Coordinated Infection Control Across Acute And Non-Acute Care Settings: A Review Of Multidepartmental Clinical And Operational Interventions

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Abstract
Infection prevention and control remains a persistent challenge across healthcare systems, particularly when patients transition between acute and non-acute care settings. While substantial efforts have focused on department-specific infection control measures, less attention has been given to failures arising from poor coordination across clinical, operational, and administrative domains. This review examines infection control as a care-continuum challenge that extends beyond individual units or disciplines, emphasizing the interconnected roles of medical, support, and governance departments in mitigating infection risks. Drawing on recent multidisciplinary evidence, the review synthesizes findings on infection risk touchpoints along the patient care pathway, including admission, diagnosis, treatment, environmental exposure, and discharge or transfer. It highlights the often-overlooked contributions of non-clinical departments, the influence of human and organizational factors, and the impact of fragmented surveillance and information systems. The review further identifies coordination mechanisms and governance structures associated with improved infection control outcomes. Overall, the findings underscore that effective infection prevention depends on system-wide integration, shared accountability, and coordinated interventions across acute and non-acute care environments.
Keywords: Infection control; healthcare-associated infections; multidisciplinary coordination; acute and non-acute care; patient safety; healthcare systems integration; care continuity

INTRODUCTION

Infection prevention and control (IPC) remains a fundamental pillar of patient safety and healthcare quality worldwide. Healthcare-associated infections (HAIs) continue to impose substantial clinical and economic burdens on health systems, contributing to prolonged hospital stays, increased antimicrobial resistance, excess mortality, and rising healthcare costs (World Health Organization, 2016; Magill et al., 2018). Despite decades of guideline development and technological advancement, HAIs persist across both acute care environments—such as intensive care units, emergency departments, and surgical wards—

and non-acute settings including outpatient clinics, long-term care facilities, rehabilitation centers, and home-based care services.

Traditionally, IPC efforts have been implemented through department-specific protocols focusing on hand hygiene, isolation procedures, environmental cleaning, and antimicrobial stewardship. While these measures are essential, growing evidence suggests that infection risks are often amplified not within isolated departments, but at the interfaces between them (Borg et al., 2019). Patient movement across care settings, fragmented responsibilities, and inconsistent application of IPC standards frequently undermine otherwise well-designed infection control programs. As healthcare delivery increasingly emphasizes continuity of care, integrated service models, and early discharge, the need for coordinated IPC strategies across the entire care continuum has become more pressing.

Acute and non-acute care settings differ markedly in terms of patient acuity, infrastructure, staffing patterns, and infection surveillance capacity. Acute care settings often benefit from specialized IPC teams and real-time monitoring systems, whereas non-acute settings may face limited resources, variable staff training, and less robust reporting mechanisms (Stone et al., 2018; Mitchell et al., 2020). These disparities create critical vulnerabilities during care transitions, where lapses in communication, documentation, and accountability can facilitate infection transmission and delayed outbreak detection.

Furthermore, IPC is no longer viewed solely as a clinical responsibility. Operational and support departments—including environmental services, facilities management, supply chain, patient transport, and administrative units—play pivotal roles in shaping the infection risk environment (Dancer, 2019). Human factors such as workload, compliance fatigue, organizational culture, and interdepartmental communication also significantly influence adherence to IPC practices (Huis et al., 2017). In parallel, digital fragmentation across laboratory systems, electronic health records, and surveillance platforms continues to limit timely, system-wide responses to emerging infection threats (Baker et al., 2021).

In this context, there is a growing call for system-oriented approaches that conceptualize infection control as a coordinated, multidepartmental function spanning acute and non-acute care settings. This review responds to that need by synthesizing evidence on how clinical, operational, and governance interventions interact across the patient care pathway. By reframing IPC as a shared organizational and system-level responsibility, the review aims to identify coordination mechanisms capable of strengthening infection prevention efforts and enhancing patient safety across the full continuum of care.

Mapping Departmental Touchpoints Along the Infection Pathway

Effective infection prevention and control (IPC) requires an understanding of how infection risks emerge and propagate across the entire patient care pathway. Rather than being confined to individual departments, infection risks arise at multiple **touchpoints** where patients, healthcare workers, equipment, information, and environments intersect. Mapping these touchpoints provides a systems-based perspective that clarifies how diverse medical and support departments collectively influence infection transmission across both acute and non-acute care settings.

The infection pathway often begins at admission or initial patient contact, whether in emergency departments, outpatient clinics, or long-term care facilities. At this stage, failures in early risk identification—such as delayed recognition of infectious symptoms, incomplete travel or exposure histories, or inconsistent screening protocols—can allow pathogens to enter healthcare environments unchecked (Mitchell et al., 2020). Clinical staff, reception services, infection control teams, and information systems all contribute to this touchpoint. In non-acute settings, limited screening capacity and variable staff training further heighten vulnerability, emphasizing the importance of standardized triage and communication protocols across care levels.

Diagnostic testing and invasive procedures represent critical moments of infection risk amplification. Laboratories, radiology units, surgical services, and bedside clinical teams interact closely through specimen collection, equipment use, and procedural workflows. Breakdowns in specimen handling, delays in laboratory reporting, or inadequate disinfection of shared diagnostic equipment can facilitate cross-contamination (Baker et al., 2021). Coordination between clinical departments and laboratories is particularly important for timely pathogen identification and isolation decisions, especially when patients transition between acute and non-acute services before results are finalized.

Medication administration and therapeutic interventions form another major infection control interface. Pharmacy services, prescribers, nursing staff, and antimicrobial stewardship programs collectively shape infection outcomes through prescribing practices, drug preparation, and administration processes. Inappropriate antimicrobial use across care settings contributes to antimicrobial resistance and increases susceptibility to secondary infections (Borg et al., 2019). In non-acute care, limited stewardship oversight and fragmented documentation may exacerbate these risks, underscoring the need for coordinated medication management across the continuum.

Environmental exposure remains a persistent source of infection risk throughout the patient journey. Environmental services, facilities management, transport teams, and clinical staff jointly influence hygiene standards in patient rooms, shared spaces, and vehicles. Patient movement between units or facilities—such as transfers from hospitals to rehabilitation or long-term care—creates additional exposure opportunities through shared equipment, surfaces, and transport pathways (Dancer, 2019). The effectiveness of environmental cleaning, ventilation systems, and equipment reprocessing depends heavily on synchronization between clinical schedules and operational workflows.

Discharge and transfer represent some of the most fragile points in the infection pathway. Incomplete infection status documentation, inconsistent isolation instructions, and poor communication with receiving facilities can allow infections to spread beyond acute settings (Stone et al., 2018). Case managers, clinicians, infection control teams, and administrative staff all play roles in ensuring continuity of IPC practices. In community and home-care contexts, limited oversight and variable resources further amplify these risks, highlighting the importance of standardized discharge planning and shared accountability.

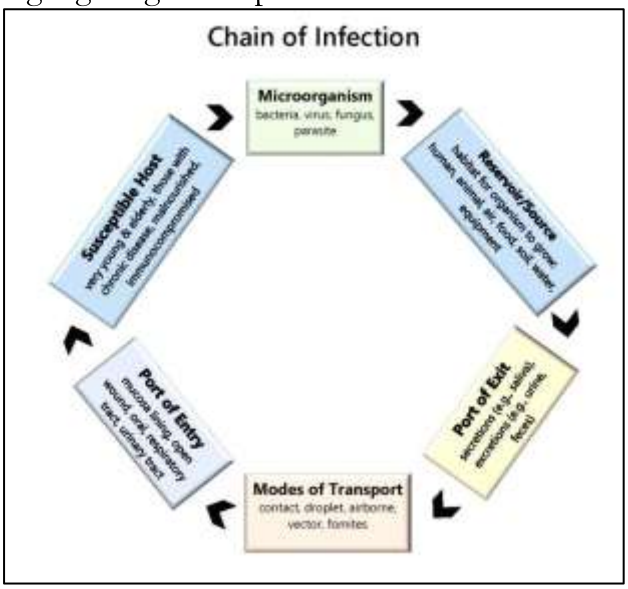

Figure 1. Infection Risk Touchpoints Along the Patient Care Pathway

Mapping departmental touchpoints reveals that infection control failures rarely stem from isolated errors; rather, they arise from misalignment between departments and care settings. Viewing infection pathways through this lens supports targeted interventions at high-risk interfaces, promotes shared responsibility, and facilitates the design of integrated IPC strategies that span acute and non-acute environments.

Invisible Contributors: The Role of Non-Clinical Departments in Infection Control

Infection prevention and control (IPC) is frequently perceived as a primarily clinical responsibility; however, a growing body of evidence highlights that non-clinical departments play a decisive yet often underappreciated role in shaping infection risks within healthcare systems. These "invisible contributors" operate at the intersection of infrastructure, logistics, and patient flow, exerting substantial influence over the conditions that enable or prevent pathogen transmission across both acute and non-acute care settings.

Environmental services represent one of the most critical non-clinical contributors to IPC. Effective cleaning and disinfection of patient rooms, shared equipment, and high-touch surfaces are fundamental to reducing environmental contamination. Studies have consistently demonstrated that suboptimal cleaning practices are associated with persistent pathogen reservoirs, including multidrug-resistant organisms (Dancer, 2019). Importantly, the effectiveness of environmental services is closely tied to coordination with clinical teams, as misaligned schedules, rapid patient turnover, or unclear responsibility for equipment cleaning can compromise infection control outcomes.

Facilities management and engineering departments also play a central role in IPC through ventilation systems, water management, and spatial design. Inadequate air exchange, poorly maintained heating, ventilation, and air-conditioning (HVAC) systems, or failures in water systems have been linked to outbreaks of airborne and waterborne infections, particularly in high-risk units such as intensive care and long-term care facilities (Stockwell et al., 2019). As healthcare expands into ambulatory and community-based environments, consistent facility standards across care settings become increasingly important.

Supply chain and sterile processing services further contribute to infection control by ensuring the availability, integrity, and sterility of medical devices, personal protective equipment, and consumables. Disruptions in supply chains or lapses in reprocessing standards can lead to unsafe reuse of equipment or inconsistent adherence to IPC protocols (Mitchell et al., 2020). Coordination between procurement, clinical departments, and infection control teams is therefore essential to align resource availability with infection risk mitigation.

Patient transport, reception, and security services are additional non-clinical touchpoints that influence infection transmission. These staff members facilitate patient movement across units and facilities, manage waiting areas, and control access to clinical spaces. Inadequate training or unclear protocols in these roles can increase exposure risks, particularly during outbreaks or when managing patients requiring isolation (Stone et al., 2018). In non-acute settings, where formal IPC oversight may be limited, these risks are often amplified.

Finally, **administrative and scheduling units** indirectly shape infection control by influencing patient flow, bed management, and care transitions. Overcrowding, prolonged waiting times, and poorly coordinated transfers can increase contact density and environmental contamination, thereby elevating infection risk (Borg et al., 2019). Administrative decisions regarding staffing levels, workflow design, and resource allocation thus have tangible implications for IPC effectiveness.

Collectively, these non-clinical departments form a foundational layer of infection prevention infrastructure. Recognizing their contributions reframes IPC as an organizational ecosystem rather than a purely clinical endeavor. Sustainable infection control across acute and non-acute care settings therefore requires deliberate integration of non-clinical departments into IPC governance, training, and accountability frameworks.

Human Factors and Behavioral Dynamics in Infection Prevention

Human factors and behavioral dynamics play a pivotal role in the success or failure of infection prevention and control (IPC) efforts across healthcare settings. Even when evidence-based protocols, adequate infrastructure, and advanced technologies are in place, IPC outcomes ultimately depend on how individuals and teams perceive risks, communicate, and adhere to recommended practices. Understanding these behavioral determinants is therefore essential for addressing persistent gaps in infection prevention across acute and non-acute care environments.

One of the most frequently cited human-factor challenges in IPC is **variability in compliance** with standard precautions, particularly hand hygiene and personal protective equipment (PPE) use. Compliance is influenced not only by knowledge and training but also by workload intensity, time pressure, and perceived priorities during clinical care. In high-acuity environments such as emergency departments and intensive care units, competing clinical demands may reduce adherence, while in non-acute settings, lower perceived infection risk may foster complacency (Huis et al., 2017; Mitchell et al., 2020). These behavioral patterns suggest that compliance should be viewed as a dynamic response to context rather than an individual failure.

Communication and teamwork further shape IPC behaviors. Infection prevention often requires rapid information sharing across departments and professional groups, including clinicians, non-clinical staff, and external care providers. Breakdowns in communication—such as unclear isolation status, delayed reporting of laboratory results, or inconsistent handover documentation—can undermine IPC continuity, particularly during care transitions (Borg et al., 2019). Hierarchical structures and professional boundaries may also inhibit open communication, reducing the likelihood that staff will question unsafe practices or escalate concerns related to infection risks.

Organizational culture strongly influences how infection prevention behaviors are enacted in daily practice. A culture that prioritizes productivity over safety, or that frames IPC as an additional burden rather than an integral component of care, is associated with lower adherence and reduced staff engagement (Sexton et al., 2018). Conversely, leadership commitment to patient safety, visible support for IPC initiatives, and consistent reinforcement of shared responsibility have been linked to improved behavioral outcomes. Importantly, culture affects not only clinical staff but also non-clinical personnel who may receive limited infection control training despite frequent patient and environmental contact.

Another critical factor is **compliance fatigue and cognitive overload**, particularly during prolonged outbreaks or periods of organizational stress. Repeated protocol changes, alert fatigue from digital systems, and inconsistent guidance across departments can erode motivation and trust, leading to selective adherence or workarounds (Baker et al., 2021). These challenges are often intensified in non-acute care settings, where staffing shortages and resource constraints limit opportunities for refresher training and behavioral reinforcement.

Finally, **education and behavioral reinforcement strategies** significantly influence IPC effectiveness. Traditional training focused solely on procedural knowledge has shown limited impact when not accompanied by feedback, role modeling, and social reinforcement mechanisms. Multimodal approaches—including peer accountability, audit and feedback cycles, and behaviorally informed interventions—are increasingly recognized as essential for sustaining IPC behaviors across diverse care environments (Huis et al., 2017).

Overall, human factors underscore that infection prevention is not merely a technical challenge but a socio-organizational one. Addressing behavioral dynamics through culture, communication, leadership, and system design is therefore central to achieving consistent and coordinated IPC performance across acute and non-acute care settings.

Data Fragmentation and Surveillance Blind Spots

Robust infection prevention and control (IPC) depends on timely, accurate, and integrated data across the full continuum of care. Yet, despite advances in health information technology, **data fragmentation** remains a central barrier to effective surveillance and coordinated response. Fragmented data infrastructures create **surveillance blind spots**—points where emerging infections, transmission chains, or compliance failures go undetected—particularly at interfaces between departments and between acute and non-acute care settings.

A primary source of fragmentation arises from **disconnected information systems**. Laboratories, electronic health records (EHRs), pharmacy systems, and infection surveillance platforms often operate as parallel rather than interoperable systems. Delays in laboratory reporting, inconsistent data fields, and limited cross-system visibility can postpone isolation decisions and outbreak recognition (Baker et al., 2021). In acute settings, specialized surveillance tools may exist but are frequently confined to specific units, while non-acute settings such as long-term care and outpatient clinics often lack real-time surveillance capacity altogether (Mitchell et al., 2020).

Care transitions represent a major surveillance vulnerability. When patients move between emergency departments, inpatient units, rehabilitation centers, or community care, infection-related information—such as colonization status, pending test results, or antimicrobial exposure—may not be fully communicated or electronically shared (Stone et al., 2018). These gaps compromise continuity of IPC measures and increase the likelihood of secondary transmission beyond the originating facility. The absence of shared regional or network-level surveillance further limits the ability to detect cross-facility outbreaks.

Another blind spot involves **non-clinical data streams** that influence infection risk but are rarely integrated into IPC surveillance. Environmental cleaning schedules, equipment reprocessing records, ventilation system performance, and patient flow metrics are often maintained by operational departments using separate platforms. The lack of linkage between these operational datasets and clinical infection outcomes obscures root-cause analysis and limits proactive risk mitigation (Dancer, 2019). Consequently, infection signals are frequently recognized retrospectively rather than prevented prospectively.

Human–digital interaction challenges further exacerbate fragmentation. Alert fatigue, inconsistent data entry practices, and limited user training can reduce the effectiveness of surveillance systems even when data are technically available (Sexton et al., 2018). Frontline staff may bypass or delay documentation during periods of high workload, while non-clinical staff may not have access to or understanding of IPC-relevant data, reinforcing silos between departments.

Emerging evidence suggests that **integrated surveillance models**—combining laboratory data, clinical indicators, antimicrobial use, and operational metrics—offer significant advantages over isolated reporting systems. Such models support early detection, coordinated escalation, and shared situational awareness across departments and care settings (Borg et al., 2019). However, implementation remains uneven, constrained by governance fragmentation, privacy concerns, and limited interoperability standards, particularly across acute and community-based care.

Figure 2. Surveillance Blind Spots Across the Care Continuum

Overall, data fragmentation transforms IPC from a proactive safety function into a reactive response mechanism. Addressing surveillance blind spots requires not only technological integration but also governance alignment, standardized data definitions, and shared accountability across clinical and non-clinical domains. Without these reforms, infection risks will continue to traverse care settings faster than the systems designed to detect them.

Coordination Mechanisms That Actually Work

While infection prevention and control (IPC) frameworks frequently emphasize guidelines and technical interventions, evidence increasingly suggests that **coordination mechanisms**—the structured ways departments align actions, share information, and resolve risks—are among the most powerful determinants of IPC effectiveness. Across acute and non-acute care settings, successful infection control programs share common features: they operationalize coordination, embed accountability, and create continuous feedback across clinical and non-clinical domains.

One of the most consistently effective mechanisms is the use of **multidepartmental IPC governance structures** that extend beyond traditional infection control committees. High-performing organizations employ cross-functional IPC councils that include representatives from nursing, medicine, laboratories, environmental services, facilities management, pharmacy, administration, and information technology. Such councils facilitate shared situational awareness, align priorities, and reduce ambiguity regarding responsibility for infection-related decisions (Borg et al., 2019). Importantly, their effectiveness depends on decision-making authority rather than advisory status alone.

Standardized handover and escalation protocols constitute another critical coordination mechanism. Infection risks often escalate during patient transfers between units or care settings, particularly when isolation status, pending laboratory results, or antimicrobial regimens are inadequately communicated. Structured infection-specific handover tools—integrated into discharge summaries, transfer forms, or electronic systems—have been shown to reduce lapses in precaution continuity and improve early containment of emerging infections (Stone et al., 2018). In non-acute care, these tools are especially valuable given variable IPC expertise and resource constraints.

Integrated audit and feedback systems also demonstrate strong evidence of effectiveness. When compliance data related to hand hygiene, environmental cleaning, antimicrobial use, and isolation practices are shared transparently across departments, organizations are better able to identify systemic patterns rather than individual blame. Regular multidisciplinary review of audit results fosters collective ownership of IPC performance and supports targeted interventions at high-risk touchpoints (Huis et al., 2017). Feedback loops that link operational indicators (e.g., bed turnover, cleaning intervals) with infection outcomes are particularly powerful in bridging clinical–non-clinical divides.
Another coordination mechanism with growing support is the implementation of **joint IPC rounds and huddles**. Unlike traditional rounds led solely by infection control specialists, joint rounds involve frontline clinical staff, environmental services, facilities personnel, and leadership. These interactions allow real-time identification of environmental hazards, workflow mismatches, and behavioral barriers to compliance (Dancer, 2019). Short, structured huddles have been shown to improve communication quality and enhance staff engagement across hierarchical and departmental boundaries.
Digital integration platforms further enhance coordination when designed to support shared workflows rather than isolated reporting. Dashboards that aggregate laboratory alerts, patient location data, antimicrobial prescribing patterns, and environmental service schedules enable proactive risk management across departments and care settings (Baker et al., 2021). However, digital tools are most effective when accompanied by clearly defined escalation pathways and role-based access that ensures relevant information reaches the right stakeholders at the right time.
Finally, **formalized accountability and role clarity** underpin all effective coordination mechanisms. Successful organizations explicitly define IPC responsibilities across departments, incorporate infection control metrics into performance evaluation, and assign ownership for cross-setting risks such as care transitions (Sexton et al., 2018). This approach shifts IPC from a reactive, committee-driven function to an integrated component of operational and clinical governance.

Table 1. Effective Coordination Mechanisms for Infection Prevention and Control

Coordination Mechanism	Departments Involved	Care Setting	Documented Impact
Cross-functional IPC councils	Clinical, laboratory, environmental, facilities, administration	Acute & non-acute	Improved accountability and faster outbreak response
Infection-specific handover tools	Nursing, physicians, case management	Transitions of care	Reduced precaution discontinuity
Integrated audit & feedback loops	Clinical and non-clinical departments	Hospital-wide	Higher compliance and shared ownership
Joint IPC rounds and huddles	Clinical staff, environmental services, leadership	Acute & non-acute	Early hazard identification
Integrated digital dashboards	IT, IPC teams, operations	Network-wide	Proactive surveillance and coordination
Formal role definition & metrics	All departments	System-level	Sustained IPC performance

Together, these mechanisms demonstrate that IPC coordination is not achieved through policy alignment alone but through deliberate structural, procedural, and relational interventions. Embedding these mechanisms across acute and non-acute care settings is essential for transforming infection prevention from isolated departmental efforts into a cohesive system-wide capability.

Toward a Network-Based Infection Control Model

Traditional infection prevention and control (IPC) frameworks are largely built on **linear and hierarchical models**, where responsibility flows from infection control teams to individual departments through policies and procedures. While these models offer clarity and standardization, they often fail to reflect the **complex, interconnected reality** of modern healthcare systems—particularly across acute and non-acute care settings. Evidence synthesized in this review indicates that infection transmission is rarely confined to single units or processes; rather, it emerges from **dynamic interactions within networks of people, departments, data systems, and physical environments**. This recognition necessitates a shift toward a **network-based infection control model**.

A network-based model conceptualizes IPC as a **distributed system of interdependent nodes** rather than a centralized function. In this model, nodes include clinical departments (e.g., nursing, medicine, pharmacy), non-clinical services (e.g., environmental services, facilities management, transport), digital systems (e.g., laboratory information systems, electronic health records), and governance structures. Infection risk propagates through the connections between these nodes, particularly where coordination is weak, information is delayed, or accountability is unclear. Consequently, IPC effectiveness depends less on the strength of individual nodes and more on the **quality of their interactions**.

One defining feature of the network-based model is its emphasis on **horizontal coordination**. Instead of relying solely on top-down directives, the model prioritizes lateral communication between departments that share infection risk interfaces. For example, effective infection prevention during patient transfers requires synchronized actions among clinical teams, transport services, environmental cleaning staff, and receiving facilities. Network thinking reframes these interactions as continuous relational processes rather than discrete handovers, reducing reliance on individual vigilance alone.

Another core element is **adaptive feedback loops**. In contrast to periodic audits characteristic of traditional models, network-based IPC incorporates continuous data feedback from multiple sources, including laboratory results, antimicrobial use, environmental cleaning logs, and patient flow metrics. These feedback loops enable early signal detection and localized responses, allowing departments to adjust practices in real time rather than waiting for centralized interventions. Such adaptability is particularly critical in non-acute settings, where delayed detection has been repeatedly associated with outbreak escalation.

The network-based model also integrates **human and behavioral dimensions** as active components rather than contextual variables. Compliance behaviors, communication patterns, and safety culture are treated as network properties that influence how information and practices circulate. For instance, psychologically safe environments encourage frontline staff—clinical and non-clinical alike—to report breaches, question unsafe workflows, and participate in shared problem-solving. This contrasts with compliance-driven models that often discourage reporting due to fear of blame.

Governance within the network-based framework shifts from exclusive committee ownership to **distributed accountability**. While centralized IPC leadership remains essential, responsibility for infection risks at specific touchpoints is explicitly assigned to the relevant network nodes. Care transitions, for example, are managed as shared risks with

joint ownership across sending and receiving settings. This approach aligns accountability with operational reality and supports sustained performance across the care continuum.
Importantly, the network-based model enhances **system resilience**. By avoiding overdependence on single departments or surveillance systems, it reduces the likelihood that localized failures will cascade into system-wide outbreaks. Redundancy, cross-monitoring, and shared situational awareness become design principles rather than inefficiencies. In complex healthcare environments characterized by workforce shortages, increasing patient mobility, and emerging pathogens, such resilience is essential.

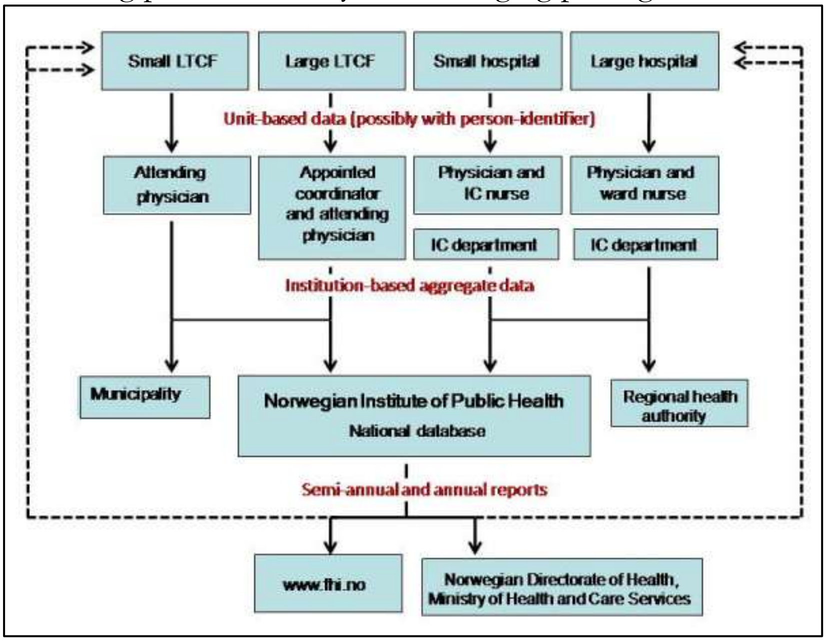

Figure 3. Network-Based Model of Coordinated Infection Control Across Acute and Non-Acute Care Settings

In summary, the network-based infection control model provides a conceptual framework that better captures the complexity of infection risks across acute and non-acute care settings. By emphasizing interdependence, adaptive feedback, shared accountability, and human-centered design, it offers a robust foundation for rethinking IPC as a **living organizational system** rather than a static set of rules. Adoption of this model has the potential to transform infection prevention from a reactive, department-bound activity into a proactive, system-wide capability.

10. Implications for Practice, Leadership, and Health System Design

The synthesis of evidence presented in this review underscores that effective infection prevention and control (IPC) requires a fundamental reorientation of practice, leadership, and health system design. Moving beyond department-specific interventions toward a coordinated, network-based approach has significant implications for how IPC is operationalized across acute and non-acute care settings.
At the practice level, IPC should be embedded into routine workflows rather than treated as an ancillary or compliance-driven activity. Frontline clinical teams must be supported by standardized, infection-specific handover tools that ensure continuity of precautions during patient movement across care settings (Stone et al., 2018). Equally important is the integration of non-clinical departments—such as environmental services, facilities management, and transport—into daily IPC processes, including joint rounds, huddles, and shared performance reviews. Aligning operational schedules with clinical workflows can reduce environmental exposure risks and minimize breakdowns at high-risk touchpoints (Dancer, 2019).

From a leadership perspective, IPC should be elevated as a core organizational priority linked directly to patient safety, quality outcomes, and system resilience. Executive leaders play a pivotal role in fostering a culture that supports shared accountability and psychological safety, enabling staff across departments to report risks and engage in collaborative problem-solving (Sexton et al., 2018). Governance structures must evolve beyond advisory infection control committees to empowered, cross-functional councils with decision-making authority that spans acute and non-acute care. Assigning clear ownership for cross-setting risks—such as care transitions and outbreak escalation—can mitigate ambiguity and enhance responsiveness (Borg et al., 2019).

At the system level, health system design should prioritize interoperability and network connectivity. Integrated digital platforms that aggregate laboratory data, clinical indicators, antimicrobial use, and operational metrics enable real-time situational awareness and coordinated responses across departments and facilities (Baker et al., 2021). Investments in interoperable information systems are particularly critical for non-acute and community-based care, where surveillance capacity is often limited. In parallel, physical infrastructure design—such as ventilation systems, spatial layouts, and patient flow pathways—should be aligned with IPC principles across the continuum of care (Stockwell et al., 2019).

Sustainable IPC performance also depends on workforce development strategies that extend beyond clinical training. Education and competency frameworks should explicitly include non-clinical staff who regularly interact with patients and environments. Multimodal training approaches that incorporate behavioral insights, feedback mechanisms, and role modeling are more effective than knowledge-based instruction alone (Huis et al., 2017). Furthermore, incorporating IPC metrics into performance evaluation and quality improvement initiatives reinforces long-term accountability and system learning.

Collectively, these implications highlight that IPC excellence is achieved not through isolated interventions, but through deliberate system design, engaged leadership, and integrated practice. Health systems that adopt these principles are better positioned to prevent infection transmission, manage emerging threats, and deliver safer, more resilient care across all settings.

DISCUSSION

This review sought to reconceptualize infection prevention and control (IPC) as a coordinated, system-wide function spanning acute and non-acute care settings rather than a collection of isolated, department-specific activities. The synthesis of evidence demonstrates that persistent infection risks are most pronounced at **interfaces**—between departments, professions, data systems, and care settings—where responsibility becomes diffuse and coordination mechanisms are weakest. These findings align with growing recognition that healthcare-associated infections (HAIs) are emergent properties of complex systems rather than the result of individual non-compliance or isolated procedural failures.

A central contribution of this review is the articulation of **touchpoint-based infection pathways**, which shift analytical focus from organizational silos to the patient journey. Mapping infection risks across admission, diagnostics, treatment, environment, and discharge highlights that no single department can independently control transmission risk. Instead, effective IPC depends on synchronized actions among clinical and non-clinical actors, particularly during care transitions. Prior studies have similarly emphasized transitions as high-risk periods for infection spread, yet implementation efforts often remain confined to inpatient settings, leaving non-acute and community care comparatively under-resourced (Stone et al., 2018; Mitchell et al., 2020).

The review also reinforces the critical yet underrecognized role of **non-clinical departments** in IPC performance. Environmental services, facilities management, supply chain, transport, and administrative units shape the physical, temporal, and logistical conditions under which care is delivered. When these contributors are excluded from IPC governance and training structures, infection prevention efforts become fragmented and reactive. Evidence suggesting strong associations between environmental hygiene, ventilation, patient flow, and infection outcomes underscores the need to integrate operational domains into IPC strategy (Dancer, 2019; Stockwell et al., 2019).

Human factors and behavioral dynamics emerged as another decisive determinant of IPC success. Variability in compliance, communication breakdowns, and compliance fatigue reflect systemic pressures rather than individual shortcomings. Consistent with behavioral science and safety culture research, the findings suggest that sustainable IPC improvement requires leadership engagement, psychological safety, and feedback mechanisms that promote collective responsibility rather than punitive oversight (Huis et al., 2017; Sexton et al., 2018). These insights are particularly salient in non-acute settings, where lower perceived risk and limited specialist support may exacerbate behavioral drift.

Data fragmentation and surveillance blind spots further constrain IPC effectiveness across the care continuum. Disconnected information systems, delayed laboratory reporting, and incomplete transfer of infection-related information undermine early detection and coordinated response. While digital tools hold promise, this review highlights that technology alone is insufficient without interoperability, governance alignment, and clearly defined escalation pathways (Baker et al., 2021). The absence of integrated surveillance across acute and non-acute settings remains a critical vulnerability, especially in the context of increasingly mobile patient populations.

In response to these challenges, the proposed **network-based infection control model** offers a conceptual advance over traditional hierarchical approaches. By framing IPC as a set of interdependent relationships among departments, systems, and behaviors, the model aligns with contemporary perspectives on resilience engineering and systems thinking in healthcare. Its emphasis on horizontal coordination, adaptive feedback, and distributed accountability reflects evidence that robust IPC performance depends on interaction quality rather than centralized control alone (Borg et al., 2019). Importantly, this model accommodates heterogeneity across care settings while preserving shared standards and accountability.

Despite its contributions, this review has limitations. Variability in study designs, settings, and outcome measures limited direct comparison across interventions. Evidence from non-acute and community care remains comparatively sparse, and many studies focus on process indicators rather than long-term patient outcomes. Additionally, the rapidly evolving nature of digital health and IPC practices suggests that some findings may require ongoing updating as technologies and policies mature.

Overall, the discussion underscores that advancing IPC effectiveness requires a paradigmatic shift: from isolated compliance efforts to **coordinated system design**. Health systems that embrace network-based coordination, integrate non-clinical contributors, address human factors, and close data gaps are better positioned to prevent infection transmission and respond to emerging threats across the full continuum of care.

CONCLUSION

Infection prevention and control (IPC) is no longer adequately addressed through isolated, department-based interventions confined to acute care environments. The findings of this review demonstrate that infection risks emerge from **interconnected processes**

spanning clinical practice, operational systems, human behavior, and information infrastructure across both acute and non-acute care settings. As healthcare delivery increasingly emphasizes continuity of care and patient mobility, failures in coordination—rather than lack of technical knowledge—represent a primary driver of persistent healthcare-associated infections.

By synthesizing evidence across the patient care pathway, this review highlights that effective IPC depends on how well departments interact at critical touchpoints such as admission, diagnostics, treatment, environment, and care transitions. Non-clinical departments, often overlooked in traditional IPC models, play a foundational role in shaping infection risk environments and must be fully integrated into governance, training, and accountability structures. Likewise, human and behavioral factors—including communication quality, safety culture, and compliance fatigue—emerge as central determinants of sustainable IPC performance.

The proposed **network-based infection control model** provides a unifying framework for addressing these challenges. By conceptualizing IPC as a distributed system of interdependent actors and feedback loops, the model shifts the focus from compliance-driven oversight to **shared responsibility, adaptive coordination, and system resilience**. This approach enables health systems to respond more effectively to emerging infection threats, reduce transmission during care transitions, and sustain IPC performance across diverse care settings.

In conclusion, advancing infection prevention requires a paradigm shift from fragmented interventions to **coordinated system design**. Health systems that invest in integrated governance, interoperable data systems, workforce engagement, and cross-departmental collaboration are better positioned to deliver safer, more resilient care and protect patients and staff across the entire continuum of healthcare.

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