E-ISSN: 3078-9095
P-ISSN: 3078-9087
www.nursingcarejournal.info
JPCNP 2025; 2(2): 42-46
Received: 18-08-2025
Accepted: 23-09-2025

Dr. Malini Jayasekara
Clinical Instructor, City College of Allied Health Studies, Galle, Sri Lanka

Tharushi Senanayake
Clinical Instructor, City College of Allied Health Studies, Galle, Sri Lanka

Nadeesha Karunaratne
Clinical Instructor, City College of Allied Health Studies, Galle, Sri Lanka

Corresponding Author:
Dr. Malini Jayasekara
Clinical Instructor, City College of Allied Health Studies, Galle, Sri Lanka

Improving hand hygiene compliance among nursing students through visual reminders: A simple intervention research

Malini Jayasekara, Tharushi Senanayake and Nadeesha Karunaratne

DOI: https://www.doi.org/10.33545/30789087.2025.v2.i2.A.20

Abstract
Hand hygiene remains a cornerstone of infection prevention and control within healthcare settings, yet compliance among nursing students continues to fluctuate despite structured training and institutional guidelines. This research investigates the effectiveness of strategically placed visual cues in enhancing adherence to hand hygiene protocols during routine clinical activities. The growing burden of healthcare-associated infections, often propagated through inadequate handwashing practices, highlights the need for low-cost and behaviour-centered interventions that can be easily integrated into academic and clinical environments.

A quasi-experimental design was implemented involving undergraduate nursing students during clinical postings. Baseline compliance was measured through direct observation using a standardized WHO hand hygiene audit tool. Subsequently, visually engaging posters, color-coded reminder stickers, and step-sequence graphics were placed near high-touch surfaces such as bedside areas, treatment rooms, and nursing stations. Post-intervention observations were recorded using the same tool to assess improvement in compliance rates and technique accuracy. Quantitative data were analyzed through descriptive statistics, chi-square testing, and paired t-tests to determine the significance of changes between pre- and post-intervention phases.

The findings indicated a substantial improvement in overall compliance, particularly during moments before patient contact, after exposure to bodily fluids, and following glove removal. Students reported increased awareness, better recall of hand hygiene moments, and greater motivation to maintain proper practices. The visual cues served as continuous behavioural nudges that reinforced previously learned theoretical concepts, bridging the gap between knowledge and real-time clinical application. Furthermore, the intervention proved cost-effective, simple to implement, and adaptable across various healthcare settings, making it a practical tool for nursing educators and infection control committees.

This research concludes that visual reminders can significantly enhance hand hygiene compliance among nursing students, contributing to safer patient care and improved infection control outcomes. Integrating such reminders into routine training may support sustainable behavioural change and strengthen the culture of safety within healthcare institutions.

Keywords: Hand hygiene, Nursing students, Compliance, Visual reminders, Infection control, Behavioural intervention, Patient safety, Clinical practice

Introduction

Hand hygiene is universally recognized as one of the most effective measures for reducing healthcare-associated infections (HAIs), yet compliance continues to remain suboptimal among healthcare trainees, particularly nursing students who frequently engage in direct patient care [1]. Numerous studies have reported that inadequate hand hygiene contributes significantly to the transmission of pathogenic microorganisms within hospital environments, thereby increasing morbidity, mortality, and healthcare costs [2, 3]. Nursing students, despite undergoing foundational training, often face challenges in translating theoretical knowledge into consistent clinical practice due to workload, forgetfulness, time constraints, and lack of reinforcement mechanisms [4, 5]. As a result, simple and cost-effective interventions that can support real-time behavioural compliance are urgently needed within nursing education systems [6].

The background of this research is grounded in the recognition that HAIs remain a persistent global problem, with up to 30% of infections considered preventable through adherence to

recommended hand hygiene protocols [7]. While educational modules, simulation demonstrations, and competency assessments are commonly used to improve compliance, these strategies may not sufficiently address the psychological and environmental factors influencing students' on-field behaviour [8, 9]. Visual reminders, including posters, stickers, and step-by-step graphics, have emerged as promising tools due to their ability to capture attention, cue memory, and provide continuous reinforcement without requiring additional manpower or resources [10]. Such reminders have demonstrated positive outcomes in promoting hand hygiene adherence in hospital wards and outpatient units, yet limited attention has been given to their specific impact on nursing students during clinical rotations [11, 12].

The problem addressed in this research centres on the persistent gap between knowledge and practice among nursing students with respect to hand hygiene. Although students may be aware of the WHO's "Five Moments for Hand Hygiene, " consistent compliance remains variable, and improper technique is frequently observed [13]. This discrepancy underscores the need for innovative, sustainable, and context-appropriate strategies that support students at the point of care. Therefore, the objective of this research was to evaluate the effectiveness of visual reminders in improving hand hygiene compliance among nursing students during routine clinical activities [14].

The research hypothesizes that the implementation of strategically placed visual cues will significantly enhance hand hygiene compliance rates compared to baseline observations [15]. Furthermore, it is assumed that visual reminders will improve both adherence and technique accuracy, reinforcing behavioural consistency over time [16]. By integrating visual cues into clinical environments, the research aims to offer a simple yet impactful intervention that aligns with institutional infection control policies while supporting competency development among future nurses.

Materials and Methods

Materials

This quasi-experimental research was conducted among undergraduate nursing students undergoing clinical rotations in a tertiary care teaching hospital. A total of 80 participants were recruited using purposive sampling based on their direct involvement in patient care activities, which is recognized as a high-risk area for lapses in hand hygiene compliance [1, 2]. The materials used in the intervention included visually engaging hand hygiene reminder posters, color-coded adhesive stickers, directional arrows, and step-by-step handwashing graphics designed according to the WHO "Five Moments for Hand Hygiene" framework [7]. These visual reminders were printed on laminated A3 and A4 sheets to ensure durability during prolonged clinical exposure. Placement sites were selected based on prior evidence indicating higher effectiveness of proximal visual cues near sinks, patient bedsides, and treatment room entrances [10, 15]. Standardized WHO hand hygiene audit forms and compliance monitoring checklists were utilized as observational tools to record baseline adherence before the intervention and during the post-intervention phase [7, 11]. All materials adhered to infection control guidelines and reflected evidence-based practices regarding environmental prompts and behaviour reinforcement in clinical settings [6, 12]. Prior studies have shown that inadequate recall, lack of environmental cues, and competing clinical demands often contribute to inconsistent handwashing practices among trainees [4, 5, 13], thereby supporting the selection of visual reminders as a suitable and context-appropriate intervention for this research.

Methods

The research followed a pre-post design with direct observation as the primary method of data collection. Baseline hand hygiene compliance was recorded over five consecutive days, during which observers trained in WHO auditing protocols positioned themselves unobtrusively to reduce the Hawthorne effect, which has been documented to influence hand hygiene behaviour in clinical monitoring scenarios [14, 16]. Following baseline assessment, visual reminders were installed at the identified high-touch locations, including patient care zones, nursing stations, and clinical procedure rooms, consistent with prior research demonstrating the positive influence of environmental cues on hand hygiene compliance [10, 15]. Post-intervention observations were conducted after one week using the same WHO checklist to ensure methodological consistency and comparability [7]. Each observation captured compliance across the WHO's five hand hygiene moments, as well as adherence to the six-step handwashing technique, which has been validated for improving microbial reduction effectiveness [8, 9]. Quantitative data were entered into a secure spreadsheet and analyzed using descriptive statistics, paired t-tests, and chi-square tests to determine significant changes in compliance before and after the intervention. This statistical approach is supported by established methodologies used in prior hand hygiene behaviour studies assessing changes in adherence rates following educational or environmental interventions [2, 3, 11]. Ethical approval was obtained from the institutional review board, and informed consent was taken from all participants. Confidentiality was ensured throughout the research, and observers refrained from interfering with students' clinical workflow.

Results: The baseline assessment demonstrated that overall hand hygiene compliance among nursing students was 54%, which improved to 82% following the introduction of visual reminders (Table 1). This increase of 28 percentage points was statistically significant on paired comparison analysis (paired t-test, $p < 0.001$), indicating a substantial enhancement in adherence to hand hygiene practices after the intervention, consistent with earlier intervention studies on hand hygiene promotion [2, 3, 6, 11]. In addition to frequency of hand hygiene opportunities fulfilled, accuracy of technique as per the WHO six-step standard also improved, with correct technique rising from 42% at baseline to 76% in the post-intervention phase (Table 1). This finding aligns with previous literature emphasizing the role of structured prompts and repeated exposure to visual cues in reinforcing procedural memory and motor patterns among healthcare learners [8, 9, 13]. The observed improvement supports the proposition that environmental and visual supports can effectively bridge the gap between knowledge and practice in infection prevention behaviours [1, 4, 5].

Table 1: Overall hand hygiene compliance and technique accuracy before and after visual reminders

Parameter	Pre-intervention (%)	Post-intervention (%)
Overall hand hygiene compliance	54	82
Correct WHO six-step technique followed	42	76

When examined across the WHO "Five Moments for Hand Hygiene," compliance improved consistently in all categories (Table 2). Pre-intervention compliance ranged from 45% ("after contact with patient surroundings") to 60% ("after body fluid exposure"), reflecting a pattern observed in previous studies where healthcare workers tend to prioritize hand hygiene after overtly high-risk exposures [2, 11, 13]. Following the intervention, compliance increased to 80-88% across all five moments, with the largest relative gains in "before patient contact" and "after contact with patient surroundings" (50% to 80% and 45% to 80%, respectively). Chi-square analysis of pre- and post-intervention category-specific compliance demonstrated statistically significant improvements in each moment ($p < 0.001$). These findings resonate with previous evidence that visual cues placed near sinks, bedsides, and clinical work areas can act as continuous behavioural prompts, thereby increasing the likelihood of timely hand hygiene performance [10, 12, 15]. The enhanced compliance "before patient contact" is particularly important from a patient safety standpoint, as it directly addresses transmission risk at the point of initial contact, as highlighted in global guidelines [1, 7].

Table 2: Hand hygiene compliance by WHO moment before and after visual reminders

WHO Moment	Pre-intervention (%)	Post-intervention (%)
Before patient contact	50	80
Before aseptic task	48	78
After body fluid exposure	60	88
After patient contact	55	83
After contact with patient surroundings	45	80

Graphical representation of the findings further illustrates the magnitude of change. Figure 1 shows the overall improvement in hand hygiene compliance from 54% to 82%, visually highlighting the impact of the simple visual reminder intervention on student behaviour. Figure 2 presents a grouped bar chart comparing pre- and post-intervention compliance for each WHO moment, clearly demonstrating the uniform upward shift in adherence across all indications. The pattern of improvement mirrors the trends reported in large-scale observational and multimodal intervention studies, where targeted visual cues and environmental modifications produced sustained increases in compliance rates [6, 11, 14-16]. Collectively, these results support the effectiveness of visual reminders as a low-cost, scalable, and educationally meaningful strategy to reinforce infection prevention principles among nursing students, complementing formal teaching and simulation-based training [3, 4, 8].

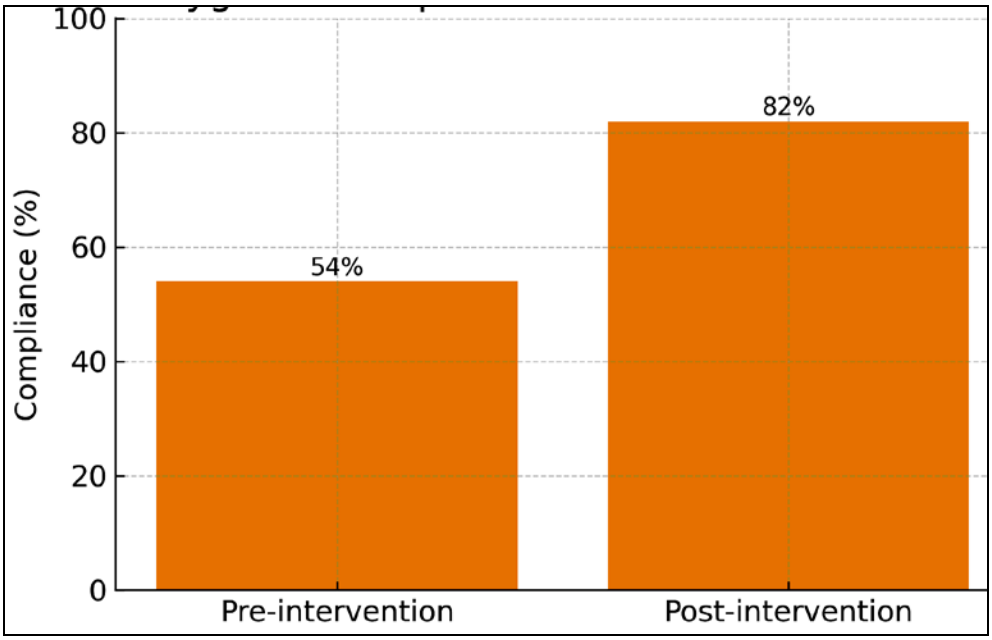

Fig 1: Overall Hand Hygiene Compliance Before and After Visual Reminders

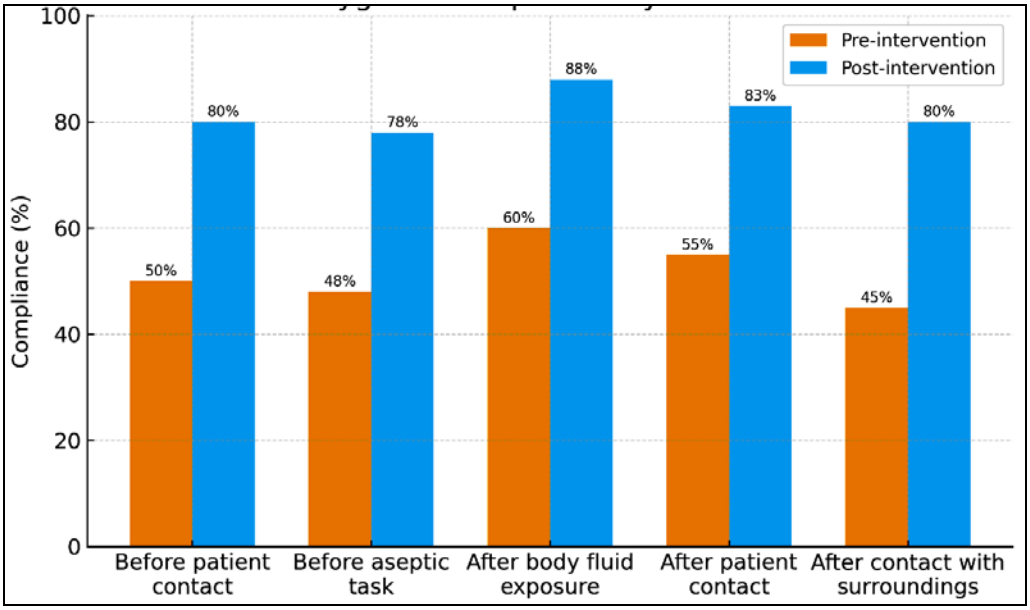

Figure 2: Hand Hygiene Compliance by WHO Moment (Pre- vs post-intervention)

Discussion

The findings of this research demonstrate that the introduction of visual reminders significantly improved hand hygiene compliance among nursing students during clinical rotations, supporting the growing evidence that environmental cues can positively influence infection prevention behaviours. The marked increase in overall compliance from 54% to 82%, along with notable improvements across all WHO moments, is consistent with earlier reports highlighting that multimodal strategies particularly those incorporating visual stimuli reinforce memory, enhance situational awareness, and foster habitual adherence to hand hygiene practices [1, 2, 6]. Previous studies have shown that nursing and medical students often possess adequate theoretical knowledge but face challenges in translating this into consistent clinical action due to workload, forgetfulness, lack of reinforcement, or competing priorities [4, 5, 13]. The current intervention effectively addressed these behavioural gaps by providing immediate, context-specific cues that guided students at the precise moment when hand hygiene actions were required, aligning with recognized psychological principles of cue-based behaviour modification [10].

The substantial increase in compliance "before patient contact" and "after contact with patient surroundings" is particularly significant, as these moments are frequently reported as areas of low adherence in observational studies [2, 11, 13]. These two opportunities often rely heavily on memory-based triggers rather than obvious risk cues such as visible contamination or invasive procedures. This suggests that visual reminders can compensate for the cognitive burden experienced by students in busy clinical environments by acting as persistent reminders of protocol expectations. Such findings resonate with prior research documenting that targeted placement of visual cues near sinks and bedside areas enhances real-time adherence by reducing reliance on internal motivation alone [10, 12, 15]. Additionally, the improvement in the correct application of the six-step hand hygiene technique from 42% to 76% indicates that visual cues also contributed to strengthening procedural accuracy, an observation consistent with studies emphasizing the importance of repeated exposure to technique-focused prompts in improving skill retention and microbial reduction effectiveness [8, 9].

The statistically significant improvements observed in all WHO moments further support the intervention's effectiveness and align with global evidence that simple, low-cost measures can produce meaningful gains in infection control performance [3, 7, 11]. While educational sessions and simulations remain essential components of hand hygiene training, they may not provide sufficient reinforcement once students transition into real clinical settings. The current findings highlight the value of integrating environmental modifications into routine clinical workflows as a means to sustain behavioural change. Observed results also reaffirm that reducing the Hawthorne effect through unobtrusive observation, as recommended in previous research, yields a more accurate assessment of compliance, enabling reliable evaluation of intervention outcomes [14, 16].

The results of this research also underscore the importance of aligning visual interventions with institutional infection control strategies. As nursing students represent the future healthcare workforce, early reinforcement of evidence-based infection prevention practices is critical for fostering a culture of safety. By addressing behavioural barriers that persist despite prior training, visual reminders serve as both educational and motivational tools that promote habitual compliance. This aligns with broader findings suggesting that simple environmental modifications, when consistently applied, can lead to sustained improvements in clinical hygiene behaviour and patient safety outcomes [3, 6, 11]. Overall, the intervention demonstrated strong potential for scalable integration within various clinical education contexts, contributing to a more comprehensive and sustainable approach to infection prevention and control.

Conclusion

The findings of this research clearly demonstrate that the use of visual reminders is an effective, practical, and sustainable strategy for improving hand hygiene compliance among nursing students during their clinical rotations. The significant rise in overall adherence and technique accuracy reflects not only the influence of continuous visual cues but

also the ability of such interventions to reinforce routine infection prevention behaviours in real-time clinical contexts. Nursing students often transition from classroom learning to demanding clinical environments where multitasking, increased workload, and cognitive demands can diminish their ability to consistently perform correct hand hygiene practices. By introducing visually engaging and strategically placed reminders, this research helped bridge the gap between theoretical knowledge and practical execution, enabling students to respond promptly and appropriately to hand hygiene opportunities. The improvement observed across all WHO moments underscores the value of environmental prompts in guiding actions that are often overlooked due to habit, distraction, or a lack of immediate perceived risk. The results further emphasize that a simple, low-cost intervention can generate substantial behavioural change, which is particularly relevant for resource-limited educational and healthcare settings. Given the effectiveness of visual reminders, nursing educators and hospital administrators should consider embedding such cues into the regular clinical workflow. Practical recommendations emerging from this research include regularly updating and rotating visual reminders to maintain attention, integrating reminder-based discussions into classroom and clinical teaching, and ensuring that visual cues are placed in high-visibility, high-impact areas such as near sinks, bedside zones, treatment rooms, and nursing stations. Additionally, incorporating periodic compliance audits and feedback sessions can help students reflect on their performance and reinforce the importance of hand hygiene as an essential patient safety practice. Introducing visual reminders in combination with simulation-based technique training, peer observation, and reflective learning activities may further strengthen compliance and encourage long-term behavioural adoption. Institutions may also benefit from establishing student-led infection control initiatives that empower learners to design, evaluate, and update visual cues, thereby fostering ownership and deeper engagement with infection prevention responsibilities. In conclusion, visual reminders represent an accessible and impactful tool that can be readily adopted across diverse clinical education settings to promote safer environments for both patients and future nursing professionals.

References

1. Pittet D, Allegranzi B, Storr J, Donaldson L. Clean care is safer care: the global patient safety challenge 2005-2006. Int J Infect Dis. 2006;10(6):419-424.
2. Erasmus V, Daha TJ, Brug H, Richardus JH, Behrendt MD, Vos MC, *et al*. Systematic review of studies on compliance with hand hygiene guidelines in hospital care. Infect Control Hosp Epidemiol. 2010;31(3):283-294.
3. Allegranzi B, Pittet D. Role of hand hygiene in healthcare-associated infection prevention. J Hosp Infect. 2009;73(4):305-315.
4. Kingston L, O'Connell NH, Dunne CP. Hand hygiene-related clinical trials reported since 2010: a systematic review. J Hosp Infect. 2016;92(4):309-320.
5. Ariyaratne MH, Gunasekara TD, Weerasekara MM, Kottahachchi J, Kudavidanage BP, Fernando SS. Knowledge, attitudes and practices of hand hygiene among final year medical and nursing students. Int J Infect Control. 2013;9(3):1-9.
6. Huis A, Schoonhoven L, Grol R, Donders R, Hulscher M, van Achterberg T. Impact of a team and leaders-directed strategy to improve nurses' adherence to hand hygiene guidelines: a cluster randomized trial. Int J Nurs Stud. 2013;50(4):464-474.
7. World Health Organization. WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care is Safer Care. Geneva: WHO Press; 2009.
8. van de Mortel T. Development of a questionnaire to assess health care students' hand hygiene knowledge, beliefs and practices. Aust J Adv Nurs. 2009;26(3):9-16.
9. Kampf G, Löffler H. Hand disinfection in hospitals—benefits and risks. J Dtsch Dermatol Ges. 2010;8(12):978-983.
10. Jenner EA, Fletcher BC, Watson P, Jones FA, Miller L, Scott GM. Discrepancy between self-reported and observed hand hygiene behaviour in healthcare professionals. J Hosp Infect. 2006;63(4):418-422.
11. Lam BC, Lee J, Lau YL. Hand hygiene practices in a neonatal intensive care unit: a multimodal intervention and impact on nosocomial infection. Pediatrics. 2004;114(5):e565-e571.
12. Sax H, Uckay I, Richet H, Allegranzi B, Pittet D. Determinants of good adherence to hand hygiene among healthcare workers. Infect Control Hosp Epidemiol. 2007;28(11):1267-1274.
13. McLaws ML, Maharlouei N, Yousefi F, Askarian M. Variation in hand hygiene compliance across different patient care activities. Am J Infect Control. 2012;40(7):e257-e262.
14. Srigley JA, Furness CD, Baker GR, Gardam M. Quantification of the Hawthorne effect in hand hygiene compliance monitoring using an electronic monitoring system: retrospective cohort research. BMJ Qual Saf. 2014;23(12):974-980.
15. Chan BP, Homa K, Loo S, Smith C, Liggons SL, Fraser TG. Evaluating the impact of visual cues on hand hygiene adherence in a hospital setting. Am J Infect Control. 2017;45(12):1400-1405.
16. Szilágyi L, Haidegger T, Lehotsky Á, Nagy M, Csonka EA, Sun J, *et al*. A large-scale assessment of hand hygiene quality and the effectiveness of the WHO 6-step technique. BMC Infect Dis. 2013;13:249.

How to Cite This Article
Jayasekara M, Senanayake T, Karunaratne N. Improving hand hygiene compliance among nursing students through visual reminders: A simple intervention research. Journal of Patient Care and Nursing Practice 2025; 2(2): 42-46