Actionable Patient Safety Solutions™ (APSS™):

Isolation Precautions and Environmental Safety

How to use this guide

This APSS provides evidence-based actions and resources for executives, leaders, clinicians, and performance improvement specialists. This document is intended to be used as a guide for healthcare organizations to examine their own workflows, identify practice gaps, and implement improvements. In it, you'll find:

Best Practice Summary: A high level summary of evidence-based, clinical best practices. (page 2)

Executive Summary: Executives should understand the breadth of the problem and its clinical and financial implications. (page 2)

Leadership Checklist: This section is for senior leaders to understand common patient safety problems and their implications related to isolation precautions and environmental safety. Most preventable medical harm occurs due to system defects rather than individual mistakes. Leaders can use this checklist to assess whether best practices are being followed and whether action is needed in their organization around isolation precautions and environmental safety. (page 3)

Clinical Workflow: This section includes more specific information about isolation precautions and environmental safety across the continuum of care. Leaders should include the people doing the work in improving the work. This section outlines what should be happening on the frontline. Clinicians can use this section to inform leaders whether there are gaps and variations in current processes. This is presented as an infographic that can be used for display in a clinical area. (page 4)

Education for Patients and Family Members: This section outlines what frontline healthcare professionals should be teaching patients and family members about isolation precautions and environmental safety. Clinicians can inform leaders whether there are gaps and variations in the current educational processes. (page 6)

Performance Improvement Plan: If it has been determined that there are gaps in current practice, this section can be used by organizational teams to guide them through an improvement project. (page 7)
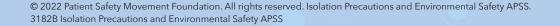
What We Know about Isolation Precautions And Environmental Safety: This section provides additional detailed information about isolation precautions and environmental safety. (page 12)

Resources: This section includes helpful links to free resources from other groups working to improve patient outcomes and safety. (page 13)

Endnotes: This section includes the conflict of interest statement, workgroup member list, and references. (page 14)

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Patient Safety
MOVEMENT

Best Practice Summary

Admission

- ☐ Screen all high risk patients for infection, including those from nursing homes, prisons, group homes, the homeless, and those on dialysis.
- ☐ Determine if additional precautions must be taken based on risk and to prevent future risk.
- ☐ Utilize standard hand hygiene and precautions, cough etiquette, and spatial separation of any patient suspected with acute respiratory infection.
- ☐ Utilize the appropriate personal protective equipment (PPE) and determine isolation status.
- ☐ Place patients who pose a risk for transmission to others in single occupancy rooms, if possible.

Routine Care

- ☐ Employ proper hand hygiene, isolation precautions, and sanitation per hospital standards at all times.
- ☐ When performing sanitation and hand hygiene, ensure that the patient care team is using verified disinfectants.
- ☐ Limit transportation of infectious patients as much as possible to limit exposure.
- ☐ Routinely clean areas most frequently touched by the patient.
- ☐ Ensure visitation policies are routinely updated and clearly communicated to all visitors.

Discharge

- ☐ Ensure that instructions regarding isolation precautions are provided to both the patient and the family caring for the patient post-hospitalization.
- ☐ Coordinate follow care with the patient via hospital case management team,
- ☐ After the room has been vacated, thoroughly disinfect.

Executive Summary

The Problem

Isolation precautions apply to all patients in all healthcare settings in every scenario and are particularly important to standardize due to the impact on the full healthcare system if not employed properly. Although disease-specific isolation guidelines exist, healthcare professionals may be prone to error in the application of these precautions, especially if the disease is not often seen at the organization or if there were delays in the diagnosis. Therefore, consideration of human factors, process, and workplace design are key for effective infection prevention.

The importance of isolation precautions and environmental safety is particularly visible during the peak annual infection period. Historically, examples of infectious diseases capturing the crucial need for standardized isolation precautions immediately upon presentation to the hospital included, but are certainly not limited to, influenza (36,000 killed annually in the US

alone), COVID-19 (4.07 million deaths worldwide and growing), and C. diff ($4.8 billion in annual excess cost in the US alone). These examples, among a plethora of others, illustrate the readiness for these infections to spread to the patients and healthcare workers alike and highlight the need for a consistent standard for isolation and environmental control.

The Cost

It is difficult to quantify the exact dollar amount due to multiple variables, such as a range of microorganisms, screening methods, and varieties in definitions. In addition to the financial figure, isolation precautions have hidden costs, such as healthcare worker labor time, and it has been suggested that isolation precautions are associated with delayed discharge and preventable ICU days (Sprague et al., 2016). It has been found that the mean cost of isolation for MRSA and VRE ranges from $400-2,000 per patient per day (Sprague et al., 2016).

It is clear that the investment is worth it, due to the inverse relationship between isolation precautions and healthcare-associated infections. In a case study of a comprehensive infection control program, of which one of the main components included isolation precautions, researchers observed a mean reduction of 270 patients per year with a hospital-acquired infection (HAI), which translated to a reduction of healthcare costs of nearly $4.5 million over the two year intervention (Hacek et al., 1999). Environmental safety departments in hospitals play a crucial role in reducing HAIs, which alone impact two million patients and cost US hospitals between $28 and $45 billion each year (Stone, 2009).

The Solution

Many healthcare organizations have successfully implemented and sustained improvements and reduced death from poor isolation precautions and environmental procedures. This document provides a blueprint that outlines the actionable steps organizations should take to successfully improve environmental safety and summarizes the available evidence-based practice protocols. This document is revised annually and is always available free of charge on our website.

Leadership Checklist

On a monthly basis, or more frequently if a problem exists, the executive team should review the outcomes of patients in or at risk for isolation precautions. See the Performance Improvement Plan for specific processes to consider assessing. Use this checklist as a guide to determine whether current evidence-based guidelines are being followed in your organization:

Frontline Coordination

- ☐ Strengthen the relationship between facilities, frontline, and infection prevention personnel by discussing the role each plays in infection prevention and involving each in improvement.
- ☐ Clearly standardize isolation precaution and environmental safety policies and ensure that isolation precaution and environmental safety protocols are embedded into clinical workflows, whether electronic or paper. See here or here for suggested PPE and isolation precautions based on microorganism.
- ☐ Eliminate barriers to making rapid changes to documentation templates and order sets.
- ☐ Establish policies to 'train' family members and visitors about appropriate isolation precautions for their hospitalized loved one.

- [ ] Develop a process and implement policies to limit patient visits to high-risk areas, while considering exceptions for end of life care. Devise a process to screen visitors in these areas for possible infections.

Organizational Improvement

- [ ] Make preventing the transmission of infectious agents an organizational priority.
- [ ] Ensure there are enough staff to effectively manage necessary preventive care.
- [ ] Provide adequate training and documentation of isolation precaution competencies and skills.
- [ ] Ensure that leaders have a simple process to oversee isolation precaution and environmental safety improvement work while also considering how it aligns with other initiatives across the organization.
- [ ] Reinforce consistent messaging multiple times in multiple ways. Consider partnering with other organizations for consistent messaging to healthcare professionals and the community.
- [ ] Provide all supplies necessary for consistent and thorough observance of standard precautions.
- [ ] Allocate financial and workforce resources to meet infection control precaution demands.
- [ ] Debrief on a regular basis to solicit team feedback about barriers to sustained compliance. Adjust the plan quickly and nimbly as needed.
- [ ] Hold staff accountable for providing the standard of care and reward success.

Clinical Workflow

1. ADMISSION

- Screen high risk patients (e.g., those from nursing homes, prisons, group homes, the homeless, and those on dialysis). Assess every patient at the point of care to determine additional precautions based on risk. See CDC's guidance for specific indications and isolation recommendations for patients upon point of care assessment.
- Assess the risk of exposure to body substances before performing any healthcare activity.
- At the very least, employ standard precautions, including hand hygiene, cough etiquette, and spatial separation of persons with acute respiratory symptoms. See the World Health Organization's Healthcare Facility Recommendations for Standard Precautions for key elements at a glance.

2. INFECTION SURVEILLANCE

- Select the appropriate personal protective equipment (PPE) upon risk assessment and determine isolation status. Initiate isolation precaution as soon as infectious disease is suspected.
- Place patients who pose a risk for transmission to others (e.g., uncontained secretions, excretions or wound drainage, infants with suspected viral respiratory or gastrointestinal infections) in a single-patient room when available (CDC, 2019).
  - o If it is not possible, cohort patients with the same pathogen and prioritize patients with conditions that may facilitate transmission.
  - o If this is still not possible, consultation with the infection control specialist is recommended to understand the mode of transmission before placement (CDC, 2016).
- Determine patient placement based on their (CDC, 2019):
  - o Routes of transmission of the known or suspected infectious agent
  - o Risk factors for transmission in the infected patient
  - o Risk factors for adverse outcomes resulting from a healthcare-associated infection in other nearby patients
  - o Availability of single rooms
  - o Options to cohort patients with the same infection.

3. ROUTINE CARE

- Avoid touching surfaces close to the patient unnecessarily.
- Wash hands frequently. See Hand Hygiene APSS.
- Select appropriate PPE.
- Limit transportation as much as possible. When transportation is necessary, ensure that the infected areas of the body are adequately covered and that indicated isolation precautions are maintained. See here for example transportation guidelines.
- Perform donning and doffing properly.
- Clean high touch areas and surfaces that are likely to be contaminated with pathogens.
- Employ EPA-registered disinfectants that have microbicidal properties against pathogens. Use according to specific manufacturer instructions.
- Maintain a log of all visitors to the patient's room.
- Assess routinely for changes to isolation status and possibility for discontinuation of isolation. See Discontinuation of Isolation.
- See page seven of the Minnesota Hospital Association's Environmental Services Cleaning Guidebook for step by step occupied room cleaning instructions.

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4. DISCHARGE AND TRANSITION

- Provide instructions on isolation precautions, if any, for the receiving facility.
- Coordinate with case management for follow-up care.
- See pages 8-9 of the Minnesota Hospital Association's Environmental Services Cleaning Guidebook for step by step terminal room cleaning instructions.
- Consider UV light disinfection to reduce active microbial activity. Disinfect equipment properly upon discharge.
- Continue following PPE precautions even after the room has been vacated.

Education for Patients and Family Members

The outline below illustrates all of the information that should be conveyed to the patient and family members by someone on the care team in a consistent and understandable manner.

- Explain what isolation precautions are and why isolation precautions are needed.
- Clearly describe what is expected of visitors and family members.
- Provide opportunities for patients and family members to get engaged in their care, such as:
  o Monitoring for hand hygiene in all healthcare providers and visitors,
  o Wiping down surfaces, or
  o Watching for any signs of an infection, including redness, coreness, or fever, and elevate to the care team.
- Describe what can be anticipated with the isolation precautions.
- Provide contact information if patients and family members have any concerns.
- Explain how the room and surfaces will be cleaned and ask if the patient would like anything further done during environmental cleaning (e.g., whether or not the patient would like to be provided with cleaning wipes for their own use).

HOW INFORMATION IS TYPICALLY CONVEYED TO PATIENTS	HOW TO IMPROVE
"Based on your lab results, we have implemented contact isolation precautions due to the C. diff diagnosis."	"We sent your poop sample to the lab for testing. They were looking for any bacteria that might tell us whether or not you need any special adjustments to your care. The lab results showed that you have "C. diff", which means that we will have any team members and visitors wear a gown and gloves when coming into your room so you are protected. Can you help me make sure that everyone who comes into your room also washes their hands with soap and water?"

Performance Improvement Plan

Follow this checklist if the leadership team has determined that a performance improvement project is necessary:

☐ **Gather the right project team.** Be sure to involve the right people on the team. If possible, you'll want two teams: an oversight team that is broad in scope, has 10-15 members, and includes the executive sponsor to validate outcomes, remove barriers, and facilitate spread. The actual project team consists of 5-7 representatives who are most impacted by the process. In general, the key is having the right people on the team (people impacted by the process, executive sponsors, and subject matter experts), no matter the size of the organization. Whether a discipline should be on the advisory team or the project team depends upon the needs of the organization. Patients and family members need to be involved in all improvement projects, as there are many ways they can contribute to safer care. Define what constitutes a quorum, which team members are needed to make the quorum, and who can serve as alternatives.

> **Complete this Lean Improvement Activity:**
> Conduct a SIPOC analysis to understand the current state and scope of the problem. A SIPOC is a lean improvement tool that helps leaders to carefully consider everyone who may be touched by a process, and therefore, should have input on future process design.

RECOMMENDED ISOLATION PRECAUTION AND ENVIRONMENTAL SAFETY IMPROVEMENT TEAM
• Executive sponsor
• Admitting and registration staff
• Front desk personnel
• Facilities
• Bed control personnel
• EVS technicians
• Infection control specialists
• Epidemiologists
• Nurses
• Physicians
• Pharmacists
• EMS personnel
• Quality and safety specialists
• Patients and family members
• Transporters and lift personnel
• EHR specialists
• Data analysts
• Senior leadership
• Organizational infection prevention planning committee members

Table 1: Understanding the necessary disciplines for an isolation precaution and environmental safety improvement team

☐ **Understand what is currently happening and why.** Reviewing objective data and trends is a good place to start to understand the current state, and teams should spend a good amount of time analyzing data (and validating the sources), but the most important action here is to go to the point of care and observe. Even if team members work in the area daily, examining existing processes from every angle is generally an eye-opening experience. The team should ask questions of the frontline during the observations that allow them to understand each step in the process and identify the people, supplies, or other resources needed to improve patient outcomes.

Create a process map once the workflows are well understood that illustrates each step and the best practice gaps the team has identified (IHI, 2015). Brainstorm with the advisory team to understand why the gaps exist, using whichever root cause analysis tool your organization is accustomed to (IHI, 2019). Review the map with the advisory team and invite the frontline to validate accuracy.

ISOLATION PRECAUTION AND ENVIRONMENTAL SAFETY PROCESSES TO CONSIDER ASSESSING

Admission and Placement
- Admission process and assessment of patient upon admission
- Screening of infection upon admission
- Cohorting
- Process for flagging readmitted patients if those patients previously had an infection
- Communication between bed control personnel in the ED and EVS staff

Visitors and Patient and Family Member Education
- Visitor restrictions
- Visitor education
- Donning/doffing of visitors
- Patient and family member education
- Explanation of visitor restrictions

Diagnosis and Changes in Diagnosis
- Use of signs on the door and other indications for isolation patients
- Diagnosis and subsequent isolation order
- Visibility of isolation precaution orders in EHR
- Decision Making and Frontline Empowerment
- Frontline decision making for implementation of isolation precautions when infection prevention personnel are not available
- Access to infection definitions to the frontline (especially if not already noted on the lab report)
- Clarity and ease of access to infection definitions to those on the frontline
- Risk versus benefit evaluation of decolonization
- Which personnel have ability to implement and discontinue isolation precautions
- Process to discontinue isolation and orders/labs required
- Protocol for switching rooms from positive to negative pressure rooms
- Perceptions of roles for frontline versus infection prevention personnel
- Chart and verbal hand-offs
- Primary languages of EVS staff
- How and where the dwell time is conveyed on the package
- Relationship between facilities and frontline
- Decision making during end of life

Transport and Transfer
- Transportation within hospital
- Care coordination with receiving facilities
- Notification of EVS staff that a patient has been discharged

Organizational Improvement
- MDRO identification by hospital
- Infection prevention planning and risk assessments based on population, services, MDROs, transmission based organisms, etc., frequency of re-evaluation, and ability to update in live time
- Mechanism for all in the organization to elevate concerns to infection prevention
- Just in time education and psychological safety
- General public awareness campaigns around hospital infection prevention
- Agreements with vendors to mitigate impact of equipment shortages
- Communication methods for any changes in practice or supply

Table 2: Consider assessing these processes to understand where the challenges around isolation precautions and environmental safety may be in your organization

☐ **Prioritize the gaps to be addressed and develop an action plan.** Consider the cost effectiveness, time, potential outcomes, and realistic possibilities of each gap identified. Determine which are priorities of focus for the organization. Be sure that the advisory team supports moving forward with the project plan so they can continue to remove barriers. Design an experiment to be trialed in one small area for a short period of time and create an action plan for implementation.

The action plan should include the following:
- Assess the ability of the culture to change and adopt appropriate strategies
- Revise policies and procedures
- Redesign forms and electronic record pages
- Clarify patient and family education sources and content
- Create a plan for changing documentation forms and systems
- Develop the communication plan
- Design the education plan
- Clarify how and when people will be held accountable

TYPICAL GAPS IDENTIFIED IN ISOLATION PRECAUTION AND ENVIRONMENTAL SAFETY PROCESSES

Collaboration and Role Clarity
- **Gap:** Expectation that infection preventionists are solely responsible for isolation precautions.
- **Gap:** Resources that are already available are not leveraged (e.g,. Bed control personnel are not involved in identifying a previous infection in a readmitted patient).
- **Gap:** Options for alternatives to a physical visit (e.g., videoconferencing) are not available to visitors and family members.
- **Gap:** EVS staff are not empowered in their role.
- **Gap:** EVS staff has a high turnover rate.
- **Gap:** Communication with EVS personnel is not in their primary language.
- **Gap:** Contracts for outsourced employees may compromise cleaning at certain heights and there's an assumption that someone else employed by the hospital (e.g., facilities) will take care of higher points.

Frontline Work
- **Gap:** "Critical labs" are not clearly defined.
- **Gap:** Laboratory reports are difficult to interpret for non infection prevention personnel on the frontline.

- **Gap:** Definitions for identification are not easily accessible and easy to understand by non infection prevention personnel on the frontline.
- **Gap:** It is difficult to implement an isolation precaution (e.g., due to requirement of provider order, etc).
- **Gap:** The nurse driven protocols do not exist and/or the ability to implement nurse driven protocols may vary by type of infection/laboratory results.
- **Gap:** Ancillary staff aren't aware of isolation precaution (e.g., because they can't see isolation alerts in EHR, etc).
- **Gap:** Isolation protocols fall short during times of emergency.
- **Gap:** Healthcare personnel do not wash their hands before applying gloves.
- **Gap:** EVS staff may try to conserve supplies (e.g., combining cleaning bottles, reusing PPE, etc).
- **Gap:** It is difficult to keep track of each product's dwell time, especially in times of emergency.
- **Gap:** IT infrastructure is not capable of detecting the communicable disease status of the patients at the time of readmission to institute appropriate isolation precautions.

Decision Making
- **Gap:** Isolation precautions are not implemented as early as possible based on suspected infections.
- **Gap:** Patients leave without being decolonized and then become recolonized.
- **Gap:** Risk versus benefit decision making around decolonization is not standardized.
- **Gap:** The nurse driven protocols may not exist.
- **Gap:** The organization cannot separate patients into single rooms.
- **Gap:** There is no standardized mechanism to 'partner' patients into rooms if they both have the same infection.
- **Gap:** Visitors and healthcare personnel perceive that they are immune to the infection because they were exposed to the patient outside of the hospital.
- **Gap:** Isolation precautions are not discontinued when indicated based on clinical data.
- **Gap:** There is a lack of a standard for visitor flexibility in certain situations (e.g., end of life care).
- **Gap:** Lack of just in time education for patients who decline to have their room cleaned.
- **Gap:** Isolation precautions for end of life care are ambiguous, unstandardized, and could lead to conflict.
- **Gap:** It is difficult to determine if symptoms are due to infection or treatment.
- **Gap:** Appropriate disinfectant is not used reliably. Lack of knowledge regarding the use of appropriate disinfectant

Transitions and Communication
- **Gap:** Isolation information is lost during hand-offs.
- **Gap:** EHR information does not match verbal conversations between frontline personnel and infection prevention specialists.
- **Gap:** Isolation precautions are not coordinated during transitions of care (e.g., from one facility to another within the health system and between health systems) or during times of transport.
- **Gap:** EVS staff are unaware of when to clean a patient room based on their discharge time.
- **Gap:** The isolation sign is removed when a patient is discharged and therefore, the EVS staff is unaware of the need for isolation.
- **Gap:** Shortages are not communicated effectively with team members impacted (e.g., EVS staff do not have email).

Accountability
- **Gap:** Just in Time education for those not adhering to isolation precautions is not encouraged.
- **Gap:** Isolation precautions are delayed due to a rare disease or disease not often seen at that location.
- **Gap:** Isolation precautions are prioritized differently for different patients based on the perceived level of patient risk for HAI.
- **Gap:** Variations in training for contracted employees, like EVS staff.
- **Gap:** EVS personnel are not aware of how thorough their cleaning efforts are.

Table 3: By identifying the gaps in isolation precaution and environmental safety processes, organizations can tailor their project improvement efforts more effectively

☐ **Evaluate outcomes, celebrate wins, and adjust the plan when necessary.** Measure both process and outcome metrics. Outcome metrics include the rates outlined in the leadership checklist. Process metrics will depend upon the workflow you are trying to improve and are generally expressed in terms of compliance with workflow changes. Compare your outcomes against other related metrics your organization is tracking.

Routinely review all metrics and trends with both the advisory and project teams and discuss what is going well and what is not. Identify barriers to completion of action plans, and adjust the plan if necessary. Once you have the desired outcomes in the trial area, consider spreading to other areas (IHI, 2006).

It is important to be nimble and move quickly to keep team momentum going, and so that people can see the results of their labor. At the same time, don't move so quickly that you don't consider the larger, organizational ramifications of a change in your plan. Be sure to have a good understanding of the other, similar improvement projects that are taking place so that your efforts are not duplicated or inefficient.

Read this paper from the Institute for Healthcare Improvement to understand how small local steps

ISOLATION PRECAUTION AND ENVIRONMENTAL SAFETY METRICS TO CONSIDER ASSESSING
• Hospital-acquired infections
• Patient turnover
• Length of stay
• Transfer to a higher level of care
• Time from admission to implementation of isolation precaution
• Signage compliance
• Bundle compliance
• Patients for whom isolation precautions were indicated who were not placed on isolation precautions
• Nosocomial transmission
• Staff exposure
• Hand hygiene compliance
• Family compliance with isolation precautions
• Patient education of isolation precaution
• Patient understanding of the isolation precaution education

Table 4: Consider evaluating related metrics to better understand isolation precautions and environmental safety

What We Know About Isolation Precautions and Environmental Safety

Isolation precautions are intended to minimize pathogen transmission and subsequent hospital-acquired infections among staff, patients, and visitors. The main indications for isolation precautions are microorganisms with antibiotic resistance, microorganisms with high transmission, and microorganisms with high virulence ([Sprague et al., 2016](#)). See [Typical Isolation Precautions and Isolation Recommendations for Various Microorganisms](#) table.

Standard Precautions

Also known as "universal precautions", this assumes that any blood or bodily fluid is infectious and recommends decision-making based on the type of interaction with the patient. Use standard precautions for all patients ([CDC, 2016](#)). Gloves should be worn when touching blood or bodily fluids on mucous membranes, non-intact skin, or contaminated equipment. A gown should be worn during procedures when the clothing has the potential for contact with blood or bodily fluids. Masks, goggles, and face shields should be used when splashes or sprays of blood or bodily fluids are anticipated.

High Touch Areas and Equipment

Upon cleaning the room post-discharge, EVS should be aware of high touch areas and should understand equipment-specific cleaning instructions.

High touch areas include bed hand rails, nurse call box, telephone, bedside table, patient chair, door handles, light switches, keyboards, sinks, and toilet (handle and rails). See pages 17-25 of [Minnesota Hospital Association's Environmental Services Cleaning Guidebook](#) for equipment-specific cleaning instructions.

Donning and Doffing Standards

Proper donning and doffing is crucial to prevent the spread of infection. It has been found that almost 40% of healthcare workers make errors in removing PPE, which correlate to a third of those workers being contaminated with multi-drug resistant organisms ([Society for Healthcare Epidemiology of America, 2019](#)).

- See the [CDC's infographic "Sequence for Putting on PPE" and "How to Safely Remove PPE"](#) for specific steps to prevent contamination.
- See the CDC's ["PPE Use in Healthcare Settings: How to Safely Don, Use, and Remove PPE"](#) on page 19.

UV Light Disinfection

It has been shown that UV light can decrease transmission of four major bacteria by 30% cumulatively ([Anderson et al., 2017](#)). This finding is significant, as it has been suggested that, even after thorough manual cleaning and sterilization of a patient room after their discharge, organisms can remain in the room and potentially affect the next patient. Upon an analysis of the effectiveness of a focused multivector ultraviolet system on disinfection, it was shown that while manual-chemical disinfection reduced the active microbial burden by 52.8%-90.9%, the focused multivector ultraviolet system reduced the active microbial burden by 92%-97.7% ([Armellino, Walsh, Petraitis, & Kowalski, 2018](#)). While the potential of this technology is still

being explored for effectiveness in a range of environments, the evidence thus far is promising and requires further research.

Resources

For Isolation Precaution and Environmental Safety Improvement:

- Sample Healthcare Worker Influenza-like Illness Monitoring Form for Workers Exposed to Patients with ARIs of Potential Concern
- Recommendations on Implementing Isolation Precautions in Hospital Settings
- Understanding the current state of infection prevention to prevent Clostridium difficile infection: A human factors and systems engineering approach
- Cost-Effectiveness of an Environmental Cleaning Bundle for Reducing Healthcare-Associated Infections
- Minnesota Hospital Association: Environmental Services Cleaning Guidebook
- CDC: "Sequence for Putting on PPE" and "How to Safely Remove PPE
- CDC: Infection Control Guideline Library
- CDC: Disinfection and Sterilization Guideline
- Assessment of Focused Multivector Ultraviolet Disinfection with Shadowless Delivery Using 5-point Multi-sided Sampling of Patient Care Equipment
- Without Manual-Chemical Disinfection
- Enhanced Terminal Room Disinfection and Acquisition and Infection Caused by Multidrug-Resistant Organisms and Clostridium difficile (the Benefits of Enhanced Terminal Room Disinfection study): A Cluster-Randomised, Multicentre, Crossover Study
- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings
- Improving Staff Compliance with Isolation Precautions Through Use of an Educational Intervention and Behavioral Contract
- Interventions to Improve Hand Hygiene Compliance in Patient Care
- Improving Adherence to Standard Precautions for the Control of Healthcare Associated Infections
- Contact Precautions Monitoring Tool
- Environmental and Safety Advances for Health Care Facilities
- Interior California: Infection Prevention and Control
- Isolation Precautions for Visitors to Healthcare Settings
- Infection Prevention and Control of Epidemic- and Pandemic-Prone Acute Respiratory Infections in Healthcare: Annex B
- Vanderbilt University: Discontinuation of Isolation

For General Improvement:

- CMS: Hospital Improvement Innovation Networks
- IHI: A Framework for the Spread of Innovation
- The Joint Commission: Leaders Facilitating Change Workshop

- [IHI: Quality Improvement Essentials Toolkit](#)
- [SIPOC Example and Template for Download](#)
- [SIPOC Description and Example](#)

Endnotes

Conflicts of Interest Disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Workgroup members are required to disclose any potential conflicts of interest.

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