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Original Research

Nurses' Individual Characteristics Associated with Five Moments Handwashing Compliance

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ABSTRACT

Introduction: The most effective way to control infection is to ensure that hospital staff carry out handwashing according to the protocols. This study aims to determine the characteristics of nursing individuals that affect the compliance of the five moments of handwashing in the hospital inpatient room.

Methods: The method used was a quantitative with a cross-sectional approach. The population was all nurses in five inpatient rooms totalling 84 nurses selected using purposive sampling. The dependent variable was the compliance of nurses' handwashing. The independent variables were the individual characteristics of the nurses, including knowledge, gender, age, attitude, motivation, skin condition, years of service, education, employment status, infrastructure, and type of room. The data were collected using a questionnaire and observation of handwashing compliance. The handwashing observation was based on the hospital guidelines, and the relationship between the variables was analyzed using Chi square and logistic regressions test.

Results: The study indicates that there is a significant relationship between motivation, education, and room type on compliance with the five moments handwashing ($p < 0.05$). The most dominant factor was type of room, and there is no relationship between gender, age, years of work, skin condition, knowledge, attitude, employment status and infrastructures ($p > 0.05$).

Conclusion: It is hoped that nurses can increase self-motivation to wash their hands for five minutes while working, as a form of dedication at work and to protect patients and themselves from nosocomial infections. Besides, hospital management needs to make efforts to increase the motivation of nurses.

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INTRODUCTION

The incidence of nosocomial infections is increasing in both developed and developing countries. The cause of nosocomial-infections is mostly transient flora. Microorganisms classified as transient flora are obtained by health workers when they are in direct contact with patients or with a contaminated environment. The source of cross-contamination in hospitals is the transfer of microorganisms from the hands of healthcare workers who make direct contact from one patient to another. The impact of the incidence of infection nosocomial can cause long days of stay, increase resistance to microorganisms, increase the burden of treatment costs, and, the most dangerous, death. One of the components to limit the spread of nosocomial infections is sufficient infection control. The most effective way to control contamination is to ensure that hospital staff perform hand hygiene according to the regulation (Lankford et al., 2003; WHO, 2009).

The Word Health Organization (WHO), a long-standing leading authority in campaigning hand hygiene (HH), urges every country to strengthen infection prevention and control, and appeals for networking with stakeholders to take better action for the prevention of HAIs (Saito, Kilpatrick, & Pittet, 2018). HAIs are still a substantial burden among infectious diseases, exceeding the burden of other infections such as influenza and tuberculosis (Cassini, Plachouras, Eckmanns, Abu Sin, Blank, Ducomble, & Suetens, 2016).

Nurses, doctors, and all people involved in patient care must perform infection prevention and control

(Duerink et al., 2006). Hand hygiene is the most effective simple way and the most cost-reducing approach to nosocomial infections (Hugonnet et al., 2002; Kampf et al., 2009; Sickbert-Bennett et al., 2016; von Lengerke et al., 2017). Nurses are professionals who play a significant role in hospital services and have contact with patients for a longer time, up to 24 hours straight. Thus, nurses have a role in the incidence of nosocomial infections (Nursalam, 2011). Health workers generally know about the importance of washing hands to prevent infections. However, the implementation of handwashing that follows the standard procedure is still low among health workers (Akyol, 2007; Nurbaety et al., 2019). Various previous studies stated that compliance with nurses' handwashing was still low, not reaching 100% (Jonker & Othman, 2018; Karuru et al., 2016; Putri et al., 2018; Ratnasari & Dulakhir, 2016; Umboh et al., 2017). Based on previous research, it is known that the individual characteristics of nurses related to handwashing compliance include age, gender, length of work, knowledge, attitudes, motivation, and nurse education (Anugrahwati & Hakim, 2019; Fauzi et al., 2015; Zainaro & Laila, 2020).

Based on the description above, this study aims to determine the individual characteristics of nurses that affect the compliance of the five moments handwashing in the inpatient room of Pangkalpinang City with a quantitative approach.

MATERIALS AND METHODS

This research is a quantitative study with a cross-sectional approach. The dependent variable of the study is the nurses' compliance with handwashing in the inpatient room. The independent variables are individual characteristics, including knowledge, gender, age, attitude, motivation, skin conditions, length of work, education, employment status, infrastructure, and type of room. The population of the study were all associated nurses who work in the inpatient room, as many as 98 nurses. A total of 84 implementing nurses as research respondents was obtained using purposive sampling (ICU = 14; PICU = 16; Non-surgical = 27; Children = 12; Surgery = 15) with the following inclusion criteria: (1) willing to be respondents, (2) not being assigned to the isolation room during the research. The COVID-19 isolation room was not involved in the research because, when the study was taking place, there were no patients. Thus, they could not estimate washing hands for the five moments.

The procedure in this research began by arranging a permit to a government hospital in Pangkal Pinang City. It was followed by conducting a meeting to equate the perception of the research process. The meeting was performed by hospital infection prevention and control programs (IPC). Four people assisted in the process of data collection. Two students were as research assistants who were in charge of collecting questionnaires and documentation. Two hospital IPC officers were responsible for observing the compliance of nurses' handwashing in the rooms. Researchers also coordinated with all heads of room related to research activities. First, the researchers explained to the respondents about the objectives and procedure of the research and the guarantee of data confidentiality. Nurses willing to sign the informed consent form as research respondents then filled out the questionnaire. The study questionnaire was adopted from previous researchers with modifications. The questionnaire covered the nurse's identity (name, age, gender, latest education, years of service, skin condition), room name, and handwashing infrastructure. The knowledge variable consists of 10 questions about the five moments handwashing and has passed the validity and reliability test. Questionnaire validation and reliability test had been done at RSUP Ir. Soekarno with the number of respondents as many as 20 people. Cronbach's alpha test results obtained knowledge value (0.932), motivation (0.958), attitude (0.969) and were declared reliable. Of the 10 questions and statements, all are declared valid with a calculated R value > R table (0.375). Each correct answer is given a value of 1 and 0 if the answer is wrong. The attitude variable includes 10 statements consisting of eight positive statements and two negative statements using a Likert scale. Meanwhile, the motivation variable has 10 statements using a Likert scale. For positive statements, the highest point is 5 in the SS category (strongly agree), while the highest point negative statement is 5 in the STS category (strongly disagree).

The 84 nurses were then observed for the five moments of handwashing compliance in the room by the hospital IPC officers. The observation process was uninformed to the respondents, and only carried out once in 10 days, starting from 22nd to 31rd of August, 2020. Furthermore, each research respondent is given a code, R01 for the first respondent up to R84. The questionnaire files and observation sheets were not accessible other than to the researchers. After data collection was complete, the study continued with data entry. Incomplete nurse data were confirmed to the head of the room concerned. The relationship between individual characteristics and compliance with handwashing was tested using the Chi-square test with a confidence degree of 95% (α = 0.05). Meanwhile, the relationship between variables was analyzed using the multivariate analysis method using logistic regression test with SPSS version 20 software.

RESULTS

Based on Table 1, there are 11 characteristic components of individual nurses. The dominance of female gender nurses, age less than 40 years, vocational education, long working period, non-sensitive skin condition, and civil servant status. Knowledge, attitude and motivation have equal value.

Table 1. Characteristics of Research Respondents

Characteristics of Respondents	n	%	Median
Age			
> 41 Years	13	15.5	-
≤ 40 Years	71	84.5	
Motivation			
Low	35	41.7	39.07
High	49	58.3	
Attitude			
Negative	39	44.6	43.67
Positive	45	53.6	
Knowledge			
Fair	31	36.9	9.61
Good	53	63.1	
Work Period			
New	10	11.9	-
Old	71	88.1	
Infrastructure			
Insufficient	4	4.8	-
Adequate	80	95.2	
Skin condition			
Sensitive	14	16.7	-
Not Sensitive	70	83.3	
Education			
Vocational Degree	63	75	-
Academic Degree	6	7.1	
Professional Degree	15	17.9	
Employment Status			
Civil Servant	63	75	-
Contract	21	25	
Gender			
Male	12	14.3	-
Female	72	85.7	

Table 2. Distribution of Respondents' Handwashing

Handwashing Compliance	n	%
Noncompliant	53	63.1
Compliant	31	36.9
Total	84	100

Table 3. Percentage Distribution of Respondents' Handwashing by Type of Room

Type of Room	Handwashing Compliance				Total
	Noncompliant		Compliant		n
	n	%	n	%	
ICU & PICU	7	23.3	23	76.7	30
Non-surgical	25	92.6	2	7.4	27
Surgery	12	80	3	20	15
Children	9	75	3	25	12
Total					84

Handwashing Compliance

Most of the respondents (63.1%) in this study did not comply with the five-minute handwashing, as in Table 2. The room with the highest level of compliance with washing hands was the ICU & PICU room, while in the normal inpatient room the level of compliance with washing hands was low, as shown in Table 3. While the five most neglected moments are after touching patient surroundings, as in Table 5.

Based on the statistical test in Table 2, there are three variables with p-value < 0.05, namely motivation, education, and type of room. It shows that the three aspects affect the washing of hands by nurses in the room. Furthermore, the OR value of the motivation variable is 2.986, meaning that nurses who have high motivation have the opportunity to comply 2.98 times more than nurses with low motivation. Based on the multivariate logistic regression test, the omnibus test section shows a p-value of 0.0001 (<0.05), which means that there is an interaction between motivation, education and type of room on compliance with handwashing. Based on Table 6, it can be found that the most dominant variable is the type of room.

DISCUSSION

Most of the respondents in this study did not comply with washing their hands for five moments. The research found only a small part of the individual characteristics of nurses that affect handwashing compliance, namely education and motivation. New findings from this research are that type of room was known to be significantly related to handwashing compliance, and to be the most dominant factor. The results of this study support previous research reporting that most nurses do not comply with handwashing (Arifin & Ernawaty, 2019; Karuru et al., 2016; Nurbaety et al., 2019). Handwashing or hand hygiene is a general term that refers to the act of cleansing the hands five times, commonly called five moments. The five moments are: the moment before contact with the patient, before the cleaning procedure or aseptic, after procedures exposing to the body fluids, after contact with patients, and after contact with the area around the patient (WHO, 2009). Permenkes no 27 Tahun 2017, concerning infection prevention and control in health facility services, states that hand hygiene is one of the standard precautions that must be applied routinely in the care of all patients in the hospital.

The hospital as a medical service unit cannot be separated from the activities of treatment and care for patients with various causes, one of which is infection. Infections that occur in health services during treatment and medical procedures after ≥ 48 hours and after ≤ 30 days after leaving a health facility are called nosocomial infections or hospital-acquired infections (HAI). According to Petersen et al. (2010), HAI causes a prolonged length of stay, thus harming patients and increasing treatment costs. HAI is a worldwide problem because it is detrimental to patients and hospitals. Lankford et al. (2003) state that one of the components to limit the spread of HAI is to implement infection control. The most effective way to control infection is to ensure that hospital-staff practice hand hygiene following the standard.

Factors related to the compliance level of nurses' handwashing include individual-factors, i.e.: gender, age, facilities, attitudes, length of work (Anugrahwati & Hakim, 2019; Arifin & Ernawaty, 2019; Fauzi et al., 2015; Pratama et al., 2016). However, this study gave different results as to which of these factors did not

Table 4. Five Moment Handwashing by Type of Rooms

Five Moment		Type of Room (%)			
		ICU & PICU	Non-Surgical	Surgery	Children
Before touching a patient	Noncompliant	0	59.3	33.4	41.7
	Compliant	100	40.7	66.6	58.3
Before clean/aseptic procedures	Noncompliant	0	22.3	13.4	25
	Compliant	100	77.7	86.6	75
After body fluid exposure/risk	Noncompliant	0	7.5	6.7	0
	Compliant	100	92.5	93.3	100
After touching a patient	Noncompliant	0	0	0	0
	Compliant	100	100	100	100
After touching the patient's surroundings	Noncompliant	26.7	92.6	80	75
	Compliant	73.3	7.4	20	25

Table 5. Relationship of Nurses' Individual Characteristics toward Handwashing Compliance

Characteristics of Individual Respondents	Compliance with Handwashing				Total		OR (95% CI)	p-value
	Non-compliant		Compliant					
	n	%	n	%	n	%		
Age	7	53.8	6	46.2	13	100	0.643	0.537
> 41 Years	46	64.8	25	35.2	71	100	(0.192-2.093)	
≤ 40 Years								
Attitude	27	77.1	8	22.9	35	100	0.584	0.339
Negative	26	53.1	23	46.9	49	100	(0.239-1.429)	
Positive								
Knowledge	20	64.5	11	35.3	31	100	1.102	1.000
Fair	33	62.3	20	37.7	53	100	(0.438-2.770)	
Good								
Work Period	7	70	3	30	10	100	1.420	0.738
New	46	62.2	28	37.8	74	100	(0.339-5.945)	
Old								
Infrastructure	4	100	0	0	4	100	1.633	0.292
Insufficient	49	61.3	31	38.3	80	100	(1.372-1.944)	
Adequate								
Skin condition	8	57.1	6	42.9	14	100	0.741	0.840
Sensitive	45	64.3	25	37.5	70	100	(0.231-2.377)	
Not Sensitive								
Education	43	68.3	20	31.7	63	100	-	0.042
Vocational Degree	1	16.7	5	83.3	6	100		
Academic Degree	9	60	6	40	15	100		
Professional Degree								
Employment Status	36	57.1	27	42.9	63	100	0.314	0.09
Civil Servant	17	81	4	19	21	100	(0.95-1.040)	
Contract								
Gender	9	75	3	25	12	100	1.909	0.521
Male	44	61.1	28	38.9	72	100	(0.476-7.664)	
Female								
Motivation	27	77.1	8	22.9	35	100	2.986	0.043
Low	26	53.1	23	46.9	49	100	(1.134-7.861)	
High								
Type of Room	7	23.3	23	76.7	30	100	-	0.0001
ICU & PICU	25	92.6	2	7.4	27	100		
Non-Surgical	9	75	3	25	12	100		
Pediatric	12	80	31	20	15	100		
Surgery Room								

have a significant effect on the co mpliance of nurses' handwashing. The gender of nurses was dominantly females. However, there is no difference in the proportion of compliance with handwashing between female and male respondents. The age of nurses was mostly ≤ 40 years, but there was found no difference in the proportion of compliance with handwashing between nurses aged ≤ 40 years and nurses aged > 41 years. Most of the nurses considered that the handwashing infrastructure was adequate in the patient room, and there was no difference in the proportion of compliance with handwashing among nurses who were considered supported by the infrastructure to be adequate and inadequate. These findings support previous research that found that the availability of facilities and infrastructure did not relate to handwashing compliance (Yotlely, 2019). The researcher assessed the non-correlation because there were adequate handwashing facilities in the

room. There were hand rubs in each patient's bed, room corridor, and nurse station.

The results showed that most of the nurses had a long working tenure, namely > 5 years, but there was no difference in the proportion of compliance with handwashing between nurses with a long tenure and nurses with a new tenure. The positive attitude of nurses is almost proportional to negative attitudes, and there is no difference in the proportion of compliance with handwashing between nurses with positive attitudes and nurses with negative attitudes. The same thing is found in the knowledge factor. Most of the nurses have good knowledge of handwashing. However, there is no difference in the proportion of compliance in washing hands between nurses with adequate knowledge and nurses with less knowledge. This is also in line with previous research which found that knowledge was not related to handwashing cosmpliance (Arifin & Ernawaty, 2019; Ratnasari & Dulakhir, 2016; Syamsulastri, 2017). Nurses may have good knowledge about handwashing, but other factors can lead to difficulty implementing handwashing compliance, one of which is the high workload. From the research results, nurses in ordinary inpatient rooms (surgical, non-surgical, children) were the most obedient to wash their hands at moment 3 (after being exposed to body fluids) and moment 4 (after touching the patient). However, the most neglected moment is moment 5 (after touching the patient's environment). It shows that nurses prioritize washing hands after exposure to patients. Further research is needed regarding the workload of nurses in inpatient rooms.

Also, another finding from this study is that employment status does not correlate with nurse handwashing compliance. Most of the nurses are civil servants, but there is no difference in the proportion of compliance in washing hands between nurses who are civil servants and nurses who are honorary status. Also, most skin conditions are not sensitive to handwashing fluids. However, there is found no difference in the proportion of washing hands between nurses with sensitive skin conditions and nurses who are not sensitive to handwashing fluids. There were complaints from the respondent such as dry hands, but the researcher's opinion is that the small number of nurses who have sensitive skin causes this variable to be unrelated. It is necessary to develop further research to find out more clearly.

An interesting finding in this study is that nurses' motivation affects compliance with nurses' handwashing. The number of nurses with high motivation is almost equal to those with low motivation. Nevertheless, there is a difference in the proportion of compliance with handwashing between highly motivated nurses and those with low motivation. These findings support previous research where 'motivation' is significantly related to nurses' compliance with handwashing (Ananingsih & Rosa, 2016; Fauzi et al., 2015; Sani & Pratiwi, 2017). Nurses need to cultivate high motivation as a form of dedication and altruism to patients' needs for healing (Nursalam, 2017). Besides, nurse education was found to affect compliance with handwashing. There was a difference in the proportion of handwashing between nurses with vocational, academic, and professional education. One of the factors that can increase the productivity or performance of nurses is the formal education of nurses. Education provides knowledge not only directly related to the implementation of tasks, but also a foundation for self-development and the ability to utilize all available facilities for smooth tasks (Nursalam, 2017).

The new finding from this study is that room type is related to the compliance of nurses' handwashing. There is a difference in the proportion of compliance with handwashing between intensive and non-intensive rooms (general inpatient care). Based on Table 6, it was found type of room to be the most dominant factor. Of the five rooms studied, there were two types of intensive rooms and three general inpatient rooms. Based on diagram 2, the highest handwashing compliance is in the intensive room, where moments 1 to 4 are 100%, but in moment 5 the compliance is 73.3%. Meanwhile, in general, inpatient rooms, the non-compliance of handwashing was five moments higher. This finding supports previous research that the workplace influences compliance with hand hygiene, where ICU nurses are more obedient than other wards (Arini, 2016). Further research is needed to be able to find a more specific cause.

The researcher's opinion is that not only individual characteristics should be highlighted in compliance with nurses' handwashing. Other factors outside the nurses as individuals also contribute to handwashing compliance. They can be organizational characteristics, which include reward systems, training, and development, leadership, and organization culture. Moreover, it is important to pay attention to aspects of job characteristics, including feedback, workload, and assignment methods.

This study has several limitations, although attempts have been made to overcome them. Researchers could not control nor directly see when respondents filled in answers or justify the truth of the answer given. In addition, observing the compliance of nurses' handwashing was only done once in a period.

CONCLUSION

Most nurses do not comply handwashing. From 11 nurses' individual characteristic factors, there were three factors related to the compliance of the nurse's hand washing, namely education, motivation and type of patient room. The research found type of room to be the dominant factor. However, knowledge, facilities, attitudes, age, gender, skin sensitivity conditions, and employment status do not relate to handwashing compliance.

It is hoped that nurses can increase self-motivation to perform the five moments of hand hygiene while working, as a form of dedication at

work and to protect patients and themselves from nosocomial infections. The researcher also recommends that further researchers be able to identify more about other factors, including reward systems, training and development, leadership, organizational culture, feedback, workload, and assignment methods. Thus, they can find the right intervention to increase compliance with the nurse's handwashing.

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