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Cross-Departmental Infection Control Practices Among Nurses, Dental Assistants, and Radiologic Technologists in a Tertiary Hospital in Riyadh

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Abstract

Background: Infection control in tertiary hospitals is a complex, multidisciplinary responsibility. While individual departments such as nursing, dental services, and radiology maintain their own protocols, inconsistencies across units may compromise patient safety and infection prevention outcomes.

Objective: This study explored cross-departmental infection control practices among nurses, dental assistants, and radiologic technologists in a tertiary hospital in Riyadh, Saudi Arabia, with the aim of identifying challenges, gaps, and opportunities for interprofessional alignment.

Methods: A cross-sectional, mixed-methods study was conducted involving 75 participants across nursing, dental, and radiology departments. Quantitative data were collected via structured questionnaires, while qualitative insights were drawn from semi-structured interviews. Descriptive and inferential statistics were used to analyze survey data, and thematic analysis was applied to interview transcripts.

Results: Nurses demonstrated the highest levels of compliance with infection control protocols, while radiologic technologists reported lower adherence, particularly in equipment disinfection and interdepartmental communication. Key barriers included inconsistent training, siloed protocols, and unclear responsibilities regarding shared equipment. Participants strongly supported the need for standardized, cross-departmental infection control strategies.

Conclusion: Infection control in tertiary care settings must extend beyond departmental boundaries. This study underscores the importance of unified protocols, interprofessional training, and shared accountability frameworks to reduce infection risks and improve patient outcomes.

Keywords:
Infection control, cross-departmental collaboration, nursing, dental assistants, radiologic technologists, tertiary hospital, Saudi Arabia, interprofessional practice

Introduction

Healthcare-associated infections (HAIs) remain a persistent challenge in tertiary hospitals, where complex clinical workflows and overlapping diagnostic or therapeutic procedures elevate the risk of cross-

contamination. Infection control, once siloed within individual departments, is increasingly understood as a shared responsibility across clinical roles—particularly among nurses, dental assistants, and radiologic technologists, whose functions often intersect in patient care.

Interdisciplinary collaboration is crucial to maintaining infection control integrity. When practices are fragmented across departments, gaps in protocol adherence, communication, and training can result in suboptimal outcomes. This concern was emphasized by Kohn et al. (2000), who argued that effective infection control systems must span departmental boundaries to function reliably in high-risk settings.

Recent evaluations of tertiary care institutions reveal that infection-related incidents frequently emerge from intersections between radiology, dental, and nursing units. A Japanese study by Ayabe et al. (2018) showed that multidisciplinary incident reporting systems improved infection control awareness and reduced oversight blind spots. Similarly, Al-Hrenat (2021) reported that Palestinian hospitals experienced improved infection control outcomes after implementing Joint Commission International (JCI) standards that required cross-departmental audit systems and training.

Nonetheless, disparities in how infection control protocols are applied remain widespread. Zarzaur et al. (2020) documented gaps in preparedness among radiology departments compared to nursing teams during the COVID-19 pandemic, stressing the need for systemic alignment in infection response efforts. Furthermore, Simon & Chakravorty (2021) emphasized that infection control strategies benefit most from iterative feedback and inclusive planning across units.

Despite these advancements, there is limited research focused specifically on the triad of nursing, dental, and radiologic staff within infection prevention frameworks—especially in Middle Eastern healthcare contexts such as Saudi Arabia. This study aims to explore infection control practices across these departments in a tertiary hospital in Riyadh, Saudi Arabia. It seeks to identify gaps, collaborative strengths, and opportunities for standardization and improvement across disciplines.

Literature Review

Infection control is a fundamental pillar of patient safety in tertiary care institutions, where complexity in care delivery demands cohesive, interdepartmental strategies. Multiple studies have confirmed that fragmented or department-specific infection protocols can lead to inconsistent outcomes, especially when different professionals are involved in patient diagnostics and treatment. A landmark publication by Kohn et al. (2000) emphasized the importance of system-wide safety mechanisms, advocating for infection control strategies that transcend departmental lines and integrate various clinical units.

Multidisciplinary Infection Control and Safety

The effectiveness of cross-departmental collaboration in infection prevention was demonstrated by Ayabe et al. (2018), who investigated incident reporting systems in a Japanese tertiary hospital. Their findings highlighted that infection control errors frequently occurred at points of transition—where patients moved between radiology, dental, and nursing units. The study concluded that multidisciplinary oversight and shared safety reporting mechanisms were crucial in identifying gaps and implementing timely corrective actions.

Similarly, Simon & Chakravorty (2021) analyzed feedback loops in hospital infection control procedures across departments. Their work showed that infection mitigation strategies developed collaboratively—rather than unilaterally by infection control teams—were more adaptable, sustainable, and better enforced across units.

Role-Specific Infection Risks and Responsibilities

Each profession in the care team has a unique risk profile and infection control responsibility. Nurses, often the primary point of contact, are involved in wound care, hygiene, and medication administration—all high-risk for pathogen transmission. Dental assistants handle aerosol-generating procedures, making their work particularly susceptible to airborne pathogen spread. Radiologic technologists, meanwhile, engage in frequent patient handling and surface contact in imaging environments, where equipment hygiene is critical.

Despite their different scopes of practice, research shows a need for integrated training and shared infection control protocols**.** Zarzaur et al. (2020) detailed a hospital-wide infection control restructuring effort during the COVID-19 pandemic, demonstrating that coordinated policies among nurses and radiology teams led to more effective PPE compliance and improved outbreak management.

In contexts outside of pandemics, however, gaps persist. Gray & Moore (2008) discussed how hierarchical differences and unclear departmental boundaries can hinder interprofessional communication, leading to infection control failures, especially during invasive or high-contact procedures.

Regional Standards and Institutional Accreditation

Evidence from the Middle East also reflects the global pattern. Al-Hrenat (2021) investigated infection control protocols in Palestinian tertiary hospitals before and after Joint Commission International (JCI) accreditation. The study found that infection rates decreased significantly after implementing cross-audit and standardized hygiene protocols involving nurses, radiologic technologists, and dental personnel. This supports the hypothesis that interdepartmental training, auditing, and accountability frameworks improve infection outcomes**.**

Additionally, Lin (2004) identified that collaborative infection control in cardiac procedures—requiring radiology, nursing, and surgical departments—led to increased procedural safety and overall infection control score improvement in a tertiary hospital.

Methodology

Study Design

This study employed a cross-sectional, mixed-methods design to explore infection control practices across three departments—nursing, dental services, and radiology—in a tertiary hospital in Riyadh, Saudi Arabia. The goal was to evaluate the current state of cross-departmental infection control protocols, staff perceptions, and interprofessional collaboration in minimizing infection risks.

Setting

The research was conducted at King Saud Medical City, a large tertiary referral hospital in Riyadh with integrated inpatient, surgical, diagnostic, and dental care services. The hospital is accredited by the Saudi

Central Board for Accreditation of Healthcare Institutions (CBAHI) and adheres to Joint Commission International (JCI) standards for infection control.

Participants

Participants included frontline healthcare professionals from three departments:

- Nurses (n=40), primarily from surgical, emergency, and ICU units.
- Dental assistants (n=15), involved in both inpatient oral care and outpatient dental clinics.
- Radiologic technologists (n=20), including professionals from MRI, CT, and diagnostic X-ray units.

All participants had a minimum of one year of clinical experience, were directly involved in patient care, and provided written informed consent prior to participation.

Data Collection

Quantitative Component

A structured, self-administered questionnaire was distributed to assess:

- Knowledge of infection control protocols (hand hygiene, PPE use, sterilization, etc.)
- Perceived departmental compliance with infection guidelines
- Interdepartmental communication and collaboration
- Barriers to cross-functional infection prevention

The instrument was adapted from previously validated tools used in similar studies (Ayabe et al., 2018; Zarzaur et al., 2020). Responses were measured on a 5-point Likert scale, and data were collected anonymously to ensure participant confidentiality.

Qualitative Component

To complement the survey data, semi-structured interviews were conducted with 5 representatives from each profession (total n=15). Questions focused on:

- Personal experiences with infection control incidents
- Cross-departmental coordination challenges
- Recommendations for improvement

Interviews were audio-recorded, transcribed verbatim, and thematically analyzed.

Data Analysis

Quantitative data were analyzed using SPSS v27**.** Descriptive statistics summarized demographics and response patterns. One-way ANOVA was used to assess differences in infection control perceptions among professions, and Pearson's correlation examined relationships between interdepartmental collaboration and protocol adherence.

Qualitative data were coded using thematic analysis**.** Two independent reviewers identified recurring themes, which were then grouped under categories such as *communication barriers*, *policy inconsistencies*, and *professional silos*.

Ethical Considerations

The study was approved by the hospital's ethics committee. All participants were assured of the voluntary nature of their participation and the confidentiality of their responses. Data were stored securely and used exclusively for research purposes.

Results

Participant Demographics

A total of 75 participants completed the questionnaire: 40 nurses, 15 dental assistants, and 20 radiologic technologists. The overall response rate was 93.8%. Most respondents were female (68%) and had between 2–10 years of clinical experience.

Profession	N (%)	Mean Years of Experience	Female (%)
Nurses	40 (53%)	6.2	70%
Dental Assistants	15 (20%)	4.9	73%
Radiologic Technologists	20 (27%)	7.1	60%
Total	75	—	68%

Infection Control Knowledge and Compliance

Overall, participants demonstrated moderate-to-high knowledge of infection control practices. However, perceived compliance varied significantly between departments, particularly in sterilization procedures and equipment disinfection in radiology.

Item	Nurses (Mean ± SD)	Dental Assistants (Mean ± SD)	Radiologic Techs (Mean ± SD)	*p*-value
Knowledge of Infection Control Guidelines	4.6 ± 0.5	4.4 ± 0.6	4.2 ± 0.7	0.08
PPE Usage Compliance	4.8 ± 0.3	4.6 ± 0.4	4.3 ± 0.6	0.03*
Surface & Equipment Sterilization Consistency	4.7 ± 0.4	4.3 ± 0.6	3.9 ± 0.7	0.01*
Cross-Departmental Communication	3.9 ± 0.7	3.7 ± 0.8	3.2 ± 0.9	0.02*

*Significant at $p < 0.05$

Barriers to Infection Control

From the survey, the most frequently reported barriers to effective infection control included:

- Lack of interdepartmental training (71%)
- Unclear cross-departmental protocols (63%)
- Time pressure and staffing shortages (57%)
- Gaps in equipment disinfection responsibilities (52%)

Qualitative Findings: Themes and Sub-Themes

Through thematic analysis of 15 semi-structured interviews (5 participants per profession), four major themes were identified. Each theme includes sub-themes with representative participant responses to illustrate the shared and differing experiences across departments.

Theme 1: Siloed Infection Control Protocols

Sub-theme 1.1: Department-Specific Guidelines

Participants reported inconsistencies in infection control protocols between units, resulting in confusion or non-compliance.

- Nurse (P3): *"In the ICU, we follow strict isolation measures, but when the patient goes for X-ray, it feels like a completely different standard applies."*
- Radiologic Technologist (P2): *"We aren't given the same guidelines as the wards. Sometimes we have to ask nurses what PPE is required."*

Sub-theme 1.2: Lack of Shared Audits or Supervision

There was no unified infection control audit system across the three departments.

- Dental Assistant (P1): *"The infection control team checks dental monthly, but I've never seen them audit radiology."*

Theme 2: Communication Gaps Between Departments

Sub-theme 2.1: Limited Cross-Departmental Handover

Infection risk updates were often not communicated when patients transitioned between departments.

- Radiologic Technologist (P4): *"We sometimes find out a patient was on isolation precautions only after the exam is done."*

Sub-theme 2.2: Informal and Inconsistent Channels

Participants cited the lack of structured reporting tools to notify other departments about infection control concerns.

- Nurse (P2): *"If I suspect a wound infection, I might tell the dental team verbally—but there's no formal system to log it."*

Theme 3: Inconsistent Infection Control Training

Sub-theme 3.1: Unequal Training Frequency

Training schedules varied by department, and some staff went long periods without updates.

- Dental Assistant (P3): *"We get annual refreshers, but I heard radiology hasn't had a session in over two years."*

Sub-theme 3.2: Role-Specific, Not Cross-Functional Content

Training was tailored to each role but did not include scenarios involving interdepartmental collaboration.

- Nurse (P4): *"Our infection control drills are for nursing situations only. We don't know how radiology handles things."*

Theme 4: Ambiguity in Shared Equipment Responsibilities

Sub-theme 4.1: Overlapping Duties Without Clarity

Participants expressed confusion over who was responsible for disinfecting portable imaging equipment or dental chairs used by multiple teams.

- Radiologic Technologist (P5): *"Sometimes I assume the bed was wiped down after the nurse left. But they may think we're doing it."*

Sub-theme 4.2: Need for Joint Checklists or Protocols

Many suggested implementing shared equipment disinfection checklists to ensure accountability.

- Dental Assistant (P2): *"It would help if we had a joint log or sticker system showing when something was last cleaned."*

Discussion

This study aimed to explore cross-departmental infection control practices among nurses, dental assistants, and radiologic technologists in a tertiary hospital in Riyadh, Saudi Arabia. The results highlight a critical need for better alignment, communication, and shared responsibility in infection control across clinical

departments. Both quantitative and qualitative data suggest that while individual departments show high infection control awareness, system-level disconnects persist, affecting consistency and safety.

Inconsistencies in Protocol Compliance Across Departments

The survey results indicated that nurses consistently demonstrated higher compliance with infection control measures compared to dental assistants and radiologic technologists. This aligns with previous findings by Ayabe et al. (2018), who found that nurses often lead in infection control practices due to their central role in patient care and routine exposure to infection risks. Conversely, radiologic technologists scored lower in areas such as equipment disinfection and communication, reflecting findings from Zarzaur et al. (2020) where diagnostic units had weaker infection control integration during system-wide emergency responses.

Communication and Collaboration Gaps

The study's qualitative component revealed significant communication gaps between departments. Radiologic technologists, for instance, frequently reported receiving no prior warning about a patient's isolation status, while nurses expressed frustration over inconsistent reporting mechanisms. These findings reflect long-standing concerns about siloed communication in hospital systems, as described by Kohn et al. (2000), and were similarly observed in Simon & Chakravorty (2021), who emphasized the value of real-time, cross-departmental feedback systems in infection control.

Disparities in Training and Oversight

Training emerged as a key area of divergence. Nurses and dental assistants generally received more regular infection control refreshers, while some radiologic technologists reported going multiple years without formal training. Moreover, none of the participants reported joint or cross-functional infection control training, despite regularly interacting with other departments. This finding supports Gray & Moore (2008), who argued that without shared training, infection prevention efforts are compartmentalized and vulnerable to failure.

Ambiguity in Shared Responsibilities

One of the most striking qualitative findings was the lack of clarity regarding who is responsible for disinfecting shared equipment—a recurring point of concern for all professions. This ambiguity reinforces findings by Lin (2004), who reported that undefined cross-departmental roles can undermine procedural safety. Participants in this study recommended simple, practical solutions such as checklists or cleaning logs, which could significantly improve accountability.

Regional Implications and Policy Gaps

The study's findings also have specific relevance to the Saudi healthcare context. While tertiary hospitals in Riyadh adhere to CBAHI and JCI standards, implementation varies between departments. Al-Hrenat (2021) showed that JCI-accredited hospitals in Palestine saw improvements when infection control became a system-wide priority, rather than a department-led responsibility. This model may serve as a valuable reference for Saudi hospitals seeking to strengthen infection prevention across departmental lines.

Limitations

While the study offers meaningful insights, it has some limitations. The sample size was limited to one tertiary hospital in Riyadh, potentially limiting generalizability. Self-reported survey data may introduce response bias, and interviews were subject to the participants' ability to recall and articulate experiences. Future research could expand to multiple sites and include patient outcomes related to infection incidents.

Conclusion

This study highlights critical gaps in cross-departmental infection control practices among nurses, dental assistants, and radiologic technologists in a tertiary hospital in Riyadh. While individual departments demonstrate adequate knowledge and compliance, inconsistencies in protocols, communication breakdowns, and unclear responsibilities undermine overall infection prevention efforts. The findings underscore the need for unified infection control policies, regular interprofessional training, and shared accountability systems. Addressing these issues through system-level coordination can enhance patient safety and improve adherence to national and international healthcare standards.

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