The Academic
International Journal of Multidisciplinary Research

An Online Peer Reviewed / Refereed Journal
Volume 4 | Issue 10 | October 2026
ISSN: 2583-973X (Online), SJIF IF(2026): 5.6
Website: www.theacademic.in

Significance of Hand Hygiene in Preventing Infections: A Narrative Review

Manisha P. Joshi

Assistant Professor, Jagannath University, https://orcid.org/0009-0008-4133-0360

DOI : https://doi.org/10.5281/zenodo.24417154

ARTICLE DETAILS

Research Paper

Received: 29-10-2026

Accepted: 04-11-2026

Published: 20-11-2026

Keywords:

hand hygiene; healthcare-associated infections; infection prevention and control; handwashing; healthcare workers

ABSTRACT

Hand hygiene is the most useful technique to stop infections from spreading in healthcare settings, yet it is still carried out without consistency. Healthcare-associated infections (HAIs) increase the length of hospital stays, raise treatment costs, and can cause illness or even death. The hands of healthcare workers are one of the main ways pathogens spread between patients, medical equipment, and hospital surfaces. This review explains the importance of hand hygiene, how pathogens spread through hands, the hand-cleaning practices recommended by international guidelines, and the common problems that prevent healthcare workers from following them regularly. It also discusses ways to improve hand hygiene practices. Evidence from international guidelines, research reviews, and individual studies shows that cleaning hands at the right times during patient care helps prevent the spread of pathogens and infections in hospitals. Alcohol-based hand rub is advised for routine use when hands are not visibly soiled, while soap and water remain necessary in certain situations. Reported compliance, however, is often well below what is needed: about 40% in a large international review and 44% in a recent synthesis of Indian studies. The gaps are linked to heavy workloads, missing or badly placed supplies, limited training and weak monitoring, rather than to a lack of awareness alone. Combining training, convenient access to products, reminders, feedback and visible leadership support offers the best chance

Disclaimer: The opinions, interpretations, conclusions, recommendations, analyses, and statements expressed in this research article are solely those of the author(s) and do not reflect the views, policies, or positions of the Publisher, Chief Editor, Editors, Editorial Board, Reviewers, or their affiliated institutions. The author(s) are solely responsible for ensuring the originality, authenticity, and integrity of the manuscript and for ensuring that it is free from plagiarism, AI-generated content, copyright infringement, data falsification, and any other form of academic misconduct.

of lasting improvement. Hand hygiene should be treated as a core element of patient safety and not as a matter of individual diligence.

1. Introduction

Healthcare-associated infections (HAIs) are infections that patients acquire during their stay in a hospital or while receiving medical care or medical treatment. These infections were absent, or developing, at the time of admission in hospital [1]. These infections are a major concern for healthcare systems globally, but low- and middle-income countries are affected more severely than high-income countries.

[4]. For patients, these infections can lead to longer hospital stays, extra treatment and health problems that could have been prevented. For hospitals, they increase treatment costs and the risk of spreading pathogens that are resistant to antibiotics [5]. Hands are one of the main ways germs spread in healthcare settings. During a single shift, healthcare workers come into contact with many things, including patients, their beds, personal belongings, medical equipment, body fluids and different surfaces. If they do not clean their hands properly between these activities, pathogens can easily spread from one patient or surface to another [12]. Hand hygiene means cleaning hands with soap and water or using an alcohol-based hand rub to remove or kill germs or pathogens. According to WHO (2009), hand hygiene is one of the most important ways to prevent and control infections. Although the process is simple, healthcare workers do not always follow it at the right time. Some common reasons include heavy workloads, lack of proper handwashing facilities or supplies, limited knowledge and poor monitoring of hand hygiene practices [3]. This review discusses the importance of hand hygiene in preventing infections and the different ways to improve hand-cleaning practices in healthcare settings. It also focuses on how well healthcare workers follow hand hygiene practices in India, where recent research data are available [6].

2. Review Methodology

This is a narrative literature review. The search was done with the help of peer-reviewed publications and established infection prevention guidelines, namely the WHO guidelines on hand hygiene in health care (WHO, 2009), the guideline of the Healthcare Infection Control Practices Advisory Committee (Boyce & Pittet, 2002) and the guideline of the Association for Professionals in Infection Control and Epidemiology (Larson, 1995). Clinical studies, systematic reviews and meta-analyses were considered alongside these documents, with attention to the link between hand hygiene practice and infection prevention in hospitals and other healthcare facilities. The paper is a narrative review. This review is not a registered systematic

review and does not include any new research findings. No patient information was collected, and no statistical tests were performed. Therefore, ethical approval was not needed for this review.

3. Role of Hands in the Transmission of Infection

During routine care, healthcare workers' hands can contaminate with microorganisms from many sources, such as various body fluids like urine, blood, and sputum etc., intact skin, wound dressings, contaminated instruments, linen, and the surfaces around a patient. These organisms may then be travel to another patient or to a vulnerable body site such as a wound or an intravenous line [12].

Pittet et al. (2006) described this process as a sequence of five steps:

1. Microorganisms are present as flora or from environment on the patient's skin, in body fluids or on contaminated surroundings.
2. The healthcare worker's hands become contaminated through direct or indirect contact.
3. The microorganisms survive for a period on the hands.
4. Hand hygiene is missed or inadequate, so the organisms remain on the hands.
5. Contact with another patient, a medical device or an environmental surface transfers the organisms from one person to another.

Seen this way, hand hygiene is the step that can break the chain of infection. Hands of healthcare workers are identified as a major vehicle for the transmission of healthcare-associated pathogens, which is why cleaning them at the right moment is so central to interrupting the growth of infection causing organisms.

4. Significance of Hand Hygiene in Preventing Infections

4.1 Prevention of healthcare-associated infections

Hand hygiene reduces the transfer of microorganisms between patients and healthcare workers and, through this, lowers the risk of infections linked to hospital stays and medical procedures [5]. A hospital-wide hand hygiene programme using alcohol-based hand rub helped healthcare workers clean their hands more regularly. This also led to a reduction in hospital-acquired infections and the spread of MRSA between patients [17]. The study used a before-and-after design without a control group, so its results are best read as strong supporting evidence rather than proof of cause. Its findings have, nevertheless, been widely cited in later guidance [19].

4.2 Prevention of cross-infection

Cross-infection occurs when microorganisms pass from one patient to another, either directly or indirectly such as a healthcare worker's hands or shared equipment. Cleaning the hands before and after patient contact interrupts this route [16,19]. The point matters most in intensive care units, emergency departments, operating theatres and other areas where patients are acutely ill or particularly susceptible to infection [19].

4.3 Reduction in antimicrobial-resistant infections

Antimicrobial resistance is among the most serious challenges in modern healthcare. Resistant organisms such as MRSA can spread through contaminated hands and surfaces in the same way as susceptible ones, and the infections they cause are harder and costlier to treat. Hand hygiene limits their transmission and works alongside other measures, including environmental cleaning, isolation precautions and antimicrobial stewardship [5,19].

4.4 Protection of healthcare workers

Hand hygiene also protects the people who deliver care. Cleaning the hands after contact with patients, body fluids or contaminated equipment lowers the risk of occupational exposure and transmission [14,19].

4.5 Protection of patients and visitors

Preventing infections is not only the responsibility of doctors and nurses. Laboratory staff, technicians, students, housekeeping workers, patients and visitors also come into contact with people and surfaces in hospitals. Everyone has a role to play in stopping the spread of infections. Patients and their family members should also be encouraged to follow proper hand hygiene practices. When everyone takes care of hand cleanliness, hospitals become safer places for patients, staff and visitors [19].

5. Recommended Hand Hygiene Practices

Two methods, washing with soap and water, and rubbing with an alcohol-based hand rub were recommended. But it is totally situational. Hand rub is preferred for routine use, whereas soap and water are advised when the hands are visibly dirty, are contaminated with blood or other body fluids, or may have been exposed to spore-forming organisms or bacteria such as *Clostridioides difficile* [19].

5.1 Handwashing with soap and water

Washing can remove dirt physically, organic material and microorganisms from the hands. The procedure is described below:

1. Wet the hands with clean running water.
2. Apply enough soap to cover all hand surfaces.
3. Rub the palms together.
4. Rub the right palm over the back of the left hand, and then the reverse.
5. Rub the palms together with the fingers interlaced.
6. Rub the backs of the fingers against the opposite palm.
7. Clean each thumb with a rotational movement.
8. Rub the fingertips against the opposite palm.
9. Rinse thoroughly with water.
10. Dry the hands with a clean, single-use towel.

The whole sequence should take about 40–60 seconds (WHO, 2009).

5.2 Alcohol-based hand rub

Alcohol-based hand rub is the suitable method for routine hand antisepsis when the hands are not visibly soiled [19]. It acts quickly, takes less time than washing, and can be placed at the point of care, which makes it easier to use at the moments that matter. The rub should be applied in enough quantity to cover all hand surfaces and rubbed in until the hands are dry, which takes roughly 20–30 seconds. How well it works depends on the formulation, the amount used and the technique [14].

5.3 Hand hygiene and glove use

Gloves do not replace hand hygiene. They can become contaminated during work, care, and microorganisms may spread when gloves are removed or when the same pair is used for different tasks. Hands should be cleaned before putting gloves on and after taking them off, in line with infection prevention guidelines.

6. WHO's Five Moments for Hand Hygiene

Healthcare workers should clean their hands at five important times during patient care. These five moments are based on the WHO's hand hygiene model, which was developed to make hand hygiene easier to understand, teach and monitor in hospitals [18]. The five moments are explained in Table 1.

Moment	Indication	Purpose
1	Before touching a patient	Protects the patient from harmful microorganisms
2	Before a clean or aseptic procedure	Prevents microorganisms from entering the patient's body
3	After body fluid exposure risk	Protects healthcare workers and the environment
4	After touching a patient	Prevents the spread of microorganisms
5	After touching patient surroundings	Prevents transmission from contaminated surfaces

Table 1-*The WHO Five Moments for Hand Hygiene*

Source-Adapted from WHO (2009) and Sax et al. (2007).

Because the moments are tied to the point of care rather than to a fixed routine, the framework can be applied across different care settings and gives staff a practical way to build hand hygiene into everyday patient care [18-19].

7. Evidence from Previous Studies

A substantial body of research supports the role of hand hygiene in preventing infection, and a growing part of it asks why compliance still falls short. A hospital-wide hand hygiene improvement programme showed positive results in reducing the spread of infections. After the programme was introduced, healthcare workers became more regular in cleaning their hands, and hand hygiene compliance increased from 48% to 66%. At the same time, there was a decrease in hospital-acquired infections and the spread of MRSA

between patients. These findings highlight that regular hand cleaning can play an important role in protecting patients and improving safety in hospitals [16]. Hand hygiene is considered one of the most important ways to prevent hospital-acquired infections and reduce the spread of germs that are resistant to antibiotics. Regular hand cleaning helps protect patients and improves infection control in healthcare settings [5]. The gap between guidance and behaviour was documented by, who reviewed 96 studies and found an average baseline compliance of about 40% [9]. Physicians complied less often than nurses, and compliance was lower before patient contact than after it. Several reviews have examined what works. In a network meta-analysis of hospital studies, found that interventions such as education, reminders, performance feedback and institutional strategies can improve compliance [15]. The largest gains were seen when multimodal strategies based on the WHO approach were combined with goal setting, incentives or accountability. These findings favor using several complementary approaches rather than relying on a single one. reached a similar conclusion in a Cochrane review, reporting that feedback, education and convenient access to hand hygiene products can improve compliance, although the certainty of the evidence for some interventions, and for their effect on infection rates, remained limited [11]. Reflecting on three successive Cochrane reviews, it is noted that the evidence base had grown but that firm conclusions about the single most effective intervention were still difficult to draw [11]. More recent work has looked at barriers. It is synthesized 28 qualitative studies and identified behavioural, organisational, physical and societal or interpersonal barriers that interact with one another. Their findings suggest that improving compliance needs change at both the individual and the institutional level. Indian studies point the same way [3]. A questionnaire survey at a rural teaching hospital, found that the proportion of staff who said they always practised hand hygiene ranged from 40% to 96% depending on the situation, and that the main barriers were workload, scarce resources, limited information and a perception that hand hygiene was not a priority [8]. A systematic review and meta-analysis reported pooled observed compliance of 44% among healthcare workers, with considerable variation between studies, which underlines the need for stronger training, monitoring and institutional support in Indian healthcare settings [6].

8. Factors Affecting Hand Hygiene Compliance

Although its value is widely recognized, compliance remains uneven in many healthcare facilities [9]. The reasons fall broadly into individual, institutional and skin-related groups, and they often overlap [3]. Broader reviews of infection prevention practice describe a similar mix of barriers and facilitators among healthcare workers [2].

8.1 Individual factors

At the individual level, studies point to gaps in knowledge about how infections spread, forgetfulness, and incorrect technique. Some staff also hold mistaken beliefs about gloves, assuming that wearing them removes the need to clean the hands [7]. Motivation matters too: hand hygiene is more likely to be skipped when it is seen as a low priority, whether by the individual or by the institution [8].

8.2 Institutional factors

Many of the most frequently reported barriers sit with the institution rather than the individual. These include soap, water or hand rub that is unavailable or placed in the wrong location, heavy patient loads, staff shortages, time pressure, and little regular monitoring or feedback [3]. In the review, the unavailability and inconvenience of hand hygiene resources drew particular attention.

8.3 Skin-related problems

Frequent handwashing and unsuitable products can cause dryness, irritation or dermatitis, and staff who experience these problems may clean their hands less often. Suitable hand-care products and well-formulated alcohol-based rubs can help address the problem [13].

9. Strategies to Improve Hand Hygiene Compliance

No single measure reliably improves hand hygiene on its own. Healthcare institutions are better served by a combination of approaches, outlined below [15].

9.1 Regular education and training. Orientation programmes, workshops, practical demonstrations and refresher sessions should be offered to healthcare workers and students. Training works best when it shows the correct technique and links it to the Five Moments rather than only describing the theory [11].

9.2 Availability of resources. Clean water, liquid soap, disposable towels and alcohol-based hand rub need to be available at all times and close to where care is given. Hand rub at the point of care was a central element of the programme evaluated by Pittet et al. (2000) and is a key component of the WHO multimodal strategy [19].

9.3 Posters and visual reminders. Posters showing the Five Moments, placed near patient-care areas, laboratories, washrooms and nursing stations, act as low-cost reminders.

9.4 Monitoring and feedback. Regular audits by direct observation, followed by prompt feedback to staff, show units where they stand and allow progress to be tracked [18].

9.5 Institutional policies. Clear written hand hygiene policies, with infection prevention and control committees responsible for overseeing their implementation, give hand hygiene an organisational footing.

9.6 Leadership and role modelling. When senior clinicians clean their hands visibly and consistently, other staff are more likely to follow. Leadership commitment is also what secures the budget, staffing and time on which the other measures depend [19].

9.7 Patient participation. Patients and their families can be informed about hand hygiene and encouraged to take an active part in infection prevention.

Evidence from intervention reviews supports combining education, easy access to products, reminders and feedback to improve adherence [10].

10. Discussion

The literature reviewed establishes hand hygiene as a fundamental part of infection prevention in healthcare facilities. Hands carry microorganisms between patients, staff, equipment and the environment, so cleaning them at the right moments interrupts one of the main routes of transmission [16].

The evidence also shows that knowing what to do is not the same as doing it. Even when staff understand why hand hygiene matters, heavy workloads, inadequate facilities and time pressure can prevent them from following recommended practice [8]. This may help explain why compliance was reported at around 40% in a large international review [9], despite the benefits seen in programmes such as the one described [17].

More recent syntheses suggest that lasting improvement depends on a combination of training, institutional support, adequate supplies and regular monitoring [11]. The certainty of the evidence is still limited for some interventions, particularly regarding their effect on infection rates themselves [10].

in India, the overall rate of hand hygiene compliance was found to be 44%, showing that there is still a need to improve hand-cleaning practices. The results also varied across different studies, suggesting that hand hygiene practices are not the same in all healthcare facilities [6]. Healthcare institutions should therefore treat hand hygiene as a patient safety priority for which the organization is accountable, rather than as an individual responsibility alone [19].

11 Limitations

This review has several limitations. As a narrative review, it did not follow a formal protocol or a structured quality appraisal, and the choice of sources reflects the author's judgement, so relevant studies may have been missed. Compliance figures come from studies that measure it in different ways. Direct observation is regarded as the reference method [19], but self-reported practice, may not match what is observed, and pooled estimates can hide large differences between studies [6]. Finally, much of the intervention evidence comes from hospital settings and may not transfer fully to primary care, long-term care or resource-limited facilities [10].

12. Recommendations

Based on the literature reviewed, the following recommendations are proposed:

1. Hand hygiene training should be part of the orientation programme for all healthcare workers and students, with refresher sessions at regular intervals [10,19].
2. Healthcare institutions should ensure that handwashing facilities and alcohol-based hand rub are always available, including at the point of care [3,19].
3. Compliance should be monitored regularly through direct observation and audits, with the results fed back to staff (10,18].
4. Infection prevention and control committees should organize awareness programmes and practical demonstrations [19].
5. Healthcare workers should follow the WHO Five Moments for Hand Hygiene [18].
6. Posters and reminders should be displayed in high-risk patient-care areas [15].
7. Institutional leadership should foster a culture of patient safety and infection prevention [3,19].
8. Further research should evaluate hand hygiene knowledge, attitudes, practices and observed compliance in different healthcare settings, including in India, and should test which combinations of interventions improve both compliance and infection rates [6,11].

13. Conclusion

Hand hygiene is a simple, cost friendly and essential way of preventing the spread of infection in healthcare settings. It reduces cross-infection, helps control HAIs and the spread of antimicrobial-resistant organisms, and protects both patients and healthcare workers [5].

The guidance is clear, yet compliance remains inconsistent. Whether a hand hygiene programme succeeds depends not only on individual awareness but also on supplies, policies, training, monitoring and leadership support [3,15].

Adherence to recommended practice should therefore be promoted as a shared responsibility among healthcare workers, patients and visitors. Consistent implementation contributes to safer care environments and better patient outcomes [19].

References

1. World Health Organization. (2011). *Report on the burden of endemic health care-associated infection worldwide*.

2. Abalkhail, A., & Elbehiry, A. (2025). Barriers and facilitators of health care workers' compliance with infection prevention and control practices in health-care facilities: A systematic literature review. *Indian Journal of Public Health, 69*(1), 74–81. https://doi.org/10.4103/ijph.ijph_254_24

3. Afework, A., & Tamene, A. (2025). Uncovering the obstacles: A comprehensive analysis of barriers to hand hygiene adherence among healthcare providers: A systematic review. *BMC Infectious Diseases, 25*, Article 502. https://doi.org/10.1186/s12879-025-10924-4

4. Allegranzi, B., Bagheri Nejad, S., Combescure, C., Graafmans, W., Attar, H., Donaldson, L., & Pittet, D. (2011). Burden of endemic health-care-associated infection in developing countries: Systematic review and meta-analysis. *The Lancet, 377*(9761), 228–241. https://doi.org/10.1016/S0140-6736(10)61458-4

5. Allegranzi, B., & Pittet, D. (2009). Role of hand hygiene in healthcare-associated infection prevention. *Journal of Hospital Infection, 73*(4), 305–315. https://doi.org/10.1016/j.jhin.2009.04.019

6. Basu, S., Roy, S., Roy, D., & Maheshwari, V. (2026). Prevalence and determinants of hand hygiene knowledge, compliance, and practices among Indian healthcare workers: A systematic review and meta-analysis. *Tropical Medicine & International Health, 31*(2), 113–137. https://doi.org/10.1111/tmi.70057

7. Boyce, J. M., & Pittet, D. (2002). Guideline for hand hygiene in health-care settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *Morbidity and Mortality Weekly Report: Recommendations and Reports, 51*(RR-16), 1–45.

8. Diwan, V., Gustafsson, C., Rosales Klintz, S., Joshi, S. C., Joshi, R., Sharma, M., Shah, H., Pathak, A., Tamhankar, A. J., & Stålsby Lundborg, C. (2016). Understanding healthcare workers self-reported practices, knowledge and attitude about hand hygiene in a medical setting in rural India. *PLOS ONE, 11*(10), Article e0163347. https://doi.org/10.1371/journal.pone.0163347

9. Erasmus, V., Daha, T. J., Brug, H., Richardus, J. H., Behrendt, M. D., Vos, M. C., & van Beeck, E. F. (2010). Systematic review of studies on compliance with hand hygiene guidelines in hospital care. *Infection Control & Hospital Epidemiology, 31*(3), 283–294. https://doi.org/10.1086/650451

10. Gould, D. J., Moralejo, D., Drey, N., Chudleigh, J. H., & Taljaard, M. (2017). Interventions to improve hand hygiene compliance in patient care. *Cochrane Database of Systematic Reviews, 2017*(9), Article CD005186. https://doi.org/10.1002/14651858.CD005186.pub4

11. Gould, D., Moralejo, D., Drey, N., Chudleigh, J., & Taljaard, M. (2018). Interventions to improve hand hygiene compliance in patient care: Reflections on three systematic reviews for the Cochrane Collaboration 2007–2017. *Journal of Infection Prevention, 19*(3), 108–113. https://doi.org/10.1177/1757177417751285

12. Jumaa, P. A. (2005). Hand hygiene: Simple and complex. *International Journal of Infectious Diseases, 9*(1), 3–14. https://doi.org/10.1016/j.ijid.2004.05.005

13. Kampf, G., & Kramer, A. (2004). Epidemiologic background of hand hygiene and evaluation of the most important agents for scrubs and rubs. *Clinical Microbiology Reviews, 17*(4), 863–893. https://doi.org/10.1128/CMR.17.4.863-893.2004

14. Larson, E. L. (1995). APIC guideline for handwashing and hand antisepsis in health care settings. *American Journal of Infection Control, 23*(4), 251–269. https://doi.org/10.1016/0196-6553(95)90070-5

15. Luangasanatip, N., Hongsuwan, M., Limmathurotsakul, D., Lubell, Y., Lee, A. S., Harbarth, S., Day, N. P. J., Graves, N., & Cooper, B. S. (2015). Comparative efficacy of interventions to promote hand hygiene in hospital: Systematic review and network meta-analysis. *BMJ, 351*, Article h3728. https://doi.org/10.1136/bmj.h3728

16. Pittet, D., Allegranzi, B., Sax, H., Dharan, S., Pessoa-Silva, C. L., Donaldson, L., & Boyce, J. M. (2006). Evidence-based model for hand transmission during patient care and the role of improved practices. *The Lancet Infectious Diseases, 6*(10), 641–652. https://doi.org/10.1016/S1473-3099(06)70600-4

17. Pittet, D., Hugonnet, S., Harbarth, S., Mourouga, P., Sauvan, V., Touveneau, S., & Perneger, T. V. (2000). Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *The Lancet, 356*(9238), 1307–1312. https://doi.org/10.1016/S0140-6736(00)02814-2

18. Sax, H., Allegranzi, B., Uçkay, I., Larson, E., Boyce, J., & Pittet, D. (2007). 'My five moments for hand hygiene': A user-centred design approach to understand, train, monitor and report hand hygiene. *Journal of Hospital Infection, 67*(1), 9–21. https://doi.org/10.1016/j.jhin.2007.06.004

19. World Health Organization. (2009). *WHO guidelines on hand hygiene in health care: First global patient safety challenge: Clean care is safer care*. https://www.who.int/publications/i/item/9789241597906