



## The determinant factor of nurse's hand hygiene adherence in Indonesia<sup>☆</sup>



Hanny Handiyani<sup>a,\*</sup>, Mitsuhiro Ikegawa<sup>b</sup>, Rr. Tutik Sri Hariyati<sup>a</sup>, Mika Ito<sup>b</sup>,  
Firman Amirulloh<sup>a</sup>

<sup>a</sup> Faculty of Nursing, Universitas Indonesia, Depok, West Java, Indonesia

<sup>b</sup> Care Environmental Laboratory, Japan

Received 13 November 2018; accepted 17 April 2019

Available online 27 June 2019

### KEYWORDS

Hand hygiene adherence;  
Nurse's attitude;  
Nurse education;  
The head of ward's support

### Abstract

**Objective:** The general objective of this research is to describe the determinant factors of hand hygiene adherence in the inpatient ward settings.

**Method:** This research has been done with quantitative method with cross-sectional approach. Research data were obtained from the questionnaire and observation forms of hand hygiene adherence. Respondents are nurses from 10 public regional hospitals in DKI Jakarta. The sample size for questionnaire was 457 nurses with incidental sampling and the total of observation was 2437 opportunities in terms of hand hygiene implementation.

**Results:** The analysis result of nurse's hand hygiene adherence with a questionnaire instrument is 51.2% while the nurse's hand hygiene adherence with observation instrument is 20.4%. The dominant factors in doing hand hygiene are the nurse's gender, the nurse's attitude, and the head of ward's support ( $R^2 = 0.123$ ). The observation of hand hygiene stated that the dominant determinant were age and nurse education ( $R^2 = 0.046$ ).

**Conclusion:** Education, age, gender and nurse attitude were internal significant determinant and the most external determinant was the head of ward's support. Other studies are related to other causes of hand hygiene compliance need to be investigated to find the biggest causes of noncompliance. Thus, appropriate interventions can be established to improve nurses' compliance with hand hygiene.

© 2019 Elsevier España, S.L.U. All rights reserved.

\* Corresponding author.

E-mail address: [honey@ui.ac.id](mailto:honey@ui.ac.id) (H. Handiyani).

<sup>☆</sup> Peer-review under responsibility of the scientific committee of the Second International Nursing Scholar Congress (INSC 2018) of Faculty of Nursing, Universitas Indonesia. Full-text and the content of it is under responsibility of authors of the article.

## Introduction

During the past decades, the concept of nursing care has been shifted to patient care focusing on patient safety. The general concept of patient safety is outlined in six goals introduced by Joint Commission International: (1) the accuracy of patient identification; (2) the improvement of effective communication; (3) the improvement of safety high-alert medication; (4) the assurance of correct-site, correct-procedure, correct-patient surgery; (5) the reduction of health-care-associated infections; and (6) the reduction of risk fall patient number.<sup>1</sup> The implementation of patient safety standard at the hospital are set into seven steps: (1) to build an awareness of patient's safety value; (2) to lead and support employment; (3) to integrate the management risk activities; (4) to develop reporting systems; (5) to communicate and involving patients; (6) to learn and share about patient safety experience; and (7) to prevent injuries with the implementation of patient safety systems.<sup>2</sup>

The implementation of patient safety standard is important for patients to obtain quality health services in accordance with professional and procedural operational standards as well as the effectiveness of services. Patients are prevented from both physical and material harm if their safety is guaranteed, especially being prevented from the danger of infection and falling caused by non-optimal Nurse's hand hygiene and the nurse's efforts to prevent the falling patients. The level of hand hygiene adherence is one of the important indicators of patient safety implementations in the hospital and this performance closely related to the quality of nursing care. Hand hygiene can reduce the incidence of infection in health care facilities (HAIs) as hand hygiene is a major factor in the effectiveness of patient safety programs by preventing the spread of multi-resistant microorganisms in health care facilities.<sup>3,4</sup> The nurses have the responsibility of providing high-quality service especially by performing hand hygiene adherence.

Despite hand hygiene is important to prevent the occurrence of HAIs, the results of adherence observation are still low. In general, hand hygiene adherence is 70–72%.<sup>5</sup> The hard effort has been made to increase hand hygiene adherence, but it has not worked optimally. Besides, it has used a hand hybrid multimodal approach as a strategy in accordance with WHO guidelines or other tested guidelines.<sup>6</sup>

Nowadays, the eligible data of hand hygiene adherence is mostly not clearly revealed. This may indicate that the data only being stored in hospitals or it never been properly assessed because the data not accordance to national baseline data. The Indonesian Nurse's Association focuses on Infectious Prevention and Control (HIPPII) lacks of national data on hand hygiene by emphasizing the importance of supervision and evaluation to improve nursing service quality. Therefore, this study aims to understand and to obtain the real situation of hand hygiene adherence although limited only for few hospitals in Indonesia.

## Method

The method of this research is the cross-sectional design with quantitative approach by the questionnaire and

observation forms of hand hygiene adherence. The data have been collected by many approaches and resources, based on number of research sample according to WHO with minimum 388 incidents (WHO sample size for the implementation of health studies, p36). The estimation of responds level is 90% considering any rejections or mistakes during this research, yet the minimum sample is 431 Nurse's and incidents. The duration of these two implementations was 14 days in two weeks at one hospital. This research was conducted at 10 public regions hospitals from 5 sub-districts in DKI Jakarta.

## Results

The analysis result of nurse's hand hygiene adherence with a questioner instrument is 51.2% while the nurse's hand hygiene adherence with observation instrument is 20.4%. This research supported by another research<sup>7</sup> about assessment of nurse's hand hygiene adherence with an observation instrument is lower than nurse's hand hygiene with questionnaire and self-report instrument (39.16% and 75%).

The observation of nurse's hand hygiene adherence using observation sheets have been established by WHO with a total of observation was 2437 opportunities in terms of doing hand hygiene. Direct observation is a gold standard in measuring nurse's hand hygiene adherence<sup>8</sup> but it has a shortage of high bias data and it can lead to patient's privacy violation.

The highest adherence of nurse's hand hygiene is before nurses' touch the patient (7.30%) while the lowest adherence is before performing an aseptic action (1.36%). The reason why nurse's adherence gets a lowest score before performing an aseptic action is because when nurses using gloves they assume that they do not need to do hand hygiene.<sup>9</sup>

Table 1 indicates that there are determinant differences that affect handwashing compliance from the perspectives obtained from questionnaires, categories and observations. It was concluded that the level of education is a significant determinant that affects handwashing compliance ( $p$  category; 0.006 and  $p = 0.006$  observation), while age also influences handwashing compliance ( $p$  category 0.001 and  $p < 0.001$  observation). Nurse's attitude ( $p < 0.001$ ) and support ( $p < 0.001$ ) from Head nurse have a significant effect on handwashing.

Table 2 shows early modeling of multivariate analysis conducted by logistic regression in hand hygiene adherence.

Table 3 states the most dominant factor of nurse's hand hygiene adherence from observational and questioner item. The most dominant factors in doing hand hygiene are the nurses' gender, the nurse's attitude, and the head of ward's support. The observation of hand hygiene stated that the most dominant determinant were age and nurse education.

The analysis result shows that there is correlation between nurse's genders with level of hand hygiene adherence ( $p < 0.001$ ). The result of this research is different from the past research<sup>7</sup> with  $p = 0.90$ . Female nurses (55.1%) are more obedient doing hand hygiene compared to male nurses. This research result is similar with another research conducted.<sup>10</sup> It stated that the level of hand hygiene adherence of female nurses to 88% while male nurses were 85%. Female nurses are more obedient than male nurses.

**Table 1** Determinant relation analysis nurse's hand hygiene adherence.

Variable	<i>p</i> (Questioner)	<i>p</i> (Category)	<i>p</i> (Observation)
Nurse's knowledge level	0.208	0.948	0.948
Nurse's attitude	0.001*	0.177	0.178
Nurse's beliefs	0.032	0.057	0.057
Head of ward's support	0.001*	0.115	0.115
Hand hygiene training	0.244	0.091	0.091
Nurse's gender	0.001*	0.342	0.343
Nurse's education level	0.332	0.006*	0.006*
Nurse's career ladder	0.369	0.576	0.577
Nurse's employment status	0.230	0.116	0.117
Nurse's age	0.207	0.001*	0.001*
Nurse's working experience	0.037	0.001*	0.001*

**Table 2** Early modeling of multivariate analysis with logistic regression hand hygiene adherence.

Variable	Questioner instrument		
	<i>B</i>	<i>p</i>	<i>R</i> square
Nurse's knowledge level	0.152	0.499	0.137
Nurse's attitude	0.897	0.000	
Nurse's beliefs	0.066	0.755	
Head of ward's support	0.491	0.015	
Hand hygiene training	0.277	0.189	
Nurse's gender	−0.767	0.003	
Nurse's employment status	0.216	0.628	
Nurse's age	−0.034	0.295	
Nurse's working experience	0.045	0.209	
(Constant)	−1.816	0.064	
Variable	Observational instrument		
	<i>B</i>	<i>p</i>	<i>R</i> square
Nurse's knowledge level	−0.351	0.180	0.082
Nurse's attitude	−0.328	0.192	
Nurse's beliefs	0.498	0.047	
Head of ward's support	0.484	0.067	
Hand hygiene training	−0.767	0.057	
Nurse's gender	−0.234	0.710	
Nurse's employment status	−0.077	0.094	
Nurse's age	0.025	0.621	
Nurse's working experience	1.523	0.231	

This is because female nurses have a higher level of care than male nurses due to the nature of maternal instincts.

The analysis result shows that there is a correlation between nurse's attitude and nurse's hand hygiene adherence ( $p < 0.001$ ). The result of this research is similar with another research with  $p = 0.023$  and  $p = 0.001$ .<sup>11</sup> Nurses with a positive attitudes 60.8% obedient in doing hand hygiene compared to nurses with negative attitudes.

Adequate facilities and infrastructure in hand hygiene must be fulfilled by the head of the hospital to form a positive attitude toward to improve hand hygiene adherence. Nurses who have beliefs, evaluation, and tendency to act will form a complete attitude in doing hand

hygiene. Positive attitudes are responsible for maintaining nurse's hand hygiene adherence.<sup>12</sup>

The analysis result shows that there is a correlation between nurse's beliefs and nurse's hand hygiene adherence ( $p = 0.032$ ). The result of this research is similar to another research with  $p = 0.027$ .<sup>13</sup> Nurses who have beliefs in hand hygiene 55.6% are more obedient in doing hand hygiene compared to nurses who do not have beliefs in hand hygiene. Nurses may hesitate hand hygiene due to the false belief such as hand hygiene often causes skin irritation. Knowledge, the needs and interests are factors which can shape the nurse's beliefs in hand hygiene. The needs for using appropriate antiseptic for each nurse's skin can minimize

**Table 3** Final modeling multivariate analysis with logistic regression hand hygiene adherence.

Variable	Questioner instrument			
	<i>B</i>	<i>p</i>	<i>Exp(B)</i>	<i>R square</i>
Nurse's gender	−0.748	0.003	0.473	0.123
Nurse's attitude	0.936	<0.001	2.549	
Head of ward's support	0.493	0.014	1.637	
(Constant)	−2.075	<0.001		
Variable	Observational instrument			
	<i>B</i>	<i>p</i>	<i>Exp(B)</i>	<i>R square</i>
Nurse's education level	−0.925	0.019	0.397	0.046
Nurse's age	−0.057	0.033	0.944	
(Constant)	1.277	0.120		

the possibility of nurse's hand irritation so the nurses' feels convinced in doing hand hygiene. Errors in hand hygiene can be caused by improper and uncomplete knowledge.<sup>12</sup>

The analysis result shows that there is a correlation between head of ward's support and the nurse's hand hygiene adherence ( $p < 0.001$ ). Nurses who get support from their head of ward 59.5% are more obedient in doing hand hygiene compared to nurses who do not get the support from their head of ward. The result of this research is similar with another research stated that there is a correlation between head of ward's support and the nurse's hand hygiene adherence.<sup>14</sup> Nurses who received support from their head of ward have higher hand hygiene adherence compared to nurses who did not receive support.<sup>14</sup> The head of ward gives advice and information about hand hygiene that can improve hand hygiene adherence.<sup>15</sup> Besides, the head of ward showed attentiveness, empathy and caring. The head of ward also gives reward for increasing hand hygiene adherence. The head of ward supports by ensuring the availability of facilities that can support hand hygiene adherence.

Although the previous study showed the significant correlation between variances such as knowledge level ( $p = 0.208$ ), education level ( $p = 0.332$ ), age ( $p = 0.207$ ), work experiences ( $p = 0.037$ ), nurses' career ladder ( $p = .396$ ) and training experience ( $p = 0.244$ ), there are no significant correlation in this study.

## Discussion

The analysis result shows that the most dominant factors in doing hand hygiene are the nurse's gender, the nurse's attitude, and the head of ward's support. The level of influence from those three variables is weak, which is only 12.3% while the rest is influenced by other variables. The cause of nurse's adherence is caused by many factors, namely internal factors and external factors.

The nurse's gender is the most influential factor in doing hand hygiene. This can be caused by the respondents of this research mostly are female nurses (79.9%: 20.1%) while the female nurse's adherence level is higher compared to male nurses (55.1%: 35.9%). Nursing profession are favored by

many women because of figures and feminism by the famous international nurse, Florence Nightingale, and for men who are interest to choose nurses as their profession are only about 10%.<sup>16</sup>

The nurse's attitude is the next dominant variable that influences the nurse's hand hygiene adherence. In this research, the nurse's attitude is a positive attitude. The nurse's positive attitudes can improve nurse's hand hygiene adherence.<sup>17</sup> It can be influenced by the hospital facilities that continuously support nurses in doing hand hygiene. This may describe that negative attitude with higher knowledge level and education level leads to low awareness on hand hygiene as this research shows.

There are beliefs about the benefits of doing hand hygiene and the evaluation from the head of ward about nurse's hand hygiene adherence which can help the formation of whole positive attitudes to do hand hygiene.<sup>12</sup> The support from the head of ward in doing hand hygiene is a dominant factor other than the nurse's gender and attitudes. Head nurse support is a nurse's external factor which influences nurses to do hand hygiene. This research is accordance with another research stated that the head of ward's support is very significant to improve nurse's hand hygiene adherence.<sup>14</sup> The support that can be made by the head of ward to improve nurse's hand hygiene adherence with showing attitudes of attention, caring, empathy, gives reward, availability of facilities, gives some advices and hand hygiene knowledge increased.<sup>15</sup>

The improvement of hand hygiene adherence can use the multimodal strategy which proposed by WHO. Multimodal strategy has been modified according to the requirements, namely education, monthly feedbacks, and hand hygiene reminders. The positive impact of implementation of this strategy is proved to improve nurse's adherence up to 57.4%.<sup>8</sup> The improvement of hand hygiene adherence using multimodal strategy did not reach the target which already set in the beginning (level of hand hygiene adherence by 95%). Therefore, the commitment of hospitals and nurses are strongly necessary to create a hand hygiene culture in the hospital.<sup>18</sup>

Finding research stated of the most dominant factor of nurse's hand hygiene adherence from observational and questioner item. The most dominant factors in doing hand

hygiene are the nurse's gender, the nurse's attitude, and the head of ward's support and the observation of hand hygiene stated that the most dominant determinant were age and nurses' education. It were concluded that education, Age, Gender and the nurses' attitude were internal significant determent and the most external determinant was the head of ward's support. Although the head nurse of the patient wards is considered as the external determinant, it has significant influence to the nurses' attitude and knowledge level. In addition, further study to analyze nurses' attitude psychologically by approaches of interviews may help to understand nurses' self-esteem on hand hygiene. As recommendation to improve nurses' hand hygiene adherence, stronger commitment from hospitals such as management as well as nurses' individual commitment are important and key factors.

## Funding

We want to acknowledge to Care Environmental Laboratory Co., Ltd., Japan as the primary funders and grant IDs of our research.

## Conflict of interests

The authors declare no conflict of interest.

## References

1. International JC. Joint Commission International Accreditation Standards; 2017.
2. Kemenkes RI. Peraturan Menteri Kesehatan Republik Indonesia No. 11 tahun 2017 tentang Keselamatan Pasien; 2017.
3. Allegranzi B, Gayet-Ageron A, Damani N, Bengaly L, McLaws ML, Moro ML, et al. Global implementation of WHO's multimodal strategy for improvement of hand hygiene: a quasi-experimental study. *Lancet Infect Dis*. 2013;13:843–51, [http://dx.doi.org/10.1016/S1473-3099\(13\)70163-4](http://dx.doi.org/10.1016/S1473-3099(13)70163-4)
4. Organization WH. WHO guidelines on hand hygiene in health care: first global patient safety challenge clean care is safer care; 2009, 270 p.
5. Sunkesula VCK, Meranda D, Kundrapu S, Zabarsky TF, McKee M, Macinga DR, et al. Comparison of hand hygiene monitoring using the 5 Moments for Hand Hygiene method versus a wash in-wash out method. *Am J Infect Control* [Internet]. 2015;43:16–9, <http://dx.doi.org/10.1016/j.ajic.2014.10.003>
6. Kingston L, O'Connell NH, Dunne CP. Hand hygiene-related clinical trials reported since 2010: a systematic review. *J Hosp Infect* [Internet]. 2016;92:309–20, <http://dx.doi.org/10.1016/j.jhin.2015.11.012>
7. Seyed Nematian SS, Palenik CJ, Mirmasoudi SK, Hatam N, Askarian M. Comparing knowledge and self-reported hand hygiene practices with direct observation among Iranian hospital nurses. *Am J Infect Control* [Internet]. 2017;45:e65–7, <http://dx.doi.org/10.1016/j.ajic.2017.03.007>
8. Rees S, Houlahan B, Safdar N, Sanford-Ring S, Shore T, Schmitz M. Success of a multimodal program to improve hand hygiene compliance. *J Nurs Care Qual*. 2013;28:312–8, <http://dx.doi.org/10.1097/NCQ.0b013e3182902404>
9. Ghorbani A, Bravo G. Managing the commons: a simple model of the emergence of institutions through collective action. *Int J Commons*. 2016;10:200–19, <http://dx.doi.org/10.18352/ijc.606>
10. Chen JK, Wu KS, Lee SSJ, Lin HS, Tsai HC, Li CH, et al. Impact of implementation of the World Health Organization multimodal hand hygiene improvement strategy in a teaching hospital in Taiwan. *Am J Infect Control* [Internet]. 2016;44:222–7, <http://dx.doi.org/10.1016/j.ajic.2015.10.004>
11. Kamble VS, Biradar SM, Takpore A, Reddy S. Knowledge of hand hygiene practices among students of ESIC medical college, Gulbarga, Karnataka, India. *Int J Community Med Public Heal* [Internet]. 2016;33:94–8, <http://dx.doi.org/10.18203/2394-6040.ijcmph20151234>
12. Notoatmodjo. Ilmu Perilaku Kesehatan. Jakarta: PT Rineka Cipta; 2014.
13. Al-Khawaldeh OA, Al-Hussami M, Darawad M. Influence of nursing students handwashing knowledge, beliefs, and attitudes on their handwashing compliance. *Health (Irvine Calif)* [Internet]. 2015;07:572–9, <http://dx.doi.org/10.4236/health.2015.75068>
14. Amil Kusain T, Jeffrey O. Assessing healthcare associated infections and hand hygiene perceptions amongst healthcare professionals. *Int J Caring Sci* [Internet]. 2015;8:108–14. Available from: <https://pdfs.semanticscholar.org/0749/d03d5d7f390e05fa00643e18ab13a572d6e7.pdf>
15. Duerink DO, Farida H, Nagelkerke NJD, Wahyono H, Keuter M, Lestari ES, et al. Preventing nosocomial infections: improving compliance with standard precautions in an Indonesian teaching hospital. *J Hosp Infect*. 2006;64:36–43, <http://dx.doi.org/10.1016/j.jhin.2006.03.017>
16. Ross D. Challenges for men in a female dominated environment. *Links to Heal Soc Care*. 2017;2:4–20.
17. Mohamed NA, Zulkifli Amin NN, Ramli S, Mohamed Salleh N, Isahak I. Knowledge, attitudes and practices of hand hygiene among parents of preschool children. *J Sci Innov Res* [Internet]. 2016;5:1–6. Available from: [www.jsirjournal.com](http://www.jsirjournal.com)
18. Präfflin F, Tufa TB, Getachew M, Nigussie T, Schönfeld A, Häussinger D, et al. Implementation of the WHO multimodal hand hygiene improvement strategy in a University Hospital in Central Ethiopia. *Antimicrob Resist Infect Control* [Internet]. 2017:1–10, <http://dx.doi.org/10.1186/s13756-016-0165-9>