

# Infection Prevention and Control for Healthcare Facility Managers

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# The Joint Commission Disclaimer

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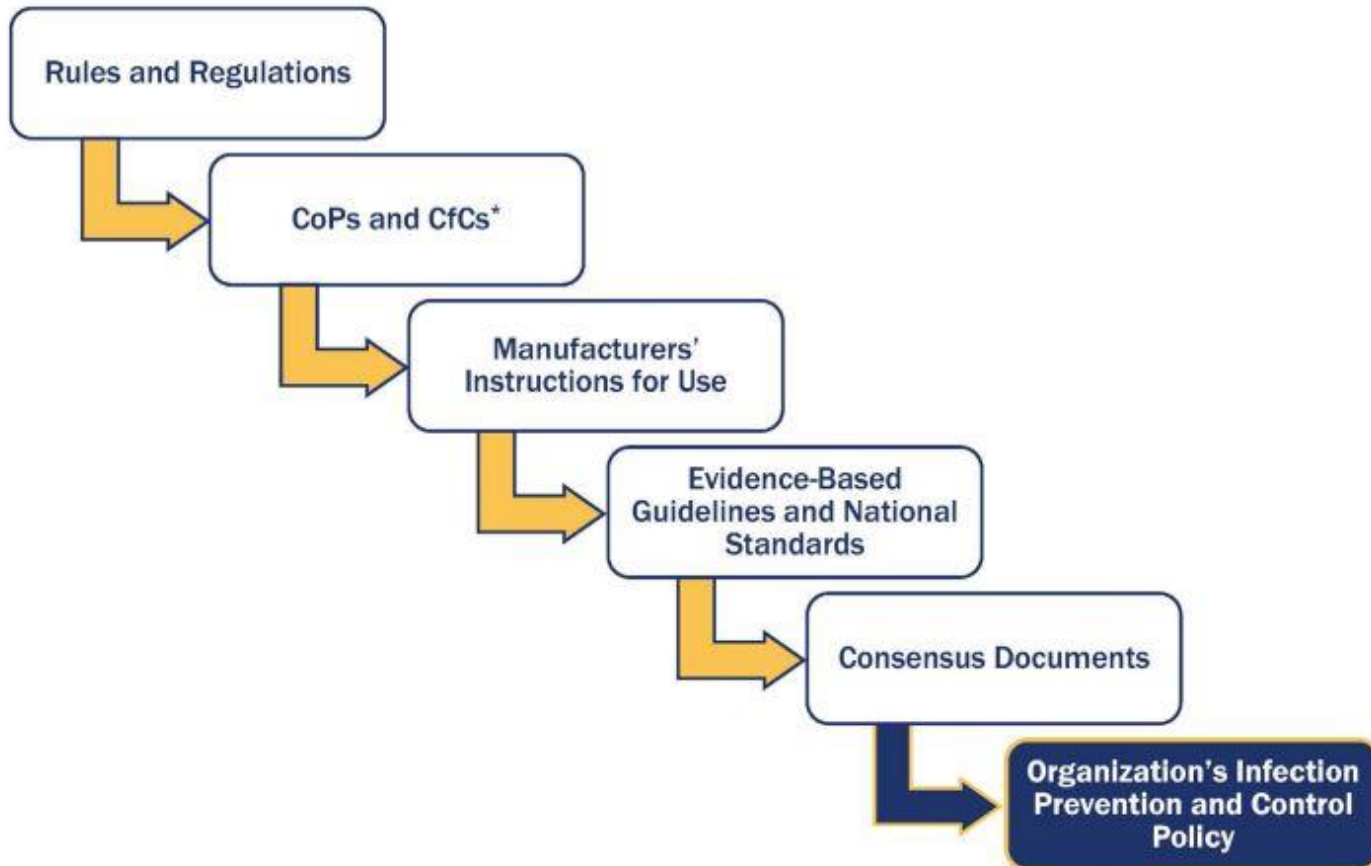
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# Objectives

- Review the hierarchical approach to infection control standards
- Identify the risks related to waterborne pathogens and mold
- Review requirements for control of these pathogens and how non-compliance is scored by the Joint Commission

# Hierarchical Approach to IC Standards



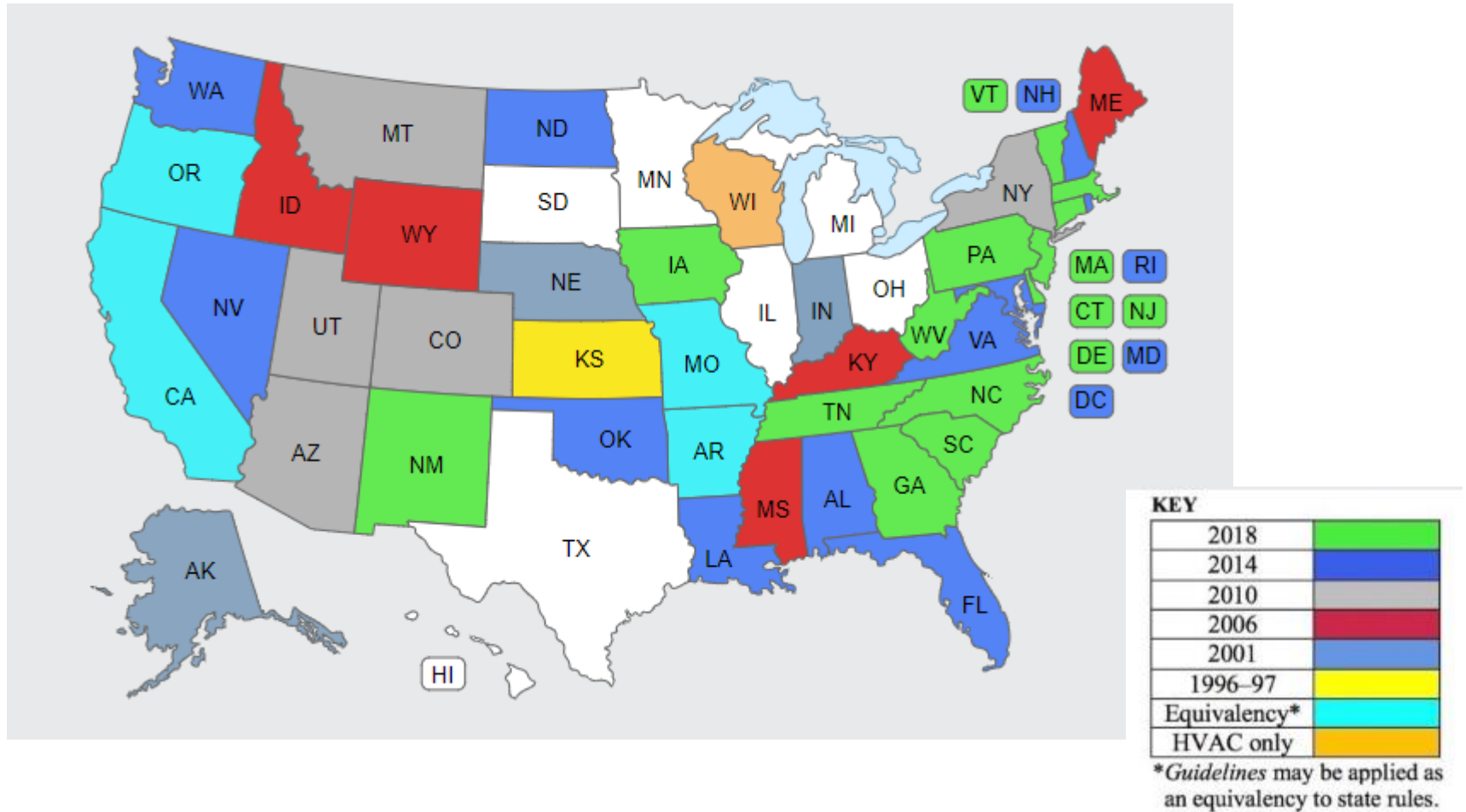
*\* For organizations that use Joint Commission accreditation for deemed status purposes or that are required by state regulation or directive, Conditions of Participation (CoPs) and/or Conditions for Coverage (CfCs) should be reviewed for applicable mandatory requirements.*

# Regulations

# Regulations

- Common sources of infection control related regulation
  - Local, state and federal building code requirements
  - Occupational Safety and Health administration (OSHA)
  - Food and Drug Administration (FDA)

# Regulations



# Regulations: OSHA

## Bloodborne Pathogens Standard (1991)

- Applies to PPE necessary to protect from exposure to blood and other potentially infectious materials linked to transmission of bloodborne pathogens

## Personal Protective Equipment for General Industry (1994)

- Applies to PPE necessary to protect workers from infectious disease that does not fall under coverage of the BBP standard (e.g., implementation of isolation)



# Conditions of Participation

# State Operations Manual

The screenshot shows the CMS.gov website interface. At the top, the CMS.gov logo is on the left, and navigation links (Home, About CMS, Newsroom, Archive, Share, Help, Print) are on the right. Below the logo is the text "Centers for Medicare & Medicaid Services". A search bar is located to the right of the navigation links. Below the search bar is a row of yellow buttons for various CMS services: Medicare, Medicaid/CHIP, Medicare-Medicaid Coordination, Private Insurance, Innovation Center, Regulations & Guidance, Research, Statistics, Data & Systems, and Outreach & Education. Below these buttons is a breadcrumb trail: Home > Regulations and Guidance > Manuals > Internet-Only Manuals (IOMs) Items > Details for title: 100-07. On the left side of the page, there is a "Manuals" section with a "Return to List" link. The main content area is titled "Details for title: 100-07" and contains a table with two rows: "Publication #" with value "100-07" and "Title" with value "State Operations Manual". Below this table is a "Downloads" section containing a list of links to various PDF documents, each with a file size and a PDF icon. The links are: Chapter 1 - Program Background and Responsibilities [PDF, 136KB], Chapter 2 - The Certification Process [PDF, 2MB], Chapter 3 - Additional Program Activities [PDF, 706KB], Chapter 4 - Program Administration and Fiscal Management [PDF, 816KB], Chapter 5 - Complaint Procedures [PDF, 457KB], Chapter 6 - Special Procedures for Laboratories [PDF, 1MB], Chapter 7 - Survey and Enforcement Process for Skilled Nursing Facilities and Nursing Facilities [PDF, 901KB], Chapter 8 - Standards and Certification [PDF, 115KB], Chapter 9 - Exhibits Table of Contents [PDF, 163KB], Chapter 10 - Chapter 10 - Survey and Enforcement Process for Home [PDF, 313KB], and Appendices Table of Contents [PDF, 43KB]. The last link, "Appendices Table of Contents [PDF, 43KB]", is circled in red.

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**Manuals**  
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**Details for title: 100-07**

Publication #	100-07
Title	State Operations Manual


**Downloads**

- [Chapter 1 - Program Background and Responsibilities \[PDF, 136KB\]](#)
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- [Chapter 7 - Survey and Enforcement Process for Skilled Nursing Facilities and Nursing Facilities \[PDF, 901KB\]](#)
- [Chapter 8 - Standards and Certification \[PDF, 115KB\]](#)
- [Chapter 9 - Exhibits Table of Contents \[PDF, 163KB\]](#)
- [Chapter 10 - Chapter 10 - Survey and Enforcement Process for Home \[PDF, 313KB\]](#)
- [Appendices Table of Contents \[PDF, 43KB\]](#)

# Program Specific State Operations Manual

## Medicare State Operations Manual Appendix

- Each Appendix is a separate file that can be accessed directly from the SOM Appendices Table of Contents, as applicable.
- The appendices are in PDF format, which is the format generally used in the IOM to display files. Click on the corresponding letter in the “Appendix Letter” column to see any available file in PDF.
- To return to this page after opening a PDF file on your desktop use the browser "back" button. This is because closing the file usually will also close most browsers



Appendix Letter	Description
<b>A</b>	Hospitals
AA	Psychiatric Hospitals
B	Home Health Agencies
C	Laboratories and Laboratory Services
D	Portable X-Ray Service
E	Outpatient Physical Therapy or Speech Pathology Services-Interpretive Guidelines
F	Physical Therapists in Independent Practice - Deleted
G	Rural Health Clinics (RHC's)

# Program Specific State Operations Manual

## ~~State Operations Manual~~ Appendix A - Survey Protocol, Regulations and Interpretive Guidelines for Hospitals

Table of Contents  
(Rev. 176, 12-29-17)

### [Transmittals for Appendix A](#)

### Survey Protocol

#### Introduction

- Task 1 - Off-Site Survey Preparation
- Task 2 - Entrance Activities
- Task 3 - Information Gathering/Investigation
- Task 4 - Preliminary Decision Making and Analysis of Findings
- Task 5 - Exit Conference
- Task 6 – Post-Survey Activities

#### Psychiatric Hospital Survey Module

#### Psychiatric Unit Survey Module

#### Rehabilitation Hospital Survey Module

#### Inpatient Rehabilitation Unit Survey Module

#### Hospital Swing-Bed Survey Module

### Regulations and Interpretive Guidelines

- §482.1 Basis and Scope
- §482.2 Provision of Emergency Services by Nonparticipating Hospitals
- §482.11 Condition of Participation: Compliance with Federal, State and Local Laws
- §482.12 Condition of Participation: Governing Body

# Program Specific State Operations Manual

## Hospitals

### Regulation

#### **§482.41(a) Standard: Buildings**

The condition of the physical plant and the overall hospital environment must be developed and maintained in such a manner that the safety and well-being of patients are assured.

### Interpretive Guidelines

#### **Interpretive Guidelines §482.41(a)**

...routine and preventive maintenance and testing activities are performed as necessary, in accordance with *Federal and State laws, regulations, and guidelines and manufacturer's recommendations*, by establishing maintenance schedules and conducting ongoing maintenance inspections to identify areas or equipment in need of repair...

# More CMS Requirements

- Survey and Certification Letters
- Quality Safety & Oversight Memoranda

DEPARTMENT OF HEALTH & HUMAN SERVICES  
Centers for Medicare & Medicaid Services  
7500 Security Boulevard, Mail Stop C2-21-16  
Baltimore, Maryland 21244-1850

**CMS**  
CENTERS FOR MEDICARE & MEDICAID SERVICES

Center for Clinical Standards and Quality/Quality, Safety and Oversight Group

DATE: June 02, 2017

TO: State Survey Agency Directors

SUBJECT: Requirement to Reduce *Legionella* Risk in Health Care Facilities, Water Systems, and Prevent Cases and Outbreaks of Legionnaires Disease

Ref: **QSOA17-30- Hospitals/CAHs/NHs**  
**REVISED 07.06.2018**

DEPARTMENT OF HEALTH & HUMAN SERVICES  
Centers for Medicare & Medicaid Services  
7500 Security Boulevard, Mail Stop C2-21-16  
Baltimore, Maryland 21244-1850

**CMS**  
CENTERS FOR MEDICARE & MEDICAID SERVICES

Center for Clinical Standards and Quality/Survey & Certification Group

DATE: June 26, 2015

TO: State Survey Agency Directors

FROM: Director  
Survey and Certification Group

SUBJECT: Advanced Copy - Update to Ambulatory Surgical Center (ASC) Infection Control Surveyor Worksheet (ICSW)

Ref: **S&C: 15-43-ASC**

## Memorandum Summary

- **ASC Infection Control Surveyor Worksheet Revisions:** The Centers for Medicare & Medicaid Services (CMS) has made minor revisions to the Infection Control Surveyor Worksheet, Exhibit 351 of the State Operations Manual (SOM) for assessing compliance with the Medicare ASC Infection Control Condition for Coverage (CIC).
- **Change:** Revisions were made to bring the worksheet into alignment with current accepted standards of practice; reflect recently released guidance; and improve the clarity of certain questions. The worksheet is used by State and Federal surveyors on all survey activity in ASCs when assessing compliance with the infection control CIC.

## Background

The ASC ICSW, Exhibit 351 of the SOM, provides detailed prompts or survey probes which help surveyors gain a better understand of infection prevention and control issues in the ASC setting. We have made minor revisions to the ASC ICSW in order to align with current

Centers for Medicare & Medicaid Services  
Hospital Infection Control Worksheet

Name of State Agency: \_\_\_\_\_

Instructions: The following is a list of items that must be assessed during the on-site survey, in order to determine compliance with the Infection Control Condition for Coverage. Items are to be assessed by a combination of observation, interviews with hospital staff, patients and their family/support persons, review of medical records, and documents necessary to the surveyor to request and documents necessary to the support persons.

The interviews should be conducted with the following staff person(s):

1. Hospital name: \_\_\_\_\_

2. CMS Certification Number: \_\_\_\_\_

3. Date of site visit: \_\_\_\_\_

## Exhibit 351

### ASC INFECTION CONTROL SURVEYOR WORKSHEET

(Rev.)

Name of State Agency or AO (please specify) \_\_\_\_\_

**Instructions:** The following is a list of items that must be assessed during the on-site survey, in order to determine compliance with the infection control Condition for Coverage. Items are to be assessed primarily by surveyor observation, with interviews used to provide additional confirming evidence of observations. In some cases information gained from interviews may provide sufficient evidence to support a deficiency citation.



The interviews and observations should be performed with the most appropriate staff person(s) for the items of interest (e.g., the staff person responsible for sterilization should answer the sterilization questions). A minimum of one surgical procedure must be observed during the site visit. The surveyor(s) must identify at least one patient and follow that case from registration to discharge to observe pertinent practices. For facilities that perform brief procedures, e.g., colonoscopies, it is preferable to follow at least two cases. When performing interviews and observations, any single instance of a breach in infection control would constitute a breach for that practice.

Citation instructions are provided throughout this instrument, indicating the applicable regulatory provision to be cited on the Form CMS-2567 when deficient practices are observed.

## PART 1 - ASC CHARACTERISTICS

1. ASC Name  
\_\_\_\_\_
2. Address, State and Zip Code  
Address  
\_\_\_\_\_  
City State Zip
3. 10-digit CMS Certification Number  
\_\_\_\_\_  
Y Y Y Y
4. What year did the ASC open for operation?  
\_\_\_\_\_  
Y Y Y Y

# Joint Commission Standards Tie into CMS Standards

Nbr	Elements of Performance (EPs)	CMS	New	FSA	MOS	CR	DOC	SC	ESP
1	<p>The hospital implements infection prevention and control activities when doing the following: Cleaning and performing low-level disinfection of medical equipment, devices, and supplies. *</p> <p>Note: Low-level disinfection is used for items such as stethoscopes and blood glucose meters. Additional cleaning and disinfecting is required for medical equipment, devices, and supplies used by patients who are isolated as part of implementing transmission-based precautions.</p> <p>Footnote *: For further information regarding cleaning and performing low-level disinfection of medical equipment, devices, and supplies, refer to the website of the Centers for Disease Control and Prevention (CDC) at <a href="http://www.cdc.gov/hicpac/Disinfection_Sterilization/acknowledg.html">http://www.cdc.gov/hicpac/Disinfection_Sterilization/acknowledg.html</a>.</p>	<a href="#">§482.42</a> <a href="#">§482.51</a> <a href="#">§482.51(b)...</a>		<b>R</b>	<b>M</b>			<b>C</b>	
2	<p>The hospital implements infection prevention and control activities when doing the following: Performing intermediate and high-level disinfection and sterilization of medical equipment, devices, and supplies. * (See also EC.02.04.03, EP 4)</p> <p>Note: Sterilization is used for items such as implants and surgical instruments. High-level disinfection may also be used if sterilization is not possible, as is the case with flexible endoscopes.</p> <p>Footnote *: For further information regarding performing intermediate and high-level disinfection of medical equipment, devices, and supplies, refer to the website of the Centers for Disease Control and Prevention</p>	<a href="#">§482.42</a> <a href="#">§482.51</a> <a href="#">§482.51(b)...</a>		<b>R</b>				<b>A</b>	

# Blue Links in E-dition Tie to CMS TAGs and CoPs

## ✓ The Joint Commission July 1, 2019 Requirements

### 📖 Nursing Care Center

#### 📖 Infection Prevention and Control

##### 📖 IC.02.01.01

2.

**The organization uses standard precautions, \* including the use of personal protective equipment, to reduce the risk of infection. (See also EC.02.02.01, EP 4)Note: Standard precautions are infection prevention and control measures to protect against possible exposure to infectious agents. These precautions are general and applicable to all patients and residents; the type of precaution used depends on the risk of exposure to body fluids.**Footnote \*: For further information regarding standard precautions, refer to the website of the Centers for Disease Control and Prevention (CDC) at <https://www.cdc.gov/hicpac/recommendations/core-practices.html> (Infection Control in Healthcare Settings).

## ✓ CMS Medicare Requirements

### 📖 Nursing and Rehabilitation

§483.80

§483.80 Infection Control

📖 The facility must establish and maintain an infection prevention and control program designed to provide a safe, sanitary, and comfortable environment and to help prevent the development and transmission of communicable diseases and infections.

§483.80(a)

📖 (a) Infection prevention and control program. The facility must establish an infection prevention and control program (IPCP) that must include, at a minimum, the following elements:

§483.80(a)(2)

📖 (2) Written standards, policies, and procedures for the program, which must include, but are not limited to:

§483.80(a)(2)(i)

**TAG: F880**

✓ (i) **A system of surveillance designed to identify possible communicable diseases or infections before they can spread to other persons in the facility;**

§483.80(a)(2)(iii)

**TAG: F880**

✓ (iii) **Standard and transmission-based precautions to be followed to prevent spread of infections;**



# Manufacturer Instructions for Use

# Manufacturer Instructions

13. SYSTEM DRAIN . The opening of the facility drain must be at least 1-1/2-inch (3.8 cm) in diameter to accommodate one machine drain hose **with an air gap**.

Source: Installation Instructions  
Automated Endoscope Reprocessor



# Evidence-Based Guidelines

# Evidence Based Guideline

- Guidelines for Environmental Infection Control in Health-Care Facilities (2003)
- Key recommendations
  - infection-control impact of ventilation system
  - establishment of a multidisciplinary team to conduct infection-control risk assessment;
  - use of dust-control procedures and barriers during construction, repair, renovation, or demolition;
  - environmental infection-control measures

# Water Management Program

# Waterborne Pathogens

Legionella must replicate and be aerosolized

- Two Primary Sources
  - Potable Water
  - Cooling Towers
- Aerosols can be created by
  - Running a faucet or shower
  - Decorative water fountains
  - Humidifiers
  - Respiratory equipment
  - Hydrotherapy



# Clinical Disease

- Pontiac fever
  - Influenza-like illness, with fever, headache, muscle aches,
  - symptoms occur within 72 hours of exposure
- Legionnaires' disease
  - Severe and potentially fatal pulmonary form
  - Symptoms include malaise, myalgia, anorexia, headache, and fever, with a non-productive cough and gastrointestinal symptoms (e.g., abdominal pain and diarrhea )

# Who is at risk?

Groups at highest risk of infection:

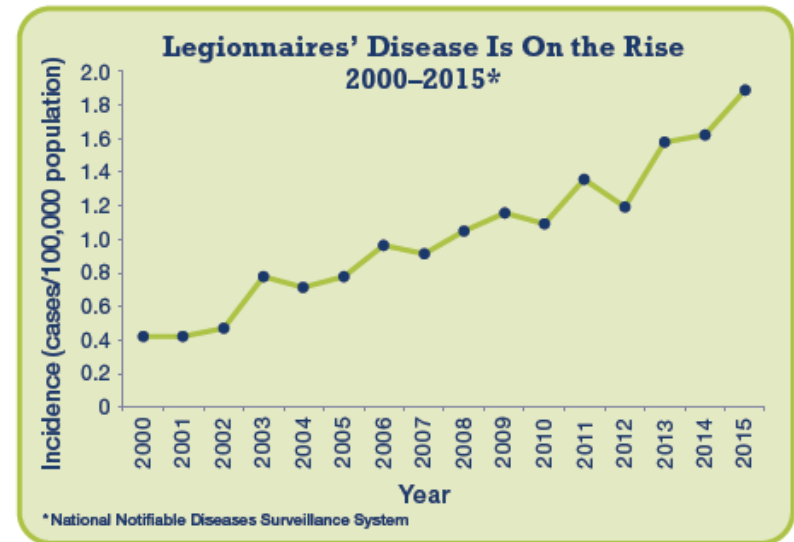
- Over 50 years of age (males 3x more)
- Heavy smokers and drinkers
- Diabetics
- Chronic lung disease
- Impaired immune systems



# Why is Legionnaires Disease on the rise?

- More *Legionella pneumophila* in the environment
- More susceptible patient population
  - Increasing age and immunosuppression
- Increased awareness and testing

Most outbreaks linked to buildings with large water systems that were not well maintained



In the United States, reported cases of Legionnaires' disease have increased by nearly four and a half times since 2000. More illness occurs in the summer and early fall but can happen any time of year.

Source: CDC Legionella Toolkit

# When does *Legionella* multiply?

- At 60 °C (140 °F) - *Legionella* die instantly
- At 55 °C (131 °F) - 95% of *Legionella* die
- 50 to 55 °C (122 to 131 °F) - *Legionella* survive but do not multiply
- 20 to 50 °C (68 to 122 °F)- *Legionella* actively multiply
- Below 20 °C (68 °F) - *Legionella* can survive but are dormant, even below freezing.

# Where can *Legionella* multiply?

- Hot and cold water tanks / cisterns
- Pipes with little or no water flow
- Slime and dirt on pipe and tank surfaces
- Rubber and natural fibers in washers and seals
- Water heaters and hot water storage tanks
- Scale in pipes, showers and taps

# Examples: Controlling Legionella

- *Develop, implement and maintain a water management program for any water source, examples include*
  - Cooling Towers: maintain biocides and other chemicals
  - Respiratory Therapy: use sterile water for humidification
  - Potable Water: measure water quality
  - Water Heaters: maintain appropriate temperatures
  - Dental Water Units: disinfect according to system manufacturer's instructions

–

# Other “water bugs”

- Bacteria living in water can cause infections
  - Pseudomonas
  - Stenotrophomonas
  - Serratia
  - Acinetobacter
  - Aeromonas
- Outbreaks have been linked to
  - dead ends in piping (hemodialysis)
  - overwhelmed filters (contaminated ice machine)
  - lack of air gaps in drains (endoscope disinfectant)

# Waterborne Pathogens

- **Do not** require replication and aerosolization
- Transmitted by direct or indirect contact.
  - Bathing
  - Drinking
  - Rinse water
  - Stagnant water

# Examples : Controlling Other “water bugs”

- Faucet aerators
  - No consensus on whether to remove or disinfect; may be prudent to remove where high risk patients are housed
- Hydrotherapy tanks and pools
  - Follow manufacturer’s or installers recommendations for disinfection
- Equipment filters
  - Use appropriate type and change in accordance with instructions for use

# Regulations

- New York Department of Health: *Protection Against Legionella* Effective date: 7/6/16
  - Cooling Tower: < 20 CFU/mL
  - Healthcare Facilities:
    - Sampling sites determined by environmental assessment
    - Water cultures every 90 days for first year or if water system serves hematopoietic stem cell transplant or solid organ transplant patients every 90 days
- New Jersey Senate Bill S1108, introduced January 25, 2018: Requires registration, inspection, testing, cleaning, and disinfection of cooling towers to control outbreaks of Legionnaire's Disease



# Regulation

- “General Duty Clause” [Section 5\(a\)\(1\)](#) of the [Occupational Safety and Health \(OSH\) Act of 1970](#), 29 USC 654(a)(1),
  - Employers should know the hazards and risks with having water sources in the workplace and maintain all systems to prevent *Legionella* growth.
- Other OSHA standards and regulations
  - Personal Protective Equipment (PPE) ([29 CFR 1910.132](#))
  - Respiratory Protection ([29 CFR 1910.134](#)) standards.
  - Hazard Communication standard ([29 CFR 1910.1200](#)): Chemicals for cleaning and water system disinfection
  - [Section 11\(c\)](#) of the OSH Act, 29 USC 660(c), prohibits employers from retaliating against workers for raising concerns about safety and health conditions.

# Survey and Certification S&C 17-30 Legionella

- Applies to
  - Hospitals
  - Critical Access Hospitals
  - Long-Term Care
- Implement plan that reduces
  - Legionella
  - Other opportunistic water pathogens

DEPARTMENT OF HEALTH & HUMAN SERVICES  
Centers for Medicare & Medicaid Services  
7500 Security Boulevard, Mail Stop C2-21-16  
Baltimore, Maryland 21244-1850



Center for Clinical Standards and Quality/Survey & Certification Group

Ref: S&C 17-30-Hospitals/CAHs/NHs  
REVISED 06.09.2017

DATE: June 02, 2017  
TO: State Survey Agency Directors  
FROM: Director  
Survey and Certification Group  
SUBJECT: Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)  
\*\*\*Revised to Clarify Provider Types Affected\*\*\*

## Memorandum Summary

- **Legionella Infections:** The bacterium *Legionella* can cause a serious type of pneumonia called LD in persons at risk. Those at risk include persons who are at least 50 years old, smokers, or those with underlying medical conditions such as chronic lung disease or immunosuppression. Outbreaks have been linked to poorly maintained water systems in buildings with large or complex water systems including hospitals and long-term care facilities. Transmission can occur via aerosols from devices such as showerheads, cooling towers, hot tubs, and decorative fountains.
- **Facility Requirements to Prevent Legionella Infections:** Facilities must develop and adhere to policies and procedures that inhibit microbial growth in building water systems that reduce the risk of growth and spread of *legionella* and other opportunistic pathogens in water.
- *This policy memorandum applies to Hospitals, Critical Access Hospitals (CAHs) and Long-Term Care (LTC). However, this policy memorandum is also intended to provide general awareness for all healthcare organizations.*

# Manufacture Instructions

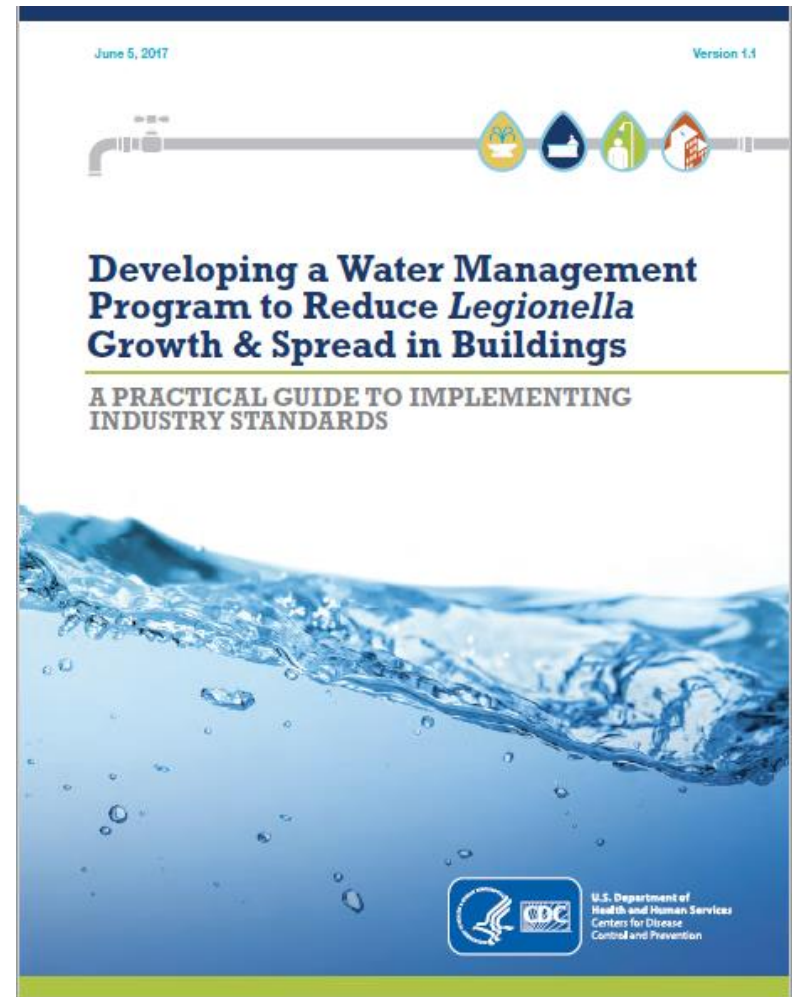
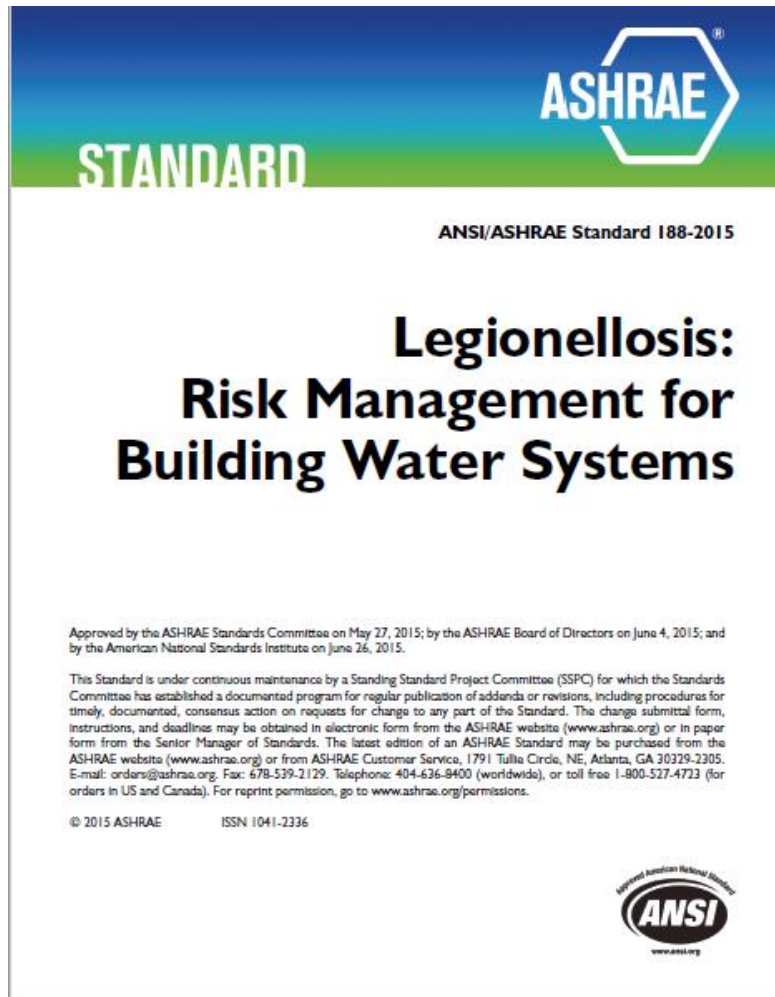
## Tower Cleanliness

An unclean tower can be an amplifier of unhealthy biological agents...**periodically inspect** an operating cooling tower for good biological control. The inspection should include, at a minimum, **visual evaluation of the condition of the water and the distribution basins**. Good biological control is indicated by clean, clear water with no green or brown algae below the water line. Poor control is detected by...

## Drift (Mist) Eliminators

Cleanliness and effectiveness of drift eliminators are critical in preventing the spread of *Legionella pneumophila* bacteria. Make sure that all air passages are clear of debris, and as clean as possible. Check that all components are properly installed. Check condition of seals to assure that water can't bypass the eliminators through deteriorated or missing seals.

# Evidence Based Guidelines



# Requirements: Water Management Program

- **Facility risk assessment**
  - CDC Toolkit provides step by step direction
- **Water management program**
  - Establish a water management team
  - Describe the building's current water system
  - Identify where Legionella and other pathogens can grow
  - Determine control measures and how to monitor (DOES NOT require cultures)
  - Establish interventions when clinical limits are not met
  - Make sure the program is functioning as designed and effective
  - Document and communicate
- **Testing protocols and acceptable ranges for control measures**
  - results of testing and corrective actions taken when control limits are not maintained.

# The Joint Commission Standards

## **Standard EC.01.01.01**

- The hospital has a written plan for managing its utility system

## **Standard EC.02.01.01**

- The organization manages safety and security risks.

## **Standard EC.02.05.01**

- The organization manages risks associated with its utility systems

## **Standard EC.02.05.05**

- The organization inspects, tests, and maintains utility systems.

## **Standard IC.01.03.01**

- The organization identifies risks for acquiring and transmitting infections

## **Standard IC.01.05.01**

- The organization has an infection prevention and control plan

## **Standard IC.02.01.01**

- The organization implements its infection prevention and control plan

## **Standard IC.03.01.01**

- The organization evaluates the effectiveness of its infection prevention and control plan

# Environment of Care Standards

EC.02.01.01 EP5: The hospital maintains all grounds and equipment.

- The organization did not implement their water management plan. *For example*, plan calls for
  - monitoring temperature in 10 patient rooms per month but did not have any documentation that it was done
  - checking for residual chlorine but had no documentation of testing

# Environment of Care Standards

EC.02.05.01 EP14: The hospital minimizes pathogenic biological agents in cooling towers, domestic hot- and cold-water systems, and other aerosolizing water systems.

- No evidence of a plan to manage legionella and other waterborne pathogen risks associated with the water management processes, including testing protocols and acceptable ranges for control measures
- The organization could not demonstrate how evidence-based control measures were incorporated into the water management program.



# Environment of Care Standards

EC.02.05.05 EP5: Infection control utility system components on the inventory. The completion date and the results of the activities are documented. *Note 1 and 2 require 100% completion.*

- Failure to implement effective equipment maintenance for humidifiers, hot water tempering equipment, cooling towers, evaporative coolers, holding tanks, and any equipment that stores or uses water in accordance with *manufacturers' recommendations*

# Infection Control Standards

- IC.01.05.01 EP1: The HCO could not demonstrate how evidence-based guidelines were incorporated into the water management activities that includes legionella clinical considerations.
- IC.01.05.01 EP2: The infection prevention and control plan did not define activities, such as surveillance, specific to risks related to legionella or other waterborne pathogens.
- IC.02.01.01 EP1: No evidence that the clinical aspects of the water management plan were implemented as evidenced by lack of infection prevention and control activities and/or surveillance specific to mitigating risk of Legionnaires' Disease.
- IC.03.01.01 EP1: No evidence that the infection control program used the data obtained from the water management program and clinical surveillance to evaluate and improve its efforts at mitigating risk of waterborne pathogens.

# Mold Prevention

# Molds in the Healthcare Setting

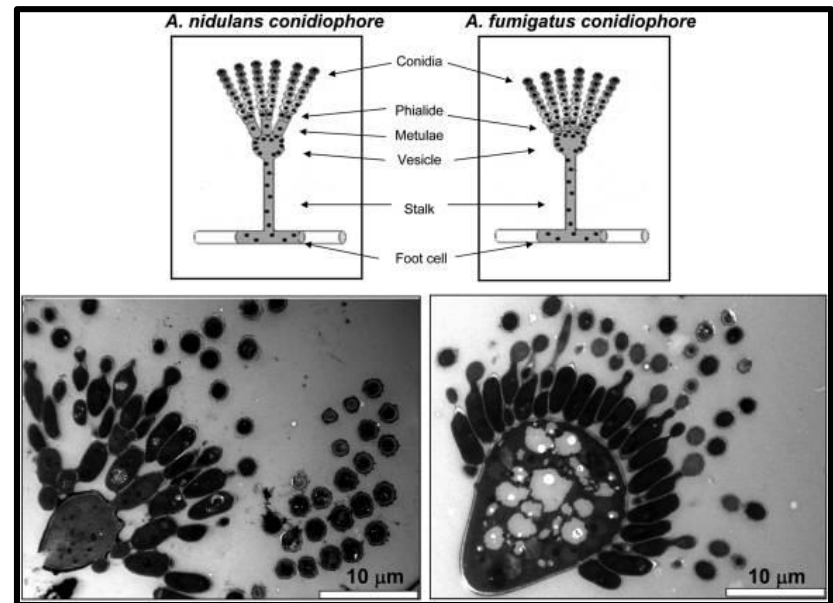
- “...Concentrations below 1cfu/m<sup>3</sup> was enough to cause infection in high-risk patients. Virtually all outbreaks of nosocomial aspergillosis are attributed to airborne sources, usually construction...”
- Fatality rate was 57.6% in high risk patients and 39.4% in patients without severe immunodeficiency.



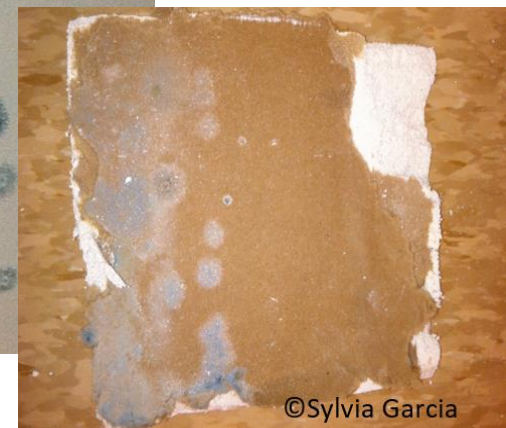
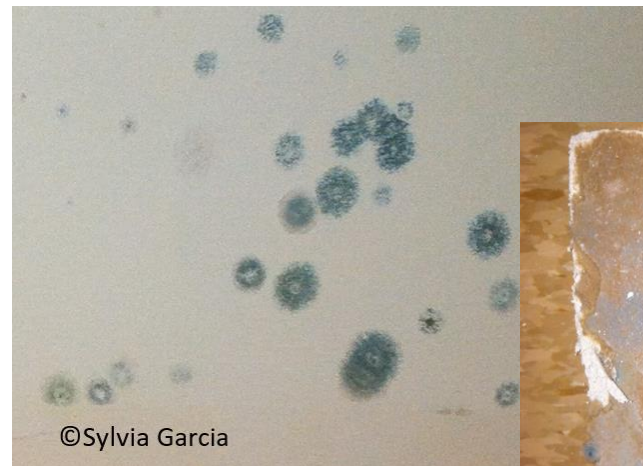
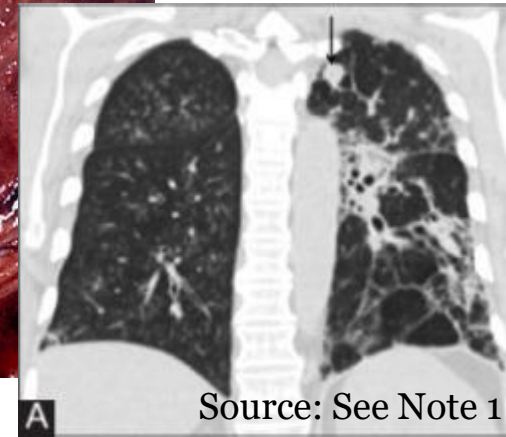
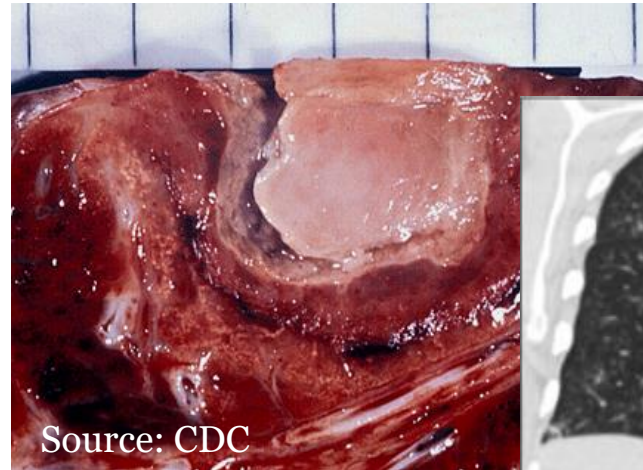
# Background

Mold spores versus active mold replication

- Spores drift through the air all the time (think dust)
- To change into its replicative state (generate hyphae) spores require
  - Nutrients
  - Moisture
  - The right temperature



Source: Yu J. H. (2010). Regulation of Development in *Aspergillus nidulans* and *Aspergillus fumigatus*. *Mycobiology*, 38(4), 229-37.



Note 1. Madan R, Chansakul T, Goldberg HJ. Imaging in lung transplants: Checklist for the radiologist. *Indian J Radiol Imaging*. 2014;24(4):318-26.

# Other Implications of Mold

- Sensitive to molds
  - Stuffy nose
  - Wheezing
  - Red or itchy eyes/ skin
- Allergic to molds/ asthmatics
  - Fever
  - Shortness of breath
- Exposure to mold may lead to development of asthma

# Sources of Mold Spores

- ANY work that generates dust
- Drilling through walls or ceilings
- Coring through floors, removing floor tile or carpet
- Air movement over the tops of ceiling tiles
- Anything that stays wet for >72 hours is a potential mold source (e.g., wet ceiling tiles)
- Disruption of air supply or incorrect pressurization
- Improper filter installation
- Open windows or doors (lack of airlocks)
- Cleaning air supply or exhaust grills and ducts
- Vacuum cleaners
- Plants or fresh flowers



# How do we reduce risk?

- AIA (now FGI) addressed the issue in 2001 last revision 2014
- Joint Commission followed with related EC standard in 2002
- CDC published Guidelines for Environmental Infection Control in Health-Care Facilities (2003)
  - Available at <https://www.cdc.gov/infectioncontrol/guidelines/environmental/>

# Two Types of Risk Assessment Required

1. Planning, Design, Construction and Commissioning
  - “...infection control risk assessment shall be part of the integrated facility planning, design, construction, and commissioning activities and shall be incorporated into the safety risk assessment.”
  - FGI terminology ICRA; others PCRA
2. Mitigation
  - Plans that describes the specific methods by which transmission of contaminants will be avoided during maintenance, renovation, construction and commissioning
  - FGI terminology ICRM; others ICRA

# FGI: Design Elements

- Number, location, type of airborne isolation and protective environment rooms
- Special HVAC needs
- Water/plumbing system
  - Minimum hand hygiene and first aid equipment
  - Water management program
- Selection of materials for surfaces and furnishings

# FGI: Construction Elements

- Testing and certification of installed systems
- Assessment of external and internal construction activities
- Location of known hazards

# FGI: Infection Control Risk Mitigation

- Written plan that addresses
  - Construction
  - Commissioning
    - HVAC and plumbing systems started/restarted (ice machines, sterilizers)

# Required Elements

- ICRA Team
- Content
  - Patient placement and relocation
  - Standards for barriers and other protective measures to protect adjacent areas and susceptible patients
  - Temporary provisions or phasing for construction or modifications of HVAC and water supply systems
  - Protection from demolitions

# Required Elements (cont'd)

- Content (cont'd)
  - Training for staff, visitors, and construction personnel
  - Impact of potential outages or emergencies
  - Impact of movement of debris, traffic flow, clean-up, elevator use for construction materials and workers, and construction worker routes
  - Provision of use of bathroom and food facilities by construction workers
  - Installation of clean materials that have not been damaged by water

# Most Common Example of Risk Mitigation Document

- Most ICRAAs result in issuing and posting an IC Permit or similar document
- Joint Commission does not require a specific form
- Should include all of the elements required by
  - Local regulations
  - FGI 2014
  - CDC 2003

Infection Control Construction Permit					
					Permit No:
Location of Construction:				Project Start Date:	
Project Coordinator:				Estimated Duration:	
Contractor Performing Work				Permit Expiration Date:	
Supervisor:				Telephone:	
YES	NO	CONSTRUCTION ACTIVITY		YES	NO
		TYPE A: Inspection, non-invasive activity			GROUP 1: Low Risk
		TYPE B: Small scale, short duration, moderate to high levels			GROUP 2: Medium Risk
		TYPE C: Activity generates moderate to high levels of dust, requires greater 1 work shift for completion			GROUP 3: Medium/High Risk
		TYPE D: Major duration and construction activities Requiring consecutive work shifts			GROUP 4: Highest Risk
CLASS I		1. Evacuate work by methods to minimize raising dust from construction operations. 2. Immediately replace any ceiling tile displaced for visual inspection.		3. Minor Demolition for Remodeling	
CLASS II		1. Provides active means to prevent air-borne dust from dispersing into atmosphere. 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Wipe surfaces with disinfectant.		6. Contain construction waste before transport in tightly covered containers. 7. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 8. Place dust mat at entrance and exit of work area. 9. Isolate HVAC system in areas where work is being performed, restore when work completed.	
CLASS III		1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 3. Complete all critical barriers or implement control cube method before construction begins.		6. Vacuum work with HEPA filtered vacuums. 7. Wet mop with disinfectant. 8. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 9. Contain construction waste before transport in tightly covered containers. 10. Cover transport receptacles or carts. Tape covering. 11. Upon completion restore HVAC system where work was performed.	
Date		4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.		7. All personnel entering work site are required to wear shoe covers	
Initial		5. Do not remove barriers from work area until complete project is thoroughly cleaned by Env. Services Dept.		8. Do not remove barriers from work area until completed project is thoroughly cleaned by the Environmental Service Dept.	
CLASS IV		1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of duct system. 3. Complete all critical barriers or implement control cube method before construction begins.		9. Vacuum work area with HEPA filtered vacuums. 10. Wet mop with disinfectant. 11. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 12. Contain construction waste before transport in tightly covered containers. 13. Cover transport receptacles or carts. Tape covering. 14. Upon completion restore HVAC system where work was performed.	
Date		4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.		9. Vacuum work area with HEPA filtered vacuums.	
Initial		5. Seal holes, pipes, conduits, and punctures appropriately. 6. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work site.		10. Wet mop with disinfectant.	
Additional Requirements:					
Date Initials					
Exceptions/Additions to this permit are noted by attached memoranda					
Permit Request By:				Permit Authorized By:	
Date:				Date:	



# Shortcoming of the Standard Form

- Multiple phase projects
- May not account for actual risk (e.g., Immunocompromised patients could be in different risk areas because of care required)
- Does provide project specific information (e.g., restrooms, break locations)

Low Risk	Medium Risk	High Risk	Highest Risk
<ul style="list-style-type: none"><li>Office areas</li></ul>	<ul style="list-style-type: none"><li>Cardiology</li><li>Echocardiography</li><li>Endoscopy</li><li>Nuclear Medicine</li><li>Physical Therapy</li><li>Radiology/MRI</li><li>Respiratory Therapy</li></ul>	<ul style="list-style-type: none"><li>CCU</li><li>Emergency Room</li><li>Labor &amp; Delivery</li><li>Laboratories (specimen)</li><li>Newborn Nursery</li><li>Outpatient Surgery</li><li>Pediatrics</li><li>Pharmacy</li><li>Post Anesthesia Care Unit</li><li>Surgical Units</li></ul>	<ul style="list-style-type: none"><li>Any area caring for immunocompromised patients</li><li>Burn Unit</li><li>Cardiac Cath Lab</li><li>Central Sterile Supply</li><li>Intensive Care Units</li><li>Medical Unit</li><li>Negative pressure isolation rooms</li><li>Oncology</li><li>Operating rooms including C-section rooms</li></ul>

# Infection Surveillance

- Establish and maintain surveillance for airborne environmental disease (e.g., aspergillosis) as appropriate during construction, renovation, repair, and demolition activities
  - Monitor for airborne fungal infections in immunocompromised patients.
  - Periodically review the facility's microbiologic, histopathologic, and postmortem data
  - If cases of health-care–associated airborne fungal infections occur, aggressively pursue the diagnosis

# Monitoring and Planning

- Written procedures for suspension of work
- Protective measures including the responsibilities and limitations of each party (governing body, designer, contractor, and monitor)
- Governing body shall provide monitoring plans for effective application of ICRMRs, may place responsibility with (and/or)
  - Infection Preventionist
  - Epidemiologist
  - Construction Coordinators
  - Safety staff
  - Independent outside consultants

# Ventilation of Construction Zone

- Dedicated ventilation/exhaust system for the construction area
  - Locations of exhaust discharge as well as disconnections and sealing of existing ducts
- System cleaned prior to occupancy if existing building HVAC system, or portion, used to achieve requirement
- Barriers maintained at 0.03 inches of water with airflow from clean to dirty
- Visual display of pressurization at barriers

# Disaster Plans for Emergencies

- Written plan for
  - HVAC shutdown
  - Water outage
    - Location of supplies
    - Who is responsible for what
    - Who will be notified
  - Water leak



# EC Standards

## EC.02.06.05

- EP 1 Must use one of the following
  - State rules and regulations
  - Guidelines for Design and Construction of Health Care Facilities, 2014
- EP 2 Preconstruction risk assessment for
  - Demolition
  - Construction
  - Renovation
  - General maintenance

# EC Standards

## EC.02.06.05

- EP 2 Preconstruction risk assessment addresses
  - air quality requirements
  - infection control
  - utility requirements
  - noise, vibration, and other hazards
- EP 3 Take action based on risk assessment

# Survey Process

- When passing construction sites observe:
  - An ICRA/ ICRM posted
  - An intact barrier
  - Evidence of negative pressure
  - Dust outside of the barrier
  - Workers or construction debris coming in and out





**Where is the ICRA for this project?**

**How was IC involved in the planning and design of this project?**

# How Scored

## Standard EC.02.06.05 EP 2

*The hospital did not perform a risk assessment to minimize risks during construction. A risk assessment prior to construction is required by State Regulation, Joint Commission Standards, FGI and CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003).*

**Must have this form signed BEFORE construction begins**

- Must install physical barrier between patient traffic area and construction zones. No patient movement is allowed through construction areas
- Evaluate adjacent patient care areas. Evaluate ventilation system for impact on other areas
- Depending on patient care area, construction workers should dress according to the department dress code. Indicate Dress Code :
- The worksite should be kept under negative pressure at all times during the project. A device should be used by the contractor to measure the pressure and record differential prior to beginning construction each day.
- Negative pressure created by enclosing the work area with a full height (Floor to deck) zippered door plastic enclosure or Edge guard walls with taped edges .
- Run a HEPA filtered negative air machine inside continuously . Supply ducts should be blocked off and return air ducts should be covered with pleated air filter.
- Only one door will be designated for routine access. This routine access exit door will be designated in each contract by the Hospitals and Identified on the construction plans. Place a dust mat outside the access door.
- During demolition, there should be no movement in or out of the construction site that would lead to contamination outside of the construction site

Debris must be removed from the containers which are closed with clean, intact plastic barriers with tape

- Route for debris removal —
- Perform during following c

- Mop any dust or tracks left by c
- Contractor to broom clean and cleaning of area before reestab

REFER to DRAWING

**Description of work:** \_\_\_\_\_  
project . Affected rooms \_\_\_\_\_

Location: \_\_\_\_\_  
Project Manager: \_\_\_\_\_  
Contractor: Walsh-  
Start Date: 9/30 /15  
Duration: 4.5 months  
Permit expires: 12/30/15

Infection Control  
Permit Date and Signature: 9/30/

©Sylvia Garcia

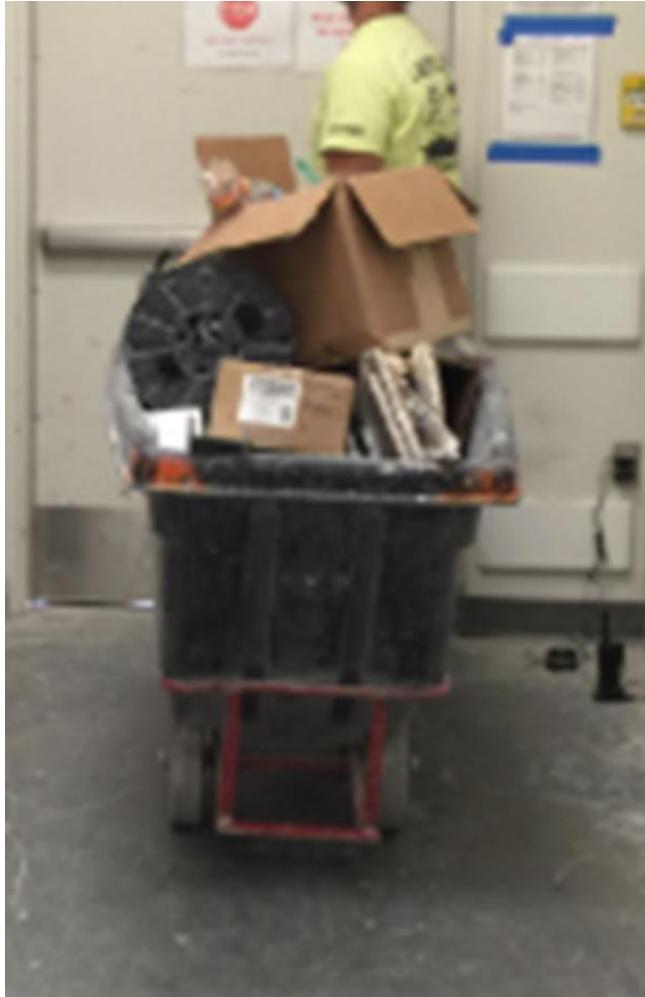
**Is there an ICRA posted but it is not being followed?**

# What does the ICRA say about pressurization and barriers?



- FGI: Barriers maintained at 0.03 inches of water with airflow from clean to dirty
- CDC: Establish negative pressure

# What does the ICRA say about construction waste?



- FGI: ICRM must include impact of movement of debris, traffic flow, clean-up, elevator use for construction materials and workers, and construction worker routes
- CDC: Mist debris and cover disposal carts before transport

# Have staff started to stock supplies and hang curtains before dust removed?



- FGI: ICRA must address commissioning
- CDC: Remove dust generated during construction



# How Scored

EC.02.06.05 EP 3

*The hospital did not take action based on its assessment to minimize risks during construction. Barriers were not intact and construction debris waste not contained when leaving the construction site as required by the posted ICRA.*

# How Scored

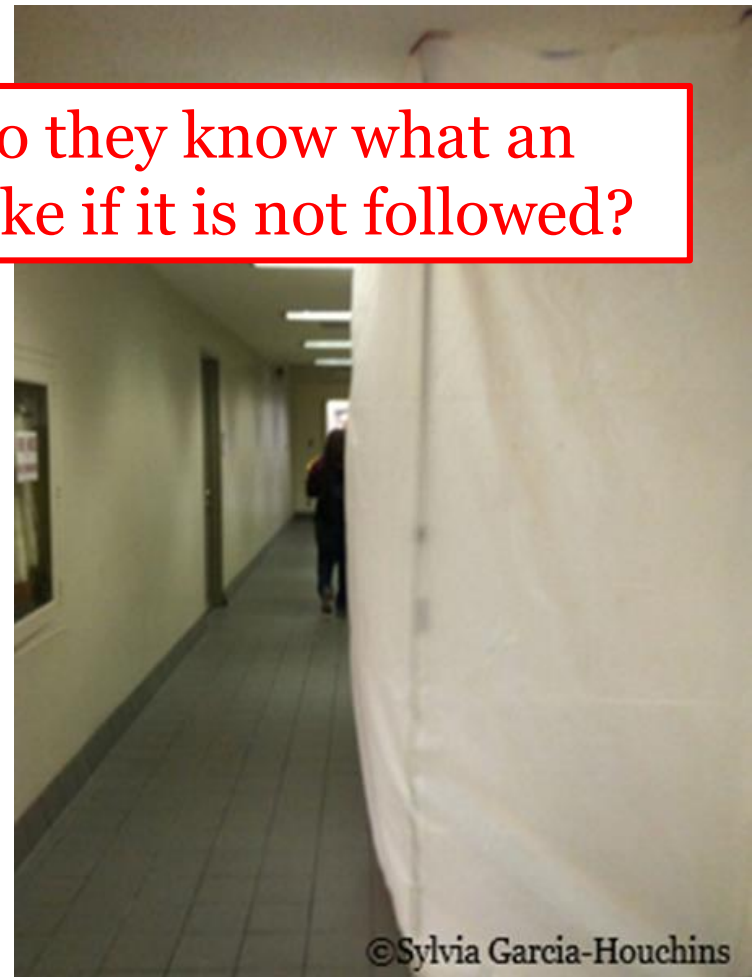
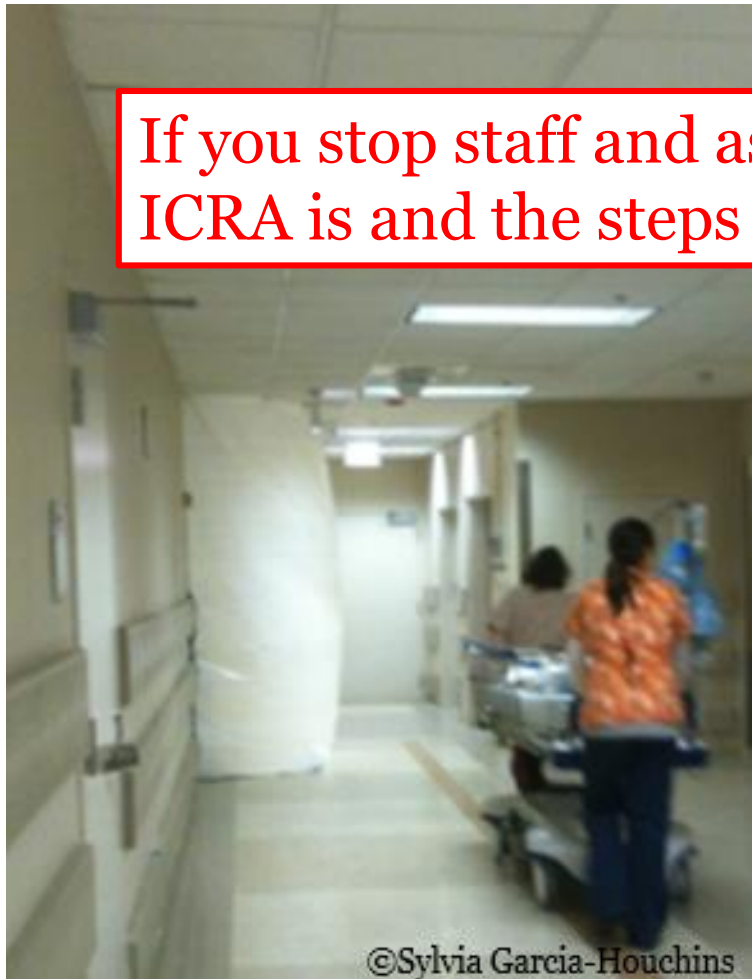
IC.01.03.01 EP 1 (unsafe condition is identified during survey because it was not addressed in ICRA)

*The hospital failed to identify the risk of mold contamination that could result from transporting construction debris that was not contained. Supplies were placed in supply rooms before terminal cleaning to remove dust contamination. Containment of construction debris and terminal cleaning are identified as a step for implementation in the Guidelines for Environmental Infection Control in Health-Care Facilities (2003)*

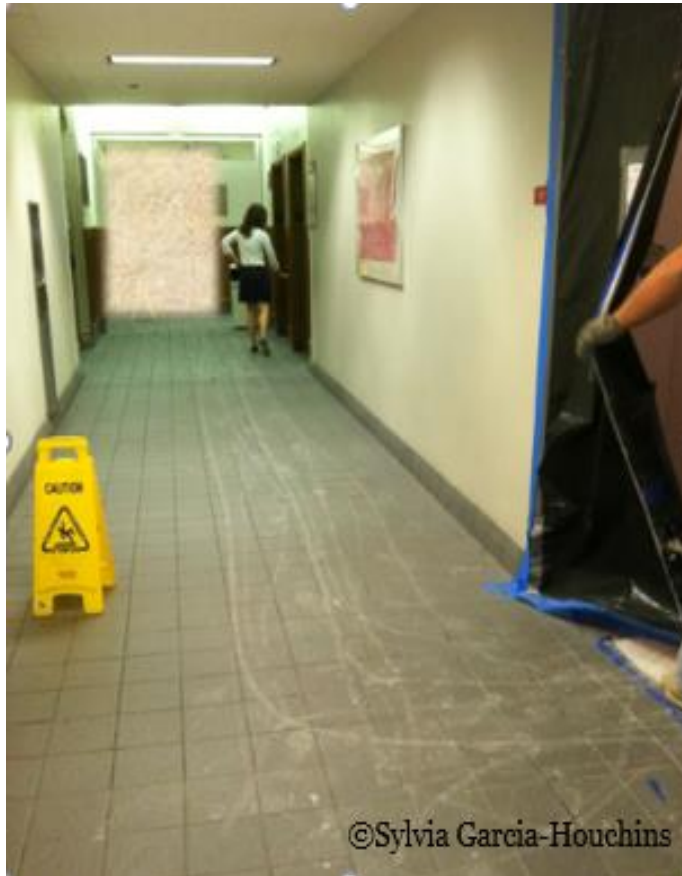


# Are staff walking past a barrier that is not correct?

If you stop staff and ask, do they know what an ICRA is and the steps to take if it is not followed?



# Are construction workers aware of the importance of adhering to infection control measures during the project?



# How Scored

IC.02.01.01 EP 7 (did not know)

*The hospital did not communicate responsibilities for preventing and controlling risk of infection related to construction as staff did not know their responsibilities in accordance with CDC guidelines. Education of staff and construction workers is identified as a required element by FGI and a step for implementation in the Guidelines for Environmental Infection Control in Health-Care Facilities (2003)*

# How Scored

EC.02.06.05 EP 3 (knew, but failed to report)

*The hospital did not take action based on its assessment to minimize risks during construction. Staff and workers did not correct an unsafe situation. Staff failed to report problems with barriers and dust outside of a construction site. Implementation of the risk assessment is required by Joint Commission Standards.*

# How Scored

If a pattern of non-compliance is identified surveyors may score leadership LD.01.02.01 EP4

*Leadership failed to make certain that the hospital wide quality assessment and performance improvement and training programs addressed problems with implementation of ICRA that had been identified by the individual responsible for infection prevention and control and that corrective action plans were successfully implemented. Review of Committee minutes and surveyor observations indicate continued non-compliance with ICRA requirements*

# Infection Control Standards

## IC.01.02.01 EP 1 Leaders allocate resources: Access to Information

- *How is the IC Program notified of possible renovation, design and construction to ensure they are included in planning and design?*
- *Are maintenance, renovation or construction projects that could put patients at risk started without the IC Programs knowledge?*

## IC.01.05.01 IC Plan

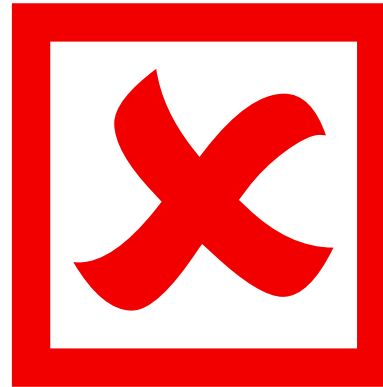
- EP 1 Uses evidence-based national guidelines: *Which evidence based guidelines are used to develop construction related IC policies?*
- EP 2 Written description of activities: *Is there a written process for the ICRA / ICRM?*
- EP 5 Process for investigating outbreaks: *Can the IP explain how they would know if hospital-acquired cases of mold infection are occurring?*

# Barrier Details



## Barrier with Solid Top

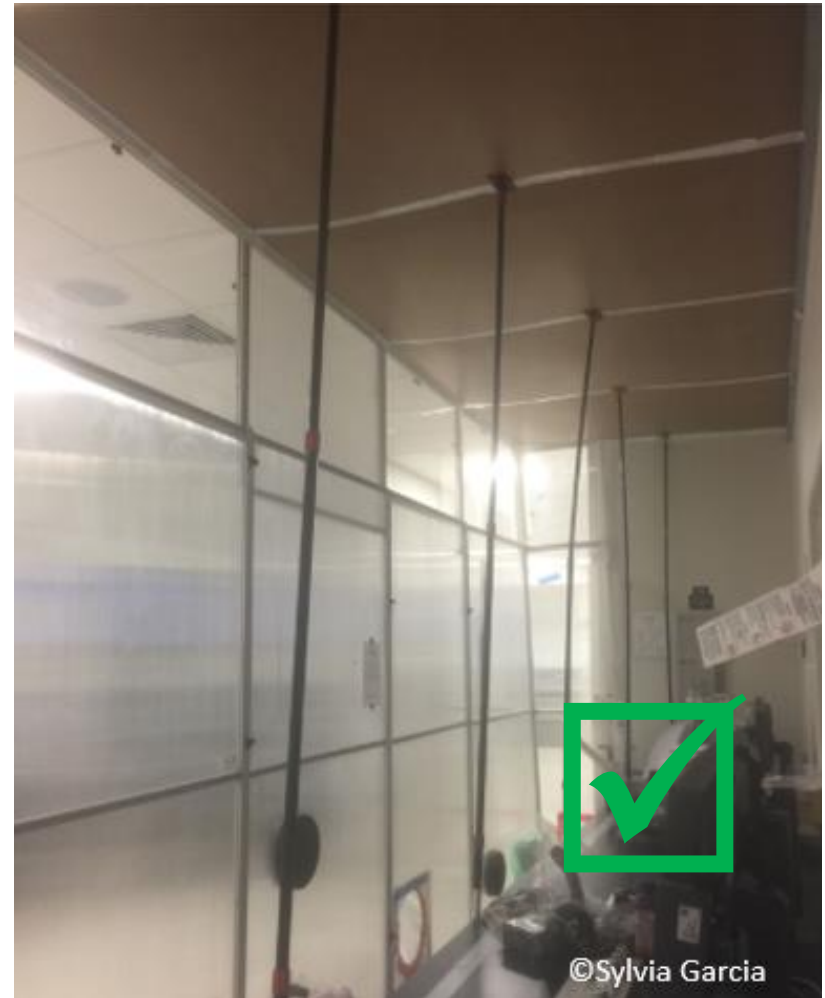




**Barrier that goes to  
drop ceiling**



**If drop ceiling, MUST cover inside of barrier to prevent penetration of dust outside of barrier**





**Take a second look....**



**Has a soft top that goes  
across drop ceiling**



**What about this one?**



**Take a closer look  
from the inside**



**What do you think?**



**Inside you see one piece  
of plastic from wall,  
across ceiling to floor**

# Maintaining Negative Pressure: HEPA Filters



## A photograph showing a yellow flexible duct installed in a room. The duct is connected to a wall and extends downwards. In the background, there is a door with a blue frame and a sign that says 'LAV'. The room appears to be a bathroom or a similar facility. The duct is yellow with black rings. The wall is white. The door is white with a blue frame. The sign is blue with white text. The floor is dark. There are some cleaning supplies in the background. The text '© Sylvia Garcia' is visible in the bottom right corner.



# Where to Exhaust HEPA Filters

- Must NOT exhaust directly into a return
  - The duct will be pressurized and dust can blow out of other returns
- Must NOT exhaust into the space above a dropped ceiling
  - Dust on the pipes and other utilities will be dislodged and blow out along edges of ceiling tiles





# Filters

- Planning must include impact of changing filters
- Filters need to be placed when system is turned on to avoid contamination of ducts during construction
- Final filters should have a gasket and be clipped in to prevent unfiltered air from leaking around filter



**Not Gasketed  
Resulting in  
Air Leak  
around Filter**



# Policy and Procedure

# Example Policy: ABC Best Hospital

Hot water system should be maintained in a manner that suppresses growth of *Legionella* and other waterborne pathogens.

- A water mitigation plan should be developed whenever new plumbing will be installed to ensure that it does not become a source of infection for patients or staff.

# Example Policy: ABC Best Hospital

Wear a half-face air-purifying respirator equipped with an N95 filter

- when sampling cooling towers if the fans cannot be turned off
- in enclosed spaces with an aerosol-generating device that cannot be turned off.

Reference: CDC Sampling Procedure and Potential Sampling Sites | [www.cdc.gov/legionella/outbreak-toolkit/](http://www.cdc.gov/legionella/outbreak-toolkit/) Accessed June 10, 2019

# Example Policy: ABC Best Hospital

Barriers should be placed and negative pressure should be established prior to the start of work that could generate dust and should remain in place until the affected area has been cleaned .

- Prior to the start of work in \_\_\_\_\_, the barriers will inspected by \_\_\_\_\_to ensure full containment has been established.
- Prior to establishment of positive or neutral pressurization and removal of barriers, the removal of dust will be verified by \_\_\_\_\_.

# Conclusion

- Facilities staff should understand the risks and their role in preventing infections.
- Effective management of the physical environment is necessary to prevent related disease
- It is not easy to link exposure to disease but when disease does occur it usually results in significant adverse patient outcomes (illness and/or death)

Thank you for Keeping Patients Safe!

Questions and Comments