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The effect of training program toward hand hygiene compliance among registered nurses in a private hospital in Klang Valley

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Abstract

Background: Hand hygiene is the most effective way to prevent hospital-acquired infections (HAI). Although the percentage of the HAI performance indicator target was still less than 5%, this study was carried out to reinforce hand hygiene compliance among registered nurses to increase the quality of nursing services.

Purpose: To determine the effect of a training program on hand hygiene compliance among registered nurses in a private hospital.

Method: This study used a quantitative quasi-experimental design based on an experimental group (single group) among 48 registered nurses from A&E, ICU, OT, PAED, LR, O&G, hemodialysis, and medical-surgical services working in KPJ Sentosa Hospital. The researcher used an audit monitoring pre and post-training to observe an opportunity to perform their hand hygiene practice, adapted from WHO as validated tools in this study. The 5-moment of hand hygiene before touching a patient, before clean/aseptic procedures, after body fluid exposure or risk, after touching a patient, and after touching the patient's surroundings, besides seven steps of hand hygiene compliance were included in this study determine the effect of training program's on hand hygiene compliance among registered nurses.

Results: The mean percentage of hand hygiene compliance in the post-test ($M = 6.85$) after the intervention was significantly higher than before the intervention ($M = 6.63$). Additionally, the significant (2-tailed) value is 0.020. A p -value < 0.020 was considered statistically significant.

Conclusion: Therefore, continuous training programs should continue to enhance the hand hygiene compliance rate among healthcare workers, and the impact will reduce hospital-acquired infections and establish the hospital's image well in the community.

Keywords: Effect; Hand Hygiene Compliance; Registered Nurses; Training Program.

INTRODUCTION

Hand hygiene is the simplest practice to prevent hospital-acquired Infection (HAI) in a hospital setting (World Health Organization, 2009). Hospital-acquired Infection (HAI) contributes about 5% to 50% among hospitalized patients in any developed country whereby, and hand hygiene is the most effective way to prevent transmission of infection (Smith, Tang, & Nutbeam, 2006). Hand hygiene compliance among healthcare workers is low; more education, training, and continuous observation are needed to improve hand hygiene compliance (Sands & Auger, 2020).

Therefore, countries worldwide have implemented the five moments of hand hygiene in their organization and embarked on a patient safety goal (Kampf, Löffler, & Gastmeier, 2009). Hand hygiene practice of five moments and seven steps to enhance the hand hygiene compliance rate (Anwar & Elareed, 2019).

The World Health (WHO) emphasized available facilities including alcohol-based hand rubs, soap, and towels as improvement strategies for educating and training on the five moments and seven steps of

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hand hygiene compliance among healthcare workers (World Health Organization, 2009). The Malaysian government has adhered to and supported WHO. Subsequently, MOH established an infection control unit and enthusiastically ran activities about hand hygiene according to the guidelines. As part of this collaboration, KPJ adopted the hand hygiene element on 5-moment hand hygiene observation and conducted an audit to monitor the hand hygiene compliance rate in a healthcare setting (Patient Safety Council of Malaysia & Ministry of Health Malaysia, 2013). The five-moment hand hygiene is before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient, and after touching the patient's surroundings (Goedken, Livorsi, Sauder, Vander Weg, Chasco, Chang, Perencevich, & Reisinger, 2019). The training programs enhance nursing education and knowledge among the nurses in private hospitals (Reyes, 2022).

RESEARCH METHOD

This descriptive study aimed to determine the effect of a training program on hand hygiene compliance among registered nurses in a private hospital. The researcher used a Quasi-experimental design based on an experimental group (single group) with descriptive in this study. Pre and post-training assessments were conducted on the experimental group to determine the effect of the training on hand hygiene compliance among the nurses in the private hospital.

The researcher, obtained an accurate sample size of the study referring to the published Krejcie and Morgans (1970) for determining sample size. Krejcie and Morgans (1970) sample size determination table was used for the appropriate sample size based on the corresponding population and, the results are reliable with a 95% confidence interval and a 5% margin of error. In this study, the researcher recruited 57 registered nurses from A&E, ICU, OT, PAED, LR, O&G, Hemodialysis and, Medical Surgical services working in KPJ Sentosa Hospital and the sampling will be S=48. The majority of the gender was female (n = 44, 91.7 %) and, most of the participants were in the year 31 - 40 age range (n = 22, 46%).

An observational opportunity audit exercise is used to see the compliance of Hand Hygiene (HH) among the healthcare provider where it is rated using WHO 5 moments and recorded in hand hygiene audit form for the data collection (Bob, 2012). The researcher used audit monitoring to observe an opportunity their performing their hand hygiene practice was adapted from WHO. Therefore, according to WHO (2009) all the link nurses train in the skill of observing hand hygiene compliance by carrying out their normal duty in their respective wards. The researcher used audit monitoring to observe an opportunity for their hand hygiene practice adapted from WHO, (2009) without any highly valid modification as it was approved and implemented worldwide. Moreover, the content of the training program of KPJ Sentosa Hospital Infection and Antibiotic Control Committee (HIACC) according to guidelines (World Health Organization, 2009). The valid tools will lead to collecting higher quality data and increasing data trustworthiness as document analysis is the preferred data collection method for the study (Kazi & Khalid, 2012). Moreover, the content validity of this tool was evaluated by KPJUC lecturers, who are more experience teaching in research methodology. The content validity was checked and revised to ensure enough content in this study.

The researcher used 3 stages of data collection for this study. The first stage is a pre-intervention stage, where the researcher identifies the research problem accordingly, then submitted of research proposal to get approval from KPJUC NILAI and KPJ Sentosa KL as a proposal defence. After getting approval, as pre-intervention data collection prepare document analysis to use an audit survey tool (WHO – observation form) and training content with the schedule for participants involved in this study. The study's sample is purposive sampling, which means each participant will be numbered in the sampling frame and the same participants involved in the pre and post-training audit. Thus, the link nurses conducted hand hygiene audits with WHO observation charts as pre-test data collection by observing hand hygiene compliance by carrying out their normal duty in their respective wards. The second stage is the intervention stage, a training

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program conducted by ICO and vendor implemented according to schedule. During the intervention stage, all the link nurses trained on the global burden of healthcare-associated infections, the transmission of pathogens, strategies to prevent the transmission of pathogens, and, indications for hand hygiene. Then followed, the link nurses trained all the registered nurses working in KPJ Sentosa Hospital. Subsequently, the training was conducted by the researcher with the help of ICO (Infection control officer) and vendor to all the registered nurses involved in this study. The third stage is Post-

Intervention, after the hand hygiene training the link nurses conducted hand hygiene audits with a WHO observation chart. Post-test data collection by observing hand hygiene compliance by carrying out their normal duty in their respective wards as the final step in the data collection process.

The collected data were analysed using the IBM SPSS 27 version. Descriptive statistics and measures were analysed using frequency, percentage, mean, standard deviation and paired T-test to report all the data on hand hygiene compliance among the nurses.

RESEARCH RESULTS

Table1. Demographic Characteristics of the Participants (N=48)

Variable	Results
Age (Year) (n/%)	
(Mean±SD)(Range)	(33.7±5.971)(21-56)
21-30	21/43.8
31- 40	22/45.8
41- 50	4/8.3
51-55	0/0.0
>56	1/2.1
Gender (n/%)	
Male	4/8.3
Female	44/91.7
Year of Experience (n/%)	
0-5	15/31.2
6-10	18/37.5
11-15	12/25.0
16-20	0/0.0
21-25	2/4.2
26-30	0/0.0
31-35	1/2.1

Table 1 shows the demographic characteristics of the participants in this study. Most participants were in the 31–40 age group (22, 45.8%), followed by the 21–30 age group (21, 43.8%), 4 respondents (8.3%) aged 41–50, and the smallest group was those aged >56 years, at only 2.1%. The survey results indicate that the majority of respondents were women, totaling 44 (91.7%). Similarly, the distribution of the variable regarding years of experience among registered nurses showed that the majority of respondents—18 participants (37.5%)—had 6–10 years of experience, while the smallest group consisted of 1 participant (2.1%) with 31–35 years of experience. Looking at these results as a whole, relatively young registered nurses with less than 15 years of experience constituted the majority in this study group compared to senior registered nurses.

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Table 2. Hand Hygiene Compliance Level Before & After Training

Variable	Before	After
Five Movement (n/%)		
1. Before touching patient	93/97	109/98
2. Before clean and aseptic procedure	87/98	113/100
3. After body fluid exposure risk	41/98	65/100
4. After contact patient	74/89	65/96
5. After contact patient surrounding	62/95	66/99
Seven Steps (n%)		
1. Scrub palm to palm.	46/96	46/96
2. Right palm over left dorsum and left palm over right dorsum.	48/100	48/100
3. Palm to palm fingers interlaced.	48/100	48/100
4. Backs of fingers to opposing palms with fingers interlocked.	46/96	48/100
5. Rotational rubbing of right thumb clasped in left palm and vice versa.	46/96	46/96
6. Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa.	39/81	48/100
7. Rotational rubbing of right wrist and vice versa. Rinse and dry thoroughly.	45/94	45/94

Table 2 describe the 5 moments and opportunity for hand hygiene compliance rate on pre-training. The highest hand hygiene compliance rate is from 2nd moment before the clean and aseptic procedure 98%, out of 89 opportunities, similar to 3rd moment-after body fluid exposure risk 98% out of 42 opportunities. Thus, the lowest hand hygiene compliance rate is 89% from the 4th moment- after contacting patients out of 83 opportunities. Additionally table 2 also describe distribution of the 5 moments and opportunities of hand hygiene compliance rate on post-training. The highest hand hygiene compliance rate is from the 2nd moment-before clean and aseptic procedure 100%, out of 113 opportunities, similar with the 3rd moment-after body fluid exposure risk 100% out of 65 opportunities. Thus, the lowest hand hygiene compliance rate is 96% from the 4th moment- after contacting patients out of 68 opportunities.

Compliance Rate on 7 Steps of Hand Hygiene describes compliance and non-compliance rates on 7 steps of hand hygiene Pre-training. The highest compliance rate was 48 (100 %) on the 2nd right palm over the left dorsum and left palm over the right dorsum and 3rd step palm-to-palm fingers interlaced, therefore the noncompliance rate was 0 (0%). Followed by 1st step Scrub palm to palm, 4th backs of

fingers to opposing palms with fingers interlocked, 5th step rotational rubbing of the right thumb clasped in the left palm and vice versa with 46 (96%) and the non-compliance rate was 2 (4%).

Moreover, the 2nd lowest is the 7th step rotational rubbing of the right wrist and vice versa was 45(94%) and the noncompliance rate was 3 (6%), and the lowest is on step 6th rotational rubbing, backward and forwards with clasped fingers of the right hand in left palm and vice versa 39 (81%) with 9 (19%) of non-compliance rate. below shows descriptive compliance and non-compliance rate on 7 steps of hand hygiene post-training. The highest compliance rate was 48 (100 %) on 1st step Scrub palm to palm, 2nd right palm over the left dorsum and left palm over the right dorsum, and 3rd step palm to palm fingers interlaced and, the 4th back of fingers to opposing palms with fingers interlocked.

While, the table shows less compliance on the 5th step rotational rubbing of the right thumb clasped in the left palm and vice versa, and step 6th rotational rubbing, backward and forwards with clasped fingers of the right hand in the left palm and vice versa with 46 (96%) with 2 (4%) of non-compliance rate. The lowest is on step 7th rotational rubbing of the right wrist and vice versa 45 (94%) with a 3 (6%) non-compliance rate.

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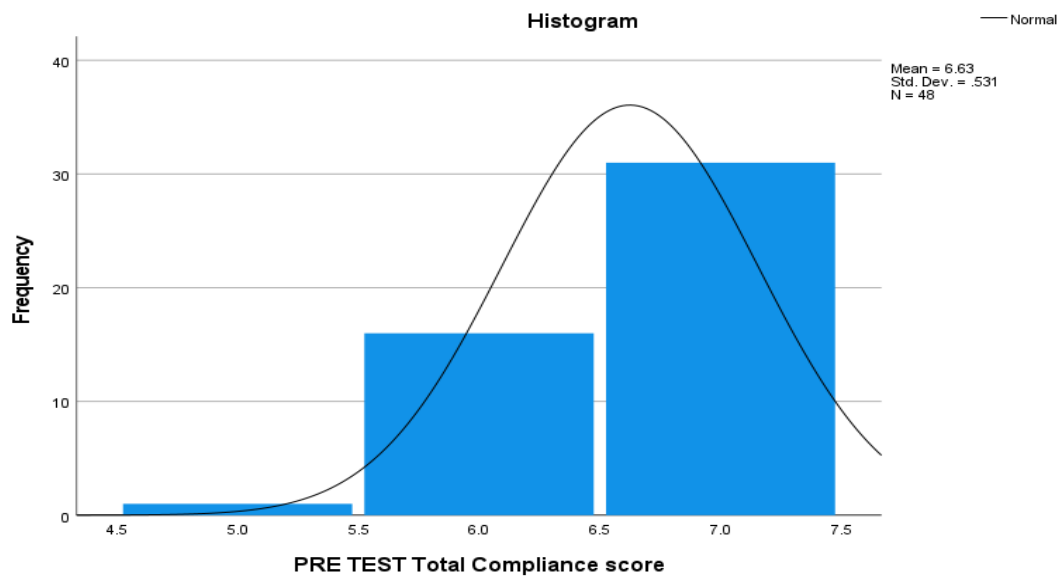


Figure 1. Pre-Test Compliance Rate

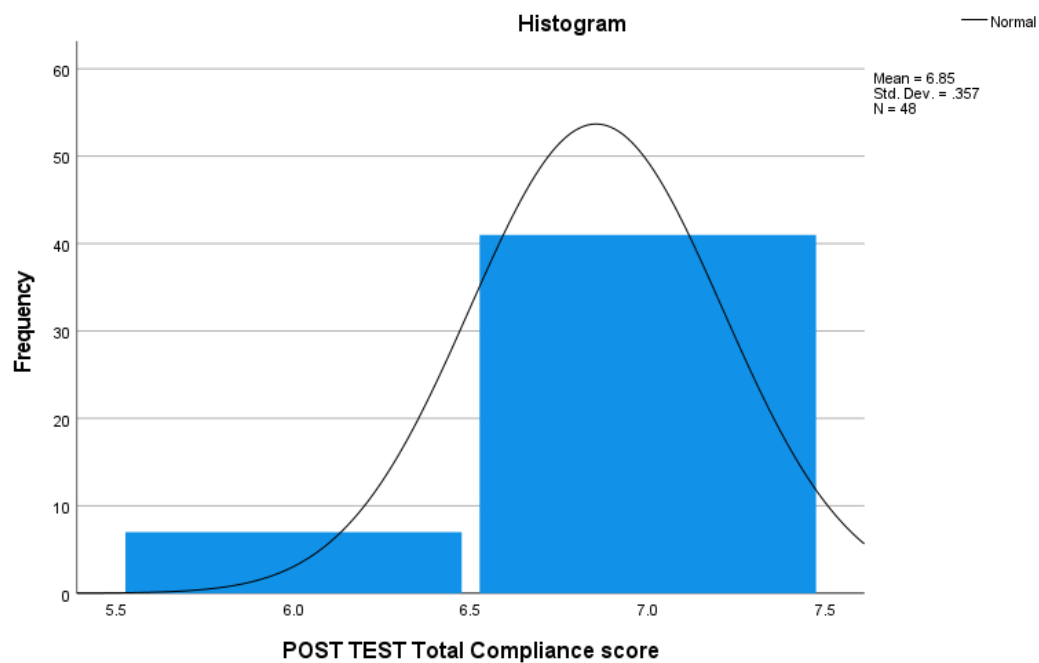


Figure2. Post-Test Compliance Rate

Figure 1 and 2 as shown above, represent a visual depiction of the distribution of total hand hygiene compliance rate pre and post-test. Standard distribution curves are plotted with normal, where both diagrams show the concentration at the middle and tapering at the ends.

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Table 3. Paired Samples Statistics Pre and Post-test

		Mean	Std. Deviation
Pair 1	PRE-TEST Total Compliance score	6.63	.531
	POST TEST Total Compliance score	6.85	.357

The paired sample statistics are generated by IBS SPSS Statistics version 27, and the output shows both pre and post-tests of the training program toward hand hygiene compliance among registered nurses. The researcher utilized paired sample t-test to analyze the data in this study. The main objective is to compare the mean difference between the two variables scores and the data is from only one respondent group.

Table 4. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Devi atio n	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE-TEST Total Compliance score - POST TEST Total Compliance score	-.229	.660	.095	-.421	-.037	-2.405	47	.020

The paired sample t-test showed the mean difference in pre and post-hand hygiene compliance among registered nurses. This research paired t-test observations in the same subject (e.g., before & after intervention). Mean difference = - 0.229, SD = 0.660 and, there were statistical differences in the pre-test total compliance rate (M = 6.63) and 0.531 standard deviations. Thus, the post-test total compliance rate (M= 6.85) was improved from the pre-test with a 0.357 standard deviation.

A 95% confidence interval of the difference score ranged from -0.421 to - 0.037. However, the significant (2-tailed) value is 0.020. A p-value <0.020 was considered statistically significant and

rejected the null hypothesis. There is a significant difference in pre and post-hand hygiene compliance scores.

DISCUSSION

In this study, the researcher undertaking this study to observe 5 moments and 7 steps of hand hygiene according to WHO guidelines and monitor the effect of training programs towards hand hygiene compliance among 48 registered nurses. An observation checklist adopted from WHO, (2009) was used for this study. An observational opportunity audit exercise is used to see the compliance of Hand Hygiene (HH) among the

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healthcare provider where it is rated using WHO 5 Moments of hand hygiene and recorded the hand hygiene audit form for the data collection. WHO tool kit and the effect of education training towards improvement on hand hygiene compliance among the registered nurses was improved (Nwaokenye, Lakoh, & Morgan, 2020).

The researcher, formula as listed used to generate the hand hygiene compliance rate in percentage to produce the finding of the study "The Effect of a Training Program Towards Hand Hygiene Compliance Among Registered Nurses. The effect of education training towards improvement on hand hygiene compliance among the registered nurses was improved (Nwaokenye et al., 2020). The 5 moments and opportunity of hand hygiene compliance rate on pre-training measured. The highest hand hygiene compliance rate is from the 2nd moment- before the clean and aseptic procedure 98%, out of 89 opportunities, similar to the 3rd moment-after body fluid exposure risk 98% out of 42 opportunities. Thus, the lowest hand hygiene compliance rate is 89% from the 4th moment- after contacting patients out of 83 opportunities. Whereby, after post-training finding shows the highest hand hygiene compliance rate is from the 2nd moment-before clean and aseptic procedure 100%, out of 113 opportunities, similar to the 3rd moment-after body fluid exposure risk 100% out of 65 opportunities. Thus, the lowest hand hygiene compliance rate is 96% from the 4th moment- after contacting patients out of 68 opportunities. The training inclusive of the 5-moment hand hygiene and the measurement taken based on an audit report according to the WHO tool kit and the effect of training towards improvement on hand hygiene compliance among the registered nurses was improved (Phan, Tran, Tran, Dinh, Ngo, Theorell-Haglow, & Gordon, 2018). Furthermore, the training program has an effect on hand hygiene compliance among healthcare professionals in an ICU conducted over a 12-month (Saharman, Fares, El-atmani, Sedono, Aditianingsih, Karuniawati, Rosmalen, Van, Verbrugh, & Severin, 2019). The researcher, monitored hand hygiene compliance significantly increased from 31.5% at baseline to 65.8% and 83.8% during the post-intervention phase and found that hand hygiene compliance increased among ICU health professionals although have no

impact on VAP incidences or mortality (Prieto Romero, Reboredo, Gomes, Coelho, De Paula, De Souza, Basile Colugnati, & Pinheiro, 2019).

Thus, the researcher also describes the compliance and non-compliance rates on 7 hand hygiene pre-education training steps. The highest compliance rate was 48 (100 %) on 2nd right palm over the left dorsum and left palm over the right dorsum and 3rd step palm-to-palm fingers interlaced, therefore the non-compliance rate was 0 (0%). Followed by 1st step Scrub palm to palm, 4th backs of fingers to opposing palms with fingers interlocked, 5th step rotational rubbing of the right thumb clasped in left palm and vice versa with 46 (96%) and the non-compliance rate was 2 (4%). Moreover, the 2nd lowest is 7th step rotational rubbing of the right wrist and vice versa was 45(94%) and the non-compliance rate was 3 (6%), and the lowest is on step 6th rotational rubbing, backward and forwards with clasped fingers of the right hand in left palm and vice versa 39 (81%) with 9 (19%) of non-compliance rate. Moreover, the researcher was also descriptive on compliance and non-compliance rate on 7 steps of hand hygiene finding post-training. The results show, the highest compliance rate was 48 (100 %) on 1st step Scrub palm to palm, 2nd right palm over the left dorsum and left palm over the right dorsum, and 3rd step palm to palm fingers interlaced and, 4th backs of fingers to opposing palms with fingers interlocked. The 2nd lowest is on the 5th step rotational rubbing of the right thumb clasped in left palm and vice versa and step 6th rotational rubbing, backward and forwards with clasped fingers of the right hand in left palm and vice versa with 46 (96%) with 2 (4%) of non-compliance rate. The lowest is on step 7th rotational rubbing of the right wrist and vice versa 45 (94%) with a 3 (6%) non-compliance rate. Moreover, the researcher determines a study on the effect of hand hygiene compliance program among ICU healthcare professionals. The outcome at the end of the study indicates that a training-based intervention such as reminder sounds, videos, and practical simulations effectively increased the results from 24.1% to 60.6% on hand hygiene compliance and being most effective in reducing MRSA infections (Martos-Cabrera, Mota-Romero, Martos-García, Gómez-Urquiza, Suleiman-Martos, Albendín-García, & Cañadas-De la Fuente, 2019). The researcher

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utilized paired sample t-test to analyze the data in this study. The main objective is to compare the mean difference between two variables scores and the data is from only one respondent group. This study finding shows statistical differences in the pre-test total compliance rate ($M = 6.63$) and 0.531 standard deviations. Thus, the post-test total compliance rate ($M = 6.85$) was improved from the pre-test with 0.357 standard deviations. However, the 95% Confidence Interval of pre and post-tests is lower than -0.421 and upper 0.037 the significant (2-tailed) value is 0.020 . A p-value < 0.020 was considered statistically significant.

There were significant improvements post-educational intervention with mean difference standard deviations (SD): 1.5 (2.5); $p < 0.001$). The findings simple training model implemented in a Vietnamese hospital revealed good hand hygiene compliance for an extended period time (Phan et al., 2018). Whereby, the mean percentage ($p = 0.001$) of hand hygiene compliance in the intervention group after the intervention was significantly higher than before the intervention (Farmani, Kargar, Khademian, Paydar, & Zare, 2019). There is a respectable outcome with effective intervention on hand hygiene among nurses, such as improvement in performance by peers and reduce the stress associated with role performance (Sands & Auger, 2020). Although, hand hygiene compliance reduced transmission of nosocomial pathogens. Lack of training and education, lack of budgets, and awareness lead to noncompliance and contribute to increased hospital-associated infections (Ni, Wang, Wang, Ni, Zhang, Zhong, & Chen, 2020). A systemic training program maximizes workers' learning abilities, knowledge, and skills to understand the importance of hand hygiene in organizations setting (Taan, Hajjar, & Alkhanaizi, 2018).

RECOMMENDATION

Direct observation is standard to measure hand hygiene practice, according to WHO (2009) guidelines. Although, the observation checklist is adapted from WHO, enhancement strategies should be implemented continuously and consistently for all healthcare workers for audit monitoring (Cheng, Peng, Lin, & Chen, 2019). The infection control team should more aggressively provide training according

to WHO tools kits to ensure sustainability on 5 moments of hand hygiene. Moreover, the enhancement strategy should be continued as a gentle reminder among healthcare workers to adhere to 5 moments of hand hygiene to improve patient safety (Yehouenou, Dohou, Fiogbe, Esse, Degbey, Simon, & Dalleur, 2020). Continuous education is highly suggested to sustain the 5 moments of hand hygiene in practice (Acharya, Mishra, Ipsita, & Azim, 2019). A recommendation from this study includes suggestions for future research on hand hygiene compliance and nursing practice in health care settings, whereby it will ensure the sustainability in compliance among the health care workers.

LIMITATIONS OF THE STUDY

This study has significant contributions to hand hygiene compliance, but this study has some limitations. The researcher, finds time constraints for this study are the main limitation to demonstrating significant changes in the short period. Moreover, the Hawthorne effect may change the participant's behavior when they are aware been observed and may add bias to an outcome. However, the participants were included from all the hospital departments and the use of the WHO intervention strategy is the strength of this study.

CONCLUSION

This research aims to determine a training program's effect on hand hygiene compliance among registered nurses in private hospitals. The researcher used the WHO observation checklist to assess 5 moments and 7 steps of hand hygiene compliance for the audit medium in this study. Moreover, this study has provided continuous training on their awareness of hand hygiene compliance among registered nurses. The analysis revealed that the compliance rate on hand hygiene improved.

Continuous training program and educational activities to enhance awareness towards 5 moments and 7 steps of hand hygiene. Making available information on hand hygiene throughout activities such as quizzes, poster competitions, booths, and displayed banners will create a culture of good hand hygiene compliance among healthcare workers. The link nurses play an important role in this study as

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observers and monitor hand hygiene compliance among the registered nurses from each service. Where the observer was given training on the method of hand hygiene practice and the technic to convert the observation to documentation.

Despite high-quality care rendered to patients, it developed a good safety culture and reputation for the organization as a potential benefit. There were statistically significant in the pre-test total compliance rate and post-test total compliance rate. The post-test total compliance rate was improved from the pre-test total compliance rate after the intervention.

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