

The Contribution of Multidisciplinary Teams to Infection Control in Hospital Settings: Analyzing the Roles of Laboratory Technologists, Pharmacists, Nurses, and Psychologists in Reducing Hospital-Acquired Infections

Ali A. Almalki¹, Amer S. Alhumaidan², Maha S. Gassas³,
Shaikha N. Binsunbel⁴, Saud N. Alshammari⁵, Ohoud M. Albedeiwy⁶,
Shaheinaz A. Alkahtani⁷, Bader H. Alanazi⁸, Fahad M. Aljuraid⁹

Health Affairs at the Ministry of National Guard

Abstract

Background: Hospital-acquired infections (HAIs) pose a significant challenge to patient safety, requiring a multidisciplinary approach for effective prevention and control. This study evaluates the contribution of laboratory technologists, pharmacists, nurses, and psychologists in reducing HAIs in a tertiary hospital setting.

Methods: A mixed-methods study was conducted over 12 months, involving 50 healthcare professionals and 200 patients in high-risk hospital units. Quantitative data on HAI rates, antimicrobial use, and hand hygiene compliance were collected before and after the implementation of a multidisciplinary infection control team. Qualitative data were gathered through interviews with healthcare professionals and patients.

Results: HAI rates significantly decreased from 10.5 to 6.7 per 1000 patient days ($p=0.003$) after the intervention. Antibiotic use was reduced ($p=0.011$), and hand hygiene compliance improved from 72% to 90% ($p=0.001$). Qualitative findings highlighted the importance of role clarity, collaboration, and psychological support in infection prevention efforts.

Conclusion: A multidisciplinary approach, integrating laboratory diagnostics, antimicrobial stewardship, infection prevention, and psychological support, significantly reduces HAIs and enhances patient outcomes. This model should be adopted in hospital settings to improve infection control practices.

Keywords: Hospital-Acquired Infections, Multidisciplinary Teams, Antimicrobial Stewardship, Infection Control, Laboratory Technologists, Pharmacists, Nurses, Psychologists

Introduction

Hospital-acquired infections (HAIs) are a major global concern, affecting millions of patients each year and leading to prolonged hospital stays, increased healthcare costs, and higher mortality rates (World Health Organization, 2016). Common HAIs include bloodstream infections, surgical site infections, urinary tract infections, and ventilator-associated pneumonia, many of which are caused by multidrug-resistant organisms like methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* (CDC, 2019). Despite

significant advancements in medical technology and infection control measures, HAIs remain a persistent issue in healthcare settings worldwide.

Effective prevention and control of HAIs require a comprehensive approach involving multiple healthcare professionals. Laboratory technologists play a critical role in the rapid and accurate diagnosis of infections, enabling timely treatment decisions (Kalenic and Budimir, 2009). Pharmacists contribute by ensuring appropriate antimicrobial use through antimicrobial stewardship programs, helping to prevent the development of antibiotic resistance (Dellit et al., 2007). Nurses are frontline healthcare providers responsible for implementing infection prevention protocols, including hand hygiene, isolation procedures, and patient education (Anderson et al., 2014). Finally, psychologists support infection control by addressing patient anxiety and stress, which are known to negatively affect immune function and slow recovery (Cohen et al., 2007).

While the individual contributions of these professions to infection control are well-documented, there is limited research on how they collaborate as part of multidisciplinary teams to reduce HAIs. This study aims to fill this gap by exploring the roles of laboratory technologists, pharmacists, nurses, and psychologists in preventing HAIs in a hospital setting. By analyzing the contributions of each profession and their collaborative efforts, this research seeks to provide insights into how multidisciplinary teams can enhance infection control practices and improve patient outcomes.

Literature Review

Hospital-Acquired Infections (HAIs): Prevalence and Impact

Hospital-acquired infections (HAIs) are a significant public health concern, affecting an estimated 1 in 31 hospital patients at any given time (Centers for Disease Control and Prevention [CDC], 2019). HAIs increase patient morbidity and mortality, prolong hospital stays, and contribute to rising healthcare costs (World Health Organization [WHO], 2016). Common HAIs include bloodstream infections, surgical site infections, urinary tract infections, and ventilator-associated pneumonia. HAIs are often caused by multidrug-resistant organisms (MDROs), such as methicillin-resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile*, and carbapenem-resistant Enterobacteriaceae (Magill et al., 2014). The growing threat of antimicrobial resistance further complicates efforts to control infections in hospital settings.

The Role of Laboratory Technologists in Infection Diagnosis

Laboratory technologists play a crucial role in diagnosing and managing infections in healthcare settings. Rapid and accurate identification of infectious agents allows clinicians to tailor treatment regimens promptly, reducing the likelihood of infection spread and improving patient outcomes. Kalenic and Budimir (2009) emphasizes the importance of microbiological laboratories in HAI prevention, noting that laboratory technologists are key to detecting infection outbreaks and monitoring antimicrobial resistance trends. The development of advanced diagnostic tools, such as polymerase chain reaction (PCR) and next-generation sequencing (NGS), has enhanced the ability of laboratory technologists to identify pathogens more quickly and accurately (Peterson & Brossette, 2016).

However, timely communication between laboratory personnel and clinical teams is essential for these advances to have an impact on patient care. Studies have shown that when laboratory results are integrated into real-time decision-making, infection control measures can be implemented more effectively (Krishna and Cunnion, 2012). Laboratory technologists not only provide diagnostic results but also work closely with infection control teams to inform hospital-wide infection prevention strategies.

Pharmacists and Antimicrobial Stewardship

Pharmacists play an integral role in reducing HAIs through antimicrobial stewardship programs, which are designed to optimize the use of antibiotics, prevent overuse, and reduce the emergence of drug-resistant organisms. The Infectious Diseases Society of America (IDSA) emphasizes the pharmacist's responsibility in promoting appropriate antibiotic prescribing and monitoring patient outcomes (Dellit et al., 2007). Antimicrobial stewardship has been shown to reduce unnecessary antibiotic use, decrease the incidence of infections caused by MDROs, and lower hospital costs (Karanika et al., 2016).

Pharmacists also provide education and guidance to physicians and nursing staff on the best practices for antibiotic use, helping to ensure that antibiotics are prescribed based on accurate diagnoses and susceptibility data. A study by Horikoshi et al. (2017) highlights the pharmacist's role in conducting antibiotic audits, adjusting doses based on kidney function, and recommending de-escalation or discontinuation of therapy when appropriate. These interventions are critical in maintaining the efficacy of antibiotics and preventing the development of resistance.

Nursing Interventions in Infection Prevention

Nurses are at the forefront of infection prevention, as they provide direct patient care and implement essential infection control practices such as hand hygiene, isolation precautions, and equipment sterilization. Hand hygiene, in particular, is one of the most effective ways to prevent the spread of HAIs, and nurses are responsible for ensuring compliance with hand hygiene protocols (Pittet et al., 2009). Nurses also play a key role in patient education, ensuring that patients understand how to prevent infections, especially after surgery or during extended hospital stays.

A study by Anderson et al. (2014) found that nurse-led infection prevention initiatives, such as regular hand hygiene audits and education programs, significantly reduced the rates of catheter-associated urinary tract infections and central line-associated bloodstream infections. In addition to these preventive measures, nurses are instrumental in recognizing early signs of infection in patients, facilitating prompt intervention. Effective collaboration between nurses and other healthcare professionals, including pharmacists and laboratory technologists, is crucial to the success of infection control programs.

Psychological Stress, Immunity, and Infection Control

While laboratory technologists, pharmacists, and nurses focus on the clinical and procedural aspects of infection control, psychologists play an essential role in managing the psychological factors that can affect patient recovery and infection susceptibility. Psychological stress has been shown to weaken the immune system, making patients more vulnerable to infections (Cohen et al., 2007). In hospital settings, patients may experience significant stress due to the nature of their illness, prolonged hospital stays, or anxiety about their recovery, all of which can compromise their ability to fight infections.

Psychologists contribute to infection control efforts by providing stress management interventions, such as cognitive-behavioral therapy (CBT) and relaxation techniques, which have been shown to improve immune function and overall well-being (Segerstrom & Miller, 2004). A study by Glaser and Kiecolt-Glaser (2005) demonstrated that reducing psychological stress through psychological interventions not only improved patient mood but also enhanced immune responses, potentially reducing infection risks. Integrating psychological care into infection control strategies could help address the emotional aspects of hospitalization, indirectly supporting better health outcomes and reducing HAIs.

Multidisciplinary Teams in Infection Control

The complexity of hospital-acquired infections requires a coordinated, multidisciplinary approach involving laboratory technologists, pharmacists, nurses, psychologists, and other healthcare professionals. Research has shown that multidisciplinary teams are more effective at reducing HAIs compared to interventions led by individual disciplines (Ivers et al., 2012). By working together, these professionals can address various aspects of infection control, from early diagnosis and appropriate treatment to patient education and mental health support.

For instance, laboratory technologists provide timely diagnostic information, while pharmacists ensure the appropriate use of antibiotics. Nurses, in turn, implement infection prevention protocols and provide hands-on care, while psychologists help reduce the psychological stress that can hinder patient recovery. A study by Arefian et al. (2016) found that hospitals that implemented multidisciplinary infection control teams, including laboratory technologists, pharmacists, and nurses, saw significant reductions in HAIs, particularly in intensive care units (ICUs). This evidence highlights the need for a collaborative, team-based approach to infection control in hospital settings.

Gaps in the Literature

While there is substantial research on the roles of individual healthcare professionals in preventing HAIs, there is limited literature on how multidisciplinary teams can collaborate to achieve optimal infection control outcomes. Additionally, the role of psychologists in infection control, particularly in reducing patient stress to enhance immune function, remains underexplored. Further research is needed to understand the full impact of multidisciplinary teams on HAI prevention and how each profession can best contribute to these efforts.

Methodology

Study Design

This study employed a mixed-methods approach to analyze the contribution of multidisciplinary teams, specifically laboratory technologists, pharmacists, nurses, and psychologists, in reducing hospital-acquired infections (HAIs) at a tertiary hospital. The study included both quantitative and qualitative components, allowing for a comprehensive evaluation of infection control measures and team collaboration. Data collection took place over a 12-month period.

Setting

The study was conducted at a large tertiary hospital with an average daily census of 500 patients. The hospital has specialized units with a high risk for HAIs, including intensive care units (ICUs), surgical wards, and long-term care units, making it an ideal setting for studying the impact of multidisciplinary infection control strategies.

Participants

The study included two groups of participants: healthcare professionals and patients.

-Healthcare Professionals: Laboratory technologists, pharmacists, nurses, and psychologists working in the hospital's infection control program and high-risk units were invited to participate. A total of 50 professionals (10 laboratory technologists, 10 pharmacists, 20 nurses, and 10 psychologists) were recruited through purposive sampling.

-Patients: The quantitative portion of the study involved 200 patients admitted to high-risk units, including ICU and surgical wards. Patients were included based on the following criteria:

-Inclusion Criteria: Adult patients (18 years and older) admitted to the ICU or surgical wards for at least 48 hours during the study period.

-Exclusion Criteria: Patients with terminal illnesses requiring palliative care or those who declined participation.

Intervention

The intervention involved the implementation of a multidisciplinary infection control team composed of laboratory technologists, pharmacists, nurses, and psychologists. Each profession contributed uniquely to infection control as follows:

1.Laboratory Technologists: Conducted rapid diagnostic testing to identify infectious pathogens and provided daily reports to the infection control team. They were also responsible for monitoring antimicrobial resistance trends in the hospital.

2.Pharmacists: Led the hospital's antimicrobial stewardship program. This involved daily reviews of antimicrobial prescriptions, optimizing dosages based on susceptibility reports from the laboratory, and educating prescribers on appropriate antibiotic use.

3.Nurses: Implemented infection prevention protocols, such as hand hygiene, isolation measures, and equipment sterilization, and educated patients about infection prevention practices.

4.Psychologists: Provided stress management interventions to patients in high-risk units to reduce anxiety and improve immune function, which has been shown to influence infection susceptibility.

Data Collection

Quantitative Data

1.HAI Rates: Hospital-acquired infection rates were measured as the primary outcome. Data on the incidence of HAIs (e.g., bloodstream infections, surgical site infections, catheter-associated urinary tract infections, and ventilator-associated pneumonia) were collected from the hospital's infection control surveillance system before and after the intervention.

2.Antimicrobial Use: The pharmacy department tracked antibiotic usage before and after the implementation of the multidisciplinary team. The defined daily doses (DDD) of antibiotics were recorded, along with rates of de-escalation of broad-spectrum antibiotics.

3.Hand Hygiene Compliance: Hand hygiene adherence was monitored through direct observation in high-risk units. Auditors observed healthcare workers for compliance with the hospital's hand hygiene protocols before and after the intervention.

4.Patient Outcomes: Clinical outcomes such as length of hospital stay, morbidity, and mortality rates were recorded for the patients included in the study.

Qualitative Data

1.Healthcare Professional Interviews: Semi-structured interviews were conducted with 20 healthcare professionals (5 from each discipline) to explore their experiences working in the multidisciplinary team and their perceptions of the team's impact on infection control. Interviews focused on team collaboration, role clarity, and barriers to effective teamwork.

2.Patient Interviews: Interviews were conducted with 20 patients (10 from ICU and 10 from surgical wards) to gather their perspectives on the infection prevention strategies and stress management interventions they

received. The interviews explored how patients felt about the care provided and their understanding of the infection control measures in place.

Data Analysis

Quantitative Analysis

-HAI Rates: A comparison of HAI rates before and after the implementation of the multidisciplinary team was conducted using

chi-square tests to assess whether there was a statistically significant reduction in infections. The analysis focused on infection rates in ICU and surgical wards, with adjustments made for potential confounders such as patient comorbidities and length of stay.

-Antimicrobial Use: Changes in antimicrobial use were analyzed using

paired t-tests to compare the DDD of antibiotics before and after the intervention. Rates of de-escalation of broad-spectrum antibiotics were compared using

Fisher's exact test.

-Hand Hygiene Compliance: Hand hygiene adherence rates were compared using

paired t-tests to determine if there was a significant improvement in compliance post-intervention.

-Patient Outcomes: Differences in clinical outcomes, including length of stay and mortality rates, were assessed using

independent t-tests for continuous variables and logistic regression for categorical outcomes.

Qualitative Analysis

Qualitative data from interviews were transcribed verbatim and analyzed using

thematic analysis. The analysis followed Braun and Clarke's (2006) six-step approach to identify recurring themes related to teamwork, communication, and the perceived impact of the multidisciplinary team on infection control. Coding was done by two independent researchers to ensure reliability, and any discrepancies were resolved through consensus.

Ethical Considerations

Ethical approval for the study was obtained from the Ethics Committee. All participants, including healthcare professionals and patients, provided written informed consent prior to their participation. Confidentiality was maintained by anonymizing all data, and interview recordings were stored securely. Participants were informed of their right to withdraw from the study at any point without consequences.

Trustworthiness

To ensure the trustworthiness of the qualitative findings:

-Credibility: Data triangulation was achieved by comparing results from multiple data sources (HAI rates, antimicrobial use, hand hygiene compliance, and interviews).

-Dependability: An audit trail documenting all research procedures was maintained to ensure transparency and reproducibility.

-Transferability: Detailed descriptions of the hospital setting, participants, and intervention were provided to allow readers to assess the applicability of the findings to other healthcare settings.

-Confirmability: Reflexive journaling was used by the researchers to minimize bias and enhance objectivity during data collection and analysis.

Findings

Quantitative Findings

The impact of a multidisciplinary infection control team on hospital-acquired infections (HAIs), antimicrobial use, and hand hygiene compliance was assessed. The following table presents the key outcomes before and after the implementation of the multidisciplinary team.

Table 1: Key Outcomes Before and After Multidisciplinary Team Implementation

| Outcome | Before Intervention | After Intervention | P-value |
|---|----------------------------|---------------------------|---------|
| Hospital-Acquired Infections (HAI Rate) | 10.5 per 1000 patient days | 6.7 per 1000 patient days | 0.003 |
| Antimicrobial Use (DDD per 1000 patient days) | 550 | 420 | 0.011 |
| De-escalation of Broad-Spectrum Antibiotics (%) | 45% | 65% | 0.015 |
| Hand Hygiene Compliance (%) | 72% | 90% | 0.001 |
| Length of Stay (Mean Days) | 10.5 | 8.3 | 0.027 |
| Mortality Rate (%) | 8.5% | 6.2% | 0.089 |

P-value < 0.05 indicates statistical significance.

Reduction in Hospital-Acquired Infections

-HAI Rates: After the implementation of the multidisciplinary team, there was a significant reduction in the rate of hospital-acquired infections, decreasing from 10.5 to 6.7 per 1000 patient days ($p=0.003$). This reduction was particularly notable in ICUs and surgical wards.

Antimicrobial Stewardship

-Antimicrobial Use: The defined daily dose (DDD) of antibiotics per 1000 patient days decreased from 550 to 420 after the intervention ($p=0.011$), indicating more judicious use of antibiotics under the guidance of pharmacists.

-De-escalation of Broad-Spectrum Antibiotics: The rate of de-escalation of broad-spectrum antibiotics increased significantly, from 45% before the intervention to 65% afterward ($p=0.015$).

Hand Hygiene Compliance

-Hand Hygiene Compliance: There was a significant improvement in hand hygiene compliance among healthcare workers, increasing from 72% before the intervention to 90% after the intervention ($p=0.001$).

Patient Outcomes

-Length of Stay: The average length of hospital stay was reduced from 10.5 days to 8.3 days ($p=0.027$), reflecting improved patient recovery and infection control.

-Mortality Rate: While there was a decrease in the mortality rate (from 8.5% to 6.2%), this reduction was not statistically significant ($p=0.089$).

Qualitative Findings

Interviews with healthcare professionals and patients provided insights into the perceived effectiveness of the multidisciplinary infection control team. Three major themes emerged: (1) Collaboration and Role Clarity, (2) Empowerment Through Education and Communication, and (3) Addressing Patient Stress and Anxiety.

Theme 1: Collaboration and Role Clarity

Sub-theme 1.1: Teamwork Across Disciplines

Healthcare professionals highlighted the importance of collaboration between laboratory technologists, pharmacists, nurses, and psychologists in reducing HAIs. Participants described how the integration of each profession's expertise improved decision-making and streamlined infection control processes.

-Participant 2 (Laboratory Technologist):

“Our diagnostic results were shared immediately with the entire team, and decisions were made quickly. It felt like we were all working toward the same goal—preventing infections before they could spread.”

-Participant 5 (Pharmacist):

“Being part of the team allowed me to intervene earlier in cases where antibiotics were being overused or misused. It was a collaborative effort, and the results showed in the reduced infection rates.”

Sub-theme 1.2: Clear Roles and Responsibilities

Professionals across disciplines noted the importance of clearly defined roles in ensuring smooth teamwork. Each professional knew their responsibilities, which minimized overlap and enhanced efficiency.

-Participant 8 (Nurse):

“We had clear roles—my focus was on the implementation of hygiene protocols and patient care, while the pharmacists focused on antibiotic management. There was no confusion about who was responsible for what.”

Theme 2: Empowerment Through Education and Communication

Sub-theme 2.1: Staff Education on Infection Control

Nurses and pharmacists reported that ongoing education about infection prevention practices and antimicrobial stewardship empowered them to implement more effective protocols. Regular meetings and feedback sessions also enhanced their confidence in controlling infections.

-Participant 12 (Nurse):

“The educational sessions were incredibly helpful. We were constantly updated on the latest infection control protocols and antibiotic guidelines, which made me more confident in implementing them.”

Sub-theme 2.2: Patient Education

Patients emphasized how education about infection prevention and the hospital's hygiene protocols made them feel more secure and involved in their own care-Patient 4 (ICU Patient):

“The nurses explained to me why handwashing was important and how it helped prevent infections. It made me feel like I had some control over my health while I was in the hospital.”

Theme 3: Addressing Patient Stress and Anxiety

Sub-theme 3.1: Stress Reduction Interventions

Patients who received psychological support mentioned that stress management interventions helped reduce their anxiety during hospitalization, which they believed contributed to their recovery.

-Patient 7 (Surgical Ward Patient):

“The psychologist really helped me manage my anxiety after surgery. I was so worried about getting an infection, but the stress management sessions made a huge difference in how I felt.”

Sub-theme 3.2: Perceived Impact on Immune Function

Several patients expressed that reducing their stress helped them feel physically better and possibly even contributed to a faster recovery.

-Patient 9 (ICU Patient):

“I felt like the stress was making me weaker, but after the sessions with the psychologist, I noticed I was feeling stronger and recovering faster.”

Discussion

This study assessed the effectiveness of a multidisciplinary team approach to infection control in reducing hospital-acquired infections (HAIs) in a tertiary hospital setting. The team included laboratory technologists, pharmacists, nurses, and psychologists, each contributing uniquely to the prevention and management of infections. The results of the study demonstrate that multidisciplinary collaboration significantly reduced HAI rates, improved antimicrobial stewardship, enhanced hand hygiene compliance, and shortened patient hospital stays.

Reduction in Hospital-Acquired Infections

The findings reveal a significant reduction in HAI rates following the implementation of the multidisciplinary team, with rates dropping from 10.5 to 6.7 per 1000 patient days ($p=0.003$). This aligns with existing literature that emphasizes the effectiveness of coordinated, team-based approaches to infection prevention (Arefian et al., 2016). The reduction in HAIs was particularly evident in high-risk areas such as intensive care units (ICUs) and surgical wards, where the risk of infections like bloodstream infections and ventilator-associated pneumonia is high. This improvement suggests that the collaborative efforts of laboratory technologists in diagnosing infections, pharmacists in managing antibiotics, nurses in enforcing infection control protocols, and psychologists in reducing patient stress worked synergistically to enhance infection control.

Impact of Antimicrobial Stewardship

Antimicrobial stewardship, led by pharmacists, played a crucial role in reducing unnecessary antibiotic use, with a 24% decrease in the defined daily dose (DDD) of antibiotics ($p=0.011$) and a significant increase in the rate of de-escalation of broad-spectrum antibiotics (from 45% to 65%, $p=0.015$). These results are consistent with studies demonstrating that pharmacist-led stewardship programs can optimize antibiotic use and reduce the incidence of drug-resistant infections (Dellit et al., 2007; Karanika et al., 2016). The improved use of antibiotics likely contributed to the observed reduction in HAIs, as unnecessary antibiotic exposure is a known risk factor for the development of multidrug-resistant organisms (MDROs).

The collaboration between pharmacists and laboratory technologists was particularly impactful in this regard. Timely diagnostic results from laboratory technologists allowed pharmacists to make informed decisions about the appropriate use of antibiotics, ensuring that patients received targeted treatments rather than broad-spectrum therapies. This collaboration highlights the importance of real-time communication between disciplines in preventing the overuse of antibiotics and promoting optimal treatment strategies.

Improvement in Hand Hygiene Compliance

Hand hygiene is one of the most effective measures for preventing HAIs, and this study observed a significant improvement in hand hygiene compliance, from 72% to 90% ($p=0.001$), following the intervention. The improvement was largely attributed to the efforts of nurses, who played a key role in reinforcing hygiene protocols and educating both patients and staff about the importance of infection prevention practices. Regular audits and feedback, combined with the multidisciplinary team's focus on infection control, likely contributed to the sustained increase in compliance.

This finding supports previous research that emphasizes the role of nursing staff in maintaining high standards of hygiene and patient care (Pittet et al., 2009). The close monitoring and continuous education provided by nurses ensured that infection control protocols were strictly followed, reducing opportunities for infections to spread within the hospital.

Role of Psychological Support in Reducing Infection Susceptibility

One of the unique aspects of this study was the inclusion of psychologists in the multidisciplinary team, addressing the often-overlooked psychological factors that contribute to patient recovery. Patients in the intervention group reported lower levels of anxiety and stress, which has been shown to positively influence immune function and potentially reduce infection susceptibility (Cohen et al., 2007). The qualitative findings revealed that patients who received stress management interventions felt more in control of their recovery and believed that the psychological support contributed to their faster healing.

While the direct impact of psychological support on infection prevention is difficult to quantify, reducing patient stress and anxiety can indirectly improve health outcomes by boosting immune responses and facilitating recovery (Glaser & Kiecolt-Glaser, 2005). This finding underscores the importance of integrating mental health support into infection control strategies, particularly for patients at high risk of infection due to prolonged hospital stays or complex medical conditions.

Collaboration and Role Clarity Among Multidisciplinary Teams

The success of the intervention was largely due to the effective collaboration between the different healthcare professionals involved. Qualitative findings revealed that clear role definitions and open communication between team members allowed for smoother implementation of infection control measures. Laboratory technologists focused on diagnostic accuracy, pharmacists optimized antibiotic use, nurses enforced hygiene protocols, and psychologists supported patient mental health—all contributing to a holistic approach to infection prevention.

These findings are consistent with research showing that multidisciplinary teams are more effective at managing complex healthcare issues, such as infection control, when roles are clearly defined, and communication is prioritized (Ivers et al., 2012). The collaboration in this study ensured that all aspects of infection control were addressed, from early diagnosis and appropriate treatment to patient education and stress management.

Implications for Clinical Practice

The findings of this study have important implications for clinical practice. First, they highlight the value of multidisciplinary teams in reducing HAIs and improving patient outcomes. Hospitals should consider implementing or strengthening multidisciplinary infection control teams, ensuring that laboratory technologists, pharmacists, nurses, and psychologists collaborate effectively. Second, antimicrobial stewardship programs led by pharmacists should be expanded to optimize antibiotic use and prevent the emergence of MDROs. Finally, the inclusion of psychological support in infection control strategies should be explored further, as managing patient stress and anxiety can enhance overall recovery and potentially reduce infection risks.

Challenges and Limitations

Despite the positive outcomes, the study had several limitations. First, the study was conducted at a single tertiary hospital, which may limit the generalizability of the findings to other settings. Future research should aim to replicate the study in different hospital environments to confirm the effectiveness of the multidisciplinary approach. Additionally, while the reduction in mortality rates was promising, it did not reach statistical significance ($p=0.089$), likely due to the relatively short follow-up period. Longer-term studies are needed to assess the sustained impact of the intervention on patient outcomes, including mortality.

Another limitation is that the study relied on direct observation for hand hygiene compliance, which may have introduced observer bias. To mitigate this, future studies could consider using more objective measures, such as electronic monitoring systems, to track compliance.

Future Research

Future research should explore the long-term impact of multidisciplinary infection control teams on reducing HAIs, particularly in different hospital settings and patient populations. Additionally, further studies could investigate the cost-effectiveness of these teams, as the reduction in HAIs and shorter hospital stays observed in this study may lead to significant cost savings for healthcare institutions. The role of psychological support in enhancing patient immune function and recovery also warrants further exploration, with larger studies needed to quantify its impact on infection prevention.

Conclusion

This study demonstrates that a multidisciplinary approach, integrating the expertise of laboratory technologists, pharmacists, nurses, and psychologists, significantly reduces HAIs, improves antimicrobial stewardship, enhances hand hygiene compliance, and improves patient outcomes. The findings highlight the importance of collaboration and clear role definition in infection control and suggest that hospitals should adopt comprehensive, team-based strategies to address the complex challenges of HAIs.

References

1. Anderson, D. J., Podgorny, K., Berríos-Torres, S. I., Bratzler, D. W., Dellinger, E. P., Greene, L., ... & Kaye, K. S. (2014). Strategies to prevent surgical site infections in acute care hospitals: 2014 update. *Infection Control & Hospital Epidemiology*, 35(S2), S66-S88.
2. Arefian, H., Vogel, M., Kwetkat, A., & Hartmann, M. (2016). Economic evaluation of interventions for prevention of hospital acquired infections: a systematic review. *PloS one*, 11(1), e0146381.

3. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
4. Centers for Disease Control and Prevention (CDC). (2019). National and state healthcare-associated infections progress report. <https://www.cdc.gov/hai/data/portal/progress-report.html>
5. Cohen, S., Janicki-Deverts, D., & Miller, G. E. (2007). Psychological stress and disease. *Jama*, 298(14), 1685-1687.
6. Dellit, T. H., Owens, R. C., McGowan, J. E., Gerding, D. N., Weinstein, R. A., Burke, J. P., ... & Hooton, T. M. (2007). Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. *Clinical infectious diseases*, 44(2), 159-177.
7. Glaser, R., & Kiecolt-Glaser, J. K. (2005). Stress-induced immune dysfunction: implications for health. *Nature reviews immunology*, 5(3), 243-251.
8. Horikoshi, Y., Suwa, J., Higuchi, H., Kaneko, T., Furuichi, M., Aizawa, Y., ... & Shoji, T. (2017). Sustained pediatric antimicrobial stewardship program with consultation to infectious diseases reduced carbapenem resistance and infection-related mortality. *International Journal of Infectious Diseases*, 64, 69-73.
9. Karanika, S., Paudel, S., Grigoras, C., Kalbasi, A., & Mylonakis, E. (2016). Systematic review and meta-analysis of clinical and economic outcomes from the implementation of hospital-based antimicrobial stewardship programs. *Antimicrobial agents and chemotherapy*, 60(8), 4840-4852.
10. Kalenic, S., & Budimir, A. (2009). The role of microbiology laboratory in healthcare-associated infection prevention. *International Journal of Infection Control*, 5(2).
11. Krishna, N. K., & Cunnion, K. M. (2012). Role of molecular diagnostics in the management of infectious disease emergencies. *Medical Clinics*, 96(6), 1067-1078.
12. Ivers, N., Jamtvedt, G., Flottorp, S., Young, J. M., Odgaard-Jensen, J., French, S. D., ... & Oxman, A. D. (2012). Audit and feedback: effects on professional practice and healthcare outcomes. *Cochrane database of systematic reviews*, (6).
13. Magill, S. S., Edwards, J. R., Bamberg, W., Beldavs, Z. G., Dumyati, G., Kainer, M. A., ... & Fridkin, S. K. (2014). Multistate point-prevalence survey of health care-associated infections. *New England Journal of Medicine*, 370(13), 1198-1208.
14. Pittet, D., Allegranzi, B., Boyce, J., & World Health Organization World Alliance for Patient Safety First Global Patient Safety Challenge Core Group of Experts. (2009). The World Health Organization guidelines on hand hygiene in health care and their consensus recommendations. *Infection Control & Hospital Epidemiology*, 30(7), 611-622.
15. Segerstrom, S. C., & Miller, G. E. (2004). Psychological stress and the human immune system: a meta-analytic study of 30 years of inquiry. *Psychological bulletin*, 130(4), 601.
16. World Health Organization (WHO). (2016). Report on the burden of endemic health care-associated infection worldwide. <https://apps.who.int/iris/handle/10665/80135>