

THE LEVEL OF COMPLIANCE OF HEALTHCARE WORKERS IN PERFORMING HAND HYGIENE: A LITERATURE REVIEW

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ABSTRACT

Compliance level of healthcare workers in performing hand hygiene is a significant aspect of patient safety goals. However, it is still not optimal and is one of the critical problems of many hospitals globally, including in Indonesia. The non-optimal consequence of hand hygiene compliance is hospital-associated infections since hands are an intermediary medium for transmitting infection. This literature aims to determine the level of compliance of health workers in performing hand hygiene and find out several matters that can be done so that the health worker's compliance can be optimal or increased. Review of articles through several electronic databases including PubMed and ProQuest, with the keywords "Compliance", "Hand Hygiene", "Health Workers", and "Hospital". Inclusion criteria include articles published between 2005 and 2019, health worker respondents, English language, full text and observation, or interview data collection techniques. The literature search found 212 articles, and after manual review, ten articles were identified and assessed using the JBI form (Joanna Briggs Institute). The literature review findings suggest that, following the intervention, the level of compliance of health workers in performing hand hygiene is still lacking and growing. The conclusion is that more significant support from the hospital (e.g., role models, audits, adequate infrastructure, education and repeated training), the greater the compliance of health workers in performing hand hygiene.

Keywords: Compliance, Hand Hygiene, Health Workers, Hospital

INTRODUCTION

Hand hygiene is a core element of patient safety goals to prevent the occurrence of healthcare-related infections that are often called HCAs (healthcare-associated infections) or HAIs (hospital-associated infections) and the spread of antimicrobial resistance. Health-care-related infections are one of the important causes of morbidity and mortality for hospitalized patients worldwide. These circumstances can occur due to pathogen transmission through contaminated health workers (Mani, Shubangi, & Saini, 2010).

A survey conducted by the US Centers for Disease Control and Prevention revealed that nearly 1.7 million hospitalized patients each year acquire treatment-related infections. In addition to this, more than 98,000 patients (1 in 17) died and based on the results of a survey conducted on 100 patients hospitalized; it was found that seven patients in developed countries and ten patients in developing countries were affected by treatment-related infections (Haque et al., 2018). Recent studies, show the number of HAIs in all hospitals in Europe ranges from (4.6-9.3%) in the care unit and several other hospitals in the world, such as in

Albania, Morocco, Tunisia and the United Republic of Tanzania the incidence rate HAIs varied between (19.1% and 14.8%) (Pan American Health Organization, 2018). In line with the incidence of HAIs in several countries, in Indonesia, the incidence of infection-related care ranges from (6–16%) with an average of (9.8%) of active surveillance data at ten Education Hospital (Kemenkes, 2018).

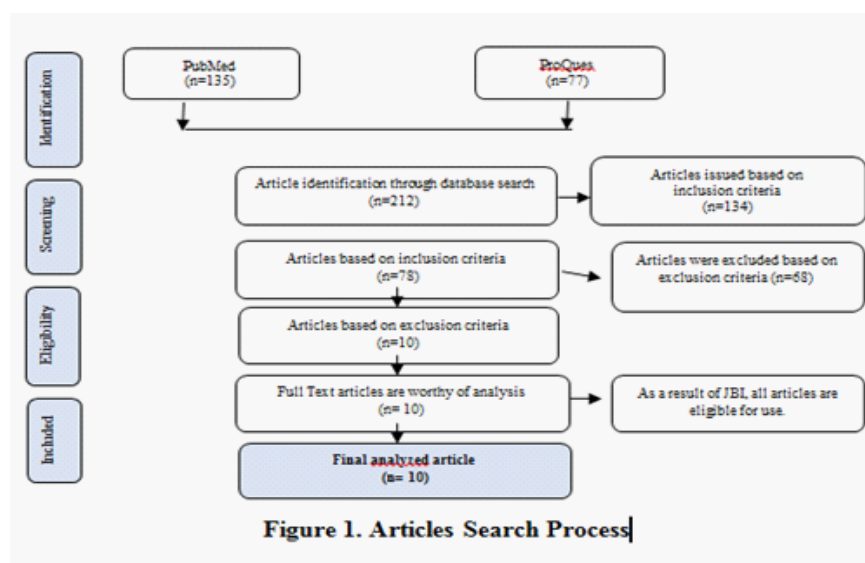
Several studies have shown that the most uncomplicated, cheapest and most efficient infection control procedure is to clean hands to save patients' lives, reduce morbidity, and minimize treatment costs (Haque et al., 2018). Hand hygiene by washing hands using soap and water or cleaning alcohol-based hands is considered a measure to control infection related to health care. This action must be supported by the compliance of health workers involved in providing health services to inpatients. However, several studies say that the level of compliance

of health workers is not optimal. These happened caused by the ignorance of the importance of hand hygiene in reducing the spread of infection, lack of understanding of proper hand hygiene techniques, lack of human resources, poor access to handwashing facilities, irritant contact dermatitis that can occur due to frequent exposure to soap and water, and lack of institutional commitment to good hand hygiene (Pittet & Boyce, 2001).

Based on the above phenomena, a more in-depth literature review is significant on the compliance of health workers in performing hand hygiene in the hospital. This literature review aims to see the level of compliance of healthcare workers in performing hand hygiene. Also, to determine what things can be done so that health worker compliance can be optimal or increased. It can be input for infection control professionals to improve patient safety and reduce infections related to hospitals' health care, especially in Indonesia.

RESEARCH METHODS

A literature review is carried out by searching for articles through several databases, namely PUBMED and PROQUEST with the keywords "Compliance", "Hand Hygiene", "Health Workers", and "Hospital". This literature search found 212 articles. The next step, the authors conducted an analysis. It obtained 78 articles according to the inclusion criteria, namely articles published in the period between 2005 and 2019, with health worker respondents, using English, full text, and data collection techniques in observational research articles or interviews. The next step, the author reads the abstract, and there are 68 articles issued based on exclusion criteria, namely only covering the abstract, the article does not match the keywords. It does not match the purpose of the literature review. The final results obtained from the selection process were ten articles. The ten articles were analyzed or assessed for their eligibility using the JBI (Joanna Briggs Institute) critical appraisal form and a checklist according to the article's type of research. The next step, the article is extracted into the table and further analyzed by the researcher, discussed and concluded.



RESULTS

This literature review's primary focus is the compliance of health workers in performing hand hygiene in hospitals. Based on the

search results for articles, ten articles will be explained in the form of 2 tables; characteristics of the articles and the results of each article's content analysis.

Table 1. Characteristics of Research Articles

Authors	Country	Research Design	Data Collection Techniques	Number of Samples
(Abdella et al., 2014)	North West Ethiopia	Cross Sectional Study	Observational	405 healthcare workers
(Demirel, 2019)	Turki	Observasional Study	Observational	270 healthcare workers
(Erasmus et al., 2009)	The Netherlands	Structured interview	Interview	65 healthcare workers
(Hoffmann et al., 2019)	Austria	Observasional Study	Observational	6009 healthcare workers
(Abdo & Al-Fadhli, 2018)	Kuwait	Interventional study	Observational	95 healthcare workers
(Kuzu et al ., 2005)	Turkey	Observasional Study	Observational	42 healthcare workers
(Mahfouz, El Gamal, & Al-Azraqi, 2013)	Saudi Arabia	Observasional Study	Observational	213 healthcare workers
(Sastry, Deepashree, & Bhat, 2017)	South India	Prospective study	Observational	18 hospitals
(Kolola & Gezahegn, 2017)	Ethiopia	Cross Sectional Study	Observational	307 healthcare workers
(Anwar & Elareed, 2019)	Egypt	Prospective study	Observational	177 healthcare workers

Authors	Titles	Results	Conclusion
(Abdella et al., 2014)	Hand Hygiene Compliance and Associated Factors Among Health Care Providers In Gondar University Hospital	Compliance with good hand hygiene of health workers in this study was 16.5%. The health workers who know hand hygiene compliance (AOR = 3.80, 95% CI 1.60, 8.97), get training (AOR = 2.60, 95% CI 1.21, 5.62), provision of towels for individuals/ tissue paper (AOR = 1.91, 95% CI 1.03, 3.56), provision of alcohol for hand hygiene (AOR = 6.58, 95% CI 2.67, 16.22) and those who know the existence of the infection prevention committee (AOR = 2.69, 95% CI 1.23, 5.37).	Compliance of health workers in implementing hand hygiene in this hospital is still low. It will be better if health workers attend training, availability of towels for individuals/tissues, availability of alcohol for washing hands, and an infection prevention committee's existence.
(Demirel, 2019)	Improvement of Hand Hygiene Compliance In A Private Hospital Using The Plan-Do-Check-Act (PDCA)	The study was conducted for one year. It divided into two semesters by conducting an assessment before and after the intervention using PDCA was given to health workers (nurses, doctors, and other medical personnel), the results had increased, namely the previous level of compliance of officers (48%) in the first six months to (60%) in the following six months.	Hand hygiene improvement takes a long time, and there is a need for cooperation between hospitals and health workers. Hand hygiene practices can be better.
(Erasmus et al., 2009)	A Qualitative Exploration of Reasons for Poor Hand Hygiene Among Hospital Workers Lack of Positive Role Models and of Convincing Evidence That Hand Hygiene Prevents Cross-Infection.	Nurses and medical students said the importance of hand hygiene to prevent cross-infection between patients and them. Doctors say hand hygiene is for personal protection, but they feel that there is not enough evidence that hand hygiene effectively prevents cross-infection. This health worker said that hand hygiene is most often done if the action taken is considered dirty.	Health workers who participated said that non-compliance with hand washing was frequent because they felt a lack of positive role models from seniors and felt a lack of evidence that hand hygiene was effective in preventing cross-infection.

(Hoffmann et al., 2019)	Interventions To Increase Hand Hygiene Compliance In Tertiary University Hospital Over A Period Of 5 Years: An Iterative Process Of Information, Training And Feedback.	The study was conducted to see the level of compliance with hand hygiene with five moments for surgical and non-surgical health workers (nurses, doctors and other medical personnel) for five years after being given repeated information, trained, and feedback increased from 81.9% (2013). to 94% (2017).	By carrying out education and emphasizing the necessity to practise hand hygiene, there is a positive trend of increasing compliance with hand hygiene.
(Abdo & Al-Fadhli, 2018)	Improving Hand Hygiene Compliance Among Healthcare Workers In Intensive Care Unit: An Interventional Study	Compliance of health workers in the intensive care unit Farwaniya Hospital, which was observed in four phases for eight months, showed that there was a significant increase from 58.81% to 73.17%.	The results of this study found an increase between pre and post-intervention both with respondent nurses, doctors and other medical personnel, as well as an increase in the five-moment hand hygiene performed on health workers in the intensive care unit.
(Kuzu et al ., 2005)	Compliance With Hand Hygiene And Glove Use In A University-Affiliated Hospital. Infection Control and Hospital Epidemiology	Compliance of health workers in performing hand hygiene was (31.9%), and (58.8%) for gloves.	The result of this research is that the level of compliance is still lacking. Health workers adhere to hand hygiene and wear gloves if there is any indication that it may cause hands to be too dirty.
(Mahfouz et al., 2013)	Hand hygiene non-compliance among intensive care unit health care workers in aseer central hospital, South-Western Saudi Arabia	Overall, the non-compliance of the hand hygiene of health workers was 41.0%, and at the moment before contact with patients, hand hygiene was often not done.	The observed hand hygiene non-adherence figures demand intensive education to promote hand hygiene programs and local training to help impart efficient and effective hand hygiene to all care delivery elements.

Selviah Rahayu: The Level Of Compliance Of Healthcare Workers

(Sastry, Deepashree, & Bhat, 2017)	Impact of a hand hygiene audit on hand hygiene compliance in a tertiary care public sector teaching hospital in South India.	The results of this study obtained a complete adherence rate of hand hygiene (HHCAR) (45.5%), a partial hand hygiene adherence rate (21.17%), and a nonadherence rate of 33.3%. In this study, there was a gradual increase in HHCAR during the study period, from 37.5% to 51.7%, which was statistically significant ($P = 0.001$). HHCAR was found to be the highest, namely nurses (58.9%) followed by other staff (46.7%) and doctors (46.6%).	Hand hygiene audits have a significant effect on hand hygiene compliance to be a part of manual infection control in every hospital.
(Kolola & Gezahegn, 2017)	A twenty-four-hour observational study of hand hygiene compliance among health-care workers in Debre Berhan referral hospital, Ethiopia	Implementation of hand hygiene with five moments, the results were that moments 3 and 4 had statistically significant adherence (78.5% and 71.8% respectively; $P < .001$) compared to Moments 1, 2, and 5. When HHCAR increasing, there was a statistically significant decrease in the rate of healthcare-related infections from 10.6–3.9 per 1,000 health care days ($P = 0.042$).	
(Anwar & Elareed, 2019)	Improvement of hand hygiene compliance among health care workers in intensive care units.	Overall hand hygiene adherence increased significantly from 30.9 (95% CI: 27.2–34.6%) before intervention to 69.5 (95% CI: 65.2–72.6%) post-intervention.	Compliance with hand hygiene for health workers was low at the Debre Berhan referral hospital, and compliance of health workers in protecting patients from infection was lower than protecting health workers themselves. The findings of this study indicate that hand hygiene compliance needs to be further improved.

DISCUSSION

Based on the results of an analysis of 10 research articles conducted in several countries, namely North West Ethiopia, Turkey, the Netherlands, Austria, Kuwait, Saudi Arabia, South India, Ethiopia, and Egypt between 2005 and 2019 regarding the level of compliance of health workers in performing hand hygiene at a hospital. This study shows that the level of compliance of health workers in performing hand hygiene is still lacking and increases when given the intervention. The following are the results of the analysis of 10 research articles, namely the first article conducted by Abdella et al., (2014) for one month (April to May 2013) at Gondar University Hospital North West Ethiopia involving 405 health workers. It shows that the level of compliance of health workers in performing hand hygiene is still low, due to a lack of knowledge, availability of towels or tissues for individuals, availability of alcohol-based antiseptic solutions and the existence of an infection prevention committee. Based on the results of this study, the level of compliance of health workers may increase after attending training, the availability of towels or tissues for individuals, the availability of alcohol-based hand rubs and the presence of an infection prevention committee.

In line with this article, Demirel (2019) conducted a one-year study by observing the first six months and the next six months after improvement efforts and involving 270 health workers as respondents. He stated that the level of compliance of health workers in performing hand hygiene is still low at Kadikoy Florence Nightingale Hospital Turkey in the first six months. It happened due to the high rate of staff turnover (22%). Health workers who have just started working do not have sufficient knowledge of hand hygiene, low awareness of health workers about hand hygiene, lack of warnings regarding the implementation of hand hygiene, and lack of availability of disinfectants or antiseptic fluid. However, the level of adherence increases as interventions are given through corrective measures with training. The availability of the number of alcohol-based disinfectants

that are easily accessible, evaluating and investigating possible causes of skin irritation when using antiseptic solutions and raising awareness through several warnings inviting hand hygiene such as posters, stickers and videos. The intervention to increase health worker compliance, based on the analysis results using the concept of the PDCA cycle (Plan-Do-Check-Act), so that the level of compliance increased from 48% in the first six months to 60% in the next six months after the intervention. Likewise, Erasmus et al. (2009) state that their study involved 65 health workers as respondents and came from 5 hospitals in the Netherlands. This study shows that the level of compliance of health workers in performing hand hygiene is still low, especially before contact with patients and health workers only do hand hygiene if they feel that their hands are filthy. This happened because of the lack of positive role models from seniors and the lack of evidence that hand hygiene effectively prevents cross-infection. Also, the level of compliance may be increased when there is a role model from seniors. There is evidence that hand hygiene effectively prevents cross-infection and a supportive environment with the availability of facilities for hand washing and easy access.

Hoffmann et al., (2019) conducted five years of study at the University Hospital Graz Austria involving 6009 health workers. Also suggests that the level of compliance of health workers has not reached 100% due to lack of knowledge, environmental barriers (availability of antiseptic based alcohol) and health workers feel they do not have enough time to implement hand hygiene. Some ways can be done to increase compliance, such as providing repeated information, training and feedback. In addition, it is necessary to emphasize the necessity to do hand hygiene. This statement is supported by Abdo & Al-Fadhli (2018) research, which was conducted at Farwaniya Hospital Kuwait for eight months (May to December 2017) with 95 health workers as respondents. The level of compliance of health workers in this study was known to be still low at 58.81% before the intervention. The low level of adherence is caused by the lack of self-awareness of health workers. Therefore, after the intervention (administrative support,

education and training, competitions related to the implementation of hand hygiene, observation and reporting, reminders such as posters in implementing hand hygiene, and the availability of antiseptic dispensers and disposable towels), showed a significant increase, from 58.81% to 73.17% after being given intervention.

Furthermore, the sixth article is a study conducted by Kuzu et al., (2005) at Pamukkale University Denizli, Turkey, for three months (1 September to 31 December 2002) involving 42 health workers. The results showed that the level of compliance of health workers was still low in performing hand hygiene, namely as much as 31.9%. These happened due to the lack of self-motivation, especially at the moment before the patient, the availability of alcohol-based antiseptics is not sufficient. Based on this, it is necessary to carry out routine monitoring and provide feedback regarding compliance with hand hygiene and the availability of alcohol-based antiseptics. In line with the previous article, Mahfouz, El Gamal, & Al-Azraqi (2013) researched for three months (February to April 2011) at Aseer Central Hospital South Western Saudi Arabia 213 health workers as respondents. This shows that the level of compliance of health workers is still low at 41.0%. In addition, health workers most often do not practice hand hygiene at the moment before patient contact. This can be caused by culture and knowledge, high turnover rates so that efforts are needed to improve health workers' compliance through increased education to promote hand hygiene programs and training to help inculcate efficient and effective hand hygiene compliance in all elements of care delivery.

Some of these studies, also supported by Sastry, Deepashree, & Bhat (2017) in research conducted at 18 South Indian Tertiary Care General Teaching Hospitals for 12 months (October 2015 to September 2016). This study shows that the level of compliance with the complete hand hygiene of health workers is still low, namely as much as 45.5%, which is caused by an increase in workload, lack of training on infection control, lack of role models and health workers feel they know everything. However, after the infection control team carried out an

audit, the implementation of hand hygiene and health workers' compliance increased. In addition, in this study, it was found that if health workers' compliance in implementing hand hygiene was increased, it was found to reduce the level of infection related to treatment significantly. Furthermore, Kolola & Gezahegn (2017) researched 307 health workers at Debre Berhan Referral Hospital Ethiopia for eight days (2 to 9 May 2017). It showed that the level of compliance of health workers was still low, as 22.0 % due to the lack of availability of handwashing stations, soap and alcohol-based hand rubs, and lack of monitoring, no visual reminders and no feedback regarding the implementation of hand hygiene. This compliance level can increase if a person follows the WHO (World Health Organization) strategy, multimodal (system changes, training and education, monitoring and feedback, reminders and communication, and patient safety culture). The last article, namely research conducted by Anwar & Elareed (2019) conducted at Beni Suef University Hospital Egypt for six months (March to August 2017) with 177 respondents, showed that health workers' level of compliance was still low. The low level of adherence is not known for the exact cause. However,

the level of hand hygiene compliance increased significantly from 30.9 (95% CI : 27.2-34.6%) before the intervention to 69.5 (95% CI: 65.2- 72.6%) after health education intervention, a warning notice to invite health workers to do hand hygiene in the form of posters, video shows and training handouts related to hand hygiene and routine audits.

These research articles show that the level of compliance of health workers in performing hand hygiene is still lacking. This is due to several factors following each of the articles described above and supported by other studies conducted in Indonesia. The level of compliance of health workers in implementing hand hygiene with five moments is still low. The lack of antiseptic and tissues papers become problems for health workers to properly perform hand hygiene (Ningsih, Noprianty, & Somantri, 2017). In line with this research, Pranita, Mediawati, & Mirwanti (2019) suggest that hand hygiene barriers in applying standard

precautions are because the equipment used can cause skin irritation, limited equipment and strong alcohol odour. In addition, research conducted by Sastry, Deepashree, & Bhat (2017) shows that if the compliance of health workers in performing hand hygiene increases, it will have a significant effect on reducing the rate of infection related to treatment. This is also supported by the Ministry of Health (2011), that doing hand hygiene is a step to prevent infection related to the simplest and cheapest treatment. However, health workers' compliance with the implementation of hand hygiene properly is still far from optimal or ideal.

The implementation of proper hand hygiene with five moments is still not carried out well, as in the research of Sastry, Deepashree, & Bhat (2017) which shows that hand hygiene compliance at the third moment (after being exposed to the patient's body fluids) and the fourth moment (after contact with the patient)) much higher than other moments. This is in line with the research conducted by Mahfouz et al., (2013) that health workers will be more obedient to practice hand hygiene after contact with patients, while before contact with patients is most often not done. The application of compliance with health workers in performing hand hygiene will be more optimal if carried out according to the established indicators, namely five steps. As stated by WHO (2009), that the concept of hand hygiene with five moments as evidence-based to prevent the spread of HAIs must be carried out accordingly, namely before contact with patients (moment 1), before aseptic action (moment 2), after exposure to the patient's body fluids (moment 3), after contact with the patient (moment 4), and after contact with the patient's environment (moment 5). Two of the five moments for hand hygiene are "before contact" to prevent the risk of microbial transmission to the patient. Meanwhile, the other three moments are "after contact" to prevent the risk of microbial transmission to health workers in providing care and the patient's environment. In addition, there are two hand hygiene techniques, namely 1) washing hands with water and detergent or soap, with or without antiseptic, and 2) rubbing hands with an alcohol-based solution (World Health

Organization, 2009).

Based on the review of the ten research articles above, some recommendations can be made to improve health workers' compliance in hand hygiene supported by the hospital. For instances, the existence of role models, audits, adequate infrastructure (presence of alcohol-based and easily accessible soap or antiseptic, the availability of towels or tissue, and the availability of posters, stickers and videos as reminders for health workers to carry out hand hygiene), education and repeated training. Based on the review of these ten articles, some of these things can improve health worker compliance. In addition, awareness of health workers is needed to perform hand hygiene according to predetermined indicators.

CONCLUSION

The level of compliance of health workers in performing hand hygiene is still lacking. However, it can increase when given interventions. This is based on the results of studies conducted in research at several hospitals globally, namely North West Ethiopia, Turkey, the Netherlands, Austria, Kuwait, Turkey, Saudi Arabia, and South India, Ethiopia, and Egypt. Apart from this, several studies conducted also did not describe the facilities' capacity to support health workers in performing hand hygiene in hospitals. Another thing obtained from several studies is that health workers will be more obedient to practice hand hygiene after contact with patients and before contact with patients is most often not done because they feel they do not take actions that cause dirty hands. The findings in this article also suggest the need for support from hospital institutions, because the better support from hospitals, such as role models, audits, adequate infrastructure, education and training, can increase health worker compliance in performing hand hygiene.

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