Power System Technology
ISSN:1000-3673

Received: 16-08-2025 Revised: 05-09-2025 Accepted: 05-10-2025

The Role of Multidisciplinary Healthcare Teams in Reducing Healthcare-Associated Infections (HAIs)

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Abstract

Healthcare-associated infections (HAIs) remain among the most frequent and costly adverse events in healthcare, driving preventable morbidity and mortality, longer length of stay, excess antimicrobial exposure, and increased operational pressure on health systems. While evidence-based infection prevention and control (IPC) guidance is widely available, implementation often varies because HAI risk emerges from complex interactions among patients, devices, workflows, environments, and organizational systems. As a result, sustainable HAI reduction is rarely achieved through isolated actions by a single profession. Instead, coordinated multidisciplinary teamwork—integrating clinical practice, microbiology and diagnostics, antimicrobial stewardship, environmental hygiene, engineering controls, and quality improvement—has become a defining feature of high-performing IPC programs. This paper reviews the epidemiology and drivers of HAIs, explains why multidisciplinary healthcare teams function as a core IPC strategy, and describes the distinct yet interdependent roles of physicians, nurses, infection preventionists, laboratory professionals, pharmacists, allied health staff, environmental services, and healthcare leaders. It also analyzes barriers to teamwork such as communication failures, role ambiguity, hierarchy, staffing constraints, and data fragmentation, and proposes practical approaches to strengthen collaboration, including

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care bundles, stewardship, real-time surveillance, audit-and-feedback, simulation-based training, and safety culture interventions. By aligning expertise around shared goals and measurable outcomes, multidisciplinary teams can meaningfully reduce HAIs and advance patient safety across diverse settings.

Keywords: Healthcare-associated infections; multidisciplinary teams; infection prevention and control; patient safety; antimicrobial stewardship; quality improvement

1. Introduction

Healthcare-associated infections (HAIs), sometimes called nosocomial infections, are infections acquired during the course of receiving healthcare that were not present or incubating at the time of admission. HAIs occur in acute-care hospitals, ambulatory surgical centers, long-term care and rehabilitation facilities, dialysis units, and other settings where patients receive medical services. Common HAI syndromes include central line–associated bloodstream infections (CLABSIs), catheter-associated urinary tract infections (CAUTIs), ventilator-associated events (including ventilator-associated pneumonia in settings that still track it), surgical site infections (SSIs), Clostridioides difficile infection (CDI), and infections linked to contaminated equipment or environmental reservoirs.

Modern healthcare is highly interdependent. Patients often move between departments, undergo invasive procedures, receive implanted devices, and are exposed to broad-spectrum antimicrobials. Each transition and intervention can create opportunities for microbial transmission and breakdowns in aseptic technique. Preventing HAIs therefore requires a system of coordinated practices rather than a single action. Core practices include hand hygiene, standardized aseptic insertion and maintenance of devices, safe injection practices, environmental cleaning and disinfection, isolation precautions and personal protective equipment (PPE) use, safe reprocessing of reusable equipment, diagnostic stewardship, antimicrobial stewardship, and a culture of safety that promotes learning and rapid correction of hazards.

Because the determinants of HAIs span clinical practice, diagnostics, pharmacy, nursing workflows, environmental services, facility design, and leadership decisions, multidisciplinary collaboration is foundational. A multidisciplinary healthcare team (MDT) approach brings together complementary expertise, distributes responsibility, improves situational awareness, and enables coordinated interventions that single professions cannot reliably achieve alone. This paper examines how MDTs reduce HAIs by strengthening implementation reliability, improving communication and accountability, and enabling continuous quality improvement. The discussion emphasizes how different professional groups contribute to risk reduction across the patient journey and how organizations can design teams and workflows for sustained improvement.

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2. Epidemiology and Burden of HAIs

HAIs represent a substantial burden on patient safety and health system performance. In many settings, surveillance and point-prevalence studies show that a meaningful fraction of hospitalized patients experience at least one HAI during their admission. Although the exact burden varies by country, facility type, and patient population, HAIs are consistently associated with increased morbidity, mortality, and healthcare costs. The consequences are particularly severe among critically ill patients, surgical patients, neonates, transplant recipients, and other immunocompromised populations.

The burden of HAIs can be described in clinical, economic, and organizational dimensions. Clinically, HAIs increase the risk of sepsis, organ dysfunction, delayed recovery, and complications that may require additional procedures or intensive care. Device-associated infections can lead to thrombosis, endocarditis, metastatic infection, or the need to remove life-sustaining catheters. SSIs can result in reoperation, prolonged antibiotic therapy, and impaired wound healing. CDI is associated with diarrhea, dehydration, colitis, recurrence, and transmission within facilities.

Economically, HAIs increase direct costs through longer hospitalization, increased use of diagnostic tests, isolation and PPE requirements, additional antimicrobial courses, and use of advanced supportive care. Indirect costs include loss of productivity, long-term disability, reputational harm, and litigation risk. Organizationally, HAIs reduce bed availability, increase readmissions, strain staffing, and compromise patient flow. These effects are amplified during periods of high demand, when limited capacity can delay elective procedures or lead to crowding.

Importantly, the epidemiology of HAIs is dynamic. Aging populations and higher comorbidity increase baseline vulnerability. Expanding use of complex procedures and devices increases opportunities for infection. Antimicrobial resistance (AMR) makes infections harder to treat and increases the importance of preventing transmission. External shocks—such as major respiratory outbreaks—can disrupt routine prevention programs through staffing shortages, increased device use, and competing priorities. This evolving risk landscape underscores the importance of adaptable, team-based IPC systems that can respond rapidly while maintaining core prevention practices.

3. Why a Multidisciplinary Approach Is Essential

HAIs are rarely caused by a single lapse. They often reflect multiple small failures across a care pathway—for example, imperfect hand hygiene, a break in sterile technique during device insertion, inconsistent maintenance of dressings, delayed removal of unnecessary catheters, suboptimal environmental cleaning, and inappropriate antimicrobial exposure that increases CDI risk or selects for resistant organisms. Each step may involve different

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professionals. A multidisciplinary approach ensures that prevention is embedded across the entire continuum of care rather than confined to one department or professional group.

Multidisciplinary teams support HAI prevention through four interconnected functions. First, they improve coordination by aligning processes across roles and units. For instance, successful CLABSI prevention depends on physicians and nurses agreeing on standardized insertion practices, nurses and vascular access teams maintaining lines appropriately, pharmacists supporting appropriate antimicrobial therapy, and infection preventionists monitoring adherence and outcomes. Second, teams enhance communication by creating reliable channels for sharing infection-related information such as isolation status, microbiology results, and device plans. Third, teams accelerate learning by performing structured reviews of infections and near misses, translating lessons into process changes, and tracking whether changes reduce risk. Fourth, teams strengthen implementation reliability by combining standardization (checklists, bundles, order sets) with adaptive problem solving (addressing barriers, tailoring workflows to unit context).

A multidisciplinary framework also supports a high-reliability mindset. High-reliability organizations anticipate failure, remain sensitive to operations, defer to expertise, and commit to resilience. In infection prevention, many hazards are invisible until infection occurs. Teams therefore need active detection methods—observation, audit, timely surveillance, and open reporting—to identify and correct risks early. When staff across roles feel empowered to speak up, use closed-loop communication, and share accountability, organizations are better positioned to prevent harm before it reaches the patient.

4. Team Composition and Interdependent Roles

Effective multidisciplinary IPC programs include a core set of roles, with additional expertise depending on setting and risk profile. A typical team involves physicians (including surgeons, intensivists, hospitalists, and proceduralists), nurses and nursing assistants, infection preventionists and hospital epidemiologists, clinical microbiologists and laboratory staff, pharmacists and antimicrobial stewardship professionals, environmental services (EVS) personnel, allied health professionals (such as respiratory therapists and dialysis staff), quality improvement specialists, informatics personnel, and administrative leadership. Facilities and engineering teams are also critical for airborne and water-related risks.

Each discipline contributes distinct expertise while depending on the others to achieve system-level reliability. Physicians influence HAI risk through decisions about device placement, procedure selection, and antimicrobial prescribing. Nurses influence risk through continuous bedside care, aseptic technique, device maintenance, patient education, and early recognition of infection. Infection preventionists coordinate surveillance, education, and investigation, translating evidence into practical policy and supporting behavior change

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through coaching. Laboratories provide timely identification of pathogens and resistance patterns, enabling targeted therapy and isolation decisions. Pharmacists optimize antimicrobial therapy and reduce unnecessary exposure through stewardship interventions. EVS reduces environmental reservoirs through cleaning and disinfection. Allied health staff manage high-risk equipment and procedures (ventilation circuits, dialysis lines, imaging equipment) and help ensure safe handling and reprocessing. QI and informatics specialists build measurement systems and feedback loops, and leaders secure resources and reinforce safety culture.

The strength of the multidisciplinary approach lies not simply in having representatives from multiple professions, but in integrating their work into shared processes. For example, reducing CAUTI rates requires agreement on appropriate catheter indications (physicians), reliable insertion technique and maintenance (nursing), reminders and stop orders (informatics), surveillance and feedback (infection prevention), and prompt removal protocols supported by unit leadership. When these components operate in isolation, results are often inconsistent; when integrated, they can produce sustained improvement.

5. Role-Specific Contributions to HAI Reduction

Physicians and advanced practice providers play a central role in diagnosing infection, ordering tests, initiating therapy, and determining the need for invasive devices. Their decisions influence both exposure (device days, procedural risk) and vulnerability (antimicrobial pressure). Physician engagement is crucial for implementing evidence-based insertion practices, supporting daily review of device necessity, and adopting appropriate perioperative prophylaxis for surgery. When physicians model adherence to bundles and respond positively to “stop-the-line” concerns from nurses or technicians, they reinforce a culture where safety behaviors are shared responsibilities.

Nurses and nursing assistants are at the forefront of infection prevention because they conduct most direct patient-care activities. They perform hand hygiene, manage dressings, maintain catheters and tubing, provide oral care for ventilated patients, support mobilization, and educate patients and families. Nursing workflows are closely linked to the reliability of maintenance bundles. Nurse-led protocols—such as criteria-based urinary catheter removal—have repeatedly demonstrated reductions in device days and CAUTI risk. Nurses also function as early warning systems, detecting signs of infection and initiating escalation processes before deterioration occurs.

Infection preventionists (IPs) and hospital epidemiologists provide specialized expertise in surveillance, outbreak investigation, policy development, and education. They interpret rates and trends, identify high-risk units, and coordinate targeted interventions. IPs often facilitate multidisciplinary meetings, conduct root cause analyses for HAIs, and coach teams on

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ISSN:1000-3673
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practical implementation. They also ensure alignment with national standards and coordinate responses to emerging threats such as novel resistant organisms or clusters of CDI.

Clinical microbiology laboratories support prevention through accurate and timely identification of pathogens, susceptibility testing, and detection of resistance mechanisms. Rapid reporting can shorten time to targeted therapy and inform isolation. Laboratories contribute to outbreak detection by identifying unusual organism patterns or clusters and supporting confirmatory testing or typing when available. Laboratory–clinical communication is essential: results must reach decision-makers quickly, and test ordering must be appropriate to avoid unnecessary antibiotics driven by false positives or colonization.

Pharmacists and antimicrobial stewardship teams reduce HAIs by optimizing antimicrobial selection, dosing, route, and duration. Stewardship reduces unnecessary broad-spectrum exposure that increases CDI risk and selects resistant organisms. Pharmacists also support guideline-based surgical prophylaxis, facilitate de-escalation after cultures, and promote IV-to-oral conversion when clinically appropriate. Diagnostic stewardship is a related area where pharmacists and clinicians can collaborate to limit inappropriate testing (for example, avoiding C. difficile testing in patients without compatible symptoms) and improve interpretation.

Environmental services teams reduce transmission by cleaning and disinfecting rooms, high-touch surfaces, and shared equipment. Their work is especially important for environmental survivors such as C. difficile spores. MDT collaboration with EVS enables shared expectations and practical feedback using auditing tools such as fluorescent markers or standardized checklists. Effective communication between nursing and EVS is essential during room turnover, isolation discontinuation, and terminal cleaning.

Allied health professionals—including respiratory therapists, dialysis staff, radiology technologists, and rehabilitation therapists—also influence infection risk. Respiratory therapists manage ventilator circuits and assist with practices such as head-of-bed elevation and secretion management. Dialysis staff manage vascular access and require strict aseptic technique. Radiology staff move equipment between patients and must ensure effective disinfection. These roles illustrate why IPC must extend beyond traditional nursing and physician workflows to every point of patient contact.

Leadership, quality teams, and facilities/informatics professionals provide the system conditions required for sustained prevention. Leaders allocate staffing, ensure supply availability (PPE, chlorhexidine, sterile kits), support training time, and remove barriers identified by frontline staff. QI specialists help design measurement systems and improvement cycles. Informatics teams create alerts, order sets, and dashboards that support

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timely action. Facilities teams manage ventilation, water safety, and physical layout, which influence transmission risks in ways that bedside staff cannot control alone.

6. Evidence-Based Team Interventions and Care Bundles

Multidisciplinary teams translate evidence into standardized interventions that can be implemented with high reliability. Care bundles—sets of practices performed together—are among the most widely used strategies. CLABSI prevention bundles typically include hand hygiene, maximal sterile barrier precautions during insertion, chlorhexidine skin antisepsis, optimal site selection, and daily assessment of line necessity. Achieving sustained reductions requires coordinated roles: trained inserters, assistants who can enforce sterile fields, standardized kits, nursing maintenance practices, and oversight through audit-and-feedback.

CAUTI prevention bundles emphasize avoiding inappropriate catheter placement, aseptic insertion, closed drainage systems, unobstructed urine flow, and timely removal. Success often depends on nurse-driven removal protocols or automatic stop orders supported by physicians and informatics. Daily rounds that explicitly review catheter necessity reduce "forgotten" catheters and shorten exposure time.

Ventilator-associated prevention strategies involve respiratory therapists, nurses, physicians, and rehabilitation teams. Key practices include head-of-bed elevation, sedation minimization and daily awakening trials when appropriate, early mobilization, oral care, and strict attention to ventilator circuit management. Even when definitions and surveillance methods differ across systems, teamwork around these practices supports better outcomes.

Surgical site infection prevention requires coordination across the perioperative pathway. Evidence-supported elements include appropriate timing and selection of prophylactic antibiotics, maintaining normothermia, optimizing glycemic control, using alcohol-based skin preparation, and ensuring standardized sterile technique. Postoperative wound care and patient education further influence risk. Collaboration among surgeons, anesthesiologists, nurses, and pharmacists is essential for reliable prophylaxis and for addressing patient-specific risk factors.

Hand hygiene improvement programs are most effective when they use multimodal strategies: education, accessible hand rub, behavioral prompts, monitoring, and feedback. Multidisciplinary ownership helps ensure that monitoring is credible and that feedback is framed as improvement rather than punishment. Similarly, isolation precautions require coordination to ensure timely initiation based on lab signals, correct PPE use, consistent signage, and adequate terminal cleaning. When MDTs integrate these components, lapses become less frequent and are corrected sooner.

Antimicrobial stewardship programs are inherently multidisciplinary and improve HAI outcomes by reducing CDI and limiting AMR selection. Common strategies include

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ISSN:1000-3673
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prospective audit and feedback, guideline development, restriction of select agents, dose optimization, de-escalation, and review of duration. In many hospitals, stewardship rounds or consultation models help embed recommendations into daily practice and improve acceptance by prescribers. When stewardship and infection prevention collaborate, they can also address outbreaks of resistant organisms by aligning antibiotic policy with transmission prevention measures.

7. Surveillance, Measurement, and Learning Systems

Measurement is essential for improvement, but data must be timely, trusted, and actionable. Surveillance systems track HAI incidence, device utilization ratios, and pathogen patterns. Many programs also monitor process measures such as bundle adherence, hand hygiene compliance, and cleaning quality. Multidisciplinary teams use these data to prioritize interventions, evaluate progress, and sustain gains.

High-performing teams establish rapid feedback loops. Unit dashboards can display current performance and trends, enabling frontline staff to connect daily behaviors to outcomes. Interdisciplinary huddles can review device counts, pending cultures, and isolation needs. When an HAI occurs, structured case reviews bring together relevant disciplines to map the timeline, identify breakdowns, and propose corrective actions. This approach transforms adverse events into learning opportunities. Effective reviews avoid blame and instead focus on system contributors such as training gaps, supply issues, workflow design, or communication failures.

Laboratory integration strengthens surveillance by providing early signals of resistant organisms or unusual clusters. Automated alerts for positive cultures (for example, carbapenem-resistant organisms) can trigger rapid isolation and contact tracing. Informatics support is critical to ensure alerts are actionable and avoid overwhelming staff. Diagnostic stewardship complements surveillance by ensuring that tests are ordered appropriately; inappropriate testing can inflate apparent infection rates and drive unnecessary antibiotic use. For example, avoiding C. difficile testing in patients without compatible symptoms reduces false positives and protects stewardship goals.

Audit-and-feedback is another powerful mechanism. Direct observation of insertion practices, line maintenance audits, and cleaning assessments can identify gaps. Feedback should be specific, frequent, and linked to clear standards. Coaching approaches often outperform punitive approaches because they preserve psychological safety and encourage reporting. Multidisciplinary involvement helps ensure that feedback targets the correct part of the system and that solutions are feasible in real workflows.

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8. Communication, Handoffs, and Workflow Integration

Communication failures are common root causes of HAIs, particularly during care transitions. Multidisciplinary teams reduce risk by standardizing communication pathways and embedding infection prevention into routine workflows. Interdisciplinary rounds provide opportunities to review device necessity, isolation status, antimicrobial plans, and pending cultures. Daily goals tools or electronic checklists make it less likely that critical steps—such as reassessing catheter need—are forgotten.

Structured handoffs between units (operating room to ICU, ICU to ward, ward to radiology) should include infection-related information such as colonization status, isolation precautions, antimicrobial therapy, invasive devices, and wound care requirements. Standard formats like SBAR (Situation, Background, Assessment, Recommendation) reduce omissions and support a shared mental model.

Workflow integration also requires point-of-care readiness. If sterile kits, chlorhexidine, appropriate disinfectants, or PPE are not readily available, staff may create workarounds that increase risk. Leaders and supply chain teams should use frontline feedback to ensure availability and standardization. Equipment reprocessing workflows must be clearly defined, including responsibilities for transport, cleaning, high-level disinfection or sterilization, and documentation.

Teamwork is strengthened when staff are trained in speaking up and closed-loop communication. If any team member observes a break in sterile technique during a procedure, they should feel empowered to intervene immediately. “Stop-the-line” authority and psychological safety are important features of safety culture. In infection prevention, early correction often prevents downstream harm. Multidisciplinary training, simulation, and leadership reinforcement can normalize speaking up as a professional obligation rather than a challenge to hierarchy.

9. Barriers to Multidisciplinary Success

Despite strong evidence, multidisciplinary IPC efforts often encounter barriers. Professional hierarchy can discourage junior staff from questioning senior clinicians, undermining adherence to sterile technique and bundle elements. Role ambiguity—uncertainty about who is responsible for device review, dressing changes, documentation, or isolation discontinuation—creates gaps where tasks are missed. Clear role definitions and shared protocols are essential to address this problem.

Staffing pressures and workload are major obstacles. High patient acuity, understaffing, rapid turnover, and frequent interruptions reduce time for careful technique and documentation. During surges, staff may be redeployed to unfamiliar units, increasing the likelihood of

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protocol deviations. Fatigue and burnout further reduce compliance. Reliable IPC is therefore inseparable from workforce planning and supportive working conditions.

Data fragmentation can limit engagement. If HAI metrics are delayed by weeks or months, frontline teams may not connect actions to outcomes. If dashboards are hard to interpret or perceived as inaccurate, trust erodes. Likewise, if laboratory results are not communicated promptly, isolation and targeted therapy may be delayed. Poorly designed EHR alerts can produce fatigue and be ignored. Multidisciplinary design and continuous refinement are required to keep data systems useful.

Resource constraints can impede access to PPE, disinfectants, sterile supplies, or appropriate infrastructure. Even well-resourced hospitals may experience supply interruptions. Facilities-related risks—such as inadequate ventilation or unsafe water systems—require engineering expertise and leadership investment, and cannot be solved solely by bedside staff.

Cultural barriers also matter. If IPC is framed as the responsibility of a single department, accountability becomes diffuse. Conversely, if IPC is enforced primarily through punishment, staff may conceal errors and avoid reporting near misses. A learning culture that supports transparent reporting and continuous improvement is more likely to produce sustainable reductions in HAIs.

10. Strategies to Strengthen Multidisciplinary Collaboration

Strengthening multidisciplinary HAI prevention requires structural and cultural interventions. Structurally, organizations should formalize multidisciplinary IPC committees with clear roles, authority, and unit-level representation. Committees should include frontline representatives so policies remain practical. Unit-level champions—nursing, physician, pharmacy, and EVS champions—improve local ownership and ensure that concerns are communicated upward.

Interprofessional education is critical. Training should include not only technical IPC skills but also teamwork competencies such as communication, conflict resolution, and shared decision-making. Simulation-based training can practice sterile insertion, outbreak response, and speaking-up behaviors in psychologically safe environments. Onboarding and annual competency validation for high-risk procedures reinforce correct technique and reduce variability.

Standardization reduces variation and supports reliability. Checklists, insertion carts, standardized order sets, and protocols (including nurse-driven catheter removal) help align practice. Teams should adapt protocols to local context and test changes using improvement methods such as Plan–Do–Study–Act cycles. Reliability strategies—visual cues, peer coaching, and real-time reminders—help sustain gains.

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Technology can strengthen collaboration when designed with users. EHR reminders for device review, automatic stop orders, and alerts for positive cultures can prompt action. Dashboards can provide transparent feedback. However, teams must avoid alert fatigue and ensure that technology supports rather than complicates workflows. Continuous evaluation and adjustment are necessary.

Leadership engagement is indispensable. Leaders should conduct safety rounds, ask staff what barriers impede IPC, and remove obstacles quickly. Providing adequate staffing, ensuring supply availability, and allocating protected training time signal organizational commitment. Recognizing units for improvement and supporting nonpunitive learning reviews strengthens culture.

Patient and family engagement can reinforce infection prevention. Educating patients about hand hygiene, catheter risks, and wound care encourages participation. When teams welcome patient questions—such as reminders to perform hand hygiene—accountability increases. Patient engagement should be respectful and culturally sensitive, and staff should be trained to respond constructively.

11. Future Directions and Implications for Practice

The future of HAI prevention will be shaped by evolving pathogens, growing AMR, and increasing use of complex devices and procedures. Multidisciplinary teams will remain central, but programs will increasingly integrate advanced analytics, improved diagnostics, and broader systems engineering approaches.

Electronic surveillance and predictive analytics may identify rising risk earlier, enabling targeted interventions before infections occur. Genomic epidemiology, where feasible, can clarify transmission pathways and support outbreak investigations. Yet these tools require multidisciplinary interpretation and action; data without coordinated response does not improve outcomes.

Diagnostic stewardship will likely expand, focusing on appropriate test selection, timing, and interpretation. This helps prevent overtreatment and reduces collateral damage from unnecessary antibiotics. Closer integration between laboratories, stewardship teams, and clinicians can improve turnaround times, optimize reporting formats, and support rapid de-escalation.

Facilities and engineering considerations will become increasingly important. Water management programs to prevent Legionella and other waterborne pathogens require collaboration among facilities staff, infection prevention, laboratory services, and clinical teams. Ventilation standards, room design, and airflow management influence respiratory pathogen transmission. A multidisciplinary approach that includes engineering expertise can align environmental controls with clinical needs.

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From a policy perspective, HAI metrics are often linked to accreditation and quality frameworks. Organizations should use these metrics for learning and improvement rather than punitive approaches that discourage reporting. Future research should clarify which team structures, leadership behaviors, and implementation strategies yield sustained improvement across diverse contexts, including resource-limited settings. Equity should also be considered: IPC interventions must protect all patient groups and ensure that resource allocation does not leave vulnerable populations at higher risk.

In practice, healthcare organizations should recognize multidisciplinary teamwork as an infection prevention intervention in its own right. Investments in team training, shared governance, data systems, and supportive leadership can yield benefits that extend beyond HAI reduction, including safer care transitions and improved overall quality.

12. Conclusion

Healthcare-associated infections remain a major threat to patient safety and healthcare quality. Because the determinants of HAIs span clinical practice, devices, environments, diagnostics, and organizational systems, prevention requires coordinated action across disciplines. Multidisciplinary healthcare teams provide the structure and culture needed to implement evidence-based IPC strategies reliably, learn from events, and adapt to changing risks.

When professionals share accountability, communicate effectively, and use timely data to guide improvement, infection prevention becomes embedded in routine care rather than an added burden. Investments in teamwork, competency-based training, stewardship, surveillance, and supportive leadership can yield sustained reductions in HAIs and broader improvements in quality and safety. Multidisciplinary collaboration should therefore be recognized as a core infection prevention strategy for modern healthcare systems.

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