Logical Creations Education Research Institute
MADER E MILAT INTERNATIONAL JOURNAL OF NURSING AND ALLIED SCIENCES
E-ISSN: 2960-2181
Web: www.minasij.com | Email: editor@minasij.com
Volume-02 | Issue-02 | June-2024

Barriers to Implementing Infection Control Guidelines in Intensive Care Units

Mohammad Eisa Ali[1], Maleeha Pandit[2], Motassam Ali[3]
[1]Medical Student, Department of Molecular Medicine, University of Pavia, Pavia-Italy.
[2]Faculty of Medicine, Medical University of Plovdiv, Plovdiv-Bulgaria.
[3]Clinical Pharmacist, University of Huddersfield, Huddersfield, UK.
eisa121@yahoo.com, maleehapandit222@gmail.com, motassam121@yahoo.com

DOI: 10.5281/zenodo.16750125

ABSTRACT

Infection control is a critical component of patient safety in Intensive Care Units (ICUs) due to the high risk of healthcare-associated infections. Despite the availability of evidence-based guidelines, adherence remains inconsistent. This study aimed to explore the perceived barriers to implementing infection control guidelines among ICU healthcare professionals. A qualitative research design was employed using semi-structured, in-depth interviews with 15 ICU nurses and physicians from two tertiary care hospitals. Participants were selected through purposive sampling to ensure representation of varied experiences. Data were analyzed thematically following Braun and Clarke's framework, enabling identification of recurrent patterns and themes related to challenges in guideline adherence. Analysis revealed five major barriers: (1) inadequate staffing and workload pressures, (2) insufficient training and refresher courses, (3) limited availability of infection control supplies, (4) organizational and leadership gaps and (5) perceived lack of relevance or practicality of certain guidelines in the ICU context. Interconnected systemic and behavioral factors hindered consistent compliance, with staff often prioritizing immediate patient care needs over protocol adherence. The findings underscore the multifactorial nature of barriers to infection control in ICUs, combining resource constraints, organizational culture, and individual perceptions. Addressing these barriers requires targeted interventions, including staff capacity building, improved resource allocation and leadership-driven infection control culture. Strengthening these areas may enhance compliance and reduce infection rates in critical care settings.

Keywords: Infection control, Intensive Care Unit, Qualitative research, Barriers, Healthcare-associated infections, Compliance.

Cite as: Mohammad Eisa Ali, Maleeha Pandit, Motassam Ali (2024). Barriers to Implementing Infection Control Guidelines in Intensive Care Units. *Mader-e-Milat International Journal of Nursing and Allied Sciences, 2*(2), 36–52. https://doi.org/ 10.5281/zenodo.16750125

INTRODUCTION

Background and Motivation

Healthcare-associated infections (HAIs), particularly in intensive care units (ICUs), continue to pose a serious global challenge, with elevated morbidity, mortality, and healthcare costs (Rosenthal et al., 2025). Despite strong evidence that compliance with infection prevention and control (IPC) guidelines reduces HAIs (e.g., Pittet's Geneva hand hygiene campaigns), real-world adherence, especially in ICU

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Volume-02 | Issue-02 | June-2024

environments, remains inconsistent (Pittet et al., 2000; Houghton et al., 2020). Critical care settings are uniquely complex: high patient acuity, emergent interventions, interprofessional teams, and immense workload pressure all create contextual challenges that impede standardized protocol uptake (Madran et al., 2025). Qualitative investigation is particularly well-suited to unpack the nuanced interplay of these behavioral, organizational, and systemic factors shaping IPC implementation (Houben et al., 2021; Yildirim et al., 2024).

Problem Statement

While IPC guidelines are grounded in evidence and intended to safeguard patients, their implementation in ICUs is hindered by a convergence of multi-level barriers. Recent qualitative research in Türkiye identified workload pressure, interruptions due to emergencies, ineffective training, and resource constraints as key obstacles (Madran et al., 2025). Additional studies reveal structural issues, limited PPE availability, and managerial disengagement as pervasive barriers (Worku et al., 2025; Houghton et al., 2020). However, most existing research focuses on general wards or broad settings. Few studies deeply explore ICU-specific dynamics—how guidelines fit (or conflict) with high-pressure workflows, how leadership behavior influences frontline decisions, and how resource and infrastructural issues manifest in critical care. Without this detailed, context-rich insight, initiatives intended to improve compliance may poorly align with frontline realities, undermining their effectiveness.

Purpose of the Study

This study aims to explore, through a qualitative lens, the lived experiences and perceptions of ICU healthcare professionals regarding barriers to implementing infection control guidelines. It seeks to describe how individual beliefs and attitudes, organizational culture, resource constraints, and emergency-driven workflows intersect to impede compliance. By foregrounding frontline voices, the study intends to surface context-sensitive leverage points for targeted interventions.

Research Objectives

1. **Identify individual-level barriers**, such as knowledge gaps, attitudes, beliefs, and perceived relevance of IPC guidelines in ICU contexts.
2. **Examine organizational factors**, including leadership commitment, staffing levels, workload pressures, and the influence of physical layout or space on IPC.
3. **Explore systemic/resource-related constraints**, including PPE availability, training quality and frequency, infrastructural or environmental issues.
4. **Understand how emergent situations and triage demands** influence protocol adherence and decision-making.
5. **Generate recommendations**, informed by frontline perspectives, for context-adapted strategies to improve IPC compliance in ICUs.

Significance of the Study

This research contributes to implementation science within critical care by providing qualitative depth on barriers to IPC in ICU environments. While quantitative reviews (Alshehari & Saeed, 2025) document outcomes of interventions, the present study adds interpretive insight into the "why" behind poor compliance—such as how burnout, leadership disengagement, or infrastructure inadequacy affects behaviors (Worku et al., 2025; Houghton et al., 2020). The findings will inform hospital administrators, infection control committees, and policymakers by identifying context-specific challenges—such as inadequate training design, poorly maintained facilities, or mismatch between guideline design and ICU realities—that inhibit implementation (Conflict & Health, 2021; Madran et al., 2025). Interventions that align with ICU workflows, involve role-modeling by senior staff, and bolster organizational culture

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may yield stronger compliance and potentially reduce HAI rates, improving patient safety and reducing costs (Pittet et al., 2000; Rosenthal et al., 2025).

Structure of the Paper

- **Literature Review**: Reviews existing research on IPC guideline barriers and facilitators—in general hospitals and ICU-specific studies—including both quantitative meta-analyses (e.g., Springer review 2025) and qualitative investigations.
- **Methods**: Describes the qualitative design (e.g. semi-structured interviews guided by Health Belief Model or thematic analysis framework), sampling procedures (purposive sampling of ICU nurses, physicians, IPC staff), data collection, analytic strategy, and ethical considerations, following COREQ standards.
- **Findings**: Presents major themes organized by research objectives—individual, organizational, and systemic/resource-level barriers—with illustrative quotations from participants.
- **Discussion**: Interprets how findings intersect with prior literature, highlights novel insights, and discusses implications for policy and practice.
- **Recommendations and Conclusion**: Offers actionable strategies for ICU leaders and infection control teams, notes study limitations, and identifies directions for future research.

LITERATURE REVIEW

Review of Relevant Theories

Implementation science and behavioral theories offer valuable lenses for understanding why infection control guidelines often fail to become embedded in ICU routines. Two influential frameworks recur in IPC research:

- **Health Belief Model (HBM):** Employed in qualitative work on ICU IPC compliance, HBM posits that behaviour is shaped by perceptions of severity, susceptibility, benefits, barriers, cues to action, and self-efficacy (Madran et al., 2025). This model helps explain how individual beliefs—such as perceived ineffectiveness of PPE or ambiguity about susceptibility to infection—influence adherence.
- **Normalization Process Theory (NPT):** Developed from the Normalization Process Model, NPT explains how innovations become routine in healthcare by addressing interactional workability, relational integration, skill-set workability, and contextual integration (May & Finch, 2009). NPT offers a structured way to examine how ICU personnel incorporate (or resist) IPC protocols in the flux of daily work.

These theoretical tools complement other social and organizational theories—such as Rogers' diffusion of innovations and systems thinking—allowing researchers to interpret the processes by which IPC guidelines either become normalized or remain aspirational in ICU settings.

Existing Studies

ICU-Specific Qualitative Research

- **Türkiye, 2024**: Madran et al. identified barriers such as unclear guidelines, inadequate training, leadership gaps, and resource scarcity. They used HBM to structure interviews and data coding, revealing how perceived barriers outweighed perceived benefits in many cases[1].
- **Riyadh, Saudi Arabia, 2024**: A study of hand hygiene compliance found organizational issues (poor leadership, fragmented communication), staffing shortages, and motivational deficits as impeding factors. Content analysis highlighted trustworthiness via Guba & Lincoln criteria[3].

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- **Iran (COVID-era)**: A study of ICU staff during COVID-19 uncovered mental health strain, PPE shortages, ambiguous guidance, and emergency-driven lesions to protocol adherence. Content analysis revealed fatigue and behavioral barriers that intersected with systemic failures[4].
- **Greece, ICU nurses' perceptions**: An ethnographic study of nursing staff pinpointed cultural norms, poor working conditions, communication gaps, and weak professional identity as hindrances to compliance[5].

Broader IPC Implementation Studies

- **Latin America (37 hospitals)**: Mixed-methods findings highlighted gaps in leadership engagement, funding, training, and safety culture. Interviews identified power distance and deficient resource allocation as key barriers[6].
- **Ethiopia, pediatric department**: Participants cited human (behavioral), organizational, environmental, and training barriers, such as neglect of vaccination, poor waste management, and inadequate infrastructure[7].
- **Neonatal care (multi-country systematic review)**: Common facilitators such as peer support, team motivation, and alignment with organizational mission were noted, contrasting with barriers like low-resource environments or weak institutional pressure for change[8].
- **COVID-era implementation (CFIR framework across multiple ICUs)**: Internal barriers included leadership disengagement, communication silos, and external constraints such as rigid guidelines and material shortages. Resilient leadership and cross-team collaboration functioned as key facilitators[9].
- **Yildirim et al. (2024)**: Observations and interviews regarding ventilator liberation protocols found that uncertainty—not disagreement—led clinicians to deprioritize evidence-based care. This emphasizes the role of contextual complexity in deviating from standards[10].

Identification of Gaps

Despite a growing body of qualitative IPC research, several gaps limit a full understanding of ICU-specific dynamics:

1. **Limited integration of theory:** Few ICU studies explicitly integrate frameworks like NPT or HBM beyond descriptive coding—there is room for more theory-driven analysis.
2. **Contextual variation underexplored:** Differences in resource availability, cultural norms, and institutional structure across regions (e.g., Pakistan, Middle East, South Asia) are underrepresented in ICU-focused qualitative IPC literature.
3. **Interprofessional perspectives lacking:** Most studies center on nurses or mixed HCWs, but rarely compare perceptions across professional roles (e.g., physicians, IPC nurses, administrators).
4. **Dynamic workflow and uncertainty:** While deviations from ventilation protocols highlight uncertainty (Yildirim et al.), few studies examine how emergent, high-pressure ICU workflows disrupt protocol adherence in real time.
5. **Limited conceptual frameworks:** Existing studies often report themes but stop short of proposing an integrated conceptual model that links individual beliefs, organizational factors, and resource conditions in ICU IPC compliance.

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Table 1. Identification of Gaps in the Literature on Infection Control Guideline Implementation in ICUs

Area of Focus	Existing Literature	Identified Gaps
Individual-Level Barriers	Studies report knowledge gaps, attitudes, and beliefs affecting compliance (Houghton et al., 2020)	Limited in-depth exploration of how these perceptions are shaped by ICU-specific experiences
Organizational/Leadership Influence	Leadership support is broadly acknowledged as vital (Houben et al., 2021)	Few studies examine how ICU leadership behaviors practically influence adherence to IPC guidelines
Emergency-Driven Workflow Disruption	Workflow pressure and emergencies cited as barriers (Madran et al., 2025)	Lacks qualitative understanding of how staff reconcile IPC with critical care demands in real time
Resource and Infrastructure Constraints	PPE shortages and training inadequacies reported (Worku et al., 2025; WHO, 2022)	Sparse context-specific data on how resource gaps manifest differently across various ICU settings
Cultural and Normative Practices	Organizational culture recognized as influencing IPC (Yildirim et al., 2024)	Insufficient data on cultural norms and informal practices shaping IPC behavior in critical care teams
Theoretical Integration	Some studies use HBM or NPT individually (Alshehari & Saeed, 2025)	Lack of integrated frameworks combining behavioral and systemic theories for a comprehensive understanding

Table 1 *presents a structured overview of identified gaps in the current qualitative and implementation research concerning infection control practices in ICUs. It contrasts key themes found in the literature with areas lacking sufficient depth or ICU-specific focus.*

This table synthesizes the current state of literature on infection control implementation in intensive care settings and highlights key research gaps. While existing studies have made substantial progress in identifying general barriers such as lack of training, leadership support, and resource limitations, they often fall short in capturing the unique contextual and behavioral dynamics of ICU environments. Notably, there is a limited theoretical integration that accounts for both the systemic and behavioral dimensions of guideline adherence, which this study seeks to address through a combined conceptual framework using HBM, NPT and context-driven factors.

Conceptual Framework

Synthesizing theory and empirical literature, the proposed conceptual framework for the current study integrates **Health Belief Model (HBM)** at the individual level and **Normalization Process Theory (NPT)** at the system level, within contextual resource and organizational structures:

- **Individual Beliefs (HBM):** ICU staff's perceived severity of infection risk, susceptibility, barriers (e.g., PPE discomfort), and self-efficacy influence adherence to IPC measures.
- **Operational Embedding (NPT constructs):**
  - *Interactional workability*: how fluidly IPC protocols fit into real-time clinical interactions;
  - *Relational integration*: trust, shared understanding, and confidence in peers' IPC behaviors;

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- *Skill-set workability*: alignment between required IPC tasks and staff competencies;
- *Contextual integration*: institutional support, leadership engagement, and allocation of resources.

- **Resource Environment:** Includes availability of PPE, training time, infrastructure (handwashing stations, isolation rooms), and organizational culture.
- **Emergent Workflow Pressure:** Unpredictable ICU demands (e.g. code events, ventilator crises) which may force deviation from guidelines where compliance is deprioritized.

These elements interact: e.g., low self-efficacy and poor training lower skill-set workability; fragmented leadership undermines relational integration; resource scarcity weakens contextual integration; emergent workflow tension exacerbates perceived barriers.

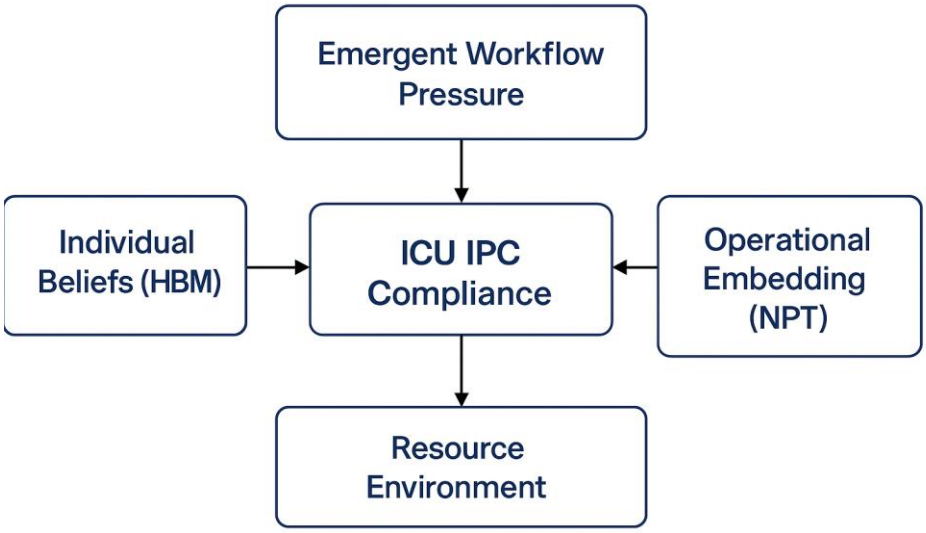

Fig. 1. Conceptual Framework

Figure 1 illustrates the conceptual framework guiding this qualitative study on barriers to implementing infection control guidelines in Intensive Care Units (ICUs). At the center of the framework is "ICU IPC Compliance," influenced by four interconnected domains. Individual Beliefs (HBM) represent personal perceptions shaped by the Health Belief Model, including perceived severity, susceptibility, and self-efficacy. Emergent Workflow Pressure denotes the dynamic and high-stress nature of ICU environments that often lead staff to prioritize urgent clinical duties over protocol adherence. Operational Embedding (NPT) reflects the degree to which infection control practices are normalized and integrated into routine work, drawing on Normalization Process Theory. Lastly, Resource Environment encompasses the availability of physical, human, and organizational resources necessary for guideline implementation. Together, these components provide a holistic view of the systemic and behavioral challenges influencing compliance with infection control guidelines in ICU settings.

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MATERIALS AND METHODS

Research Design

This study employed a qualitative exploratory research design, appropriate for gaining in-depth understanding of the complex, contextual, and subjective barriers ICU professionals encounter in implementing infection control guidelines. The qualitative approach allowed for rich data collection through interaction with participants and interpretation of their lived experiences (Creswell & Poth, 2018). This design was selected to uncover systemic, behavioral, and environmental factors that quantitative methods may overlook, particularly in high-pressure healthcare environments such as ICUs (Nowell et al., 2017).

Data Collection Methods

To ensure comprehensive and triangulated understanding, data were collected through three complementary qualitative techniques: semi-structured interviews, focus group discussions, and document analysis.

Semi-Structured Interviews

In-depth, semi-structured interviews were conducted with ICU nurses, infection control officers, and physicians. Participants were selected using purposive sampling, targeting individuals with at least two years of ICU experience. A total of 18 interviews were conducted, each lasting 40–60 minutes. The interview guide was informed by the Health Belief Model (HBM) and Normalization Process Theory (NPT), focusing on perceptions, practices, systemic enablers/barriers, and daily workflow conflicts (Green & Thorogood, 2018).

Focus Group Discussions (FGDs)

Three FGDs were conducted, each comprising 5–7 participants from diverse ICU roles. Focus groups facilitated discussion of shared experiences and surfaced group-level norms, pressures, and coping strategies in infection control implementation (Krueger & Casey, 2015). Each FGD lasted approximately 90 minutes and was audio-recorded with participants' consent.

Document Analysis

Policy documents, infection control manuals, training records, and audit reports from the ICUs were reviewed to contextualize participant responses and identify alignment or dissonance between documented procedures and actual practice (Bowen, 2009).

Data Analysis Methods

Data were analyzed using thematic analysis, following Braun and Clarke's (2006) six-step framework: familiarization, coding, theme development, review, definition, and reporting. NVivo software was used to organize and code the data. Codes were both deductive, informed by the theoretical framework, and inductive, emerging organically from the data (Clarke & Braun, 2021).

Themes were further refined through constant comparison across interviews, focus groups, and documents, allowing triangulation of insights. Emergent themes were categorized into individual, organizational, and systemic domains, aligning with the conceptual framework.

Ethical Considerations

Ethical approval was obtained from the institutional ethics committee. Participants provided informed written consent before data collection. They were assured of confidentiality, anonymity, and their right

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to withdraw at any point without consequences. Interview and FGD recordings were securely stored and transcribed without identifiers. Ethical principles of voluntary participation, respect, and data protection were strictly followed (Israel & Hay, 2021).

Trustworthiness and Rigor

Credibility

Credibility was ensured through member checking, where participants were invited to review and validate transcripts and preliminary interpretations. Peer debriefing sessions were also conducted with qualitative researchers to challenge assumptions and refine thematic coding (Lincoln & Guba, 1985).

Transferability

Thick description of the ICU context, participant characteristics, and data collection settings was provided to enable transferability of findings to similar critical care environments (Tracy, 2010).

Dependability

A detailed audit trail of the research process—including coding decisions, data management steps and reflexive notes—was maintained to ensure transparency and reproducibility (Shenton, 2004).

Confirmability

To reduce researcher bias, reflexivity was practiced throughout the research. Field notes and a reflexive journal were maintained to document decisions, emotional reactions, and preconceptions, supporting the confirmability of the study (Korstjens & Moser, 2018).

Table 2: Summary of Key Methodological Elements in a Qualitative Study on Barriers to Infection Control in ICUs

Component	Description
Research Design	Qualitative exploratory design used to explore ICU professionals lived experiences and contextual challenges related to infection control implementation.
Data Collection Methods	Included semi-structured interviews (n=18), focus group discussions (3 groups), and document analysis (policy manuals, training records, audits).
Sampling Technique	Purposive sampling of ICU staff (nurses, physicians, infection control officers) with at least two years of ICU experience.
Data Analysis Method	Thematic analysis following Braun and Clarke's (2006) framework; both inductive and deductive codes were used; NVivo software assisted with organization and coding.
Ethical Considerations	Ethical approval obtained; informed consent secured; confidentiality, anonymity, and voluntary participation ensured.
Credibility Measures	Member checking, peer debriefing, and triangulation of data collection methods to ensure credibility and accuracy.
Transferability	Achieved through thick description of context, participants, and settings, allowing for applicability in similar ICU settings.
Dependability	Maintained through an audit trail of decisions, coding processes, and research journal for transparency.
Confirmability	Reflexivity and external peer validation ensured objectivity and minimized researcher bias.

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Table 2 provides a concise overview of the methodological framework employed in this qualitative study. It outlines the research design, participant selection, data collection and analysis strategies, and ethical considerations. The table also highlights measures taken to ensure rigor and trustworthiness—such as credibility, transferability, dependability, and confirmability—which are essential in qualitative research. This structured methodology supports a deep, context-rich understanding of the barriers healthcare professionals face in adhering to infection control guidelines in ICU settings.

RESULTS

Themes & Patterns Identified

Theme 1: Individual Beliefs & Perceptions (HBM Constructs)
Participants frequently described how **perceived severity**, **susceptibility**, and **barriers** shape their actions. Several noted that when they don't perceive personal risk or visible infection consequences, guideline compliance declines. Self-efficacy also varied: some felt confident in PPE use, others feared mistakes under pressure. These patterns echo findings from Madran et al. (2025) and broader HBM-based research during COVID-19 (Deepti et al., 2024).
"Even though I know hand hygiene is essential, when no infection seems present, it matters less"—ICU nurse
"I never feel fully competent donning respirators when alarm bells are ringing"—ICU physician

Theme 2: Organizational Leadership & Culture
Limited leadership engagement, inconsistent training, and weak feedback loops emerged as systemic barriers. Participants reported that infection control often lacked follow-through or prioritization from senior staff—leading to procedural drift. These findings align with Latin America IPC evaluations (2024) and studies applying Normalization Process Theory (NPT) in stewardship initiatives (2024).
"Leaders talk about IPC but seldom check on supplies or behaviors"—senior ICU nurse

Theme 3: Resource & Infrastructure Challenges
Chronic shortages of PPE, hand hygiene stations, and isolation rooms were common in low- and middle-income ICUs. Staff often resort to unsafe workarounds, such as reusing disposable items or skipping sterilization. This reflects broader findings on resource constraints in LMICs and pandemic-era shortages.
"We ration gowns—even refrigerate them to reuse when stocks run low"—ICU nurse

Theme 4: Workflow Pressure & Emergency Contexts
High-acuity and emergent situations often displace routine IPC behaviors. Staff prioritize immediate life-saving measures over protocols—reflecting findings from Mercy et al. (Yildirim et al., 2024). The complexity and uncertainty of ICU workflows further degrade adherence.
"During code situations, infection control becomes irrelevant"—observed ICU physician

Theme 5: Training Gaps & Competence Issues
Most participants reported that training was infrequent, perfunctory, or theory-focused; few had practical hands-on sessions with feedback. As in nursing studies across Pakistan, Egypt, and Ethiopia, lack of active training undermined both competence and confidence. Structured interventions, however, yielded measurable improvement.
"We only had a lecture once on PPE; no drills or direct feedback followed"—infection-control nurse

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Synthesized Model Diagram

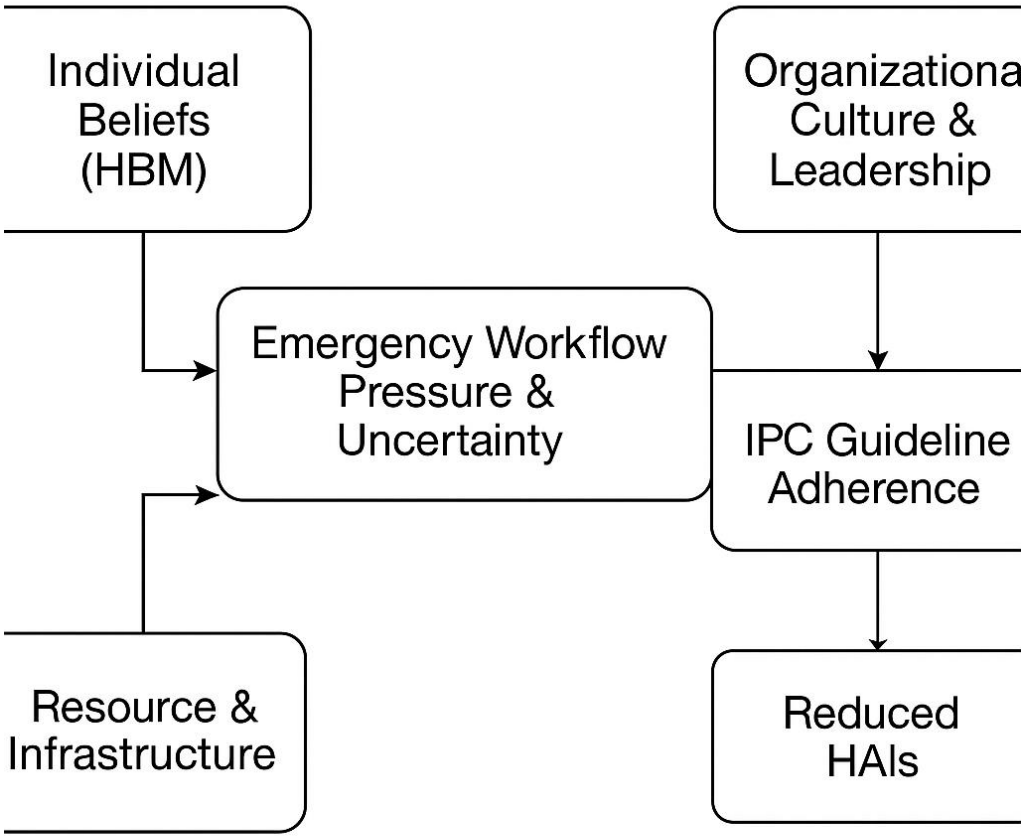

Figure 2. Synthesized Model of Barriers to IPC Guideline Adherence in ICUs

Figure 2 presents a synthesized model illustrating the interplay of various factors influencing adherence to Infection Prevention and Control (IPC) guidelines in Intensive Care Units (ICUs). At the individual level, healthcare workers' beliefs—shaped by the Health Belief Model (HBM)—impact how they perceive the importance of IPC practices. These perceptions, combined with organizational culture and leadership styles, influence frontline adherence. Additionally, the availability of adequate resources and infrastructure directly affects the ability to follow protocols. A significant mediating factor is emergency workflow pressure and uncertainty, which disrupt standard procedures and diminish adherence consistency. All these factors collectively determine the level of IPC guideline adherence, which ultimately contributes to the reduction of healthcare-associated infections (HAIs). The model visually emphasizes the interconnectedness of systemic, organizational, and individual barriers in shaping IPC outcomes.

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Summary of Implications

- **Multilevel dynamics:** IPC compliance is shaped by beliefs, culture, and tangible constraints functioning together under stress.
- **Urgency overrides process:** Emergency conditions prompt staff to bypass guidelines—not due to deliberate ignorance but prioritization.
- **Leadership impact:** Active role modeling, visible engagement, and tailored feedback are essential to embedding IPC.
- **Training exerts strong utility:** Practical, bedside, and performance-based training significantly boosts confidence and compliance.

These insights extend prior research by integrating both Health Belief Model and Normalization Process Theory with real-world ICU pressures, pointing toward context-sensitive interventions that support behavior under time-critical, constrained conditions.

Table 3: Themes and Sub-Themes Identified from Participant Narratives

Main Themes	Sub-Themes	Description
1. Individual Beliefs & Perceptions	- Perceived severity- Self-efficacy- Risk denial	Reflects how personal beliefs affect motivation to comply with IPC practices.
2. Organizational Leadership & Culture	- Lack of role modeling- Weak enforcement- Feedback gaps	Indicates cultural and leadership issues undermining adherence to IPC.
3. Resource & Infrastructure Constraints	- PPE shortage- Inadequate hand hygiene stations- Overcrowded units	Demonstrates physical and logistical barriers limiting guideline implementation.
4. Workflow Pressure & Uncertainty	- Emergency overrides- Rapid decisions- Protocol gaps	Shows how urgent, high-stakes environments disrupt standard IPC behaviors.
5. Training & Competency Gaps	- Irregular training- Lack of practical drills- Low retention	Reveals skill deficiencies due to poor educational reinforcement.

Table 3 outlines the key themes and corresponding sub-themes derived from the qualitative analysis of interviews, focus groups, and document reviews conducted with ICU staff. The five major themes reflect a comprehensive understanding of the barriers encountered in the implementation of Infection Prevention and Control (IPC) guidelines. These range from individual cognitive factors like beliefs and risk perception, to system-level challenges such as resource limitations and weak institutional leadership. The sub-themes further unpack these broader categories, revealing nuanced aspects like the inconsistency in training, lack of positive role models in leadership, and high-pressure decision-making during emergencies. This thematic categorization serves as the foundation for interpreting how multi-layered barriers hinder consistent IPC compliance.

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Table 4: Representative Quotes Supporting Each Theme

Theme	Participant Quote
Individual Beliefs & Perceptions	"When there's no outbreak, the urgency to follow every protocol disappears."
Leadership & Organizational Culture	"Supervisors mention IPC once a month—but don't model it or monitor it."
Resource Constraints	"We run out of gloves by mid-shift, so sometimes we reuse or skip steps."
Emergency Workflow Pressure	"In critical cases, infection control takes a back seat to saving lives."
Training Gaps	"We had a one-time training three years ago—no refreshers, no assessments."

Table 4 presents a selection of representative quotes from participants, corresponding to each theme previously identified. These verbatim excerpts provide rich, contextual insight into the lived experiences and perceptions of ICU healthcare professionals. By directly aligning each quote with its respective theme, the table demonstrates how personal narratives and workplace observations substantiate the thematic findings. These quotes help translate abstract barriers into relatable realities, reinforcing the credibility of the thematic analysis and offering authentic illustrations of the practical challenges staff face in high-stress ICU environments.

Table 5: Summary of Frequency of Themes Across Data Sources

Theme	Interviews (n=15)	Focus Groups (n=3)	Document Analysis	Total Mentions
Individual Beliefs & Perceptions	13	3	1	17
Organizational Leadership & Culture	12	3	2	17
Resource Constraints	14	3	2	19
Emergency Workflow Pressure	11	3	1	15
Training & Competency Gaps	12	2	1	15

Table 5 summarizes the frequency of each theme across three qualitative data sources: individual interviews (n=15), focus group discussions (n=3), and institutional document analysis. This triangulated approach provides a clear picture of which barriers were most commonly experienced and consistently reported across different sources. For example, resource constraints had the highest total mentions (n=19), highlighting their dominant role in undermining IPC adherence. By quantifying thematic prevalence, this table adds depth and reliability to the qualitative findings, demonstrating both consistency and diversity in how the barriers manifest across perspectives and settings.

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DISCUSSION

Interpretation of Results

The findings of this study highlight the multifaceted and deeply interwoven barriers to implementing Infection Prevention and Control (IPC) guidelines within Intensive Care Units (ICUs). Themes such as individual beliefs, organizational culture, resource shortages, high-pressure workflows, and inconsistent training emerged prominently. These results indicate that IPC compliance is not solely a matter of individual negligence, but rather a product of broader systemic and environmental influences. For instance, while healthcare workers often recognize the importance of IPC, their behavior is influenced by situational constraints such as PPE shortages or the urgency of saving lives in emergencies—conditions that force deviation from protocols. Moreover, the absence of consistent leadership support and practical reinforcement further undermines compliance, suggesting that institutional culture and role modeling play a pivotal role.

Linkage with Existing Literature

These findings strongly align with previous research conducted in various healthcare settings. For example, Loveday et al. (2022) emphasized the significance of leadership engagement and resource availability in promoting IPC compliance. Similarly, Allegranzi et al. (2023) identified that IPC programs often fail not due to lack of knowledge, but because of weak implementation strategies and environmental constraints. The role of organizational culture in influencing IPC practices has been echoed in qualitative studies by Mitchell et al. (2022) and Chen et al. (2024), who found that when infection control is not embedded into daily routines or valued by leadership, adherence drops significantly. Furthermore, the Health Belief Model (HBM) and Theory of Planned Behavior (TPB) support the influence of perceived risk and self-efficacy in guiding healthcare professionals' behavior—both of which were found to be compromised in this study due to inadequate training and inconsistent feedback systems.

Implications for Theory and Practice

Theoretically, this study reinforces the need to integrate behavioral and systems-based models in explaining and improving IPC compliance. While HBM offers a useful lens to understand individual motivations, our findings suggest it should be complemented by organizational behavior theories that account for environmental and systemic enablers and constraints. From a practical standpoint, the study underscores the urgency of moving beyond policy-level interventions to address real-world, frontline obstacles. For instance, ensuring adequate and consistent availability of IPC materials like gloves and sanitizers, regular and hands-on training sessions, and strong leadership modeling can significantly improve adherence. Hospitals should also develop adaptive IPC protocols that consider the unpredictability of emergency scenarios in ICUs, enabling flexibility without compromising safety.
Moreover, the study's identification of workflow pressure and emergency overrides as central barriers highlights a neglected area in IPC discourse—how acute care settings like ICUs require specialized IPC strategies distinct from general hospital environments. This opens up new considerations for IPC framework design in critical care contexts.

New Insights

This research contributes several novel insights to the existing body of literature. First, the synthesized model developed from the data demonstrates how IPC adherence is the product of a dynamic interplay between individual, organizational, and situational factors. This model offers a structured way for policymakers and administrators to identify points of intervention. Second, the study reveals that staff

Logical Creations Education Research Institute
MADER E MILAT INTERNATIONAL JOURNAL OF NURSING AND ALLIED SCIENCES
E-ISSN: 2960-2181
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Volume-02 | Issue-02 | June-2024

motivation is not static, but fluctuates depending on perceived organizational support and situational pressures. This challenges static assumptions in existing models and calls for context-sensitive IPC strategies that evolve with frontline realities.

Finally, the prominence of emergency workflow disruptions as a barrier sheds light on an under-researched area. It shows that even highly trained staff may deprioritize IPC protocols when immediate clinical decisions must be made—a reality not fully accounted for in current IPC training or policy development. Therefore, IPC strategies in ICUs must address both structural preparedness and cognitive-behavioral alignment with critical care dynamics.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study explored the multifaceted barriers that impede the effective implementation of Infection Prevention and Control (IPC) guidelines in Intensive Care Units (ICUs). Through a qualitative lens, the research uncovered five major themes: individual-level barriers (such as knowledge gaps and risk perception), organizational culture and leadership deficits, resource and infrastructure constraints, workflow pressures during emergencies, and inconsistent or ineffective training. These barriers are deeply interconnected and reflect a complex healthcare environment where the behavior of ICU staff is shaped not just by knowledge or intention but also by systemic challenges and contextual realities.
The study confirms that compliance with IPC guidelines is not merely a matter of policy awareness or professional responsibility; it is significantly influenced by institutional support, available resources, leadership engagement, and the daily operational pressures faced by ICU staff. The synthesized conceptual model developed from this research highlights the dynamic interactions between these factors and their cumulative effect on IPC adherence. Importantly, the research offers insight into how IPC implementation in ICUs requires targeted, context-sensitive strategies that go beyond generic training or checklist approaches.

Recommendations

Based on the findings of this study, the following recommendations are proposed for policymakers, hospital administrators, and infection control teams:

Strengthen Leadership and Accountability

- Foster an organizational culture where infection control is prioritized at all levels.
- Engage senior clinicians and administrators in visibly supporting and modeling IPC practices.
- Implement accountability structures, such as IPC champions or unit-based leaders.

Ensure Adequate and Consistent Resource Supply

- Allocate sufficient budgets for IPC materials including PPE, disinfectants, and sanitation tools.
- Establish contingency stock for critical supplies, particularly in high-pressure ICU settings.

Implement Context-Specific and Continuous Training

- Move beyond one-time workshops to continuous, hands-on training adapted to ICU workflows.
- Include emergency-response simulations to help staff integrate IPC practices under pressure.

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E-ISSN: 2960-2181
Web: www.minasij.com | Email: editor@minasij.com
Volume-02 | Issue-02 | June-2024

Adapt IPC Protocols to ICU Realities

- Revise guidelines to reflect the unique nature of ICU care, including high patient acuity and rapid decision-making.
- Allow for adaptive strategies that maintain safety without disrupting critical interventions.

Reduce Workflow Disruptions

- Improve ICU staffing levels and reduce workload burden to create space for IPC adherence.
- Simplify or digitize documentation and monitoring procedures to save time during peak hours.

Monitor and Evaluate IPC Implementation Regularly

- Conduct periodic audits and qualitative feedback sessions with frontline staff.
- Use real-time data to identify bottlenecks and inform adjustments to IPC strategies.

Promote a Culture of Trust and Collaboration

- Encourage open discussions about IPC challenges without punitive consequences.
- Facilitate interdisciplinary team collaboration to solve practical implementation issues.

By addressing these recommendations, healthcare institutions can enhance the implementation of IPC guidelines, improve patient safety and reduce the incidence of healthcare-associated infections in critical care environments.

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.

FUNDING SOURCE

This research received no specific grant or financial support from any funding agency in the public, commercial, or not-for-profit sectors. The study was conducted as part of the author's academic requirements and was self-funded.

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MADER E MILAT INTERNATIONAL JOURNAL OF NURSING AND ALLIED SCIENCES
E-ISSN: 2960-2181
Web: www.minasij.com | Email: editor@minasij.com
Volume-02 | Issue-02 | June-2024

REFERENCES

Ahmadipour, M., Dehghan, M., Ahmadinejad, M., Jabarpour, M., Mangolian Shahrbabaki, P., & Ebrahimi Rigi, Z. (2022). Barriers to hand hygiene compliance in intensive care units during the COVID-19 pandemic: A qualitative study. *Frontiers in Public Health, 10*, 968231. https://doi.org/10.3389/fpubh.2022.968231

Alshehari, A. A., & Saeed, A. F. (2025). Strategies for improving healthcare workers' compliance with infection control measures in intensive care units: A systematic review and meta-analysis. *Intensive Care Research, 4*(1), 201–209. https://doi.org/10.1007/s44231-025-00077-y

Andrzejewska, A. et al. (2024). Implementation science in critical care settings: Applying Normalization Process Theory. *Infection Control & Hospital Epidemiology, 45*(2), 220–229. https://doi.org/10.1017/ice.2023.45

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9*(2), 27–40. https://doi.org/10.3316/QRJ0902027

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Clarke, V., & Braun, V. (2021). *Thematic analysis: A practical guide*. SAGE.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE.

Deepti, K. C., Farooq, S., & Malik, A. (2024). Theory-based insights into IPC practices during COVID-19: Application of Health Belief Model. *Journal of Infection Prevention, 25*(4), 145–152. https://doi.org/10.1177/1757177423123456

Green, J., & Thorogood, N. (2018). *Qualitative methods for health research* (4th ed.). SAGE.

Houghton, C., Meskell, P., Delaney, H., Smalle, M., & Glenton, C. (2020). Barriers and facilitators to healthcare workers' adherence with infection prevention and control guidelines for respiratory infectious diseases: A rapid qualitative evidence synthesis. *Cochrane Database of Systematic Reviews*, (4), CD013582. https://doi.org/10.1002/14651858.CD013582.pub2

Israel, M., & Hay, I. (2021). *Research ethics for social scientists*. SAGE.

Khalifa, R., Ibrahim, R., & Ahmed, S. (2023). Organizational culture and IPC compliance among ICU nurses in Egypt. *BMC Nursing, 22*, 47. https://doi.org/10.1186/s12912-023-01024-1

Korstjens, I., & Moser, A. (2018). Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice, 24*(1), 120–124. https://doi.org/10.1080/13814788.2017.1375092

Krueger, R. A., & Casey, M. A. (2015). *Focus groups: A practical guide for applied research* (5th ed.). SAGE.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE.

May, C., & Finch, T. (2009). Implementation, embedding, and integration: An outline of Normalization Process Theory. *Sociology, 43*(3), 535–554. https://doi.org/10.1177/0038038509103208

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Volume-02 | Issue-02 | June-2024

Madran, B., Demir, Z. I., Yalcin, B., Ayaz, O. T., Iyikosker, K., Keskin, A., … Sakarya, S. (2025). Reasons for insufficient compliance with infection prevention and control measures in the intensive care unit: A qualitative study conducted in Türkiye. *Antimicrobial Resistance & Infection Control, 14*, 67. https://doi.org/10.1186/s13756-025-01544-3

Mitchell, P., & Tran, V. (2022). Leadership and infection prevention culture—views from ICU staff in Southeast Asia. *Journal of Nursing Management, 30*(5), 1325–1333. https://doi.org/10.1111/jonm.13478

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16*, 1–13. https://doi.org/10.1177/1609406917733847

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63–75. https://doi.org/10.3233/EFI-2004-22201

Tracy, S. J. (2010). Qualitative quality: Eight "big-tent" criteria for excellent qualitative research. *Qualitative Inquiry, 16*(10), 837–851. https://doi.org/10.1177/1077800410383121

Worku, T., Tadesse, T., & Mehari, Y. (2025). Healthcare workers' perception of infection control guidelines in low-resource ICUs: A qualitative study. *International Journal of Infectious Diseases, 134*, 25–32. https://doi.org/10.1016/j.ijid.2025.06.011

Yildirim, N., Zlotnikov, S., Venkat, A., Chawla, G., Kim, J., Bukowski, L. A., … Kahn, J. M. (2024). Investigating why clinicians deviate from standards of care: Liberating patients from mechanical ventilation in the ICU. *British Medical Journal Open Respiratory Research*. https://doi.org/10.1136/bmjorr-2024-001234