

Original Research Article

Improving attendant hand hygiene in the paediatrics department: a quality improvement initiative

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ABSTRACT

Background: Healthcare-associated infections remain a major cause of morbidity and mortality in paediatric inpatient settings. While hand hygiene interventions have traditionally focused on healthcare workers, patient attendants and caregivers represent a potential but under-addressed source of pathogen transmission. This project assessed whether a low-cost, behaviourally informed intervention could improve hand hygiene compliance among paediatric patient attendants in a tertiary-care hospital setting.

Methods: This prospective, before-and-after quality improvement initiative was conducted in paediatric wards of a government tertiary-care hospital in India. Baseline and post-intervention data were collected using brief, anonymized self-reported assessments of attendant hand hygiene behaviour. The intervention consisted of multilingual educational posters and improved access to alcohol-based hand sanitizer dispensers, implemented using plan-do-study-act cycles. The primary outcome was the proportion of attendants reporting sanitizer use before touching the child. Sanitizer consumption was monitored as a supporting process measure.

Results: At baseline, 47.7% (31/65) of attendants reported using sanitizer before patient contact. Following the intervention, compliance increased to 71.4% during the initial nursery-focused phase and was sustained after expansion to the entire paediatric ward, with pooled post-intervention compliance of 70.6% (137/194). The difference between pre- and post-intervention compliance was statistically significant. Ward-level sanitizer consumption increased progressively during the post-intervention period.

Conclusions: Improving access to hand hygiene resources combined with simple visual messaging was associated with sustained improvements in reported hand hygiene compliance among paediatric patient attendants.

Keywords: Hand hygiene, Posters, Paediatrics, Quality improvement

INTRODUCTION

Healthcare-associated infections (HAIs) are a significant global public health concern. According to WHO figures, between 7% and 15% of hospitalized patients acquire at least one HAI during their hospital stay, with the rates being higher in developing countries.¹ HAIs become particularly problematic in paediatric and neonatal settings as health care-associated sepsis rates are more than 7 times higher in neonates as compared to adults. HAIs also contribute to a substantial number of neonatal deaths in

hospital born neonates. Neonatal infection rates are worse in low- and middle-income countries (LMICs), being much higher than in high income countries.² Indian studies have reported variable but substantial rates of HAIs.

One tertiary-care hospital-based study reported an overall HAI prevalence of approximately 3.7%, with markedly higher rates of nearly 12% among paediatric patients.³ In intensive care units, reported infection rates range from 12% to 30%, reflecting the increased vulnerability of

critically ill patients.^{4,5} HAIs are associated with prolonged hospitalisation and contribute significantly to morbidity.⁴

Transmission of pathogens via contaminated hands is widely recognised as a major route for the spread of HAIs. Interventions that improve hand hygiene practices, particularly handwashing with soap and water or use of alcohol-based hand rub (ABHR) hold the potential to substantially reduce the risk of pathogen transmission.

According to the World Health Organization, effective hand hygiene and other infection prevention and control (IPC) measures could prevent HAIs considerably.⁶ Historically, hand hygiene efforts have focused mainly on healthcare workers, yet studies show persistent gaps in compliance even among trained clinical staff, with average baseline compliance often at suboptimal levels worldwide.⁷

In paediatric inpatient settings, family caregivers and attendants play an extremely important and ongoing role in everyday care activities. Feeding, comforting and maintaining basic hygiene for paediatric patients necessitates frequent physical contact and shared surfaces. These interactions present repeated opportunities for transmission of organisms between the environment, caregivers and vulnerable children.

Unlike healthcare professionals, caregivers rarely receive formal training in infection prevention. The attendant hand hygiene behaviours are less frequently studied or intervened upon. In regions with high reliance on attendants, addressing attendant hand hygiene represents an important but under-addressed component of infection control.

The world health organization advocates a multimodal strategy for improving hand hygiene, with system change and workplace visual reminders identified as key components.⁸ Low-cost, environmental and behavioural interventions such as strategic placement of readily accessible sanitizer dispensers and prominent educational messaging have been shown to prompt improvements in hand hygiene behaviours in a range of healthcare settings. These approaches leverage visual cues and ease of access to reduce barriers to appropriate hand hygiene without imposing significant workflow burden.

Despite the simplicity of hand hygiene as an IPC practice, compliance does not spontaneously achieve high levels and often requires targeted, context-tailored efforts to improve and sustain behaviour change.

Based on this rationale, we conducted a quality improvement initiative in the paediatrics department to improve attendant hand hygiene compliance. The primary aim was to increase the proportion of attendants who used alcohol-based hand sanitizer before touching the child by implementing low-cost, feasible interventions within existing clinical workflows.

METHODS

Study design

This project was conducted as a prospective, before-and-after quality improvement initiative. The project duration was 3 weeks (15th December 2025 to 6th January 2026). The aim was to assess changes in hand hygiene compliance among attendants of hospitalized paediatric patients following a low-cost behavioural intervention.

The project employed a structured, self-reported assessment approach, comparing pre-intervention and post-intervention data collected using the same methodology. The project was designed and conducted as part of routine departmental service evaluation and quality improvement activity and was not designed as human-subjects research. The project aimed to find temporal association between the intervention and changes in reported hand hygiene behaviour.

The project was implemented using iterative plan do study act (PDSA) cycles, a standard quality improvement framework, to allow staged implementation, observation of changes over time and pragmatic scale-up within routine clinical workflows

Project setting

The project was conducted in the paediatric inpatient wards/units of Guru Nanak Dev hospital (government medical college, Amritsar). Data collection was conducted in paediatric wards where patient attendants are routinely involved in bedside care of admitted children.

Participants

Participants included adult attendants/caregivers of paediatric patients. These attendants were actively involved in the care of admitted paediatric patients at the time of observation.

No formal sample size calculation was performed, as this was a time-bound quality improvement initiative. All eligible attendants present in the paediatric wards on the designated data collection days (i.e. last day of every week during the project period) were included.

Participation in the project survey was completely voluntary and verbal consent was obtained. Participation in the initiative did not alter any medical decision or treatment for both the participants or the non-participants. Clinical workflow was not disrupted by this project

Data collection (pre-intervention phase)

Baseline data were collected before implementation of the intervention. As this was a quality improvement initiative, no formal validated questionnaire or scoring system was employed. The questions were designed to capture a

simple, observable behaviour relevant to the project objective and were applied consistently in both pre- and post-intervention phases.

Data collection (recorded in an anonymized manner) consisted of brief confirmation of whether the attendant was actively involved in caregiving at the time of observation, date of observation, ward, whether the attendant was actively taking care of the child, whether sanitizer was used before touching the child. No personally identifiable information or demographic details were collected, as the project was conducted as a quality improvement initiative rather than formal human-subjects research, with a focus on system-level behaviour rather than individual participant characteristics.

Intervention

Following pre-interventional data collection, a low-cost behavioural intervention was implemented. The intervention consisted of educational posters, in Punjabi, Hindi and English, displayed prominently within the paediatric wards. These posters emphasized the importance of hand hygiene before patient contact and explained how to correctly use alcohol-based hand rub. Installation of alcohol-based hand sanitizer dispensers in patient care areas. Regular supply and refilling of sanitizer were ensured.

The intervention was passive, non-coercive and did not involve any sort of enforcement measures. No additional effort to raise attendant awareness was made. No changes were made to routine clinical care practices. The intervention was introduced in a phased manner using PDSA cycles. PDSA cycle 1 focused on implementation of the posters and sanitizer dispensers in the nursery sections of the paediatrics wards, allowing initial assessment of feasibility and acceptability.

PDSA cycle 2 involved expansion of the same intervention to the general areas of the paediatric wards, without modification to the intervention components, to evaluate whether observed changes were sustained following scale-up.

Post-intervention data collection

Post-intervention data collection used the same observational method. Was conducted in the same wards. Assessed the same outcome measures. Was carried out during routine ward functioning. Data were collected on multiple single-day observation periods following implementation of the intervention.

Outcome measures

Primary outcome

Proportion of attendants who performed hand hygiene using alcohol-based hand rub before touching the child.

Supporting measure

Indirect assessment of hand hygiene activity through sanitizer consumption measured at regular intervals at the ward level.

Outcome measures were chosen to reflect practical, observable changes in behaviour relevant to infection prevention practices in routine clinical settings.

Analysis

Categorical variables were summarized as frequencies and percentages. Pre-intervention and post-intervention proportions were compared to assess changes in observed hand hygiene compliance over time. Where applicable, sanitizer consumption over time was examined to assess trends following implementation.

Given the quality improvement nature of the project, analyses were focused on describing temporal changes rather than formal hypothesis testing. In addition, a chi-square test was applied to compare baseline and post-intervention compliance as a secondary, supportive statistical assessment.

Attribution and interpretation

In keeping with the principles of quality improvement work the observed changes are interpreted as temporal associations following implementation of the intervention. The use of PDSA cycles reflects an iterative service improvement with each cycle intended to support local learning and practical implementation within existing systems of care.

This project was conducted as a quality improvement initiative and was reviewed at the departmental level and was determined to not constitute human-subjects research and therefore did not require formal Institutional Ethics Committee approval.

RESULTS

During the pre-intervention phase, a total of 65 attendants across all wards in the Paediatrics department were interviewed. Of these, 31 (47.7%) attendants reported using alcohol-based hand sanitizer before touching the child.

After the intervention was implemented (installation of posters and sanitiser dispensers), attendant hand hygiene compliance improved over the subsequent observation periods. The project employed two PDSA cycles. PDSA 1 (week 1), was implemented in the nurseries (across all wards) only. It showed an increase in compliance to 71.4% (n=28). Subsequently, PDSA 2 was implemented in all paediatric wards in the department. This cycle demonstrated a sustained improvement with compliance

rates of 69.1% (n=81) in week 2 and 71.8% (n=85) in week 3 (Figure 1).

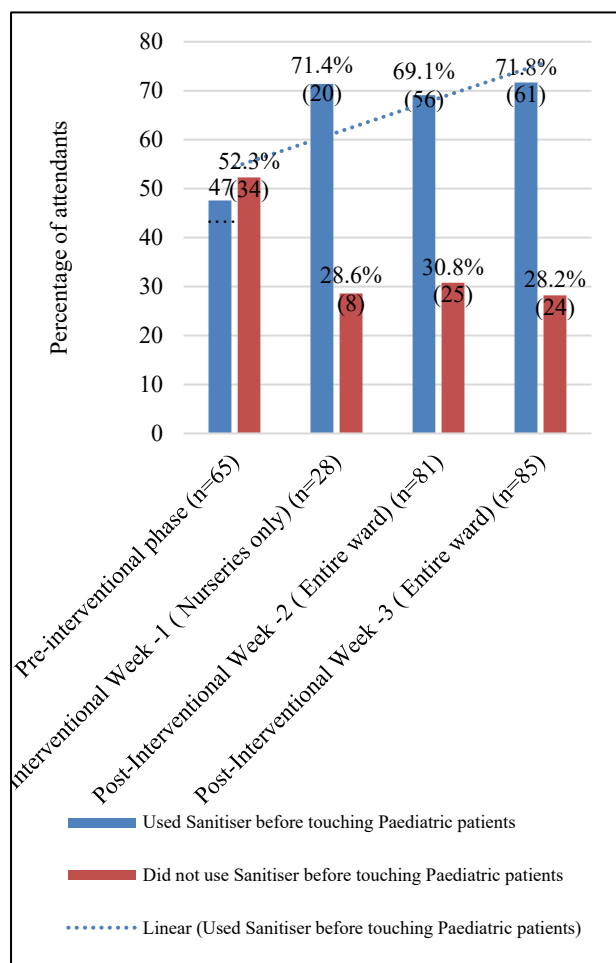


Figure 1: Temporal trends in attendant hand hygiene compliance before child contact.

Proportion of attendants reporting use of alcohol-based hand sanitizer before touching the child during routine care. Compliance increased following implementation of educational posters and installation of sanitizer dispensers, with sustained improvement

Overall, the intervention was associated with a sustained increase in reported hand hygiene compliance. The compliance plateaued around 70%. The post-intervention data was pooled across both PDSA cycles and the post-interventional compliance increased to 70.6% (n=194), to be compared to the baseline (47.7%). On using the chi-square, the difference in compliance between pre-intervention and post-intervention periods was statistically significant ($\chi^2=11.23$, $df=1$, $p=0.0008$), indicating a statistically significant difference between the pre and post-interventional periods.

Sanitizer consumption was monitored by measuring dispenser refill volumes at regular intervals. During the post-intervention period, ward-level sanitizer consumption increased progressively. Total sanitizer usage rose from 2

litres in post-intervention week 1 to 3.5 litres in week 2 and 4 litres in week 3. This increase occurred alongside a clear improvement in reported hand hygiene compliance among attendants and was sustained over the subsequent observation periods, offering indirect support for greater hand hygiene activity following the intervention. While compliance patterns showed minor variation across PDSA cycles, the early gains seen in the nursery phase (PDSA 1) were largely preserved after the intervention was extended to the entire ward (PDSA 2). This suggests that the observed improvement was sustained beyond a single care area. Small fluctuations in compliance are likely to reflect routine differences in ward activity and caregiver flow rather than a reduction in the intervention's impact. Demographic characteristics of participants were not collected as part of the project design.

DISCUSSION

Hand hygiene is essential to infection prevention. This is particularly important in paediatric wards where children are more vulnerable to hospital acquired infections and where attendants play an active role in daily care. The predominance of hand hygiene research and interventional studies targeting healthcare workers contrasts with the relative paucity of evidence focusing on patient attendants and caregivers.⁹⁻¹⁵ In this context, the observed improvement in compliance among attendants in our project provides preliminary support for considering infection prevention approaches among non-medical caregivers alongside healthcare workers. In resource-limited settings such as India, attendants often provide essential bedside care. Hence, attendant hand hygiene practices are extremely relevant to preventing infections.

Hand hygiene compliance improved from 47.7% at baseline (31/65) to 71.4% during PDSA Cycle 1 (nursery only, n=28) and was sustained during PDSA Cycle 2 following expansion to the entire paediatric ward, with compliance rates of 69.1% (n=81) in week 2 and 71.8% (n=85) in week 3. The absolute difference in compliance between the nursery-focused phase and the ward-wide phase was small. This indicates that the improvement in hand hygiene associated with the intervention was sustainable when scaled beyond a single, controlled setting, but it also highlights a potential ceiling for improvement with such an intervention. This might reflect contextual constraints, like limited literacy, limited number of dispensers per ward, the need for intentional effort to leave the bedside and short inpatient stays that limit repeated exposure to educational messaging. The improvement observed in compliance following the intervention is consistent with prior studies showing that visual reminders and environmental restructuring can improve hand hygiene behaviour without the need for intensive training or monitoring.¹⁶⁻¹⁸

The observed compliance rates in this project may be higher than those reported in some studies that define hand hygiene compliance more stringently, such as adherence to

all five WHO hand hygiene moments or composite measures of partial and complete compliance. This difference is partly attributable to the project's focused definition of compliance as use of alcohol-based hand sanitizer before touching the child. Although the educational posters described the WHO "Five Moments for Hand Hygiene," only pre-contact sanitizer use was measured, reflecting a pragmatic and context-appropriate outcome. In a low- and middle-income setting such as India, where baseline awareness and access to hand hygiene resources among attendants may be limited, sanitizer use before child contact represents a meaningful and achievable behavioural improvement. This operational definition prioritized feasibility over exhaustive behavioural assessment and aligns with the project's quality improvement intent.

Similar patterns of gradual uptake and stabilization have been described in other quality improvement initiatives targeting hygiene-related behaviours.^{19,20} Indirect support for increased hand hygiene activity was provided by the parallel rise in sanitizer consumption at the ward level. While sanitizer usage alone cannot confirm individual compliance, increasing consumption over time, particularly in conjunction with improved reported behaviour, strengthens the plausibility that the intervention led to genuine changes in practice. Use of consumption data as a supportive process or outcome measure has been described in prior hand hygiene improvement studies, especially where direct observation is impractical or resource-intensive.²¹

This project has certain limitations that should be acknowledged. Hand hygiene behaviour was assessed through brief self-reported responses. The project design did not include a control group and findings should therefore be interpreted as temporal associations rather than causal effects. Data collection occurred on discrete observation days rather than continuous surveillance. Demographic data were not collected, consistent with the system-level focus of this quality improvement initiative rather than individual-level analysis.

CONCLUSION

From the findings of this project, we can conclude that access to hand hygiene resources and visual media are temporally associated with improvement in hand hygiene related behaviours amongst paediatric patient attendants/caregivers. Improving attendant hand hygiene provides an opportunity to extend infection prevention efforts beyond healthcare workers in resource-limited settings.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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