



Dynamics of Hand Hygiene Compliance Among Nurses: A Comprehensive Analysis Through Systematic Literature Review

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ABSTRACT

This article examines the dynamics of nurse compliance with hand hygiene practices, a critical public health topic in preventing the spread of infectious diseases in healthcare settings. Systematic Literature Review (SLR) methodology was employed, drawing from peer-reviewed articles, conference papers, and relevant studies indexed in databases like Scopus, Web of Science, and Google Scholar. The review highlights significant variability in hand hygiene practices among nurses and identifies key influencing factors such as knowledge, availability of facilities, and the social environment within hospitals. The findings underscore the importance of a multifaceted approach, integrating educational initiatives from an early age and robust hospital policies to enhance compliance rates. Through a comprehensive theoretical review and empirical analysis, this research contributes to understanding the complexities behind simple practices like hand washing and proposes strategic interventions for improving nurse compliance in healthcare settings.

INTRODUCTION

Nurses' compliance with hand washing behavior (hand hygiene) has become an important topic in public health, especially in efforts to prevent the spread of infectious diseases in health facilities. Washing hands with soap is recognized as one of the simplest but most effective measures in reducing the risk of nosocomial infections. However, although the importance of handwashing practices has been widely recognized, there are still challenges in increasing nurses' compliance in carrying out this action.

Various studies conducted in various parts of the world have shown that increasing compliance with hand washing practices can significantly reduce the incidence of nosocomial infections (WHO, 2009; Radya Irshadi Caesarino et al., 2019). However, in Indonesia, observations of handwashing behavior in various settings show significant variations in the implementation of this practice. Research shows that education about hand washing is often not considered a priority, even though introducing hand washing education from an early age can form lifelong habits that contribute to reducing the spread of disease (Grace Tedy Tulak et al., 2020).

A study by Anugrahwati and Hakim (2019) at Hermina Jatinegara Hospital identified several factors that influence nurses' compliance with hand hygiene, including knowledge, availability of facilities, and the social environment of the hospital. The complexity of the issues behind seemingly simple practices such as hand washing is becoming increasingly clear. This suggests that a multi-faceted approach is needed to increase nurses' compliance with handwashing behavior.

Not only in the health sector, education and simulations about hand washing have been proven to increase compliance and reduce the incidence of disease among students (Tulak et al., 2020). Implementing handwashing programs in schools in Indonesia remains a challenge, even though there is evidence to support its effectiveness in preventing disease transmission.

The COVID-19 pandemic has changed public perceptions of personal hygiene, especially hand washing. Health policies implemented during the pandemic have increased awareness of the importance of hand hygiene as the main means of preventing the spread of the virus. This shows that with sufficient motivation and information, changes in people's behavior towards hand washing practices can be improved dramatically.

In increasing nurses' compliance with hand washing behavior, several approaches can be considered. First, comprehensive education and training about the importance of hand hygiene and the correct technique for implementing it needs to be carried out routinely in hospitals. In addition, effective personnel management is also important to ensure that health workers have sufficient time and resources to implement good handwashing practices.

Strict internal monitoring and controls are also required to ensure compliance with handwashing practices. Technology can be used to provide real-time reminders and monitoring of hand washing compliance. Apart from that, establishing an organizational culture that supports hand washing practices is also important. Positive support from colleagues and superiors as

well as promotion of the importance of hand hygiene compliance can help create a supportive environment.

In addition, approaches based on behavior change theory can also be applied to increase hand washing compliance. Implementation of behavior change theories, such as reasoned action and planned behavior, can help design more effective interventions. This approach takes into account psychological and social factors that influence handwashing behavior.

By combining all of these approaches in an integrated strategy, it is hoped that a significant increase in nurses' compliance with handwashing practices can be achieved. This will contribute to reducing the risk of nosocomial infections and improving patient safety in hospitals. Thus, ensuring nurses' compliance with hand washing behavior is crucial in improving the quality of health services and overall patient safety.

THEORETICAL REVIEW

The theoretical review for this dissertation focuses on nurses' compliance with handwashing behavior, combining the concepts of behavioral theory, social influence, and organizational factors. The importance of handwashing as a method of infection control has long been recognized, but compliance with this practice is often less than optimal. Increasing this compliance is a challenge that requires a multifaceted approach, including theoretical influences from multiple disciplines.

1. Behavioral Theory

The Theory of Planned Behavior, developed by Icek Ajzen in 1991, is one of the most influential psychological frameworks for understanding and predicting human behavior in a variety of ways, including health practices such as handwashing. This theory assumes that human behavior is primarily determined by the intention to carry out that behavior. This intention, according to Ajzen, is directly influenced by three main factors: attitude towards the behavior, subjective norms, and perceived behavioral control.

This intention, formed by a combination of attitudes, subjective norms, and perceived behavioral control, plays a critical role in driving actual handwashing behavior. Therefore, interventions designed to improve handwashing compliance need to strategically target and modify these factors. Effective and ongoing education can increase positive attitudes and knowledge about the benefits of handwashing, while improving facilities and resources can strengthen perceived behavioral control. Likewise, creating supportive group norms and reinforcing positive expectations among colleagues and superiors may motivate nurses to better adhere to desired handwashing practices.

2. Social and Organizational Factors

Social and organizational factors play an important role in increasing compliance with hand washing behavior among health workers, especially nurses. Aspects of social support, such as encouragement and assistance from colleagues and superiors, significantly influence motivation and consistency in implementing hand hygiene practices. Research by Gould et al. (2017) found that interventions that incorporated elements of social support, such as positive

feedback and recognition of good hand hygiene practices, tended to result in greater increases in compliance compared to interventions that did not involve social aspects. This shows that health workers are more likely to comply with hand washing protocols when there is encouragement from their social environment.

Apart from social support, organizational factors also have a major impact on this compliance. The availability of adequate facilities for hand washing, such as easily accessible sinks, sufficient soap, and hand sanitizer, is essential to enable effective hand hygiene practices. Curtis et al. (2009) underscored the importance of a supportive work environment, emphasizing that clear policies and adequate resources can improve hand hygiene compliance. This supportive work environment not only includes physical infrastructure, but also includes ongoing training that helps medical staff understand the importance and proper techniques of handwashing, as well as updating their knowledge of infection control and patient safety protocols.

Therefore, strategies to improve hand hygiene compliance should include strengthening social support and improving organizational conditions. Increased compliance can be achieved through the development of a collaborative and supportive work culture, where all team members feel responsible for maintaining hand hygiene standards. Interventions designed to improve compliance should also consider increasing access to handwashing facilities and ensuring that hand hygiene policies are consistently adhered to and enforced in every aspect of the hospital or healthcare facility's operations.

3. Cultural and Psychological Impact

Cultural and psychological aspects play an important role in shaping handwashing compliance behavior, especially in health care environments. This behavior is not just a medical or routine action, but also an action that is closely tied to the cultural values and norms that exist in society. Various studies have shown that cultural norms and daily habits significantly influence how and when individuals practice hand hygiene. For example, research conducted by Nalule et al. (2021) in Cambodia reveals how local norms and customs can act as barriers or incentives to handwashing practices. In this case, long-ingrained habits are often stronger than knowledge of good health practices.

When faced with the reality that handwashing practices can vary widely across cultures, it is important to acknowledge and understand the underlying values and beliefs. In many cultures, for example, physical cleanliness may be highly valued, but the methods and timing of its implementation can vary drastically. Factors such as these must be taken into account in designing and implementing hand hygiene interventions. Successful interventions usually address the psychological and social factors that influence individual behavior, including the influence of social norms, group expectations, and level of knowledge and attitudes toward hygiene.

Additionally, culturally sensitive approaches in public health education and awareness campaigns can be more effective if they involve community leaders, use appropriate language, relevant symbols, and respect traditional

practices that may influence hand hygiene. For example, in some communities, washing hands in public may be considered rude or taboo, whereas in others, it may be considered a very important preventive health measure.

By integrating this understanding into intervention programs, policy designers and health practitioners can increase the effectiveness of their efforts to increase adherence to handwashing practices. This emphasizes the importance of a holistic and inclusive approach that does not only focus on technical aspects and infrastructure accessibility, but also pays attention to cultural and psychological aspects that influence behavior in broader social and cultural terms.

4. Health Communication Model

In terms of increasing hand washing compliance among nurses, implementing an effective Health Communication Model is very important. One model that can be used is the Message Reception Model developed by McGuire in 1985. This model emphasizes the importance of various stages in effective communication, which health messages must go through in order to positively influence the behavior of the target audience.

This model starts with the attention stage, where the target audience must first become aware of and focus attention on the message being conveyed. In the case of handwashing, this may mean using a variety of media, such as posters, videos, or interactive presentations, to draw nurses' attention to the importance of hand hygiene practices.

Once attention has been attracted, the next stage is understanding. The message conveyed must be clear and easy to understand. For example, information regarding effective hand washing and its impact on reducing nosocomial infections should be presented in a simple and direct manner. The use of relatable language and relevant examples can be helpful in ensuring that the nurse not only hears but also understands the message.

Reception is the third stage in this model, where the target audience not only understands the message but also accepts and agrees with the content of the message. To achieve this, campaigns should emphasize the personal and professional benefits of adhering to handwashing practices. This may include data about reduced nosocomial infection rates in other facilities that have adopted good handwashing practices or testimonials from colleagues who have seen positive changes.

The final stage is retention, which refers to the audience's ability to remember and retain the message in the long term. Repetition of messages, regular reminders via email or newsletters, and review in regular meetings or training, can play a key role in ensuring that messages remain fresh in nurses' minds.

A comprehensive approach that covers all of these stages—from attention to retention—is necessary for a successful handwashing education campaign. By focusing on each stage in McGuire's Message Acceptance Model, health initiatives are able to increase handwashing compliance, ultimately

contributing to a reduction in nosocomial infections and increased patient safety.

Leadership and Influence

Leadership plays a crucial role in improving compliance with hand hygiene practices in healthcare facilities. An effective leader not only directs his team but also acts as a role model, demonstrating the behavior expected of each team member. This is especially important when it comes to hand hygiene, where nurses and other healthcare workers often observe and imitate the behavior demonstrated by their leaders. Effective leadership in healthcare settings influences handwashing compliance by providing clear guidance, setting high expectations, and consistently demonstrating behavior consistent with recommended hand hygiene guidelines.

According to research conducted by Pittet and Boyce (2002), leadership in the promotion of hand hygiene plays a critical role in ensuring that this practice is made a priority in health services. Effective leaders use a number of strategies to motivate their teams, including providing positive and constructive feedback, recognizing good compliance, and providing incentives that can reinforce desired behavior. They are also very proactive in addressing barriers that may hinder hand hygiene practices, such as accessibility issues to facilities or resources, and work to reduce burnout among staff, which can reduce compliance.

Furthermore, leaders in effective healthcare settings often take steps to integrate hand hygiene into routine policies and protocols, ensuring that this practice is not simply viewed as an additional task, but as an integral part of safe clinical practice. By demonstrating a commitment to hand hygiene and making it part of the organizational culture, leaders can influence the attitudes and behavior of the entire team.

Therefore, strong and effective leadership not only increases hand hygiene compliance through motivation and role modeling, but also by making this practice a strategic and operational priority within the organization. This, in turn, helps build a work environment where patient safety and quality of care are the primary focus, with hand hygiene as one of the key pillars.

METHODOLOGY

This study aims to examine in depth the compliance of nurses in hand hygiene practices using the Systematic Literature Review (SLR) method. This review process was designed to identify, evaluate, and synthesize all published empirical research relevant to the topic of hand hygiene by nurses. A systematic literature search was conducted using leading electronic databases such as Scopus, Web of Science, and Google Scholar to ensure comprehensive literature inclusion. A search strategy was developed using a combination of relevant keywords and phrases, including “nurse compliance,” “hand hygiene,” “hand washing,” as well as variations of related keywords to ensure that all relevant articles were identified. The use of filters such as “peer-reviewed,” “conference papers,” and “relevant studies” allows for the exclusion of inappropriate or low-quality literature, as well as limiting results to only material that has been

evaluated by scientific peers. The article selection process is carried out through several stages. The initial stage involves screening titles and abstracts to assess initial eligibility. Articles considered potential were then downloaded and their full texts were evaluated based on predetermined inclusion and exclusion criteria. These criteria included relevance to hand hygiene compliance by nurses, methodological quality, and geographic and temporal relevance to ensure broad representation of the existing literature.

RESULTS AND DISCUSSION

Based on the results of research conducted by Damanik, et al (2012), it was revealed that the level of nurse compliance in implementing hand hygiene at Immanuel Hospital Bandung was 48.3%. This research shows a significant relationship between length of service, knowledge, and availability of labor and compliance with hand hygiene, where availability of labor is the most dominant factor.

Analysis of this research shows that even though hand washing facilities are available, the compliance rate is still below 50%. This indicates that there are other factors that influence hand hygiene compliance apart from the availability of facilities. The workforce factor becomes very critical, indicating that an insufficient number of nurses can have a negative impact on handwashing compliance because nurses become more burdened and may neglect several important aspects of infection control.

From a theoretical perspective, this research is in line with Pittet's opinion which states that increasing knowledge and easy access to hand washing facilities can increase hand hygiene compliance. However, even though knowledge and access to facilities are improving, without sufficient workforce, these efforts are still not enough to achieve optimal compliance.

From the results of this research, it is very clear that there needs to be an increase in the number of health workers in hospitals to increase hand hygiene compliance. Hospitals need to adopt strategies that not only focus on training and education but also on increasing workforce numbers and structuring work schedules more humanely to ensure that nurses are not overtired or overburdened which could ultimately reduce their compliance with good hand hygiene practices.

Apart from that, there needs to be strengthening of internal hospital policies regarding the importance of hand hygiene, with stricter monitoring and evaluation of hand hygiene practices. The use of technology and systems that can provide real-time reminders and monitoring may be one of the innovations that can be adopted to improve hand hygiene compliance in hospitals.

From research conducted by Setiadi Syarli and colleagues (2023), it was found that there was a significant relationship between the level of knowledge and attitudes of nurses and their compliance in implementing hand washing steps at Lubuk Basung Regional Hospital. These results indicate that nurses with high knowledge about hand hygiene tend to have a better level of compliance compared to those with low knowledge. Apart from that, a positive

attitude towards the importance of hand washing also has a significant effect on hand washing compliance.

From this it can be seen that knowledge and attitudes have an important role in determining nurses' compliance with hand washing protocols. This is in accordance with the theory which states that good knowledge will form a positive attitude, which will then encourage the desired behavior. Adequate knowledge regarding effective ways to prevent the transmission of infections in health facilities is an important basis, but if it is not balanced with a supportive attitude, this knowledge may not be realized in practice.

This research also shows the importance of educating and training nurses not only about the technicalities of hand washing but also the importance of why they should wash their hands according to recommended procedures. This underscores the need for more in-depth educational programs that can instill the importance of hand hygiene and how this practice can protect them and the patients they care for from infection.

From the results of research conducted by Anugrahwati, Ria & Hakim, Nuraini (2019), it was found that the factors age, gender, length of work, knowledge, availability of facilities, rules and the social environment of the hospital had a significant relationship with nurses' compliance in carrying out hand hygiene five moments at the hospital. Hermina Jatinegara. These results demonstrate the importance of the combination of appropriate human resources and adequate infrastructure to ensure effective handwashing practices and reduce the risk of nosocomial infections.

This research underscores the importance of demographic factors such as age and gender in determining compliance with hand hygiene. It was found that older nurses tended to be more compliant, possibly due to more experience and awareness of the risk of infection. This is in accordance with research conducted by the Indonesian Ministry of Health (2009), which shows that more experienced health workers have a higher level of compliance with hand hygiene.

Apart from that, the availability of facilities is also very influential. Nurses are more likely to comply with hand hygiene protocols if hand washing facilities are easily accessible and always available. This is confirmed by a WHO study (2009) which found that increasing access to hand washing facilities increases hand hygiene compliance.

The results of this study strengthen the evidence that hand hygiene compliance is multifaceted and influenced by various factors. By understanding and addressing these factors, RS. Hermina Jatinegara and other health facilities can implement effective strategies to increase hand hygiene compliance, which in turn will improve patient safety and reduce the risk of nosocomial infections.

The results of research conducted by Caesario, R. I., Wahjono, H., & Lestari, E. S. (2019) revealed that the level of compliance of nurses at Hospital This research identified several factors that influence compliance, including nurses' knowledge of the importance of hand washing, training they have received, availability of hand washing facilities, and a conducive work environment.

This research shows that even if all nurses know about the WHO's five handwashing moments, this does not automatically result in high compliance. This emphasizes that knowledge alone may not be enough without other supporting factors such as adequate training and access to good facilities. A study by Pittet and Boyce (2002) supports these findings, showing that training and easy access to handwashing facilities significantly increase compliance.

More than 90% of respondents considered that their work environment was conducive to hand hygiene practices. This reflects that a supportive work environment can play an important role in improving handwashing compliance. Previous research by Larson has shown that coworkers and superiors who adhere to hand hygiene can encourage similar behavior among their peers, creating a strong culture of compliance within the organization.

This research strengthens the evidence that compliance with hand hygiene is the result of a complex interaction between knowledge, training, availability of facilities, and environmental support. By focusing efforts on all of these aspects, Hospital

The results of research conducted by Elsa Octaviani and Ridhwan Fauzi showed that the level of compliance with hand washing according to standards among nurses and midwives at Hermina Galaxy Bekasi Hospital was 32%. Bivariate analysis showed that there was a significant relationship between age and length of service and hand washing compliance at a p value <0.01.

These findings underscore the importance of age and years of service as factors influencing hand washing compliance. More experienced nurses and midwives tended to have higher compliance, which may indicate that awareness of the risk of infection increases with experience. In line with these findings, research by Yassi et al. (2007) also support that older and more experienced healthcare workers tend to have better hand hygiene practices due to a deeper understanding of the clinical consequences of nosocomial infections.

The study also found that adequate supervision and a positive attitude towards hand hygiene are crucial to improving compliance. Although the results did not show a statistically significant relationship between supervision and attitudes and handwashing compliance, the importance of these factors cannot be ignored. This is confirmed by additional research showing that increased supervision and fostering positive attitudes toward hygiene protocols can significantly improve compliance (McGuckin et al., 2001).

This research highlights that although handwashing compliance remains low, there are clear opportunities for improvement through better education, experience and supervision. Understanding and addressing the factors that influence hand washing compliance is key to reducing the risk of nosocomial infections and improving the safety of patients and health workers.

The results of research conducted by Wahyuni, & Kurniawidjaja, L. M. (2022) show that health workers' hand washing compliance during the COVID-19 pandemic is still quite low. This research, which used a systematic review method, found that factors such as knowledge, gender, age and attitude were the variables that most often influenced compliance with hand washing behavior among health workers.

This analysis confirms that knowledge is a crucial factor influencing compliance. Health workers who have better knowledge of risks and correct procedures tend to be more compliant with hand washing practices. These findings are in line with research by Whitby et al. (2006), who also showed that increased education about hand hygiene improved compliance levels. Additionally, demographic factors such as age and gender also play an important role, with older and female health workers showing higher levels of compliance, which may be related to more mature attitudes and deeper understanding of health protocols.

The study also highlights the importance of ongoing training, supervisor support, and the availability of adequate handwashing facilities. Regular training can update and strengthen knowledge and skills, while effective supervisor support and adequate facilities facilitate good hand hygiene practices. These results echo the findings of Allegranzi et al. (2009), who emphasized that supportive infrastructure and active leadership from supervisors are critical to improving hand hygiene compliance in healthcare facilities.

This research shows that improving handwashing compliance during the COVID-19 pandemic requires a multifaceted approach that includes increasing knowledge, institutional support, and infrastructure accessibility. Addressing these factors can strengthen handwashing compliance and significantly reduce infection transmission in healthcare settings.

From the results of research conducted by Nalule, Y., Buxton, H., Ir, P., Leang, S., Macintyre, A., Pors, P., Samol, C., & Dreibelbis, R. (2021), it was found that the level of compliance with hand hygiene among birth attendants in Cambodia is still very low, with only 18% compliance before carrying out delivery procedures and newborn care. Factors that influence hand hygiene practices include habits, glove use norms, perceived risk of infection, as well as environmental and psychological factors (Nalule et al., 2021).

These findings show that improving hand hygiene does not only depend on the availability of facilities or knowledge, but is also strongly influenced by existing habits and norms. Although many health facilities have access to handwashing facilities, habits and norms among health workers often do not support effective handwashing practices. This is in line with research conducted by Gould et al. (2017), who found that interventions that only focused on improving facilities without changing norms and habits were ineffective in increasing hand hygiene compliance.

This study shows that despite progress in infrastructure and access to handwashing facilities, factors such as habits, norms, and unsupportive work environments remain major barriers to improving hand hygiene compliance in health facilities. Therefore, a comprehensive intervention approach focused on overall behavior change is essential.

From the results of research conducted by Hamza Umar and colleagues, it was found that the level of compliance with hand hygiene among nurses working in public hospitals in the Hararghe zone, Oromia, Eastern Ethiopia was 37.4%. Factors related to hand washing compliance include gender, work

experience, hand hygiene training, availability of running water, and knowledge about hand hygiene (Umar et al., 2022).

This study highlights that work experience and hand hygiene training play an important role in improving hand hygiene compliance. Nurses who have work experience between 6-10 years show a higher level of compliance compared to those who have less than 5 years of experience. This shows that ongoing experience and training can strengthen good hand hygiene practices (Umar et al., 2022).

This study shows that hand hygiene compliance among nurses in Hararghe zone hospitals remains low, and there is an urgent need for targeted interventions to improve this practice. Through training, better supervision and improved facilities, it is hoped that hand hygiene compliance among nurses can be increased, thereby minimizing the risk of nosocomial infections.

The results of research conducted by Fergusson et al. shows that the application of behavior change theories, such as the theory of reasoned action and the theory of planned behavior, has succeeded in increasing hand washing compliance among health workers. This study found that handwashing compliance increased from 45% to 78% after implementation of an intervention designed based on these theories. Factors that are significant in influencing this change include attitudes, subjective norms, and perceived behavioral control (Fergusson et al., 2022).

These findings underscore the importance of using theoretical approaches in the design of hand hygiene interventions. According to Ajzen (1991), the theory of planned behavior emphasizes the importance of attitudes, subjective norms, and self-efficacy in forming behavioral intentions, which then influence the behavior itself. This study shows that a deeper understanding of these factors can be used to design more effective interventions aimed at increasing handwashing compliance.

This research shows that the effective application of behavior change theory can increase hand washing compliance among health workers. This approach offers valuable insight into ways to improve hand hygiene interventions that could have a significant impact on the prevention of nosocomial infections.

Research results from articles analyzed by Sandbøl and colleagues (2022) show that compliance with hand hygiene among health workers before and during the COVID-19 pandemic did not increase as hypothesized. Before the pandemic, hand hygiene compliance rates were at an average of 38.7%, and during the pandemic, although there were expectations of an increase due to greater awareness of the risk of infection, there was no significant change. In two of the three departments studied, compliance levels even decreased. This analysis is important because it identifies gaps in practice that should be strengthened during a health crisis such as a pandemic.

From Malawi, research by Nzanga and colleagues (2022) describes a similar situation with low levels of hand hygiene compliance among health workers, resulting in the persistence of nosocomial infections. They found that although there was knowledge and awareness regarding the importance of

hand hygiene, implementation of this practice was ineffective, mainly due to a lack of resources such as water, soap and hand sanitizer. This underscores the importance of adequate infrastructure and resources to support hand hygiene compliance, which is critical in preventing the spread of infections in healthcare facilities.

Both studies, although in different geographic and resource settings, highlight important issues in infection control in health facilities and demonstrate that improving hand hygiene compliance is complex and requires more than simply increasing awareness; there is also a need for improved infrastructure, access to resources, and effective training.

The next analysis focuses on a study conducted at Chiradzulu district hospital in Malawi, which also examined hand hygiene compliance among nurses and clinicians. It was found that there was a large gap between self-reported compliance by health workers and compliance observed during the study. Although many healthcare workers report that they follow recommended hand hygiene protocols, actual observations show much lower levels of compliance. This research reveals that a lack of basic infrastructure, such as the availability of water and soap, as well as a lack of ongoing training, are the main factors influencing this low compliance.

On the other hand, a study taking place in Denmark revealed that despite the installation of automatic hand hygiene monitoring systems in several hospital departments, there was no significant increase in hand hygiene compliance during the COVID-19 pandemic. This is surprising because it was previously hoped that the pandemic would increase awareness and preventive action among health workers. These results indicate that hand hygiene compliance depends not only on technology or infrastructure, but also on psychological and organizational factors that influence healthcare worker behavior.

From the analysis of these two studies, it can be concluded that improving hand hygiene compliance in healthcare settings requires a comprehensive approach. This includes improving access to hygiene facilities, ongoing education and training for health workers, and evidence-based interventions that focus on behavior change. Further research is needed to identify the most effective interventions in a variety of healthcare settings, in both low- and high-income countries, to ensure that hand hygiene practices become a consistent norm and are effective in preventing the spread of infection.

In completing the analysis of the studies already discussed, we can consider another study conducted in Japan that focused on factors influencing hand hygiene compliance among healthcare workers. This study found that apart from infrastructure and training, organizational culture and leadership factors also play an important role in influencing hand hygiene compliance. This shows that to achieve better compliance, there needs to be a comprehensive effort not only at the practical level but also at the policy and organizational culture level.

A study in the United States also revealed the importance of feedback and recognition of good hand hygiene as a motivational factor for health workers. This research shows that a constructive feedback system and a supportive environment can increase hand hygiene compliance in hospitals. This approach can be implemented in conjunction with increased access to resources and training to create sustainable changes in hand hygiene practices.

The conclusion that can be drawn from this series of analyzes is that hand hygiene compliance in healthcare settings is the result of the interaction of many factors, including but not limited to access to resources, training, organizational culture, leadership, and feedback systems. Any intervention strategy must include these components to effectively improve hand hygiene practices among health workers worldwide.

Considering the complexity of this issue, recommendations for best practices in hand hygiene in healthcare settings should be continually updated and adapted based on current evidence, including a comprehensive assessment of the needs, barriers and drivers of compliance in each healthcare setting. Strategies that focus on behavior change, increased resources, and organizational support are key to achieving better outcomes in infection control and disease prevention.

The results of research from Haenen et al. (2022) found that compliance with hand hygiene in long-term care facilities was very low, with an average compliance of only 17%. This compliance varied significantly between wards, ranging from 5 to 38%, and shows considerable differences in compliance between different types of nursing staff. This research also identified several factors that influence hand hygiene compliance, including social and leadership issues, resources, individual health worker factors, and risk perceptions. This study highlights the importance of understanding and addressing specific factors that may influence hand hygiene behavior to improve compliance in long-term care facilities.

Analysis of research conducted by Mathur (2011) provides an in-depth view of the importance of hand hygiene as the most basic but effective infection prevention effort in health facilities. This research highlights how good hand hygiene can significantly reduce the spread of nosocomial infections and antimicrobial resistance. Mathur also emphasized the importance of ongoing education and training for health workers in complying with hand hygiene practices, reflecting the global need to improve hand hygiene compliance through a multimodal approach that includes education, use of appropriate tools, and supportive policies.

Mathur also emphasized the importance of global initiatives such as WHO's hand hygiene campaign which aims to increase awareness and practice of hand hygiene across the world. This study provides indisputable evidence that strict adherence to hand hygiene can reduce the risk of cross-transmission of infection. This is important evidence supporting the implementation of stricter hand hygiene policies and more effective training programs, especially in developing countries where challenges such as lack of resources and training can hinder effective hand hygiene practices.

Overall, Mathur's findings reinforce the importance of hand hygiene and the urgent need to improve compliance in healthcare facilities worldwide. The importance of ongoing education and better monitoring of hand hygiene practices is key to reducing the rate of nosocomial infections and combating the spread of drug-resistant pathogens. These conclusions support the view that comprehensive and sustained interventions are needed to instill good hand hygiene habits among all healthcare workers.

By paying attention to the findings from these various studies, it can be concluded that to increase hand hygiene compliance in health facilities, a comprehensive approach is needed that includes aspects of education, training, management and behavior change. Through coordinated and sustainable efforts, it is hoped that higher levels of compliance can be achieved, which in turn will reduce the risk of nosocomial infections and improve the safety of patients and health workers.

CONCLUSIONS AND RECOMMENDATIONS

1. Factors that Influence Hand Hygiene Compliance

Research shows that several factors, such as knowledge, attitude, length of service, gender, and availability of facilities, play a role in determining the level of compliance with hand hygiene practices. Better knowledge, positive attitudes, and longer work experience tend to be associated with higher levels of compliance

2. The Importance of Education and Training

Adequate training and education about hand hygiene and the importance of this practice in preventing nosocomial infections can increase compliance. Ongoing training and in-depth education programs will help instill awareness of the risk of infection and the importance of hand hygiene practices

3. The Role of the Work Environment

A conducive work environment and support from colleagues and superiors also influence hand hygiene compliance. Adequate supervision, support from colleagues, and an organizational culture that supports hand hygiene practices can increase compliance

4. Managerial Implications

Hospital management needs to pay attention to increasing the number of health workers, organizing humane work schedules, and strengthening internal policies related to hand hygiene. Improved infrastructure, tighter supervision, and the use of technology for reminders and monitoring can help improve compliance.

5. Theoretical Approach

The application of behavior change theories, such as the theory of reasoned action and the theory of planned behavior, can be effective in increasing hand hygiene compliance. This approach offers valuable insights into designing more effective interventions.

Based on the research results that have been presented, there are several recommendations that can be proposed to increase nurses' compliance in hand washing practices:

1. **Improved Education and Training**
Hospitals need to organize comprehensive education and training programs about the importance of hand hygiene and the correct techniques for implementing it. This training must be routine and cover all aspects of handwashing practices that comply with patient safety standards.
2. **Effective Personnel Management**
Hospital management must pay attention to the need for an adequate number of health workers. Humane work schedule arrangements also need to be considered to reduce fatigue and workload which can hinder hand washing compliance.
3. **Strict Internal Supervision and Control**
A strict internal monitoring and control system is needed for hand hygiene practices in hospitals. Technology can be used to provide real-time reminders and monitoring of hand washing compliance.
4. **Establishment of a supportive organizational culture**
It is important for hospitals to create an organizational culture that supports handwashing practices. This includes positive support from colleagues and superiors as well as promotion of the importance of hand hygiene compliance.
5. **Theory-Based Approach to Behavior Change**
Implementation of behavior change theories, such as reasoned action and planned behavior, can help design more effective interventions. This approach takes into account psychological and social factors that influence handwashing behavior

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