

Review

Compliance with “Five Moments For Hand Hygiene” in Reducing the Incidence of Healthcare Associates Infections (HAIs): A Systematic Review

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ABSTRACT

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Background: Hand hygiene is essential in breaking the transmission chain of infections. Scientifically, it has been proven to prevent and reduce the spread of harmful microorganisms, thereby decreasing the incidence of Healthcare-Associated Infections (HAIs). The purpose of this study is to find out if compliance with hand hygiene within five moments can reduce the number of healthcare associates' infections.

Methods: This research method uses a literature review using the PRISMA technique. Data was obtained from journals, including PubMed, Clinical Key, Science Direct, and Google Scholar, from 2020-2024, based on the results of the identification based on inclusion criteria. A feasibility review was obtained, and twenty articles were received for review

Results: Compliance with hand hygiene within five seconds can reduce the number of HAIs specifically.


Conclusion: Compliance with the Five Moments for hand hygiene is a simple and effective way to reduce the rate of Healthcare-Associated Infections (HAIS) in hospitals

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
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Introduction

Hand hygiene, with the practice of washing hands, is currently essential in order to break the chain of disease transmission, and it has been scientifically proven to prevent and reduce the transfer of germs. Proper hand hygiene practices

are one of the most important, simple, and inexpensive things that can reduce the prevalence of HAIs and the spread of antimicrobial resistance. Hand hygiene is one of the efforts to eliminate microorganisms and temporary dirt with various techniques, such as using running

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water and soap or hand sanitizers. Hand hygiene is the act of cleaning hands using alcohol-based hand rubs on the surface of the hands or washing hands using water and soap or soap solutions, either non-antimicrobial or antimicrobial. With clean hands, we do not take part in the spread of germs ([Harun et al., 2023](#)).

The importance of hand hygiene was first emphasized in the 19th century. In 2009, the World Health Organization (WHO) introduced the Global Patient Safety Challenge with the initiative "Clean Care is Safe Care." This initiative aimed to develop an innovative strategy for implementing hand hygiene among healthcare workers, highlighting the "Five Moments for Hand Hygiene." These five moments represent key instances when healthcare workers should perform hand hygiene: before patient contact, before performing aseptic procedures, after exposure to potentially infectious body fluids, after patient contact, and after touching the patient's surroundings. This hand hygiene guideline and the associated assessments serve as a global framework for healthcare providers to enhance infection control practices ([Goh et al., 2023](#)).

The guidelines provided by the World Health Organization (WHO) on hand hygiene form the foundation for healthcare providers to assess healthcare workers' compliance in implementing hand hygiene practices. This is crucial in reducing or minimizing the occurrence of Healthcare-Associated Infections (HAIs). A survey conducted across 183 hospitals in the United States involving 11,282 patients found that 4% of patients were infected with at least one type of HAI. In high-income countries, approximately

30% of ICU patients are affected by at least one HAI. In Asian countries, the incidence of nosocomial infections is around 10%, while in developing countries, including Indonesia, the prevalence of HAIs stands at 9.1%, with a range of 6.1% to 16%. According to the Ministry of Health data, the rate of HAI infections in Indonesia is 15.74%, significantly higher than the rates observed in developed countries, which range from 4% to 8%-15.5%. The average prevalence of nosocomial infections in Indonesia is approximately 9.1%, varying between 6.1% and 16% ([Wiharto et al., 2023](#)).

One of the ways to prevent HAIs is hand hygiene. Permenkes number 27 of 2017 establishes 11 standard precautions for infection control and prevention, one of which is hand hygiene. Some of the results of previous studies were obtained. This case study found that 68.7% of nurses did not apply hand washing before contact with patients, 75% did not use hand washing before aseptic measures, and 75% applied hand washing after contact with the patient's environment. Meanwhile, in the other 2 moments, the implementation of hand hygiene has been above 90%. The study's results were obtained first before contact with the patient; 56.7% of nurses were not carried out, and 43.3% were carried out. In the second moment before the action was taken, 56.7% of nurses were not carried out, and 43.3% were implemented. In the third moment, after being exposed to the patient's body fluids, 100% of the nurses were carried out. At the fourth moment after contact with the patient, all 100% of the nurses were implemented. In the fifth moment after contact with the patient's



environment, all nurses were 100% nurses ([Amin et al., 2024](#)).

From the data obtained, researchers are interested in conducting a systematic review of compliance with the "five moments for hand hygiene" to reduce the number of healthcare-associated infections (HAIs). This study aims to find out if compliance with hand hygiene within five moments can reduce the number of healthcare-associated infections.

Methods

Eligibility Criteria

All journals are in English and Indonesian, with inclusion criteria: 1) Journals published in 2020-2024. 2) Open access. 3) Five moments for hand hygiene are carried out by officers who are in contact with patients; 4. Healthcare Associates Infections (HAIs). Exclusion criteria: Patients and their families carry out hand hygiene, and officers do not contact the patient. 2. Illness suffered from the beginning of hospitalization.

Information Sources & Search Strategy

Data was obtained from journals, including PubMed, Clinical Key, Science Direct, and Google Scholar, from 2020-2024, based on the identification results based on inclusion criteria. A feasibility review was obtained, and twenty articles were received for review.

SELECTION PROCESS

In searches related to the research title, 3,309 journals were found. Then, the election was carried out in 3,294 journals. Then, the journals were sorted based on titles into 1,774 journal articles based on the last four years, experimental method tests with Randomized Controlled Trial Design (RCT). in English, full text, open access so that 274 were obtained and then 82 journals were issued into 192 journals after reading thoroughly, 10 articles were accepted for review. The process and results of article selection are presented in a PRISMA diagram. This study uses a systematic review, and the technique used is PRISMA.

Results

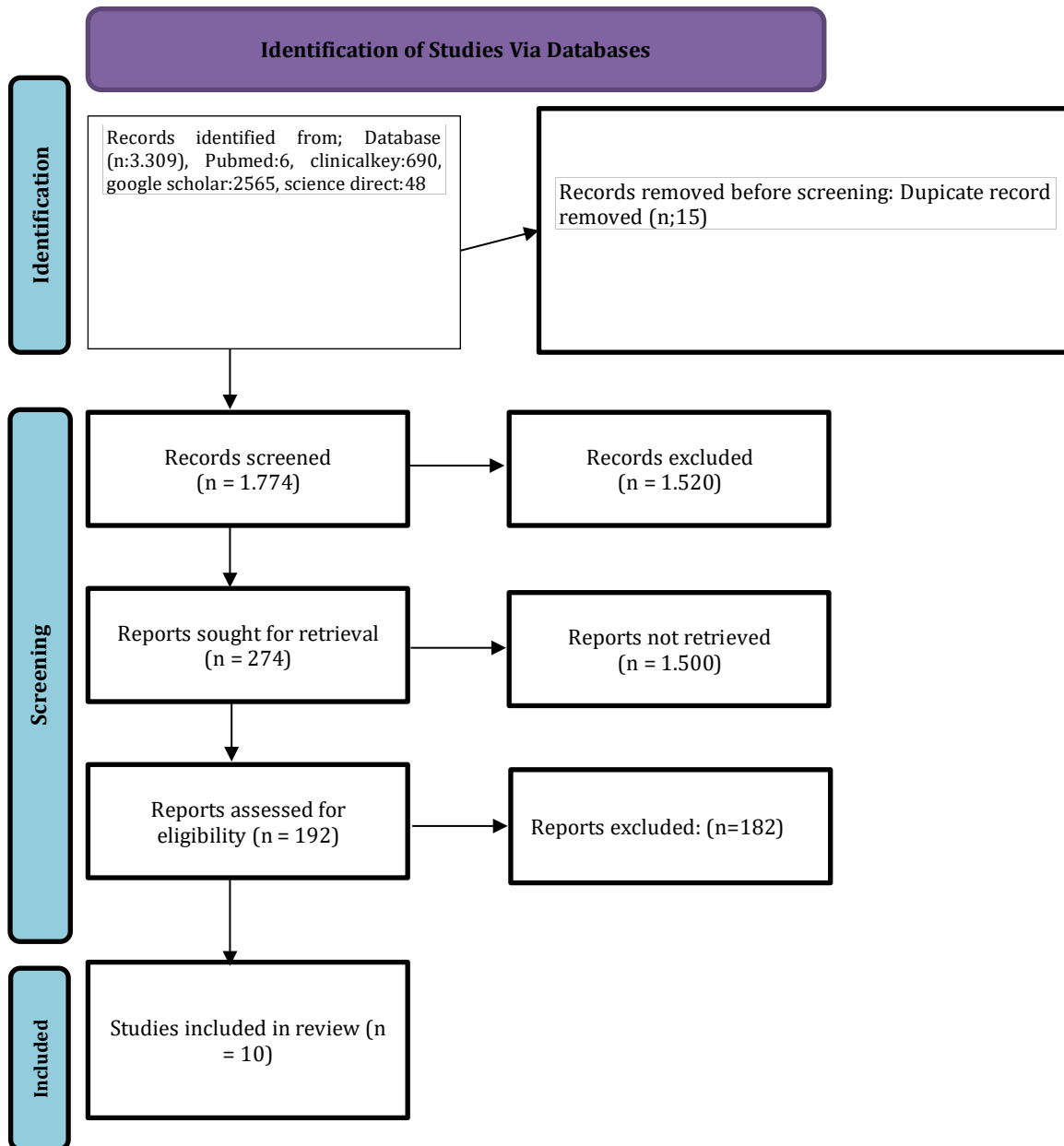


Figure 1. Flowchart PRISMA

Table 1. Characteristic of study

No	Title, Author, Year of Publication	Patient/Population of interest (P)	Intervention or Interest (I)	Comparison Intervention (C)	Outcomes (O)	Type of Questionor Study (T)
1	Hubungan Kepatuhan CuciTangan Enam Langkah Lima Momen Dengan Kejadian Infeksi Nosokomial di Ruang MawarRSUD DR.H.SoewondoKendal (Windyastuti et al., 2020)	30 teams of health workers, namely nurses and midwives with total sampling techniques.	Knowing the relationship six-step and five-second handwashing compliance with The incidence of nosocomial infections in Dr. H's rose room. Soewondo Kendal.	Results of statistical tests using the chi-square test ($\alpha = 0.05$). In the Mawar room of Dr. Soewondo Kendal is 0.675, (p value = 0.000).	There is a strong relationship between Sixth and fifth steps of hand washing with the incidence of infection nosocomial by 0.675 (P value = 0.000).	Quantitative with Using the Prospective Design of the Instrument research Using observation sheet. Data analysis Using the Chi-Square Test
2	Impact of direct hand hygiene observations and feedback on Hand hygiene compliance among nurses and doctors in medical and surgical wards: An Eight-year Observational study (Ojanperä et al., 2022)	HH monitoring included 24,614 observations among nurses and 6396 observations among doctors	To determinewhether observation andfeedback influences HHC among nurses and doctors in surgical and medical wards, and whether these actions impact HAIincidence.	In medical wards, hand hygiene compliance (HHC) increased by 10.8%, from 86.2% to 95.5%, while the incidence of healthcare-associated infections (HAIs) decreased from 15.9 to 13.5 per 1000 patient-days (P < 0.0001). In surgical wards, HHC rose by 32.7%, from 67.6% to 89.7%, and HAI incidence decreased from 13.7 to 12.0 per 1000 patient days (P < 0.0001). HHC improved significantly among nurses (17.8%) and doctors (65.8%). Nurses demonstrated higher compliance compared to doctors, with odds ratios (OR) in medical wards of 3.36 (95% CI: 2.90–3.90; P < 0.001) and in surgical wards of 9.85 (95% CI: 8.97–10.8; P < 0.001).	Direct observations and feedback on hand hygiene (HH) significantly increased hand hygiene compliance (HHC) among nurses and doctors over eight years. During this same period, there was a notable decrease in the incidence of Healthcare-Associated Infections (HAIs) in medical and surgical wards.	In this longitudinal observational study, hand hygiene compliance (HHC) and the incidence of Healthcare-Associated Infections (HAIs) were monitored across six medical and seven surgical wards in a tertiary hospital in Finland from May 2013 to December 2020. Data on the five hand hygiene (HH) moments were collected from the hospital's HH and HAI monitoring registries. Multivariable logistic regression and Poisson regression models were employed for statistical analysis.
3	Description Of Implementation Of Five-Moment Hand Washing In General Hospital Of District	The number of samples is 65 people, and the technique of	This research aims to know the description of the implementation of five moments of hand washing	The result of the study shows that the implementation of five moments of hand washing	It is expected that nurses should further enhance their awareness of the five moments of hand washing because it is one of the	The type of this research is descriptive; the analysis using univariate research method using observation



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	Ciamis (Lismayanti et al., 2023)	sampling using proportional random sampling	nurses at Inpatient room RSUD Ciamis	before contact with the patient is the disobedient category as many as 43 respondents and obedient category as many as 22 respondents before performing clean procedure/sterile obedient category as much 41 respondents and the disobedient category were 24 respondents, after the patient's body fluid, was submissive category as many as 51 respondents and non-compliant category, as many as 14 respondents, after contact With obedient patients, as many as 47 respondents and disobedience category as many as 18 respondents, and after contact with the patient, the patient compliance category, as many as 47 respondents and noncompliance category, as many as 18 respondents.	safety elements of the nurse itself and the patient's safety	
4	Penerapan 5 Momen Cuci Tangan Di Ruang Rawat Inap : Suatu Studi Kasus (Annur et al., 2022)	The population in this study is 26 room nurse Ruadah 3 with a sample of 16 nurses	This study aims to see the application of 5 moments of hand washing in the raudah room 3 RSUD dr. Zainoel Abidin	The results of this case study found that 68.7% of nurses do not apply hand washing before contact with patients, 75% of nurses do not apply washing hands before aseptic measures, and 75% of nurses implement hand washing after contact with the patient environment. Meanwhile, in the other 2 moments, the implementation of hand hygiene has been above 90%.	It is hoped that the hospital can provide continuous training on the 5 washing moments hand to increase nurses' compliance in carrying out the 5 moments of hand washing.	Sampling by incidental sampling method. Tool Data collection in the form of observation sheets



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5	Compliance In The Implementation Of Hand Hygiene Activities By Nurses At Siti Khodijah Muhammadiyah Hospital, Sepanjang Branch-Sidoarjo (Agustinarsih & Wijaya, 2023)	Nurses are health workers who care for patients 24 hours a day IN Siti Khotidjah Hospital, Sidoarjo.	to analyze the level of compliance with the implementation of hand hygiene activities by nurses in several inpatients service units	Aseptic procedures were performed by 94% of participants, marking the highest achievement among all hand hygiene moments. However, the lowest compliance was observed before patient contact, with only 87% adherence. There are still seven steps that did not reach 100% compliance: (1) rubbing the back and between the fingers, (2) rubbing the palms and between the fingers, (3) interlocking fingers, (4) rubbing thumbs in circles, (5) rubbing fingertips in circles on the palm, (6) using a towel to turn off the tap, and (7) completing all procedures within 40-60 seconds. The remaining handwashing steps achieved 100% compliance.	The findings of this research can serve as a foundation for developing interventions aimed at improving and sustaining compliance with hand hygiene practices. These interventions may include training programs, enhanced supervision, and improvements in healthcare facilities to support proper hand hygiene implementation.	This study employed a quantitative descriptive approach involving a sample of nurses from various inpatient units. Data was collected through direct observation of hand hygiene practices related to the five moments and a questionnaire assessing compliance with hand hygiene procedures. The results revealed that the compliance level for the five moments of hand hygiene among inpatient unit nurses was 94% for the moment before performing aseptic procedures, with nearly all service units achieving a high level of adherence.
6	Assessment of Hand Hygiene Compliance among Health Care Workers at selected Govt Hospital of Kashmir (Amin et al., 2024)	Out of a total of 244 opportunities of nurses	This study evaluated compliance with hand hygiene practices among healthcare workers at GMC Anantnag and its associated hospitals.	The sampling technique used in this study was non-probability convenience sampling. Of 244 nursing opportunities, 181 (74%) demonstrated non-compliance with hand hygiene practices, while 63 (26%) adhered to proper hand hygiene. Among 59 opportunities for doctors, 29 (49%) exhibited non-compliance, and 30 (51%) followed the recommended hand hygiene practices. Of nursing aides, out of 10 opportunities, 9 (90%) did not follow hand hygiene protocols, and 1 (10%) did. According to WHO guidelines, the observed	This study evaluated hand hygiene compliance among healthcare workers (HCWs) at GMC Anantnag. The overall percentages of hand hygiene actions performed were as follows: 78 (25%) for hand rub (HR), 16 (5%) for hand washing (HW), 175 (56%) for glove usage, and 44 (14%) missed opportunities. The results indicate that HCWs at GMC Anantnag demonstrated minimal adherence to optimal hand hygiene practices. This low level of compliance is primarily attributed to the lack of resources for hand hygiene at patient bedsides, which hinders the consistent practice of proper hand hygiene.	A cross-sectional observational study was conducted among healthcare workers (HCWs), during which 313 opportunities for hand hygiene were observed using the WHO tool based on the "5 Moments for Hand Hygiene" guidelines.



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				hand hygiene compliance among healthcare workers was only 30%. Nurses had an adherence rate of 26%, doctors 51%, and nursing aides just 10%. The findings indicate low adherence to proper hygiene practices, with a general compliance rate of 30%. This highlights the urgent need to implement effective infection control strategies at GMC Anantnag and its associated hospitals.		
7	Overview Of A Nurse In Implementing 5 Moments Of Hand Washing In The Prevention Of Nosocomial Infection (Aeni et al., 2024)	The sample in this study consisted of 31 nurses from the Bougenville ward on the first and second floors of RSUD, Dr. H. Soewondo Kendal.	This research aims to describe implementing the five moments of hand hygiene by nurses in the Bougenville ward at RSUD, Dr. H. Soewondo Kendal.	The research results on implementing the five moments of hand hygiene showed that most respondents consistently wash their hands before patient contact, with 23 nurses (74.2%) practicing this. Additionally, 29 nurses (93.5%) always wash their hands before performing aseptic procedures, after exposure to body fluids, after patient contact, and after contact with the patient's environment.	Behaviors aimed at preventing disease transmission from person to person or equipment to individuals can be achieved by creating a barrier between microorganisms and the person (patient or healthcare worker). One of the most effective barriers is hand hygiene, specifically through handwashing. There are five critical moments when healthcare workers must perform hand hygiene to ensure infection control.	The study employed a total sampling technique, where all eligible participants were included. The data collection instruments consisted of questionnaires and observational methods. The questionnaire utilized the standardized SPO KARS 2017. Univariate analysis was applied to analyze the research data.
8	Relationship between Level of Knowledge and 5 moment Hand Hygiene Practice among Assistant Healthcare in Malaysia Teaching Hospital (Wan Ahmad et al., 2024)	After determining the required sample size, 154 healthcare assistants were selected using a random number generator.	This study aims to evaluate the relationship between the level of knowledge and the practice of the five moments of hand hygiene among healthcare assistants in a teaching hospital in Malaysia.	The Knowledge, Attitude, and Practice on Hand Hygiene questionnaire used in this study was adapted from WHO publications. The ANOVA results revealed a significant effect of knowledge on the practice level ($F(1, 152) = 3.416, p = 0.006$). Specifically, for each unit increase in the level of knowledge, the level of practice increased by 57.725 units ($\beta = 57.725, p = 0.006$).	These findings highlight the importance of implementing targeted interventions and training programs to address the gap between knowledge and practice and improve hand hygiene compliance in healthcare settings.	A cross-sectional research methodology was employed to assess the knowledge and hand hygiene practices related to the five moments of hand hygiene within the studied population. The study focused on healthcare assistants working at a teaching hospital in Malaysia. The sample consisted of 154 healthcare assistants selected from various departments and units where



No	Title, Author, Year of Publication	Patient/Population of interest (P)	Intervention or Interest (I)	Comparison Intervention (C)	Outcomes (O)	Type of Question or Study (T)
9	The effect of a hand hygiene intervention on infections in residents of nursing homes: a cluster randomized controlled trial 000(Teesing et al., 2021)	This study is part of a cluster randomized controlled trial (RCT) in 33 nursing homes to improve hand hygiene (HANDSOME)	We investigated whether a nursing home's involvement in a hand hygiene intervention reduced healthcare-associated infections (HAIs) among residents compared to nursing homes that did not implement the hand hygiene intervention.	The intervention arm showed a statistically significant increase in gastroenteritis cases ($p < 0.001$) and a statistically significant decrease in influenza-like illness cases ($p < 0.01$) when compared to the control arm. However, there were no statistically significant differences in the incidence of pneumonia, urinary tract infections, and MRSA infections between the intervention and control arms. A sensitivity analysis revealed that gastroenteritis was no longer statistically significantly higher in the intervention arm ($p = 0.92$).	Similar to other studies, we could not conclusively demonstrate the effectiveness of a hand hygiene intervention in reducing healthcare-associated infections (HAIs) among nursing home residents. This was despite the use of well-defined outcome measures, a standardized reporting instrument, and direct observation of hand hygiene practices in a multicenter cluster randomized controlled trial (RCT).	they were actively involved in patient care. This study is part of a cluster randomized controlled trial (RCT) conducted across 33 nursing homes to improve hand hygiene (HANDSOME). The study tracked the incidence of five illnesses over 13 months: gastroenteritis, influenza-like illness, pneumonia, urinary tract infections, and infections caused by methicillin-resistant Staphylococcus aureus (MRSA). Incidence rates for each study arm were reported for three periods: baseline (October–December 2016) and two follow-up periods (January–April 2017 and May–October 2017). Healthcare-associated infection (HAI) rates were compared using a Poisson multilevel analysis, which adjusted for baseline differences (including initial infection incidence and nursing home size), clustering of observations within nursing homes, and study period.
10	Effectiveness of a hand hygiene training intervention in improving knowledge and compliance rate among healthcare workers in a respiratory disease hospital (Chakma et al., 2024)	Using knowledge and staff compliance within a respiratory disease hospital. Method: A pre-and post-training study was conducted among the healthcare workers in a respiratory disease treatment facility.	This study aimed to assess the effectiveness of a hand hygiene (HH) training intervention in improving staff knowledge and compliance within a respiratory disease hospital.	The intervention significantly improved the participants' hand hygiene (HH) knowledge and compliance. Specifically, the compliance rate for HH protocols rose from 66.0% to 88.3% between the pre-and post-training periods, while the mean knowledge score increased from 68.6% to 78.9%.	The knowledge score increased from 68.6% to 78.9%. Conclusion: This study highlights the significant impact of training and education on enhancing hand hygiene (HH) compliance and knowledge among healthcare workers. The findings suggest that healthcare facilities should regularly incorporate such interventions into their infection control programs, ultimately	A pre-and post-training study was conducted among healthcare workers at a respiratory disease treatment facility. The intervention consisted of a series of 3-hour training sessions held over five days, focusing on the World Health Organization's (WHO) guideline, "Your Five Moments For Hand Hygiene." These



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					improving patient and healthcare workers' safety.	sessions emphasized proper hand hygiene techniques and highlighted the consequences of inadequate compliance. Educational materials related to hand hygiene were prominently displayed throughout the facility. Knowledge levels and compliance rates were assessed before and after the intervention.



Discussion

Healthcare-associated infections (HAIs) are infections that patients acquire while receiving medical care in healthcare settings. These infections pose a significant challenge, contributing to increased morbidity, mortality, and healthcare costs. A key strategy to reduce HAIs is ensuring compliance with hand hygiene protocols, particularly those outlined in the World Health Organization's (WHO) "Five Moments for Hand Hygiene." Adhering to these protocols is crucial in preventing the transmission of infectious agents within healthcare environments. ([Lismayanti et al., 2023](#)).

WHO developed the Five Moments for Hand Hygiene strategy to prevent the transmission of pathogens in health facilities. The five moments are Before contact with the patient, Before aseptic treatment, After exposure to the patient's body fluids, After contact with the patient, and After contact with the patient's environment. Adherence to hand hygiene is scientifically proven to reduce the spread of pathogenic microorganisms, which are the leading cause of HAIs. Studies show that consistent handwashing practices can Lower the risk of multidrug-resistant bacterial infections such as MRSA, Reduce rates of bloodstream infections and catheter-related urinary tract infections, and Reduce the incidence of ventilator-associated pneumonia ([Teasing et al., 2021](#)).

Factors Influencing Compliance:
Individual Factors: The level of awareness of health workers to the risk of HAIs, habits or behaviors that have been internalized, and high workload.
Organizational Factors: Availability of hand hygiene facilities such as soap, clean water, and alcohol-based hand rubs; Support from management, such as continuous supervision and training.

Environmental Factors: Workspace design that supports quick access to hand hygiene facilities and patient safety culture in health facilities. Strategies to improve compliance include education and training, audit and feedback, strengthening patient safety culture, and using technology. Various studies support a direct relationship between improved hand hygiene compliance and decreased HAIs rates. Studies in large hospitals show that increasing compliance from 40% to 80% has reduced HAIs by 40%. The Five Moments protocol consistently decreases *lostridioides difficile* infections and other nosocomial infections ([Ojanperä et al., 2022](#)).

Adhering to the Five Moments for Hand Hygiene is a straightforward yet highly effective intervention in reducing the incidence of healthcare-associated infections (HAIs). A comprehensive approach involving education, organizational support, and technological tools is required to implement this strategy and improve compliance. By fostering a collaborative commitment across all levels of the healthcare setting, this practice not only safeguards patients but also protects healthcare workers and the broader community from the spread of infections.

Conclusion

Compliance with hand hygiene, mainly when performed within five seconds, can significantly reduce the incidence of healthcare-associated infections (HAIs). Adhering to proper hand hygiene protocols ensures the removal of harmful pathogens, preventing their transmission within healthcare settings. This brief yet effective practice is crucial in infection control, improving patient safety, and reducing healthcare-related complications. Future research should investigate the optimal duration and techniques for hand hygiene, exploring their effectiveness in reducing

healthcare-associated infections (HAIs) across different healthcare settings and patient populations.

Authors Contributions

The authors' contributions to this literature review are comprehensive and synergistic: one author conducted an exhaustive literature search, identified seminal works, and developed an extensive database of sources; another author critically analyzed the literature, synthesized key findings, and contextualized them within the study's theoretical framework; while a third author meticulously organized the manuscript, integrated diverse perspectives, and ensured logical flow and coherence throughout the narrative.

Conflicts of Interest

There is no conflict of interest.

Acknowledgment

Thank you to the various people who helped complete this systematic review.

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