



Infection Control Strategies Used by Respiratory Therapist, Medical Lab, Epidemiology, And Medical Nurse

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Abstract

Infection control is a fundamental component of healthcare systems, aimed at preventing the transmission of infectious diseases and protecting patients, healthcare workers, and communities. Respiratory Therapist, Medical Lab, Epidemiology, and Medical Nurse play interconnected and essential roles in implementing effective infection control strategies across clinical, diagnostic, surveillance, and patient-care settings. This article examines the infection prevention and control measures employed by these four disciplines, highlighting their responsibilities in early detection, containment, monitoring, and patient education. Through coordinated efforts, adherence to standard precautions, surveillance systems, and evidence-based practices, these professionals contribute significantly to reducing healthcare-associated infections and strengthening public health preparedness.

Keywords- Infection Control, Respiratory Therapist, Medical Lab, Epidemiology, Medical Nurse, Disease Prevention, Healthcare-Associated Infections, Public Health Surveillance

Introduction

Infectious diseases remain a major global health challenge, particularly within healthcare environments where vulnerable populations are at increased risk of exposure. Effective



infection control requires a multidisciplinary approach that integrates patient care, diagnostic accuracy, disease surveillance, and public health planning. Among the key contributors to infection prevention and control are Respiratory Therapist, Medical Lab, Epidemiology, and Medical Nurse, each bringing specialized expertise that supports a comprehensive and coordinated response to infectious threats.

Respiratory Therapists are directly involved in airway management and respiratory care, placing them at high risk of exposure to airborne and droplet-transmitted pathogens. Their infection control strategies focus on safe respiratory procedures, equipment sterilization, and prevention of cross-contamination during aerosol-generating interventions. Medical Laboratory professionals play a critical role in identifying infectious agents through accurate testing, specimen handling, and reporting, which informs both clinical decisions and public health responses. Epidemiology professionals analyze infection patterns, transmission dynamics, and outbreak trends, guiding evidence-based infection control policies and prevention strategies at local, national, and global levels. Medical Nurses, as frontline caregivers, implement infection control practices continuously through patient care, education, monitoring, and enforcement of standard precautions.

The collaboration among Respiratory Therapist, Medical Lab, Epidemiology, and Medical Nurse ensures early detection of infections, interruption of transmission chains, and protection of healthcare workers and patients. Understanding their infection control strategies is essential for strengthening healthcare safety, improving patient outcomes, and enhancing preparedness for emerging and re-emerging infectious diseases.

Infection Control Strategies Used by Respiratory Therapist

Respiratory Therapists play a critical role in infection prevention and control due to their close involvement with airway management and respiratory support. Their daily practice places them at high risk of exposure to airborne, droplet, and contact-transmitted pathogens. Effective infection control strategies are essential to protect patients, healthcare workers, and the broader community while ensuring safe and high-quality respiratory care.

1. Strict Use of Personal Protective Equipment (PPE)

Respiratory Therapists adhere to rigorous PPE protocols, especially during aerosol-generating procedures such as intubation, suctioning, nebulization, and mechanical ventilation. This includes:

- Use of N95 or equivalent respirators
- Gloves, gowns, and eye protection
- Proper donning and doffing techniques to prevent self-contamination



Consistent PPE use significantly reduces occupational exposure to infectious agents.

2. Hand Hygiene and Aseptic Technique

Hand hygiene is a cornerstone of infection control. Respiratory Therapists:

- Perform handwashing or use alcohol-based hand rubs before and after patient contact
- Maintain aseptic techniques during airway procedures
- Avoid cross-contamination between patients and equipment

Strict compliance reduces healthcare-associated infections.

3. Safe Management of Aerosol-Generating Procedures

Respiratory Therapists implement strategies to minimize aerosol dispersion, including:

- Using closed suction systems
- Applying viral and bacterial filters in ventilator circuits
- Avoiding unnecessary nebulization when alternatives are available

These measures reduce airborne transmission risks.

4. Cleaning, Disinfection, and Sterilization of Equipment

Respiratory equipment can serve as a reservoir for pathogens if improperly handled.

Respiratory Therapists ensure:

- Thorough cleaning and disinfection of ventilators, oxygen masks, nebulizers, and humidifiers
- Adherence to manufacturer and institutional sterilization guidelines
- Proper storage of clean and sterile equipment

This prevents device-associated infections.

5. Isolation and Transmission-Based Precautions

Respiratory Therapists follow isolation protocols based on the mode of transmission, including:

- Airborne precautions for tuberculosis or COVID-19
- Droplet precautions for influenza
- Contact precautions for multidrug-resistant organisms

They ensure appropriate room setup, signage, and PPE compliance.



6. Environmental Infection Control

Respiratory Therapists contribute to maintaining a safe care environment by:

- Ensuring clean patient surroundings during respiratory procedures
- Proper disposal of respiratory secretions and single-use items
- Collaborating with environmental services to maintain infection-free settings

Environmental control limits indirect pathogen transmission.

7. Patient Education and Respiratory Hygiene

Education is an essential preventive strategy. Respiratory Therapists instruct patients on:

- Proper coughing and sneezing etiquette
- Correct use of masks and oxygen devices
- Hand hygiene related to respiratory care

Patient involvement strengthens infection prevention efforts.

8. Monitoring and Reporting of Infection Risks

Respiratory Therapists remain vigilant for:

- Signs of respiratory infection deterioration
- Equipment-related infection risks
- Breaches in infection control protocols

Prompt reporting enables early corrective action.

9. Compliance With Institutional Policies and Guidelines

Respiratory Therapists follow infection control policies based on:

- Hospital protocols
- National and international guidelines
- Evidence-based respiratory care standards

Continuous education ensures updated knowledge and compliance.

10. Participation in Infection Control Training and Quality Improvement

Respiratory Therapists engage in:

- Ongoing infection prevention training
- Simulation-based learning for high-risk procedures



- Quality improvement initiatives to reduce respiratory-related infections

Professional development enhances infection control effectiveness.

Conclusion

Respiratory Therapists are central to infection control efforts due to their role in airway management and respiratory support. Through strict PPE use, hand hygiene, safe aerosol management, equipment sterilization, patient education, and adherence to infection control protocols, they significantly reduce the risk of infection transmission. Their vigilance and expertise are essential for maintaining safe respiratory care environments and protecting public health.

Infection Control Strategies Used by Medical Lab

Medical Laboratory professionals play a critical role in infection prevention and control by safely handling, processing, and analyzing biological specimens that may contain infectious agents. Because laboratories routinely work with blood, body fluids, tissues, and microbial cultures, strict infection control strategies are essential to protect laboratory personnel, prevent cross-contamination, ensure diagnostic accuracy, and support public health surveillance. Effective laboratory infection control is based on biosafety principles, standardized procedures, and continuous quality assurance.

1. Adherence to Biosafety Levels and Laboratory Design

Medical laboratories operate under defined **biosafety levels (BSL)** according to the type of pathogens handled. Infection control strategies include:

- Assigning appropriate containment levels (BSL-1 to BSL-4)
- Restricting access to authorized personnel only
- Maintaining controlled airflow, ventilation, and containment systems

Proper laboratory design minimizes the risk of accidental exposure and environmental contamination.

2. Proper Use of Personal Protective Equipment (PPE)

Medical Lab professionals consistently use PPE to protect against exposure to infectious materials. This includes:

- Laboratory coats or gowns
- Gloves appropriate to specimen type
- Face masks, respirators, or face shields when required

Correct donning and doffing procedures are strictly followed to prevent self-contamination.



3. Safe Specimen Collection, Handling, and Transport

Infection control begins at specimen collection. Medical Lab strategies include:

- Using sterile, leak-proof containers
- Proper labeling with biohazard identification
- Secure transport systems to prevent spills and leaks

Standardized handling procedures reduce the risk of exposure and specimen contamination.

4. Use of Biological Safety Cabinets (BSCs)

When handling infectious or aerosol-generating specimens, Medical Lab professionals use **biological safety cabinets**, which:

- Provide personnel, product, and environmental protection
- Reduce aerosol dispersion
- Contain infectious materials during manipulation

Proper use and regular certification of BSCs are essential infection control measures.

5. Hand Hygiene and Aseptic Technique

Hand hygiene is a fundamental infection control practice. Medical Lab professionals:

- Wash hands before and after specimen handling
- Use aseptic techniques during testing procedures
- Avoid touching face, eyes, or personal items in laboratory areas

Consistent hand hygiene prevents laboratory-acquired infections.

6. Equipment Decontamination and Surface Disinfection

Laboratory instruments and work surfaces can harbor pathogens if not properly cleaned. Infection control strategies include:

- Routine disinfection of benches, analyzers, and centrifuges
- Immediate decontamination of spills using approved disinfectants
- Scheduled equipment maintenance and calibration

These practices ensure a safe and contamination-free laboratory environment.

7. Waste Management and Biohazard Disposal

Proper waste disposal is critical in infection prevention. Medical Lab professionals:



- Segregate biohazardous waste from general waste
- Use puncture-resistant sharps containers
- Follow institutional and regulatory disposal protocols

Safe waste management prevents environmental contamination and accidental exposure.

8. Prevention of Cross-Contamination

To maintain diagnostic accuracy and infection control, Medical Labs implement:

- Separation of clean and contaminated work areas
- Unidirectional workflow from specimen receipt to disposal
- Use of dedicated equipment for high-risk testing

These strategies prevent false results and infection spread.

9. Training, Competency Assessment, and Compliance

Ongoing education is essential for infection control. Medical Lab professionals undergo:

- Regular biosafety and infection control training
- Competency assessments and audits
- Updates on emerging infectious threats

Continuous training ensures adherence to best practices and regulatory standards.

10. Incident Reporting and Exposure Management

Medical Lab professionals are trained to respond promptly to:

- Needle-stick injuries
- Spills or exposure incidents
- Equipment malfunctions

Immediate reporting and post-exposure management reduce the risk of infection and improve workplace safety.

11. Role in Surveillance and Public Health Reporting

Medical Laboratories support infection control beyond the lab by:

- Reporting notifiable diseases to public health authorities
- Supporting outbreak investigations
- Contributing data for epidemiological analysis



Accurate laboratory data is essential for early detection and control of infectious disease outbreaks.

Conclusion

Medical Laboratory professionals are central to infection control through their rigorous application of biosafety principles, PPE use, specimen handling protocols, equipment decontamination, waste management, and quality assurance practices. By maintaining strict infection control standards, Medical Labs protect personnel, ensure diagnostic reliability, and provide critical data for clinical care and public health decision-making. Their role is indispensable in preventing the spread of infectious diseases within healthcare systems and the wider community.

Infection Control Strategies Used by Epidemiology

Epidemiology plays a central role in infection prevention and control by focusing on the **distribution, determinants, and dynamics of infectious diseases** within populations. Unlike clinical disciplines that manage individual patients, epidemiology operates at the community, regional, national, and global levels. Through surveillance, data analysis, outbreak investigation, and evidence-based policy guidance, epidemiology provides the foundation for effective infection control strategies and public health decision-making.

1. Disease Surveillance and Monitoring

One of the most critical infection control strategies in epidemiology is **systematic disease surveillance**. Epidemiologists:

- Monitor incidence and prevalence of infectious diseases
- Track trends over time and across populations
- Identify unusual increases or emerging infections

Surveillance systems enable early detection of outbreaks and rapid response to prevent widespread transmission.

2. Early Outbreak Detection and Investigation

When surveillance identifies potential outbreaks, epidemiologists initiate **outbreak investigations**, which include:

- Confirming the existence of an outbreak
- Identifying the source and mode of transmission
- Determining affected populations and risk factors

Early outbreak investigation limits disease spread and guides targeted control measures.



3. Contact Tracing and Exposure Management

Contact tracing is a key epidemiological strategy used to:

- Identify individuals exposed to infectious cases
- Assess exposure risk and symptom development
- Implement quarantine, isolation, or monitoring measures

This strategy interrupts transmission chains and prevents secondary infections.

4. Risk Assessment and Modeling

Epidemiologists conduct **risk assessments** to estimate the likelihood and impact of infectious disease transmission. This includes:

- Predictive modeling of disease spread
- Assessing population vulnerability
- Evaluating the effectiveness of control measures

Risk modeling supports proactive infection control planning and resource allocation.

5. Development of Infection Control Guidelines and Policies

Epidemiology informs evidence-based infection control policies by:

- Analyzing scientific data and research findings
- Recommending prevention strategies such as vaccination and screening
- Guiding infection control protocols in healthcare and community settings

Policies based on epidemiological evidence improve consistency and effectiveness of infection prevention.

6. Vaccination Strategy Planning and Evaluation

Epidemiologists design and assess **immunization programs** by:

- Identifying priority populations
- Monitoring vaccine coverage and effectiveness
- Detecting adverse events following immunization

Vaccination strategies are among the most effective tools for infection control.

7. Health Education and Risk Communication

Effective infection control requires public cooperation. Epidemiologists:



- Develop public health messaging
- Communicate risks and prevention strategies clearly
- Address misinformation and public concerns

Clear communication improves adherence to infection prevention measures.

8. Monitoring Healthcare-Associated Infections (HAIs)

Epidemiologists track HAIs by:

- Analyzing infection rates in healthcare settings
- Identifying risk factors and high-risk procedures
- Evaluating infection control interventions

This data supports quality improvement initiatives and patient safety efforts.

9. Evaluation of Infection Control Interventions

Epidemiology supports continuous improvement by:

- Measuring the effectiveness of infection control strategies
- Comparing intervention outcomes across populations
- Adjusting policies based on evidence

Ongoing evaluation ensures efficient use of resources and improved outcomes.

10. Collaboration With Multidisciplinary Teams

Epidemiologists collaborate with:

- Medical Laboratories for diagnostic confirmation
- Medical Nurses and Respiratory Therapists for frontline implementation
- Government agencies and policymakers

This collaboration ensures coordinated and comprehensive infection control responses.

11. Preparedness for Emerging and Re-Emerging Infectious Diseases

Epidemiology plays a key role in preparedness by:

- Monitoring global disease trends
- Developing response plans for pandemics
- Conducting simulation exercises and scenario planning

Preparedness reduces the impact of future infectious disease threats.



Conclusion

Epidemiology is fundamental to infection control through its population-based approach to disease prevention and management. By enabling early detection, guiding targeted interventions, supporting vaccination programs, and informing policy decisions, epidemiology strengthens healthcare systems and protects public health. Its strategies are essential for controlling infectious diseases, preventing outbreaks, and ensuring long-term health security at local and global levels.

Infection Control Strategies Used by Medical Nurse

Medical Nurses are central to infection prevention and control because they provide continuous, direct patient care across healthcare settings. Their frequent and prolonged contact with patients places them at the frontline of infection control implementation. Medical Nurses are responsible not only for following infection prevention protocols but also for monitoring compliance, educating patients and families, and acting promptly to prevent the spread of infections within healthcare facilities and the community.

1. Strict Adherence to Standard Precautions

Standard precautions form the foundation of nursing infection control practice. Medical Nurses consistently apply:

- Hand hygiene before and after patient contact
- Appropriate use of personal protective equipment (PPE)
- Safe handling of blood, body fluids, and contaminated materials

These precautions protect both patients and healthcare workers from infection.

2. Implementation of Transmission-Based Precautions

When patients are diagnosed or suspected of having infectious diseases, Medical Nurses implement:

- **Contact precautions** for multidrug-resistant organisms
- **Droplet precautions** for respiratory infections such as influenza
- **Airborne precautions** for diseases like tuberculosis

Nurses ensure correct isolation practices, room signage, and compliance with PPE protocols.

3. Hand Hygiene Promotion and Monitoring

Medical Nurses play a key role in promoting hand hygiene by:

- Demonstrating correct handwashing techniques



- Monitoring compliance among staff, patients, and visitors
- Reinforcing hand hygiene at critical points of care

Effective hand hygiene significantly reduces healthcare-associated infections.

4. Safe Medication and Injection Practices

Infection control in medication administration includes:

- Using aseptic technique for injections and IV therapy
- Avoiding reuse of syringes or needles
- Proper disposal of sharps in puncture-resistant containers

Safe practices prevent transmission of bloodborne pathogens.

5. Environmental Cleaning and Equipment Care

Medical Nurses help maintain a clean care environment by:

- Ensuring regular cleaning of patient areas
- Disinfecting reusable medical equipment
- Reporting environmental hygiene concerns

A clean environment reduces indirect transmission of infectious agents.

6. Monitoring and Early Detection of Infection

Medical Nurses continuously observe patients for:

- Signs and symptoms of infection
- Changes in vital signs or wound appearance
- Adverse responses to invasive devices

Early detection allows prompt intervention and containment.

7. Patient and Family Education

Education is a core nursing responsibility. Medical Nurses teach patients and families about:

- Hand hygiene and respiratory etiquette
- Infection prevention at home
- Proper care of wounds and medical devices

Education empowers patients to participate in infection control.



8. Safe Handling of Medical Devices and Invasive Procedures

Medical Nurses manage devices such as catheters and IV lines by:

- Following aseptic insertion and maintenance protocols
- Monitoring for device-related infections
- Removing devices as soon as clinically appropriate

This reduces device-associated infections.

9. Waste Management and Linen Handling

Proper handling of contaminated materials includes:

- Segregating infectious waste
- Using appropriate laundry procedures
- Ensuring safe transport of contaminated items

These practices prevent environmental contamination.

10. Documentation, Reporting, and Collaboration

Medical Nurses document infection-related observations and:

- Report suspected infections promptly
- Collaborate with infection control teams
- Participate in audits and quality improvement initiatives

Accurate reporting strengthens infection surveillance systems.

11. Ethical and Professional Responsibility

Medical Nurses uphold ethical standards by:

- Protecting patient privacy and confidentiality
- Providing equitable care
- Advocating for patient safety and infection prevention resources

Professional accountability ensures high-quality infection control.

Conclusion

Medical Nurses are essential to effective infection control due to their constant presence in patient care environments. Through strict adherence to standard and transmission-based precautions, hand hygiene promotion, patient education, early detection, safe device management, and interdisciplinary collaboration, Medical Nurses significantly reduce the risk



of healthcare-associated infections. Their commitment to infection prevention safeguards patient health, protects healthcare workers, and strengthens overall healthcare quality.

Interdisciplinary Collaboration in Infection Control

Interdisciplinary collaboration is a cornerstone of effective infection prevention and control within healthcare systems. Infectious diseases do not operate within professional boundaries; therefore, preventing and controlling infections requires coordinated efforts among multiple healthcare disciplines. Collaboration among Respiratory Therapist, Medical Lab, Epidemiology, and Medical Nurse ensures early detection of infections, interruption of transmission chains, consistent implementation of preventive measures, and improved patient and public health outcomes.

1. Shared Responsibility for Infection Prevention

In interdisciplinary infection control, each discipline contributes specialized expertise while sharing collective responsibility for patient safety. Respiratory Therapists focus on airway and aerosol-related risks, Medical Lab professionals identify infectious agents, Epidemiology teams analyze disease patterns, and Medical Nurses implement infection control practices at the bedside. This shared responsibility reduces gaps in care and ensures comprehensive infection prevention.

2. Effective Communication and Information Sharing

Clear, timely communication is fundamental to interdisciplinary collaboration. Infection control relies on:

- Rapid sharing of laboratory test results
- Accurate reporting of suspected or confirmed infections
- Continuous updates during outbreaks or emerging threats

Effective communication ensures that infection risks are identified early and addressed promptly across all care settings.

3. Coordinated Surveillance and Early Detection

Interdisciplinary collaboration strengthens infection surveillance by integrating:

- Clinical observations from Medical Nurses
- Diagnostic data from Medical Labs
- Trend analysis from Epidemiology
- Exposure risk insights from Respiratory Therapists

This integrated surveillance enables early outbreak detection and rapid response.



4. Joint Development and Implementation of Protocols

Infection control protocols are most effective when developed collaboratively. Interdisciplinary teams:

- Create standardized guidelines for PPE use, isolation, and disinfection
- Align clinical procedures with public health recommendations
- Ensure protocols are practical and evidence-based

Joint ownership promotes adherence and accountability.

5. Coordinated Response to Outbreaks and Emergencies

During outbreaks or public health emergencies, interdisciplinary teams work together to:

- Implement isolation and cohorting strategies
- Manage increased testing and reporting demands
- Ensure consistent application of infection control measures

This coordination minimizes confusion and reduces infection spread.

6. Cross-Training and Shared Education

Interdisciplinary collaboration includes:

- Joint training sessions on infection prevention
- Simulation exercises for outbreak response
- Knowledge sharing on emerging pathogens

Cross-training improves understanding of each discipline's role and enhances team performance.

7. Quality Improvement and Continuous Monitoring

Collaborative infection control teams engage in:

- Auditing infection rates and compliance
- Identifying system gaps and risk areas
- Implementing corrective actions

Continuous quality improvement strengthens infection prevention outcomes.

8. Leadership and Organizational Support

Effective collaboration requires institutional support, including:



- Clear leadership structures for infection control
- Dedicated infection prevention committees
- Allocation of resources and staffing

Strong leadership fosters a culture of safety and collaboration.

9. Ethical and Cultural Considerations

Interdisciplinary teams address ethical and cultural factors by:

- Respecting patient rights and confidentiality
- Ensuring equitable access to infection prevention resources
- Providing culturally sensitive education

Ethical collaboration builds trust and compliance.

10. Impact on Patient and Public Health Outcomes

Effective interdisciplinary collaboration:

- Reduces healthcare-associated infections
- Improves outbreak containment
- Enhances healthcare worker safety
- Strengthens public health preparedness

These outcomes benefit both individual patients and the wider community.

Conclusion

Interdisciplinary collaboration is a critical determinant of effective infection prevention and control within healthcare systems. The combined efforts of Respiratory Therapists, Medical Laboratory professionals, Epidemiologists, and Medical Nurses create a comprehensive framework that addresses infection control from early detection to prevention, containment, and evaluation. Each discipline contributes unique expertise—ranging from frontline patient care and diagnostic accuracy to population-level surveillance and policy guidance—while working collectively to reduce healthcare-associated infections and prevent disease outbreaks.

Effective collaboration enhances communication, strengthens surveillance systems, ensures consistent implementation of infection control protocols, and enables rapid, coordinated responses during public health emergencies. It also fosters a culture of shared responsibility, accountability, and continuous quality improvement. As infectious disease threats continue to evolve, strengthening interdisciplinary collaboration remains essential for protecting patients.



healthcare workers, and communities, and for improving overall healthcare quality and public health resilience.

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