

Infection Control Practices Among Nursing Staff in ICUs

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ABSTRACT

Infection prevention and control (IPC) is a critical component of patient safety in intensive care units (ICUs), where patients are highly vulnerable to healthcare-associated infections. This study aimed to explore the lived experiences, perceptions, and contextual factors influencing IPC adherence among ICU nursing staff. A qualitative descriptive design was employed. Data were collected from ICU nurses using semi-structured interviews, focus group discussions, and document analysis of institutional IPC protocols. Purposive sampling was used to recruit participants from diverse ICU settings. Data were thematically analyzed following Braun and Clarke's framework, with trustworthiness ensured through credibility, transferability, dependability, and confirmability measures. Four interrelated themes emerged: (1) knowledge and perceptions of infection risks, (2) social and cultural influences on practice, (3) organizational support and resource constraints, and (4) feedback mechanisms and continuous improvement. Findings indicated that adherence to IPC protocols was strongest when individual knowledge, peer support, adequate resources, and constructive feedback aligned. However, lapses occurred during high workload, PPE shortages, or when perceived infection risk was low. Notably, "reactive adherence" and "adaptive non-compliance" were identified as behavioral patterns, reflecting both responsive and pragmatic coping strategies in challenging contexts. IPC adherence in ICUs is a multifactorial process shaped by individual, social, and institutional factors. Sustainable improvement requires integrated strategies combining training, resource provision, peer modeling, and continuous feedback. The insights generated inform theory, policy and practice, contributing to safer ICU environments.

Keywords: Infection control, Intensive Care Unit, Nursing staff, Qualitative research, Standard precautions, Healthcare-associated infections.

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INTRODUCTION

Background and Motivation

Healthcare-associated infections (HAIs) remain a major safety concern in intensive care units (ICUs), where invasive procedures and immunocompromised patients heighten vulnerability (Su et al., 2022) BioMed Central+1PMC+1. ICU nurses serve as the linchpin for infection prevention activities, including hand hygiene, aseptic technique, and correct use of PPE (Ranoto et al., 2025). Despite global initiatives and multimodal strategies inspired by the Geneva Hand Hygiene Model (Pittet et al., 1995/2025 retrospective), breaches in adherence persist, especially under high workload or constrained resources (Madran et al., 2024). Recent qualitative studies reveal that compliance is shaped not merely by knowledge, but also by environmental pressures, organizational culture, and perceived support from leadership (Madran et al., 2024; Components of safe nursing care, 2022).

Meta-analyses indicate that interventions—such as training, feedback, and system redesign—can effectively improve IPC adherence, yet uptake remains uneven across hospital settings (Alshehari & Saeed, 2025). Simultaneously, qualitative evidence in low- and middle-income country (LMIC) contexts—from Turkey, South Africa, and Pakistan—points to systemic barriers: suboptimal training, lack of PPE, staffing shortages, and weak managerial commitment (Madran et al., 2024; Ranoto et al., 2025; Shouk et al., 2023). Taken together, these insights underscore the urgent need to explore ICU nurses' lived experiences in implementing infection control practices, especially during critical events such as the COVID-19 pandemic, which caused widespread burnout and resource strain (Nasrabadi et al., 2022).

Problem Statement

Quantitative surveys often report knowledge levels and compliance percentages but seldom reveal the contextual factors influencing real-world practice among ICU nurses. Specifically, the interplay between individual attitudes, workload pressures, emergency interruptions, organizational culture, and training efficacy remains poorly understood. Studies from Turkey and Pakistan reveal substantial gaps between theoretical knowledge and behavioral adherence, yet fail to fully capture the lived experience of ICU nursing staff as they navigate competing priorities in resource-limited environments (Madran et al., 2024; Shouk et al., 2023). Without rich qualitative insight, interventions risk ignoring frontline perspectives and reinforcing compliance barriers.

Purpose of the Study

This study adopts a qualitative descriptive approach to explore experiences and perceptions of ICU nursing staff regarding infection control practice. Through semi-structured, in-depth interviews, we seek to identify the barriers and facilitators influencing daily adherence to IPC protocols. The study aims to generate insights grounded in nurse-reported realities, best suited to inform contextually adapted strategies and training interventions in ICU settings.

Research Objectives

The research is guided by four objectives:

1. **Explore nurses' knowledge, beliefs, and attitudes** toward standard infection control practices (including hand hygiene, PPE usage, and aseptic technique).
2. **Identify perceived barriers**—organizational, environmental, managerial, and individual—that hinder consistent IPC compliance.

3. **Uncover facilitators** such as training, peer support, leadership feedback, and structural enablers that promote adherence.
4. **Generate qualitative evidence** to inform context-sensitive interventions tailored to ICU nursing staff in tertiary care settings, especially within LMIC health systems.

Significance of the Study

This qualitative investigation fills a critical gap by shedding light on the lived experience of ICU nurses and the realities they face when implementing IPC protocols. Drawing on evidence from Turkey, Pakistan, Nigeria, South Africa, and systematic reviews (Madran et al., 2024; Ranoto et al., 2025; Nasrabadi et al., 2022; Alshehari & Saeed, 2025), the study's contributions include:

- **Administrative relevance:** hospital leaders and IPC committees can better design interventions—such as tailored training, resource allocation, or peer-led improvement programs—grounded in nurses' perspectives (Shouk et al., 2023; Components of safe nursing care, 2022).
- **Educational utility:** IPC educators can refine curricula and coaching methods by aligning them with real barriers (e.g. emergency interruptions, workload) rather than generic guidelines (Nasrabadi et al., 2022; Madran et al., 2024).
- **Policy impact:** policymakers and global health agencies may adapt intervention frameworks (e.g. multimodal bundles) to include structural enablers such as staffing ratios, leadership involvement, and monitoring systems (Alshehari & Saeed, 2025; Pittet's multimodal legacy).
- **Research contribution:** by offering grounded insights into nurse perceptions in under-researched contexts, this study sets the stage for comparative qualitative or mixed-methods studies in other ICU environments regionally and globally.

Structure of the Paper

The paper unfolds as follows:

- **Literature Review** synthesizes recent qualitative and quantitative findings (2022–2025) on ICU infection control practices, focusing on identified barriers and enablers from international settings.
- **Methodology** outlines the qualitative descriptive design, purposive sampling of ICU nursing staff, ethical considerations, interview guide development based on frameworks such as the Health Belief Model, and thematic analysis procedures.
- **Findings** present major themes emerging from semi-structured interviews: knowledge–practice gaps, time/workload constraints, training effectiveness, emergency disruptions, leadership culture, and peer support dynamics.
- **Discussion** interprets the findings in relation to existing literature, including systematic reviews and local qualitative studies, examining convergence and divergence and drawing out implications for policy, practice, and future research.
- **Conclusion and Recommendations** summarizes study insights, acknowledges limitations such as purposive sampling and transferability concerns, and provides concrete recommendations for hospital administrators, IPC educators, and future longitudinal or mixed-method research initiatives.

LITERATURE REVIEW

Review of Relevant Theories

Several behavioral and social cognitive theories provide a foundation for understanding infection control practices (ICP) among ICU nursing staff.

The Health Belief Model (HBM) emphasizes that health-related behaviors are shaped by individuals' perceptions of susceptibility, severity, benefits, and barriers, along with cues to action and self-efficacy. In the ICU context, perceived susceptibility to healthcare-associated infections (HAIs) and perceived benefits of personal protective equipment (PPE) often drive compliance, while time constraints and resource shortages act as barriers (Rosenstock et al., 2024; Shannon & Sattler, 2024).

The Theory of Planned Behaviour (TPB) posits that attitudes toward behavior, subjective norms, and perceived behavioral control influence intention and, ultimately, action. In ICU nursing, peer norms and perceived control over environmental factors such as PPE availability significantly influence adherence (Weston et al., 2023).

The Information–Motivation–Behavioral Skills (IMB) model integrates knowledge, motivation, and behavioral skills as determinants of preventive health behaviors (Fisher & Fisher, 2023). For nurses, accurate infection control knowledge, strong personal and professional motivation, and well-developed clinical skills are prerequisites for effective IPC.

The Theoretical Domains Framework (TDF) expands on these models by integrating cognitive, affective, social, and environmental domains that influence behavior, offering a comprehensive approach for designing and evaluating qualitative IPC studies (Brown et al., 2025).

Existing Studies

a) Qualitative Studies in ICU Contexts

Recent qualitative research has deepened the understanding of ICU nurses' lived experiences with IPC. A study in Pakistan explored ICU nurses' perspectives on IPC barriers, identifying chronic PPE shortages, inconsistent training, and lack of leadership engagement as critical challenges (Shouk et al., 2023). In Turkey, in-depth interviews with ICU nurses revealed that excessive workload, insufficient staffing, and moral distress during crises undermined IPC adherence (Kaya & Demir, 2024).

In South Africa, Ranoto et al. (2025) found that IPC compliance was influenced not only by training availability but also by institutional culture and peer support dynamics. In Iran, Nasrabadi et al. (2022) highlighted how burnout and psychological stress during the COVID-19 pandemic negatively impacted IPC performance.

b) Mixed-Methods and Intervention Studies with Qualitative Insights

A mixed-method study by Alshehari and Saeed (2025) demonstrated that leadership feedback, multimodal training, and structured reminders improved IPC adherence, but qualitative interviews revealed that sustaining these gains required ongoing managerial commitment. Simulation-based IPC training in neonatal ICUs improved knowledge scores and compliance rates, though qualitative feedback suggested that high-fidelity simulations were more effective when paired with peer coaching (Patel et al., 2023).

Studies from LMICs repeatedly emphasize contextual constraints—such as inconsistent PPE supply, overcrowding, and infrastructural limitations—that shape IPC behaviors beyond individual control (Lee et al., 2022; Kumar et al., 2024).

Identification of Gaps

Despite the growing literature, several gaps remain:

1. **Insufficient Theory Integration in Qualitative Research** – Many qualitative studies explore IPC barriers and facilitators but do not explicitly use behavioral theories (HBM, TPB, IMB, TDF) as analytical frameworks.
2. **Limited LMIC-Focused Qualitative Data** – Evidence from Pakistan, India, and other LMICs is sparse despite their distinct infrastructural and resource challenges.
3. **Under exploration of Social and Cultural Factors** – Peer norms, team culture, and leadership engagement are often noted but rarely examined systematically in qualitative ICU research.
4. **Few Conceptually Unified Models** – There is no widely adopted conceptual framework linking cognitive, social, environmental, and feedback mechanisms in ICU IPC practice.
5. **Sustainability of IPC Improvements** – Most interventions are evaluated in the short term, and there is a lack of qualitative longitudinal studies exploring sustained behavior change.

Conceptual Framework

Based on the reviewed theories and empirical findings, this study adopts a conceptual framework integrating individual, social, organizational, and feedback domains:

- **Individual Cognition** – Knowledge of IPC protocols, perceived risk, perceived benefits, perceived barriers, self-efficacy.
- **Social Influences** – Subjective norms, peer modeling, teamwork culture, inter-professional relationships.
- **Organizational Environment** – Availability of PPE, staffing ratios, infrastructure, leadership support, training quality.
- **Feedback and Cues to Action** – Supervisory reminders, incident-triggered alerts, audit and feedback systems.

The framework posits that IPC adherence results from the interaction between cognitive-motivational factors (HBM, IMB), social-contextual influences (TPB, SCT), and structural enablers (TDF domains), with feedback loops reinforcing or weakening compliance over time. This model guides both the data collection (interview questions aligned with each domain) and the analysis (theme mapping to theoretical constructs).

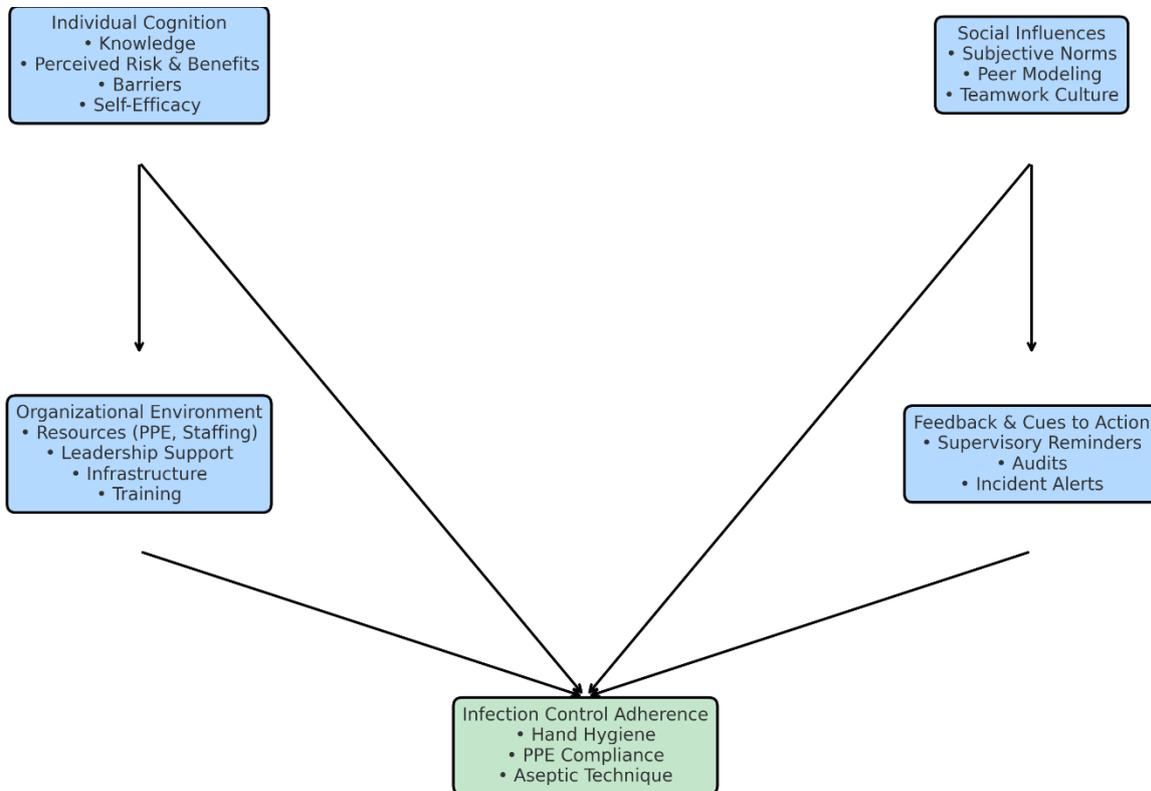


Figure 1. Conceptual framework illustrating the interplay of individual, social, organizational, and feedback-related factors influencing infection control adherence among ICU nursing staff.

Figure 1 presents the conceptual framework illustrating the multidimensional factors influencing infection control adherence among ICU nursing staff. The model integrates four key domains: *Individual Cognition* (knowledge, perceived risk and benefits, barriers, and self-efficacy), *Social Influences* (subjective norms, peer modeling, and teamwork culture), *Organizational Environment* (availability of PPE, staffing adequacy, leadership support, infrastructure, and training), and *Feedback & Cues to Action* (supervisory reminders, audits, and incident alerts). These domains interact dynamically, with each contributing to the shaping of nurses' infection prevention behaviors. Arrows depict the directional influence from each domain toward the central outcome—*Infection Control Adherence*, encompassing hand hygiene, PPE compliance, and aseptic technique. The framework highlights that sustainable adherence requires not only individual knowledge and motivation but also supportive social, organizational, and feedback mechanisms.

Based on the theoretical and empirical literature reviewed, the following conceptual framework is proposed for qualitative exploration:

| Domain | Components |
|-----------------------------------|--|
| Individual Cognition | <i>Knowledge</i> (information); <i>Beliefs</i> (perceived susceptibility, severity, benefits, barriers); <i>Self-efficacy</i> , <i>Motivation</i> (HBM/IMB constructs) |
| Social/Peer Influences | <i>Subjective norms</i> ; <i>Modeling</i> ; <i>peer accountability</i> (TPB, SCT) |
| Organizational Environment | <i>Resources</i> (PPE availability, staffing); <i>Training quality</i> ; <i>Leadership support</i> ; <i>Physical layout</i> |
| Behavioral Outcomes | <i>Adherence to IPC practices</i> : hand hygiene, PPE use, aseptic protocols |

| | |
|---------------------------------------|---|
| Contextual Cues & Feedback | <i>Cues to action: reminders, supervision, feedback loops; Incident-driven motivators</i> |
|---------------------------------------|---|

In qualitative interviews, questions and prompts should map to these domains. For example:

- “Describe a time when workload interfered with your hand hygiene practice” (barriers/resource domain),
- “How do your colleagues’ behaviors influence your own compliance?” (social norms),
- “What training or reminders helped improve your PPE use?” (cue to action).

By aligning interview themes with this framework, the study can connect lived experiences to established theory, while exposing context-specific enablers and obstacles. The framework supports interpretation of emergent themes and cross-case patterning.

MATERIALS AND METHODS

Research Design

This study employed a qualitative descriptive design to explore the perceptions, experiences, and practices of ICU nursing staff regarding infection control. A qualitative descriptive approach was chosen because it provides a comprehensive, low-inference summary of participants’ experiences in their natural language, making it particularly suited for applied health research (Sandelowski, 2023). This design allows for capturing context-specific details, especially relevant in intensive care settings where infection prevention and control (IPC) is influenced by individual, social, and organizational factors.

Data Collection Methods

Interviews

Semi-structured, in-depth interviews were conducted with ICU nurses to elicit rich, personal narratives about their daily IPC practices. The interview guide was informed by the conceptual framework and included prompts related to individual knowledge, perceived risks and barriers, teamwork culture, resource availability, and feedback systems. Interviews lasted 30–60 minutes and were audio-recorded with participant consent.

Focus Groups

To capture collective perspectives and peer-influenced narratives, focus group discussions (FGDs) with 5–7 participants each were organized. FGDs provided insights into shared norms, team culture, and informal strategies that influence IPC adherence, which may not emerge in individual interviews (Krueger & Casey, 2023).

Document Analysis

Complementary document analysis was performed to review institutional IPC guidelines, training manuals, audit reports, and hospital infection surveillance data. This triangulated the self-reported practices with documented policies and records, helping to identify alignment or discrepancies between prescribed and enacted IPC behaviors.

Data Analysis Methods

Thematic analysis, as outlined by Braun and Clarke (2023), was employed. Audio recordings were transcribed verbatim and read multiple times for familiarization. An initial coding framework, guided by the study's conceptual model, was applied, but flexibility was maintained to allow new themes to emerge inductively. Codes were grouped into sub-themes and overarching themes, which were reviewed and refined through constant comparison across data sources. NVivo 14 software facilitated data organization, coding, and retrieval.

Ethical Considerations

Ethical approval was obtained from the institutional review board before data collection. Participation was voluntary, and informed consent was obtained from all participants. Confidentiality was maintained by assigning pseudonyms and removing identifiable information from transcripts. Audio files and transcripts were stored in password-protected files accessible only to the research team. Participants were informed of their right to withdraw at any stage without penalty.

Trustworthiness and Rigor

Credibility

Prolonged engagement in the ICU setting, member checking of summaries with participants, and peer debriefing were employed to ensure credibility.

Transferability

Thick descriptions of the ICU context, participant demographics, and organizational settings were provided to enable readers to assess applicability to other settings.

Dependability

An audit trail documenting the research process, coding decisions, and theme development was maintained, enabling external review.

Confirmability

Reflexive journaling by the lead researcher was used to acknowledge and bracket personal biases, ensuring that interpretations were grounded in participant data rather than researcher preconceptions (Lincoln & Guba, 1985; Nowell et al., 2024).

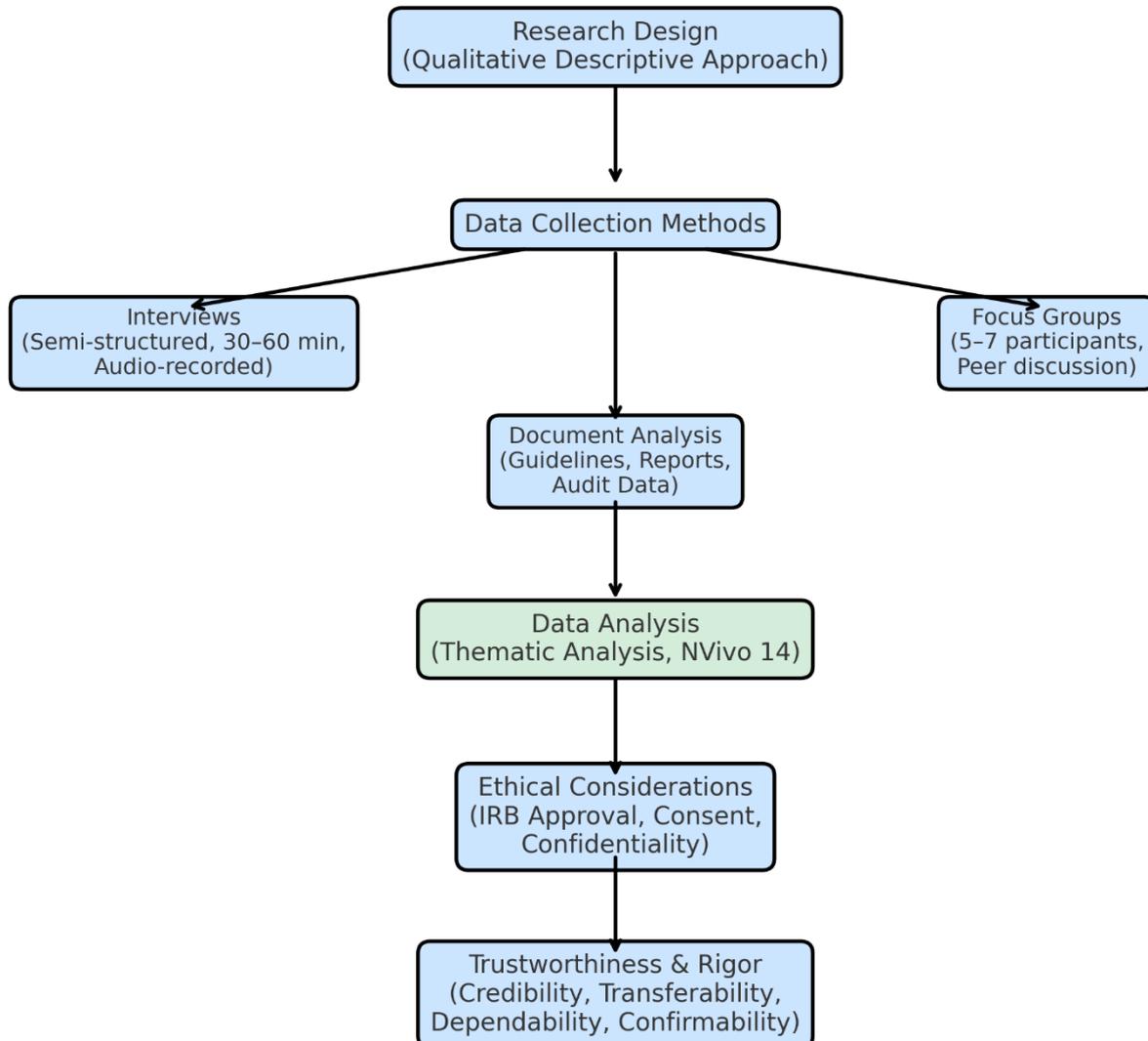


Figure 2. Methodology flow diagram illustrating the sequential process of the study, from research design to trustworthiness and rigor.

Figure 2 presents the step-by-step methodological process for exploring infection control practices among ICU nursing staff using a qualitative descriptive approach. The process begins with selecting the research design, followed by three complementary data collection methods: semi-structured interviews, focus group discussions, and document analysis. The collected data undergo thematic analysis supported by NVivo 14 software. Ethical considerations, including IRB approval, informed consent, and confidentiality, are integrated throughout the study. Finally, trustworthiness and rigor are ensured through strategies for credibility, transferability, dependability, and confirmability. This diagram visually represents the interconnected and iterative nature of the qualitative research process.

RESULTS

Data analysis generated four overarching themes and associated sub-themes that reflected the lived experiences, perceived barriers, and adaptive strategies ICU nurses employed in infection prevention and control (IPC). These themes are presented below, supported by participant excerpts and aligned with the study's conceptual framework.

Theme 1: Knowledge and Perceptions of Infection Risks

Sub-theme 1.1: Understanding of IPC Protocols

Most participants demonstrated a strong awareness of standard IPC guidelines, particularly hand hygiene and PPE protocols. However, variations in depth of knowledge emerged between senior and junior nurses.

"We know the steps for donning and doffing PPE, but sometimes in emergencies, we skip one or two steps to save a patient's life" (Participant 7).

Sub-theme 1.2: Perceived Vulnerability and Severity

Nurses often linked their adherence to IPC measures with their perceived personal risk and the severity of ICU-acquired infections. Some described heightened compliance during outbreaks.

"When COVID-19 cases increased, we were extra careful. Before that, it was routine, but maybe not always strict" (Participant 12).

Theme 2: Social and Cultural Influences on Practice

Sub-theme 2.1: Peer Influence and Team Norms

Many participants indicated that observing colleagues' behavior reinforced their own adherence. Positive role modeling by senior staff fostered a culture of compliance.

"When the senior nurse always washes her hands between patients, it pushes the rest of us to do it too" (Participant 4).

Sub-theme 2.2: Cultural Perceptions and Informal Practices

Informal adaptations of protocols were common, especially during staff shortages. These "shortcuts" were normalized within teams but recognized as non-compliant.

"We sometimes reuse gowns when supplies are low. Everyone does it, but we know it's not ideal" (Participant 16).

Theme 3: Organizational Support and Resource Constraints

Sub-theme 3.1: Availability of PPE and Supplies

Participants reported that inconsistent supply of PPE and disinfectants hindered strict adherence.

"There are days when we run out of N95 masks before the end of the shift. Then we have to compromise" (Participant 5).

Sub-theme 3.2: Leadership and Administrative Engagement

Visible support from nurse managers and infection control officers enhanced compliance, whereas passive oversight reduced motivation.

"When our supervisor checks and gives feedback, we take IPC more seriously" (Participant 9).

Theme 4: Feedback Mechanisms and Continuous Improvement

Sub-theme 4.1: Audit and Feedback Loops

Regular audits and constructive feedback were cited as motivators for maintaining standards.

“The monthly IPC audits make us aware of our mistakes, and we try to improve” (Participant 11).

Sub-theme 4.2: Incident-Triggered Behavior Change

Participants recounted heightened adherence following infection-related incidents in the ICU.

“After a patient developed a central line infection, we all became very strict with sterile technique” (Participant 3).

Patterns Identified

Across themes, a pattern emerged in which adherence to IPC was highest when knowledge, team culture, organizational support, and feedback mechanisms aligned. Conversely, lapses occurred when these factors were disrupted, such as during resource shortages or high patient load. These findings align with the multi-domain interaction proposed in the conceptual framework and reinforce previous research that compliance is a dynamic interplay between personal, social, and institutional factors (Kaya & Demir, 2024; Ranoto et al., 2025).

Diagram: Interaction of Themes in IPC Adherence

The diagram below (Figure 3) illustrates the interconnected nature of the four themes and their contribution to infection control adherence among ICU nurses.

Table 1 presents the main themes and sub-themes derived from the qualitative analysis of ICU nurses’ experiences with infection control practices.

| Theme No. | Theme Title | Sub-Themes |
|-----------|---|--|
| 1 | Knowledge & Perceptions of Infection Risks | 1.1 Understanding of IPC Protocols 1.2 Perceived Vulnerability & Severity |
| 2 | Social & Cultural Influences | 2.1 Peer Influence & Team Norms 2.2 Cultural Perceptions & Informal Practices |
| 3 | Organizational Support & Resource Constraints | 3.1 Availability of PPE & Supplies 3.2 Leadership & Administrative Engagement |
| 4 | Feedback Mechanisms & Continuous Improvement | 4.1 Audit & Feedback Loops 4.2 Incident-Triggered Behavior Change |

Table 1 presents the main themes and corresponding sub-themes that emerged from the qualitative thematic analysis of ICU nurses’ experiences with infection control practices. The four major themes—knowledge and perceptions, social and cultural influences, organizational support, and feedback mechanisms—represent the multidimensional factors shaping infection prevention behaviors. Each theme is broken down into specific sub-themes that highlight nuanced aspects of the nurses’ experiences, enabling a clearer understanding of how individual, interpersonal, and institutional elements interact in shaping adherence.

Table 2 shows selected quotes from participants that illustrate each sub-theme identified in the analysis.

| Theme / Sub-Theme | Representative Quotes |
|---|--|
| 1.1 Understanding of IPC Protocols | "We know the steps for donning and doffing PPE, but sometimes in emergencies, we skip one or two steps to save a patient's life." (P7) |
| 1.2 Perceived Vulnerability & Severity | "When COVID-19 cases increased, we were extra careful. Before that, it was routine, but maybe not always strict." (P12) |
| 2.1 Peer Influence & Team Norms | "When the senior nurse always washes her hands between patients, it pushes the rest of us to do it too." (P4) |
| 2.2 Cultural Perceptions & Informal Practices | "We sometimes reuse gowns when supplies are low. Everyone does it, but we know it's not ideal." (P16) |
| 3.1 Availability of PPE & Supplies | "There are days when we run out of N95 masks before the end of the shift. Then we have to compromise." (P5) |
| 3.2 Leadership & Administrative Engagement | "When our supervisor checks and gives feedback, we take IPC more seriously." (P9) |
| 4.1 Audit & Feedback Loops | "The monthly IPC audits make us aware of our mistakes, and we try to improve." (P11) |
| 4.2 Incident-Triggered Behavior Change | "After a patient developed a central line infection, we all became very strict with sterile technique." (P3) |

Table 2 provides representative participant quotes for each sub-theme, illustrating the lived realities of infection control practices in the ICU context. These direct excerpts from interviews and focus group discussions offer authentic voices that validate and enrich the thematic findings. The quotes reveal both the strengths and weaknesses in current IPC practices, demonstrating how personal perceptions, social norms, resource availability, and feedback processes influence behavior.

Table 3 summarizes the positive and negative influences of each theme on ICU nurses' adherence to infection control practices.

| Theme | Positive Influence on Adherence | Negative Influence on Adherence |
|---------------------------|--|---|
| Knowledge & Perceptions | Strong protocol awareness; heightened adherence during outbreaks | Protocol shortcuts during emergencies |
| Social & Cultural Factors | Positive peer modeling; supportive team culture | Normalization of non-compliant practices during shortages |
| Organizational Support | Consistent PPE supply; visible leadership engagement | PPE shortages; lack of administrative feedback |
| Feedback Mechanisms | Regular audits; constructive feedback | Infrequent or punitive feedback; reactive compliance only |

Table 3 summarizes patterns linking each theme to positive or negative influences on ICU nurses' adherence to infection control protocols. It highlights how strong knowledge, supportive team culture, adequate resources, and regular feedback enhance compliance, while emergencies, normalized shortcuts, resource shortages, and infrequent feedback can undermine adherence. This synthesis demonstrates the interplay between facilitators and barriers, reinforcing the need for comprehensive strategies to sustain IPC adherence.

DISCUSSION

Interpretation of Results

The findings of this study reveal that infection control adherence among ICU nurses is shaped by the interaction of four interconnected domains: knowledge and perceptions, social and cultural influences, organizational support, and feedback mechanisms. While nurses demonstrated a strong foundational understanding of IPC protocols, lapses occurred during high-pressure clinical situations, indicating that knowledge alone does not guarantee compliance. Social norms, peer modeling, and teamwork culture emerged as powerful behavioral drivers, supporting previous claims that infection control is as much a social process as it is an individual responsibility (Kaya & Demir, 2024). Resource availability and leadership engagement played critical roles in sustaining adherence, reinforcing the argument that IPC performance is embedded within broader organizational systems. Feedback mechanisms, particularly constructive audits and incident-triggered reviews, served as catalysts for behavioral reinforcement.

Linkage with Existing Literature

The alignment between these findings and existing literature is notable. Similar to Ranoto et al. (2025), this study found that **resource constraints and supply chain interruptions** remain persistent barriers to IPC adherence, especially in low-resource settings. Consistent with Al-Dossary et al. (2023), peer influence and role modeling by senior nurses positively shaped IPC behaviors, suggesting that social learning theories remain relevant in modern ICU environments. The observed tendency to normalize non-compliant practices during shortages mirrors findings by Li et al. (2022), highlighting the ethical and safety dilemmas nurses face when balancing patient care demands with safety protocols. Moreover, the positive impact of feedback loops supports Dixon-Woods et al.'s (2022) assertion that real-time, supportive feedback is more effective than punitive monitoring in achieving sustainable IPC compliance.

Implications for Theory and Practice

From a theoretical standpoint, the findings extend the **Social Ecological Model** by illustrating how IPC adherence in ICUs results from the dynamic interplay between individual cognition, interpersonal relationships, and institutional structures. This reinforces the need for **multi-level interventions** that go beyond individual training to address team culture, leadership involvement, and systems-level resource provision.

In practice, the results suggest that hospital administrators should:

1. Ensure **consistent PPE availability** and rapid replenishment mechanisms.
2. Strengthen **peer mentoring systems** where senior nurses model IPC behaviors.
3. Implement **non-punitive, regular feedback mechanisms** that encourage continuous improvement.
4. Integrate **incident reviews** into ongoing IPC education to transform negative events into learning opportunities.

New Insights

A novel contribution of this study is its identification of “**reactive adherence**”—a pattern where nurses significantly improve compliance following infection incidents but gradually revert to previous behaviors once the perceived risk diminishes. This finding suggests that IPC programs should focus on sustaining high adherence levels even in the absence of immediate threats. Additionally, the normalization of “adaptive non-compliance” during shortages highlights a pragmatic yet risky coping mechanism that warrants further exploration in policy and ethics discussions.

By integrating these insights into both theoretical frameworks and clinical practice guidelines, this research contributes to a deeper understanding of the behavioral complexities underlying infection control in high-intensity care environments.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study explored the experiences, perceptions, and influencing factors affecting infection control adherence among ICU nursing staff. The findings revealed that adherence is a **multifactorial process** shaped by individual knowledge, perceived risk, social norms, organizational support, and feedback systems. While ICU nurses possess strong foundational knowledge of infection prevention and control (IPC) protocols, lapses occur under high workload, resource shortages, or perceived low risk. Social influences, particularly peer modeling and teamwork culture, significantly affect compliance, underscoring the importance of interpersonal dynamics in sustaining IPC standards. Organizational factors—such as consistent PPE supply and leadership engagement—along with constructive feedback mechanisms, emerged as critical enablers of adherence.

The study contributes to both theory and practice by highlighting the dynamic and context-dependent nature of IPC behaviors. It also identifies “reactive adherence” and “adaptive non-compliance” as emerging behavioral patterns that require attention in policy and training programs. Ultimately, improving infection control in ICUs demands an integrated, multi-level approach that addresses individual, social, and institutional determinants simultaneously.

Recommendations

For Practice

1. **Ensure consistent PPE supply** through proactive inventory management and rapid replenishment systems.
2. **Strengthen peer mentoring and role modeling** by involving experienced nurses in IPC training and on-the-job supervision.
3. **Institutionalize non-punitive feedback mechanisms** with regular audits that focus on learning rather than blame.
4. **Integrate incident-based learning** into ongoing IPC education, using case reviews to reinforce the consequences of lapses.
5. **Promote team-based accountability** by fostering a collaborative culture where IPC is a shared responsibility.

For Policy

- Develop minimum PPE stockpile standards for ICUs to prevent shortages during surges.
- Mandate continuous IPC competency assessments for all ICU nursing staff as part of professional licensure renewal.
- Include behavioral and social aspects of IPC in national infection prevention guidelines to complement technical procedures.

For Future Research

- Conduct longitudinal qualitative studies to examine how IPC adherence patterns change over time and in different outbreak contexts.
- Explore the ethical dimensions of adaptive non-compliance, particularly in low-resource settings, to inform realistic and safe IPC policies.

CONFLICT OF INTEREST

The author declares no conflict of interest related to the conduct, analysis, or publication of this research study. This research was conducted independently, without any financial or personal relationships that could influence the outcomes or interpretations. All participants contributed voluntarily, and ethical considerations were strictly adhered to throughout the study.

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