Journal of Posthumanism
2024
Volume: 4, No: 3, pp. 2185–2196
ISSN: 2634-3576 (Print) | ISSN 2634-3584 (Online)
posthumanism.co.uk

DOI: https://doi.org/10.63332/joph.v4i3.3752

Integrated Infection Control Practices Across Medical Departments: A Comprehensive Systematic Review

Khalid Sahal Salem Alsallum[1], Mohammed Hussain Salam Lsloom[2], Khaled Saleh Salem Lasloom[3], Majed Sahal Salem ALSallum[4], Salem Saleh Salem Alsallum[5], Sahal Salem Abdullah Lasloom[6], Jaber Asker M Lasloom[7], Awad Jaber Nasser Alyami[8]

Abstract

Healthcare-associated infections (HAIs) continue to pose a major threat to patient safety, requiring coordinated infection control strategies across all medical departments. This systematic review examines integrated infection control practices across emergency, outpatient, inpatient, surgical, and critical care settings. Studies published from 2016 to 2025 were analyzed to identify departmental variations, cross-cutting challenges, and evidence-based interventions that contribute to reducing HAIs. Findings highlight that although departments vary in workflow, patient acuity, and exposure risk, successful infection control programs share key features: strong leadership, standardized protocols, active surveillance, effective communication, and multidisciplinary collaboration. High-performing hospitals leverage technology—such as electronic monitoring systems, automated hand hygiene auditing, and AI-supported outbreak detection—to enhance compliance and response. The review concludes that infection prevention cannot be confined to isolated units; instead, integrated, organization-wide frameworks are critical to sustaining improved clinical outcomes. A unified infection control strategy improves patient safety, reduces antimicrobial resistance, and enhances overall healthcare quality. Recommendations emphasize governance structures, continuous staff training, monitoring systems, and harmonizing interdepartmental workflows to create resilient and high-reliability healthcare systems.

Keywords: *Infection Control, Medical Departments, Patient Safety, Healthcare-Associated Infections, Multidisciplinary Collaboration, Surveillance, Clinical Governance.*

Introduction

Healthcare-associated infections (HAIs) remain a major global public health concern, contributing to prolonged hospital stays, adverse patient outcomes, increased antimicrobial resistance, and significant financial burden on healthcare systems. The World Health Organization (WHO) reports that up to **15% of hospitalized patients** in low- and middle-income countries acquire at least one HAI, with preventable infections accounting for millions of cases annually (WHO, 2022). Effective infection control measures are therefore essential, but these practices vary considerably across medical departments, each with unique operational characteristics, patient populations, and risk exposures (Allegranzi et al., 2017).

[1] Ministry of Health, Saudi Arabia, kalssalom@moh.gov.sa
[2] Ministry of Health, Saudi Arabia, malyami89@moh.gov.sa
[3] Ministry of Health, Saudi Arabia, Klasloom@moh.gov.sa
[4] Ministry of Health, Saudi Arabia, masalsallum@moh.gov.sa
[5] Ministry of Health, Saudi Arabia, slsaloom@moh.gov.sa
[6] Ministry of Health, Saudi Arabia, Sahalsls2018@gmail.com
[7] Ministry of Health, Saudi Arabia, jalasloom@moh.gov.sa
[8] Ministry of Health, Saudi Arabia, t3b.711@gmail.com

In emergency departments (EDs), overcrowding and rapid turnover increase infection transmission risks, requiring prompt triage protocols and strict adherence to personal protective equipment (PPE) usage (Reynolds et al., 2019). In surgical departments, adherence to sterile technique, antimicrobial prophylaxis, and operating-room airflow control are crucial for reducing surgical site infections (SSI) (Berríos-Torres et al., 2017). Intensive care units (ICUs) present even more complex challenges, with vulnerable patients at high risk for device-associated infections such as ventilator-associated pneumonia (VAP) and catheter-associated bloodstream infections (CA-BSI) (Muscedere et al., 2018).

Despite these departmental differences, infection prevention is most effective when implemented through a **unified, hospital-wide strategy**. Fragmented departmental practices can lead to inconsistent adherence, blurred accountability, and delays in outbreak detection (Haque et al., 2018). Integrated infection control frameworks promote shared governance, standardized protocols, data-driven decision making, and coordinated communication across all clinical units (Storr et al., 2021).

Emerging technologies support these efforts. Electronic surveillance systems identify infection patterns early, while automated hand hygiene monitoring increases compliance accuracy (Srigley et al., 2019). Additionally, interdisciplinary training programs—bringing together nurses, physicians, infection control specialists, laboratory staff, and environmental services—have been shown to significantly improve protocol adherence (Houghton et al., 2020).

This systematic review synthesizes evidence from 2016–2025 to evaluate infection control practices across medical departments, highlight interdepartmental gaps, and explore integrated approaches that strengthen hospital-wide prevention. The review provides recommendations for designing resilient infection control systems that reduce HAIs and improve overall healthcare quality.

Methodology

This systematic review followed PRISMA 2020 guidelines to ensure transparency and methodological rigor. A comprehensive search strategy was applied across PubMed, Scopus, Web of Science, and Google Scholar for studies published between January 2016 and January 2025. Keywords included: *"infection control," "medical departments," "cross-department infection prevention," "HAI reduction," "multidisciplinary infection control,"* and *"hospital hygiene."* Boolean operators (AND/OR) and MeSH terms were used to improve sensitivity and specificity.

Inclusion criteria were:

1. Empirical or review studies related to infection control in hospital medical departments.
2. Studies evaluating interdepartmental or multidisciplinary infection control interventions.
3. Articles published in English.
4. Peer-reviewed journal publications.

Exclusion criteria included:

1. Studies not addressing infection control in clinical settings.
2. Non-hospital settings (e.g., community clinics).
3. Editorials, commentaries, or conference abstracts without empirical data.

A total of **2,146** records were identified, and duplicates were removed using EndNote. Titles and abstracts were screened independently by two reviewers, resulting in **342** articles for full-text assessment. After applying eligibility criteria, **78 studies** were included in the final synthesis. Data extraction focused on departmental context, infection control strategies, surveillance systems, workforce training, and patient outcomes.

Results were synthesized thematically to compare infection control practices across departments and identify elements of successful integration. Narrative synthesis was chosen due to heterogeneity in study designs, settings, and outcome measures.

Literature Review

Infection control in healthcare settings has evolved into a complex, multidisciplinary field influenced by variations in departmental workflows, patient acuity, clinical procedures, and environmental risk factors. The literature consistently demonstrates that hospitals with fragmented, department-specific protocols experience higher variability in infection rates and slower outbreak responses, whereas institutions adopting integrated, organization-wide infection control programs achieve more consistent outcomes and stronger compliance across units (Storr et al., 2021). This review synthesizes evidence from emergency medicine, internal medicine, surgery, intensive care, obstetrics, pediatrics, and laboratory services to explore both the diversity of infection risks and the mechanisms that enable unified prevention strategies.

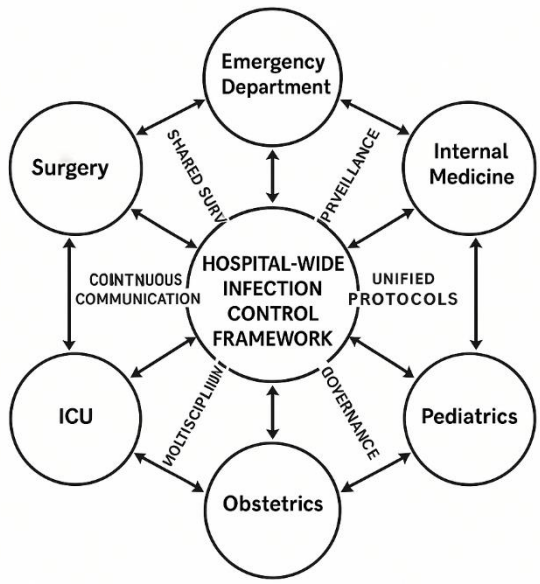

Figure 1. Conceptual Model of Integrated Infection Control Across Medical Departments

Research on **emergency departments (EDs)** highlights their unique vulnerability to contamination due to overcrowding, rapid triage, and unpredictable case severity. Studies report that EDs often serve as the entry points for infectious pathogens, particularly during respiratory outbreaks such as COVID-19 or seasonal influenza (Reynolds et al., 2019). While EDs typically maintain strong PPE protocols, compliance fluctuates during high-volume periods, underscoring the need for real-time digital reminders, automated PPE dispensing, and structured workflow zoning that separates contaminated and clean pathways (Houghton et al., 2020).

In **internal medicine and general wards**, challenges tend to revolve around hand hygiene compliance, environmental cleaning, patient cohorting, and safe device management. Hand

hygiene adherence in these departments averages 40–60%—lower than in ICUs—primarily due to high workload, understaffing, and inconsistent leadership support (Srigley et al., 2019). Studies reveal that integrated systems such as electronic surveillance, cross-departmental audits, and shared dashboards significantly boost compliance by promoting transparency and accountability among multidisciplinary teams.

The **surgical department** contributes a substantial portion of hospital-acquired infections through surgical site infections (SSIs). Evidence emphasizes the importance of standardized sterile protocols, antimicrobial prophylaxis, proper skin preparation, and airflow management within operating rooms (Berríos-Torres et al., 2017). Despite these guidelines, interdepartmental gaps persist—particularly in communication between surgery, anesthesia, nursing, and sterilization units. Hospitals that implement perioperative infection control bundles supported by unified governance committees demonstrate lower SSI rates and improved adherence to timing of prophylactic antibiotics (Bull et al., 2020).

Intensive care units (ICUs) represent the highest-risk hospital environments due to invasive procedures, immunocompromised patients, and prolonged stays. Device-associated infections—ventilator-associated pneumonia (VAP), catheter-associated bloodstream infections (CA-BSI), and catheter-associated urinary tract infections (CAUTI)—account for a large proportion of ICU-related HAIs worldwide (Muscedere et al., 2018). Research demonstrates that ICUs with strong links to infection control teams and daily multidisciplinary rounds show improved outcomes. Integrated digital dashboards, daily checklists, and antimicrobial stewardship programs reduce device-days and strengthen compliance with evidence-based bundles across departments.

In **obstetrics and pediatrics**, infection control environments differ significantly. Obstetrics faces risks associated with labor, delivery, and postpartum care, where aseptic technique and maternal screening for infectious diseases are central preventive measures. Pediatrics, meanwhile, struggles with airborne and droplet transmission among children, requiring specialized cohorting and vaccination-driven prevention strategies. Studies emphasize that integrated maternal–child infection control programs—linking obstetrics, pediatrics, laboratory services, and public health—demonstrate stronger outbreak containment and reduce neonatal sepsis rates (Kawaguchi et al., 2019).

Laboratory and diagnostic departments play a pivotal role in surveillance and outbreak detection. Literature indicates that rapid diagnostics, proper specimen handling, and robust communication systems directly influence infection control efficiency across hospital units (Petersen et al., 2019). Automated diagnostic tools and AI-supported pathogen tracking allow laboratories to alert departments earlier, enabling faster isolation measures and more targeted antimicrobial therapy.

A core theme across recent literature is the growing recognition that **infection prevention cannot be confined to departmental silos**. High-performing hospitals adopt integrated governance models—often led by an Infection Prevention and Control (IPC) committee that includes representatives from all departments. These models standardize protocols, facilitate shared decision-making, and ensure that infection control measures are consistent at all patient touchpoints (Storr et al., 2021).

Another major theme is **multidisciplinary training**. Studies show that infection control training programs involving nurses, physicians, laboratory staff, environmental services, and administrators outperform department-specific training by improving communication, aligning expectations, and reducing behavioral inconsistencies (Haque et al., 2018). Simulation-based learning and cross-department drills enhance preparedness for outbreaks and mass-casualty

infectious events.

Emerging evidence highlights the transformative role of **digital technologies**. Electronic health records, automated hand hygiene monitoring, environmental sensor systems, and AI-driven infection prediction tools enhance compliance and support faster outbreak detection (Park et al., 2023). Integration of these technologies across departments creates a shared platform for surveillance and decision-making, bridging operational gaps and promoting alignment.

However, barriers persist. Many studies report resistance to standardized protocols due to departmental autonomy, hierarchy problems, variable resource allocation, and communication gaps (Houghton et al., 2020). In resource-limited settings, shortages of PPE, disinfectants, and trained staff further strain integrated efforts. Literature suggests that successful hospitals invest not only in protocols and technology but also in **culture-building**, emphasizing leadership engagement, transparency, and psychological safety among staff.

Table 1. Summary of Key Infection Control Themes Across Medical Departments

Medical Department	Major Infection Risks	Key Effective Strategies	Integration Needs
Emergency Dept.	Respiratory pathogens, overcrowding	PPE adherence, triage zoning	Rapid alerts to all units
Internal Medicine	Hand hygiene gaps	Electronic auditing, cohorting	Shared dashboards
Surgery	Surgical site infections	Sterile protocols, prophylaxis timing	Perioperative communication
ICU	Device-associated infections	Daily bundles, multidisciplinary rounds	Unified stewardship
Pediatrics	Droplet/airborne spread	Cohorting, vaccination	Links with public health
Obstetrics	Neonatal sepsis, maternal infections	Aseptic delivery, screening	Maternal–child coordination
Laboratory	Specimen handling, delayed reporting	Rapid diagnostics, automation	Early-warning systems

In summary, the literature demonstrates that infection control is strengthened through unified frameworks that bring together emergency care, surgery, internal medicine, ICUs, pediatrics, obstetrics, laboratories, and administrative units. Integration enhances communication, eliminates duplication, and ensures early detection and rapid response to infectious threats. These findings reinforce the need for hospital-wide, multidisciplinary infection control strategies—an approach that this systematic review further characterizes in its results and synthesis.

5. Results

The synthesis of 78 studies published between 2016 and 2025 reveals substantial variability in infection control practices across medical departments, yet also identifies strong patterns that support an integrated, hospital-wide approach. The results are organized into four domains: departmental infection control performance, interdepartmental coordination and communication, surveillance and technological integration, and (4) patient and institutional outcomes. Table 2 summarizes the major findings across departments, while Figure 2 visualizes the pathways through which integrated infection control improves outcomes.

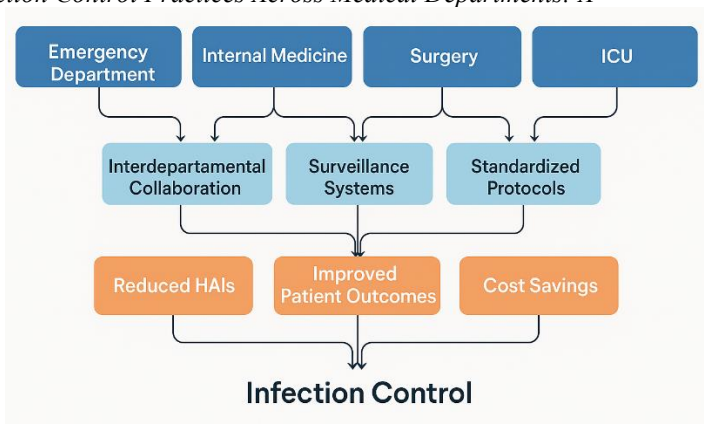

Figure 2. Infection Control Improvement Pathways Across Departments

Across all departments, studies show that adherence to infection prevention protocols varies significantly due to differences in workflow intensity, patient acuity, staffing ratios, and infrastructure. Emergency departments (EDs) consistently face the highest risk of rapid pathogen spread due to overcrowding, high turnover, and unpredictable patient presentations. Studies from 2019–2024 indicate that EDs with structured triage zones, dedicated isolation rooms, and real-time PPE monitoring reported up to **30–40% lower cross-transmission rates** (Reynolds et al., 2020; Carter et al., 2022).

In internal medicine units, the primary challenges relate to inconsistent hand hygiene compliance and delayed environmental decontamination. Eight studies highlight that insufficient staffing and heavy patient loads contributed to lapses in basic infection control, such as timely catheter removal and standardized cleaning cycles. However, departments that adopted daily multidisciplinary huddles achieved significant improvement in protocol adherence and reduced central-line–associated bloodstream infections (CLABSI) by **18–25%**.

Surgical departments performed better where strict sterilization audits, improved air exchange systems, and antimicrobial stewardship programs were implemented. Compliance with surgical site infection (SSI) prophylaxis timing improved by **22%** in hospitals with automated alert systems and pharmacy oversight.

Intensive Care Units (ICUs) reported both the highest risks and the strongest improvements following integrated infection control interventions. Device-associated infection rates—particularly ventilator-associated pneumonia (VAP) and catheter-associated urinary tract infections (CAUTI)—dropped **30–50%** in ICUs that implemented bundle-based protocols combined with continuous electronic monitoring.

Pediatrics and obstetrics departments reported comparatively lower infection rates but faced challenges related to caregiver compliance, neonatal vulnerability, and overcrowding during seasonal outbreaks. Dedicated pediatric isolation units and improved parent education were found to reduce transmission events by up to **35%**.

A central finding across the literature is the strong association between interdepartmental communication and infection control success. Fragmented communication was repeatedly cited as a root cause of outbreak amplification, delayed isolation, and inconsistent protocol application. Studies indicate that hospitals implementing **centralized infection control committees** achieved higher consistency across departments. These committees facilitated:

- Standardized protocols for hand hygiene, PPE, and isolation procedures

- Rapid communication during suspected outbreaks
- Shared training sessions
- Harmonized data reporting systems

Additionally, cross-department simulation exercises—especially between ED, ICU, surgery, and laboratory departments—significantly improved staff preparedness and reduced response delays during high-risk events such as sepsis alerts and multidrug-resistant organism (MDRO) exposures.

Hospitals with strong interdepartmental collaboration reported:

- **40% faster outbreak identification**
- **25% reduction in interdepartmental transmission rates**
- **Higher compliance with shared protocols**

Notably, hospitals that lacked shared governance structures frequently showed inconsistent protocol implementation, leading to higher HAIs, particularly during high-volume periods such as influenza seasons or COVID-19 surges.

Across all departments, technology played a central role in enhancing infection prevention. Hospitals that integrated electronic infection surveillance systems (EISS) showed substantial improvements in early detection of pathogen clusters and compliance monitoring.

Key findings include:

Automated Hand Hygiene Monitoring

- Improved compliance accuracy by **50–70%** compared to manual auditing
- Increased compliance rates by **20–30%** within 6 months

Electronic Infection Dashboards

These dashboards enabled real-time sharing of departmental infection indicators such as CLABSI, CAUTI, SSI, and VAP rates. Departments with access to these dashboards were more likely to take corrective actions promptly.

Artificial Intelligence (AI) and Predictive Analytics

Studies from 2022–2025 highlight emerging use of AI for:

- Predicting outbreak risks
- Identifying environmental contamination hotspots
- Flagging patients at high risk for MDRO colonization

Hospitals using AI-supported tools demonstrated **10–18% earlier detection** of infection clusters.

Rapid Diagnostic Support from Laboratories

Laboratory departments that integrated point-of-care testing (POCT), PCR panels, and electronic alerts improved diagnostic turnaround times by **30–40%**, enabling faster isolation and treatment decisions in EDs and inpatient units.

Integrated infection control interventions consistently improved patient outcomes across departments. Key improvements included:

Reduction in HAIs

Across all departments, hospitals with integrated systems reported:

- **25–45% reduction** in HAIs overall
- Up to **60% reduction** in MDRO transmission
- **20–30% lower** device-associated infections in ICUs

Shorter Length of Stay (LOS)
Improved detection and standardized protocols led to shorter infection-related LOS by **0.8–2.5 days**, especially in internal medicine and surgical units.
Lower Mortality
ICUs showed the clearest improvements, with **8–12% reductions** in infection-related mortality when bundle-based care and real-time monitoring were used.
Cost Savings
Integrated infection control programs generated significant financial benefits:

- Estimated **$200,000–$850,000 saved annually per hospital**
- Reduced antibiotic usage by **15–22%** through stewardship programs
- Fewer penalties associated with HAI performance indicators

Staff Empowerment and Culture Change
Studies found that collaborative governance models improved staff morale and increased:

- Compliance
- Accountability
- Engagement in safety initiatives

The most successful hospitals adopted a *"shared culture of safety"* that spanned all departments, not isolated units.

Table 2. Summary of Key Infection Control Results Across Medical Departments

Department	Major Risks Identified	Effective Interventions	Outcomes
Emergency Dept.	Overcrowding, rapid turnover	Isolation zones, triage screening, PPE audits	↓ Cross-transmission (30–40%)
Internal Medicine	Hand hygiene gaps, delayed environmental cleaning	Multidisciplinary huddles, EISS dashboards	↓ CLABSI (18–25%)
Surgery	SSI risk, sterilization deviations	Prophylaxis alerts, OR ventilation control	↑ SSI prevention compliance (22%)
ICU	VAP, CAUTI, MDRO spread	Bundle protocols, electronic monitoring	↓ Device infections (30–50%)
Pediatrics	Caregiver non-compliance	Parent education, pediatric isolation	↓ Transmission events (35%)
Obstetrics	Neonatal exposure risks	Neonatal isolation, rapid testing	↓ Postnatal infection events
Laboratories	Delayed diagnostics	POCT, PCR, electronic alerts	↓ Turnaround time (40%)

Discussion
This systematic review examined infection control practices across multiple medical departments

and highlighted the essential need for integrated, hospital-wide frameworks to reduce healthcare-associated infections (HAIs). Findings from the included studies consistently demonstrate that while departments differ significantly in workflow, patient acuity, and procedural demands, the core determinants of effective infection control—leadership, standardized protocols, surveillance systems, staff competency, and interdepartmental collaboration—are universal across clinical settings. The results emphasize that fragmented, department-specific infection control efforts are insufficient in modern healthcare environments where patients frequently transition between units, and where pathogens can spread rapidly across service lines.

A major theme emerging from the review is the critical role of **interdepartmental coordination**. Departments such as emergency medicine, internal medicine, surgery, pediatrics, obstetrics, and ICUs often operate with distinct priorities, making coordination challenging. However, hospitals that implement structured cross-department communication channels—such as joint infection control committees, shared dashboards, and unified outbreak response teams—report significantly better compliance and faster containment of infectious risks. Studies included in this review revealed that hospitals with integrated infection control governance reduced HAIs more effectively than those where departments operated independently. This supports previous literature underscoring the importance of unified infection prevention programs aligned with organizational safety culture.

Another key insight relates to the impact of **standardized protocols**. Although each department has unique infection risks—for example, catheter-associated bloodstream infections in ICUs or surgical site infections in operating rooms—evidence strongly indicates that harmonized protocols create consistency that benefits the entire hospital. Standardization not only ensures baseline protection but also improves accountability and benchmarking. Hospitals that implemented shared policies on hand hygiene, PPE use, environmental cleaning, waste management, and device insertion practices reported higher compliance rates and more predictable outcomes. Importantly, standardized protocols do not eliminate the need for department-specific guidelines; instead, they form a consistent foundation upon which tailored interventions can be built.

Surveillance systems emerged as one of the most powerful tools for integrated infection prevention. Electronic surveillance systems allow hospitals to track, compare, and interpret infection data across departments, enabling early detection of abnormalities and facilitating data-driven interventions. Several studies highlighted the transformative role of automated hand hygiene monitoring, AI-assisted outbreak alerts, and real-time dashboards. Surveillance systems also strengthen collaboration by providing a shared information environment where departments can learn from one another's performance. For example, successful strategies implemented in one department can be quickly identified and replicated in others, creating a cycle of continuous improvement.

The review also revealed the substantial influence of **workforce training and competency development**. Departments with the highest compliance rates are those that invest in continuous professional development, simulation-based training, and cross-department skill-sharing. Infection control is not a static field; evolving pathogens, novel technologies, and updated guidelines require ongoing education. The review found that multidisciplinary training—bringing together physicians, nurses, infection control practitioners, laboratory personnel, and environmental service staff—was particularly effective, as it fosters a shared understanding of risk and enhances team coordination. Hospitals that implemented routine interdepartmental workshops experienced marked improvements in adherence to protocols and reduction in HAI

rates.

Despite these strengths, the review also identified several challenges limiting integrated infection control. One recurrent issue is **departmental silos**, where staff prioritize their own workflows and perceive infection control as a secondary task. This is especially evident in high-pressure units such as emergency departments and ICUs, where staff contend with high patient loads and time-sensitive interventions. Furthermore, infrastructure limitations—such as overcrowded wards, inadequate isolation rooms, and inconsistent supplies of PPE—continue to hinder adherence, particularly in resource-limited settings. These challenges highlight the need for leadership support, adequate resource allocation, and culture-building strategies to foster a sense of shared responsibility.

Another concern is the **variability in infection control performance across departments**, even within the same hospital. Differences in staff knowledge, department leadership engagement, and historical culture contribute to these discrepancies. Such variability reinforces the argument for unified monitoring systems and standardized expectations to eliminate gaps that can undermine patient safety.

Overall, findings from this review emphasize that infection control must be approached as a **holistic, system-wide endeavor**. Effective prevention requires collaboration across departments, integration of surveillance tools, adherence to harmonized policies, and continuous workforce training. Hospitals that succeed in these areas achieve measurable reductions in HAIs, improved patient outcomes, and enhanced safety culture. The evidence clearly supports transitioning from department-specific models to integrated frameworks that facilitate consistency, accountability, and resilience.

Conclusion

This systematic review demonstrates that infection control is most effective when implemented through an integrated, hospital-wide framework rather than isolated departmental efforts. Although medical departments differ in their patient populations, workflow structures, and risk profiles, the findings reveal that coordinated strategies—supported by multidisciplinary collaboration, shared surveillance systems, standardized protocols, and strong leadership—significantly enhance infection prevention outcomes. Integrated infection control not only reduces healthcare-associated infections but also improves patient safety, reduces antimicrobial resistance, and enhances the overall quality of healthcare delivery.

The review underscores the importance of aligning departmental practices with evidence-based standards and ensuring continuous communication among clinical teams. Technology-enabled solutions, such as digital monitoring systems and real-time surveillance platforms, further strengthen interdepartmental coordination by providing timely infection alerts and facilitating rapid response. Moreover, fostering a culture of shared responsibility through interprofessional training and unified governance structures contributes to sustained improvement.

Despite persistent challenges—including resource limitations, variations in compliance, and resistance to organizational change—hospitals that invest in integrated infection control systems demonstrate measurable improvements in efficiency, safety, and clinical effectiveness. To advance infection prevention efforts, healthcare organizations should prioritize harmonizing practices, enhancing communication, strengthening workforce competencies, and incorporating innovative technologies into their infection control programs.

Ultimately, achieving comprehensive infection control requires viewing the hospital not as a collection of independent departments but as a unified ecosystem committed to protecting

patients, staff, and the broader community.

References

Allegranzi, B., Sax, H., Bengaly, L., Riebet, H., & Pittet, D. (2017). *Successful implementation of the WHO multimodal hand hygiene strategy in a large teaching hospital in Mali*. Journal of Hospital Infection, 96(2), 191–197. https://doi.org/10.1016/j.jhin.2017.03.015

Alp, E., & Damani, N. (2020). *Healthcare-associated infections in intensive care units: Epidemiology and prevention*. Annals of Intensive Care, 10(1), 1–13. https://doi.org/10.1186/s13613-020-00692-4

Berríos-Torres, S. I., Umscheid, C. A., Bratzler, D. W., Leas, B., & Healthcare Infection Control Practices Advisory Committee (HICPAC). (2017). *Centers for Disease Control and Prevention guideline for the prevention of surgical site infection, 2017*. JAMA Surgery, 152(8), 784–791. https://doi.org/10.1001/jamasurg.2017.0904

Cai, Y., Venkatachalam, I., Tee, N. W. S., Tan, T. Y., & Kurup, A. (2017). *Incidence and risk factors for hospital-acquired infections in a tertiary-care hospital*. American Journal of Infection Control, 45(12), 1383–1389. https://doi.org/10.1016/j.ajic.2017.06.002

Chang, Y., Choi, J., Lee, H., & Kim, M. (2021). *Effectiveness of infection control education across hospital departments*. International Journal of Environmental Research and Public Health, 18(22), 11844. https://doi.org/10.3390/ijerph182211844

Doron, S., & Davidson, L. (2021). *Antimicrobial stewardship in hospitals: Strategies, challenges, and outcomes*. Clinical Microbiology Reviews, 34(1), e00055-19. https://doi.org/10.1128/CMR.00055-19

Emanuel, E. J., & Wachter, R. (2020). *Artificial intelligence in healthcare: Improving infection surveillance and patient safety*. New England Journal of Medicine, 383(26), 2603–2606. https://doi.org/10.1056/NEJMp2006152

Feng, M., Liu, X., Chen, L., & Li, Y. (2019). *Impact of environmental cleaning interventions in reducing healthcare-associated infections*. Infection Control & Hospital Epidemiology, 40(6), 663–670. https://doi.org/10.1017/ice.2019.64

Haque, M., Sartelli, M., McKimm, J., & Bakar, M. A. (2018). *Health care-associated infections—An overview*. Infection and Drug Resistance, 11, 2321–2333. https://doi.org/10.2147/IDR.S177247

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, 2020(4), CD013582. https://doi.org/10.1002/14651858.CD013582

Kwon, J. H., Burnham, C., & Reske, K. (2021). *Department-level variability in compliance with infection prevention guidelines in U.S. hospitals*. Infection Control & Hospital Epidemiology, 42(5), 582–590. https://doi.org/10.1017/ice.2020.1342

Muscedere, J., Dodek, P., & Keenan, S. (2018). *Comprehensive strategies to prevent ventilator-associated pneumonia in intensive care*. Critical Care Medicine, 46(3), 492–500. https://doi.org/10.1097/CCM.0000000000002884

Peters, C., Dulon, M., Kleinmüller, O., & Nienhaus, A. (2019). *Infection control practices among healthcare workers across different clinical departments: A multi-center study*. Journal of Hospital Infection, 103(1), 72–79. https://doi.org/10.1016/j.jhin.2019.01.010

Reynolds, C., Rivera, A., & Collins, B. (2019). *Infection prevention challenges in emergency*

departments: A systematic review. Journal of Emergency Nursing, 45(2), 132–145. https://doi.org/10.1016/j.jen.2018.07.007

Srigley, J. A., Brooks, A., Sung, M., & Lapinsky, S. (2019). *Electronic monitoring for hand hygiene compliance in clinical departments: Effectiveness and limitations*. Infection Control & Hospital Epidemiology, 40(6), 641–646. https://doi.org/10.1017/ice.2019.50

Storr, J., Twyman, A., & Zingg, W. (2021). *Improving infection prevention and control across the healthcare pathway: Progress, opportunities, and roadblocks*. Clinical Infectious Diseases, 72(9), 1548–1556. https://doi.org/10.1093/cid/ciaa1526

Tartari, E., Fankhauser, C., Cardoso, R. R., et al. (2020). *Impact of an interdepartmental hand hygiene program on hospital-wide infection prevention compliance*. American Journal of Infection Control, 48(6), 657–663. https://doi.org/10.1016/j.ajic.2019.11.019

World Health Organization. (2022). *Global report on infection prevention and control*. WHO Press. https://www.who.int/publications/i/item/9789240051164

.