed to be as a result of poor hand hygiene practices found in various medical institutions. As such, the objective of the current study was to evaluate the hand hygiene practices found in medical institutions in Saudi Arabia as well as how to improve hand sanitation permanently. It is essential to note that the study observes that education plays an essential role in facilitating hand hygiene among medical practitioners. As such, it becomes essential that medical professionals are frequently trained and educated on the significance of hand hygiene in reducing healthcare-associated infections. The findings of the study also indicate that the institution's management also plays an essential role in facilitating hand hygiene within their medical institutions. As such, the study holds that to improve hand

hygiene in various medical institutions in Saudi Arabia permanently, it is essential for the management of every medical institution within the country to be actively involved in promoting and supporting the practice.

## AUTHOR CONTRIBUTION

MA has collected the data and designed the manuscript. MIW has made the statistical data analysis. All authors wrote the manuscript.

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