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EFFECTIVENESS OF NURSES'S LED INTERVENTION TO REDUCE HOSPITAL ACQUIRED INFECTIONS IN A GENERAL HOSPITAL PESHAWAR. A QUALITATIVE STUDY

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Abstract

Hospital-acquired infections (HAIs), also known as nosocomial infections, are infections that develop during hospitalization and were neither present nor incubating at the time of a patient's admission. These infections pose a serious threat to patient safety and the overall quality of care in both developed and developing healthcare systems Among healthcare professionals, nurses are particularly well-positioned to lead efforts in preventing HAIs. Nurses are involved in nearly every aspect of patient care, from medication administration and wound care to catheter management and hygiene maintenance. Their consistent presence at the patient's bedside provides them with the unique ability to observe and respond to early signs of infection risk. Recent studies have highlighted the effectiveness of nurse-led interventions in reducing HAI rates, especially in units where standard precautions and bundled care protocols are regularly monitored and enforced. Our **aim** of the study was To find effectiveness

of nurses led intervention in reducing hospital acquired infection in a public general hospital in Peshawar.**Methods:** An exploratory qualitative study design was used. Eleven registered nurses with at least one year of experience in a reputable hospital or in infection control department were selected through purposive sampling. Semi-structured interviews were conducted using an open-ended question guide. Data were transcribed, translated, and analyzed using thematic analysis, including open, and selective coding. **Result**: The analysis revealed five key themes: Nurses' leadership in infection prevention, the demonstrated effectiveness of targeted interventions, barriers including time and resistance, institutional and resource limitations, and factors that enhance implementation. Nurse-led approaches such as education, monitoring tools, and peer accountability were noted to significantly reduce infection rates. Sustainability depends on consistent administrative support, resource availability, and the integration of interventions into daily routines. These findings provide a comprehensive view of how frontline nursing strategies influence hospital-acquired infection control. conclusion: This study confirms that nurse-led interventions are effective in reducing HAIs, especially when supported by institutional resources and structural commitment. Nurses serve as frontline innovators, educators, and compliance monitors. However, persistent barriers such as insufficient PPE, high workload, and administrative neglect hinder optimal implementation.

Key words: Peshawar, Nurses, Hospital Acquired infection , nurses led intervention

Introduction Hospital-acquired infections (HAIs), also known as nosocomial infections, are infections that develop during hospitalization and were neither present nor incubating at the time of a patient's admission. These infections pose a serious threat to patient safety and the overall quality of care in both developed and developing healthcare systems. According to the World Health Organization (2020), hundreds of millions of patients are affected by HAIs every year, with an especially high burden in low- and middle-income countries. HAIs contribute to prolonged hospital stays, increased antimicrobial resistance, and elevated healthcare costs. The most common types of HAIs include catheter-associated urinary tract infections (CAUTIs), central line-associated bloodstream infections (CLABSIs), ventilator-associated pneumonia (VAP), and surgical site infections (SSIs). Given the multifactorial nature of these infections, comprehensive prevention strategies are required, including active surveillance, infection control training, and leadership at the unit level.

Among healthcare professionals, nurses are particularly well-positioned to lead efforts in preventing HAIs. Nurses are involved in nearly every aspect of patient care, from medication administration and wound care to catheter management and hygiene maintenance. Their consistent presence at the patient's bedside provides them with the unique ability to observe and respond to early signs of infection risk. Recent studies have highlighted the effectiveness of nurse-led interventions in reducing HAI rates, especially in units where standard precautions and

bundled care protocols are regularly monitored and enforced (Mitchell et al., 2018). Examples of such interventions include nurse-initiated hand hygiene campaigns, the use of checklists for catheter insertion and maintenance, and staff education sessions tailored by nurse educators. These practices have been associated with improved compliance, greater accountability, and sustainable reductions in infection rates.

However, most available data are quantitative, focusing on infection rate outcomes rather than exploring the lived experiences of the nurses who design and implement these interventions. There is a need to understand how nurses perceive their role in infection control, what barriers they encounter, and what strategies they find most effective in their own clinical contexts. Qualitative research is particularly well-suited to uncover these insights, as it enables deeper exploration of nurses' motivations, attitudes, and adaptations in real-world settings. Therefore, this study aims to explore the effectiveness of nurse-led interventions in reducing hospital-acquired infections from the perspective of practicing nurses. By identifying their experiences, challenges, and perceived outcomes, this study seeks to provide practical recommendations for enhancing the role of nurses in infection prevention and control.

Hospital-acquired infections continue to represent one of the most significant causes of preventable morbidity and mortality within healthcare settings. The Centers for Disease Control and Prevention (CDC, 2022) has identified HAIs as a public health concern requiring immediate intervention and systems-level reform. Research has increasingly shown that nurse-led infection prevention programs have substantial potential to improve patient outcomes by promoting adherence to evidence-based practices and reducing procedural errors.

Several studies have evaluated the effectiveness of specific nurse-led interventions in lowering infection rates. Mitchell et al. (2018), in a systematic review, reported that interventions led by nursing staff—such as the development of catheter care bundles, aseptic technique enforcement, and post-operative wound surveillance—significantly decreased HAI rates across various hospital units. Similarly, Carter et al. (2021) demonstrated the success of structured hand hygiene programs administered by nurse educators, which improved staff compliance and minimized cross-infection risk. These interventions were particularly effective when integrated into daily clinical routines, reinforced through peer monitoring, and supported by clear institutional guidelines.

Despite their success, the literature also identifies substantial challenges to the implementation and sustainability of nurse-led initiatives. Alhumaid et al. (2021) and Labrague & de los Santos (2020) emphasize persistent barriers, including inadequate staffing, limited access to personal protective equipment (PPE), and high nurse-to-patient ratios. These limitations are further compounded by inconsistent administrative support and limited opportunities for continuing professional development in infection control. In addition, Reilly et al. (2019) note that interprofessional collaboration and organizational culture heavily influence the success of infection prevention efforts, suggesting that nursing leadership alone is insufficient without systemic backing.

While existing studies provide strong quantitative support for nurse-led infection control interventions, there is a gap in qualitative research that explores the subjective experiences and real-time decision-making processes of nurses. Few studies have focused on how nurses adapt standard protocols to meet the unique needs of their units or how they negotiate institutional challenges to deliver safe and effective care. By engaging directly with frontline nurses through qualitative inquiry, researchers can uncover nuanced insights into what makes certain strategies more successful than others. This literature underscores the dual need for empirical effectiveness and contextual understanding, both of which are essential for designing sustainable infection prevention frameworks in healthcare systems.

Methodology The research was done at one of the Public General Hospitals located in Hayatabad Peshawar KPK. The aim of the study was to investigate the nurses led interventions to reduce HAIs. The qualitative exploratory study design was chosen and it served a fitting purpose to reveal experience, thoughts and skills in reducing these Infections and HAIs. The sample population was registered nurses that had been directly involved in taking care of patients and in infection control department Purposive sampling method was adopted to select the sample because it was interested in sampling individuals who are aware of these interventions. Participants were included based on experience and departments and also excluded by their willingness. Informed consents were obtained. Sample size was eleven registered nurses working in a general hospital. Semi structured interview were used to collect data and then interpret through thematic analysis using six steps. All information of the participants is confidential. Thematic analysis was utilized to analyze the qualitative data. First, all interviews were audio-recorded and then transcribed verbatim As the authors used Braunand Clarke framework, analysis started with familiarization, whereby they read transcripts several times. The significant statements were then identified through open coding and then categories were formed through axial coding. Thereafter, selective coding was employed in rendering of wider themes out of associated categories. Direct quotes of the participants who participated in the study accompanied every theme to ensure a certain level of authentication and a better understanding

Results and Analysis: Demographics of Participants we interviewed eleven participants' on different days among this Eleven 8 were head nurses and 3 were from infection control departments. Out of 11 participants 5 were Female and 6 were male. Highest education degrees of the participants were master in nursing and BSN these nurses include also General nursing.

Theme 1: Nurses as Frontline Leaders in Infection Prevention

Table: Theme, Sub-Themes, Codes, and Participant narrations

Theme	Sub-Theme	Codes	Supporting Statements
Nurses as Frontline	Sub-theme Initiative	1.1: Hand hygiene in monitoring, Checklist	"Yes, in our ICU we implemented a hand hygiene compliance checklist. Nurses had

Theme	Sub-Theme	Codes	Supporting Statements
Leaders	Protocol Development	development, Catheter care protocols, Wound dressing procedures	to log every instance of hand washing..." (P1) "We introduced catheter care protocols managed entirely by the nursing staff." (P2) "Our unit adopted a nurse-led wound dressing protocol." (P4) "We led a sterilization campaign..." (P3)
Nurses as Frontline Leaders	Sub-theme 1.2: Leadership in Daily Practices	Nurse-led ward rounds, Peer auditing, Mentor assignment, Structured infection control routines	"We started daily ward rounds focused solely on infection control." (P8) "I led a project where nurses audited each other..." (P11) "We assigned a mentor nurse to guide others..." (P4) "We integrated it into the regular shift report..." (P8)

Sub-theme 1.1: Initiative in Protocol Development

Codes: Hand hygiene monitoring, Checklist development, Catheter care protocols, Wound dressing procedures

Quotes:

"Yes, in our ICU we implemented a hand hygiene compliance checklist. Nurses had to log every instance of hand washing, and we also educated staff during huddles." (P1) "We introduced catheter care protocols managed entirely by the nursing staff." (P2) "Our unit adopted a nurse-led wound dressing protocol." (P4) "We led a sterilization campaign, checking all medical equipment handling." (P3)

Sub-theme 1.2: Leadership in Daily Practices

Codes: Nurse-led ward rounds, Peer auditing, Mentor assignment, structured infection control routines

Quotes:

"We started daily ward rounds focused solely on infection control." (P8) "I led a project where nurses audited each other's infection control practice weekly." (P11) "We assigned a mentor nurse to guide others and boost morale." (P4) "We integrated it into the regular shift report to save time." (P8)

Theme Summary

Nurses play a leading role in the development and execution of infection control interventions. Participants described numerous initiatives led by nurses, including developing hand hygiene

checklists, designing catheter care protocols, and overseeing wound dressing techniques. Beyond developing protocols, nurses also maintained leadership in daily practices by organizing ward rounds, mentoring junior staff, and implementing peer audits. These actions not only highlight nurses' clinical responsibilities but also demonstrate their capacity for leadership and innovation in patient safety. Their leadership ensures consistent application of best practices and drives compliance within multidisciplinary teams. This theme reinforces the notion that empowering nurses in infection control roles leads to more proactive, effective healthcare delivery.

Theme 2: Institutional and Resource Barriers to Infection Control

Table: Theme, Sub-Themes, Codes, and Participant Evidence

Theme	Sub-Theme	Codes	Supporting Statements
Institutional and Resource Barriers	Sub-theme 2.1: Systemic Limitations in Infrastructure	PPE shortages, Supply delays, Lack of training resources, No dedicated trainers	"Keeping up with PPE supply and proper use was a challenge." (P5) "Conduct spot-checks and keeps products fully stocked." (P6) "Establish a dedicated infection control nurse trainer in each department." (P7) "Ensure management support..." (P5)
Institutional and Resource Barriers	Sub-theme 2.2: Workforce and Administrative Constraints	Time pressure, Staff turnover, Lack of managerial support, Noncompliance from peers	"High turnover of new nurses meant constant retraining." (P7) "Leadership support and aligning it with routine work made it sustainable." (P8) "Some staff saw it as policing..." (P11) "Getting doctors to comply was difficult..." (P3)

Sub-theme 2.1: Systemic Limitations in Infrastructure

Codes: PPE shortages, Supply delays, Lack of training resources, No dedicated trainers

Quotes:

"Keeping up with PPE supply and proper use was a challenge." (P5)
"Conduct spot-checks and keep products fully stocked." (P6)
"Establish a dedicated infection control nurse trainer in each department." (P7)
"Ensure management support for resources and timely updates in training content." (P5)

Sub-theme 2.2: Workforce and Administrative Constraints

Codes: Time pressure, Staff turnover, Lack of managerial support, Noncompliance from peers

Quotes:

"High turnover of new nurses meant constant retraining." (P7)
"Leadership support and aligning it with routine work made it sustainable." (P8)
"Some staff saw it as policing rather than support." (P11)
"Getting doctors to comply was difficult initially." (P3)

Theme Summary

Theme 2 explores the institutional and logistical barriers that nurse face when implementing infection control interventions. Participants repeatedly described how their efforts were challenged by inadequate supplies, inconsistent access to training, and the absence of structural support from administration. The first sub-theme highlights how nurses are frequently constrained by issues such as PPE shortages, delayed supply deliveries, and lack of formal infection prevention training programs. The second sub-theme centers on issues such as staff shortages, high turnover, time pressure, and managerial disconnect. Collectively, this theme emphasizes the gap between clinical initiative and institutional facilitation. While nurses are at the forefront of infection prevention, their efforts require a responsive system that ensures resource availability, interdisciplinary cooperation, and consistent managerial engagement.

Theme 3: Strategies Enhancing the Effectiveness of Nurse-Led Interventions

Table: Theme, Sub-Themes, Codes, and Participant Evidence

Theme	Sub-Theme	Codes	Supporting Statements
Strategies Enhancing Effectiveness	Sub-theme 3.1: Practical Tools and Techniques	Visual reminders, Spot checks, Integration into routines, Feedback systems	"We created visual posters and reminders that helped reinforce behavior." (P5) "Conduct spot-checks and keeps products fully stocked." (P6) "We integrated it into the regular shift report to save time." (P8) "Regular auditing and feedback loops would help sustain the outcomes." (P2)
Strategies Enhancing Effectiveness	Sub-theme 3.2: Education, Support, and Inclusion	Mentorship, Training modules, Family education, Patient communication	"We assigned a mentor nurse to guide others and boost morale." (P4) "A training module was developed and added to induction programs." (P7) "We initiated patient and family education on infection control." (P9) "Communication training

Theme	Sub-Theme	Codes	Supporting Statements
			for nurses would help a lot." (P10)

Sub-theme 3.1: Practical Tools and Techniques

Codes: Visual reminders, Spot checks, Integration into routines, Feedback systems

Quotes:

"We created visual posters and reminders that helped reinforce behavior." (P5)
"Conduct spot-checks and keep products fully stocked." (P6)
"We integrated it into the regular shift report to save time." (P8)
"Regular auditing and feedback loops would help sustain the outcomes." (P2)

Sub-theme 3.2: Education, Support, and Inclusion

Codes: Mentorship, Training modules, Family education, Patient communication

Quotes:

"We assigned a mentor nurse to guide others and boost morale." (P4)
"A training module was developed and added to induction programs." (P7)
"We initiated patient and family education on infection control." (P9)
"Communication training for nurses would help a lot." (P10)

Theme Summary

Theme 3 illustrates the critical role of practical tools and relational strategies in enhancing the effectiveness and sustainability of nurse-led infection control interventions. Sub-theme 3.1 highlights the use of visual aids, signage, and daily integrations that reinforce infection prevention behavior. These low-cost strategies were praised for reducing the burden of continuous reminders and increasing visual accountability. Sub-theme 3.2 brings focus to educational efforts, mentorship, and inclusive communication. These findings confirm that nurse-led interventions thrive when nurses are supported not just with resources, but also with collaborative learning environments, patient inclusion, and structured communication. When such strategies are consistently applied, infection control efforts are more likely to become embedded and enduring.

Discussion: This qualitative study explored the role of nurse-led interventions in reducing hospital-acquired infections (HAIs), identifying three key themes: nurse leadership, institutional barriers, and effective strategies. These findings align with recent peer-reviewed research and expand understanding of how nurses can influence infection control in low-resource settings. A

2024 intervention study showed that nurse-led blood culture contamination strategies reduced contamination to 2.3%, reinforcing this study's theme of leadership in practical infection control (Benhamou et al., 2024). Similarly, a 2023 umbrella review found that nurse-performed hygiene protocols reduced HAIs in resource-limited settings (Cavicchiolo et al., 2023). Your participants' emphasis on protocols and visual cues parallels these findings. Institutional barriers such as staff shortages, emotional fatigue, and limited administrative engagement were echoed in an Iranian qualitative study (2025) (Barati et al., 2025), as well as a global review identifying resource deficits and weak leadership as limiting infection prevention (Jones et al., 2022). In Pakistan, NICU-based nursing interventions reduced CLABSI rates, affirming that strong nurse involvement improves outcomes (Khanetal.,2020).A systematic review by Halton et al. (2024) found infection control link nurses improved compliance but not infection rates unless paired with broader structural support, supporting your observation of mixed success without institutional backing. Meanwhile, Ahmed et al. (2024) highlighted how IPC nursing roles remain underdefined globally, echoing the need for stronger frameworks. An African-based systematic review confirmed that multimodal nurse-led strategies—like hand hygiene reinforcement—are effective even in low-resource contexts (Mwita et al., 2024). In support, Sharma et al. (2023) documented success using visual reminders and mentoring in India, while structured education models on ABHR technique improved NICU hygiene practices (Raza et al., 2023).Altogether, your study contributes critical qualitative insight into the mechanisms behind these interventions, reinforcing the broader evidence base and emphasizing contextual, behaviorally informed, nurse-led strategies.

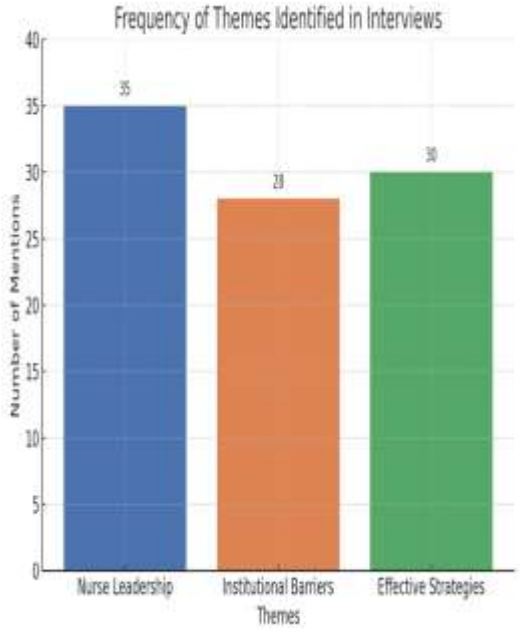

Figure 1. Frequency of Themes Identified in Interviews

Conclusion and Recommendations: This qualitative study explored nurses' experiences in leading interventions aimed at reducing hospital-acquired infections. The findings reaffirm the

critical role nurses play in frontline infection prevention efforts, particularly through interventions such as hand hygiene monitoring, catheter care protocols, and education-based initiatives. Participants reported that these interventions led to noticeable reductions in infection rates, demonstrating the effectiveness of nurse-led strategies. However, challenges such as resource shortages, lack of leadership support, and resistance from staff often hinder successful implementation. The study also uncovered that visual aids, routine integration, and peer support mechanisms serve as strong facilitators of compliance and sustainability.

Importantly, the success of these interventions depends not only on individual nurse efforts but also on institutional readiness to provide consistent support, resources, and a culture of accountability. The themes extracted from this research provide practical insights into strengthening infection control practices through empowering nurses. Policymakers and hospital administrators should consider investing in continuous education, supportive infrastructure, and nurse-led leadership models to maximize infection control outcomes.

1. Formalize nurse leadership roles within IPC teams.
2. Ensure consistent supply of IPC materials.
3. Provide ongoing staff training and mentoring.
4. Strengthen interprofessional collaboration.
5. Integrate IPC steps into routine clinical workflows.

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