



# Educational Series



## CONSTRUCTION AND MAINTENANCE RISK MITIGATION MANAGEMENT



Using the Infection Control Risk Assessment (ICRA)  
for Construction and Maintenance Containment



## 1) Identification

All construction, renovation, demolition and maintenance projects should be reviewed by qualified personnel to determine if they may pose a health risk. If possible this should be done during the planning process.



## 2) Assessment

The Infection Control Risk Assessment (ICRA) is the standard evaluation tool, approved by the AIA, APIC, and ASHE as well as other and international organizations. The ICRA should be filed with facility management.



## 3) Recommendations

Depending on location and severity, work is matched to one of four classes of precautions. Recommended Best Practices are compliant with CDC regulations and ensures patient and staff safety.



## 4) Training

Project staff training is important to ensure the purpose of precautions is understood. Often training must be completed before a facility will issue a worker a badge allowing them on site.

# Construction Containment Program Steps

5% of HAI mortalities are Construction and Maintenance Related\*



### Why Establish Containment?

Joint Commission standard marked as a direct impact requirement

Effective at preventing the spread of multi drug resistant organisms

When properly conducted it has a minimal impact on work flow

Risk Mitigation reduces liability

Less expensive than most HAI associated costs, average ~\$14K

## 6) Verification



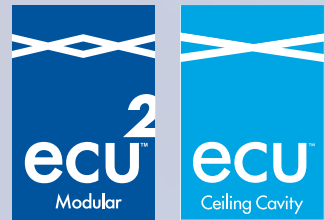
An infection control or facilities staff member periodically checks progress and compliance, sometimes daily. If project scope or conditions change the ICRA may be updated and a new permit with adjusted recommendations issued.

## 5) Permit



After receiving an ICRA facility management will issue a permit which must be displayed at the work site at all times. The permit states the project scope and required precautions. The ICRA and permits create a compliance record.

\*Centers for Disease Control and Prevention (CDC)  
American Society of Healthcare Engineers (ASHE)



# Environmental Containment Unit



Temporary containment units provide consistent performance, and many can also act as an anteroom/airlock for larger containment projects or to isolate a room. Quality units can be set up in 15 minutes and actually increase efficiency for in series penetrations.



Mintie products use a patented external, collapsible, portable frame. The unitary design prevents part loss and requires less cleaning as it is outside the envelope. When choosing a containment solution look for a product which is simple and easy to use, this will increase adoption and efficiency.



# Preventing Healthcare Associated Infection (HAI)

**1.7 million annual infections (USA)**  
**99,000 associated deaths**  
**Estimated 5,000 construction or maintenance related**

The ICRA is supported by the CDC, Joint Commission, AIA, APIC, ASHE, etc.

In general, the overall prevalence of HAI is similar in countries with well developed infection control practices and the strategic responses are driven by alike initiatives. Standardization of best practices and consistent application have been shown to significantly impact intervention efficacy. And this approach is being brought to environmental controls, which are an increasingly important part of Infection Control. A construction and maintenance containment program will help ensure that projects are being carried out with a minimum of risk.



Joint Commission standards are being used for accreditation in 39 countries throughout Europe, Asia and the Middle East. The UK and Japan are in the process of adopting similar national construction and maintenance containment standards.

2011 APIC President Russell Olmsted speaking at JSEI in Japan about the ICRA

## Centers for Disease Control and Prevention (CDC)

"Before the project\* gets under way, perform an ICRA to define the scope of the activity and the need for barrier measures"

"Create and maintain negative air pressure in work zones adjacent to patient-care areas and ensure that required engineering controls are maintained"

\*construction, renovation, maintenance, demolition, and repair

# Negative Air Machines (NAM) with HEPA Filters

High Efficiency Particulate Air (HEPA) filters are effective at filtering 99.99% of particles down to 0.3µ. The CDC considers HEPA filtered exhaust safe for release into occupied healthcare spaces, such as corridors. This makes HEPA filters the preferred choice for construction containment use in healthcare environments as they protect immuno-compromised patients.

The most common US standards call for +12 air changes per hour (ACH) = 1 change per 5 minutes. NAM airflow is rated by cubic foot or meter per minute (cfm/cmm). Choose a NAM capable of changing containment space air once in that time.

Change pre-filters often to extend HEPA filter life. Antimicrobial coatings and UVGI can help improve filtration system performance, but do not ensure filter decontamination. Used HEPA filters should be treated with caution and changed following facility procedure for potentially hazardous material.



# PPE and Clean Up

Proper personal protective equipment (PPE) and practices are a critical part of preventing worker transport and transfer of potentially dangerous particulates. Direct contact transmission as well as settled aerosol re-release can occur.

Environmental surfaces cleaning and disinfection is an important component of routine infection control in health care facilities. It is critical to clean any surfaces inside the contained space which may have become contaminated during a project. Remove PPE after initial area decontamination but while still inside the containment space.

Contain and dispose of contaminated waste in accordance with facility specific procedures. In general, disposables and worksite debris should be removed in sealed containers. Reusable items should also be placed in sealed containers until properly cleaned.

Gloves, clean suits, and disposable masks should not be reused, and perform hand hygiene after removal. Hand hygiene is the single most important practice to reduce the transmission of infectious agents and is an essential element of standard precautions.



## Description of Required Infection Control Precautions by Class

	During Construction Project	Upon Completion of Project
<b>CLASS I</b>	<ol style="list-style-type: none"> <li>Execute work by methods to minimize raising dust from construction operations.</li> <li>Immediately replace a ceiling tile displaced for visual inspection</li> </ol>	<ol style="list-style-type: none"> <li>Clean work area upon completion of task.</li> </ol>
<b>CLASS II</b>	<ol style="list-style-type: none"> <li>Provide active means to prevent airborne dust from dispersing into atmosphere.</li> <li>Water mist work surfaces to control dust while cutting.</li> <li>Seal unused doors with duct tape.</li> <li>Block off and seal air vents.</li> <li>Place dust mat at entrance and exit of work area</li> <li>Remove or isolate HVAC system in areas where work is being performed.</li> </ol>	<ol style="list-style-type: none"> <li>Wipe work surfaces with disinfectant.</li> <li>Contain construction waste before transport in tightly covered containers.</li> <li>Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.</li> <li>Remove isolation of HVAC system in areas where work is being performed.</li> </ol>
<b>CLASS III</b>	<ol style="list-style-type: none"> <li>Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.</li> <li>Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement containment cart (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.</li> <li>Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.</li> <li>Contain construction waste before transport in tightly covered containers.</li> <li>Cover transport receptacles or carts. Tape covering unless solid lid.</li> </ol>	<ol style="list-style-type: none"> <li>Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department.</li> <li>Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.</li> <li>Vacuum work area with HEPA filtered vacuums.</li> <li>Wet mop area with disinfectant.</li> <li>Remove isolation of HVAC system in areas where work is being performed.</li> </ol>
<b>CLASS IV</b>	<ol style="list-style-type: none"> <li>Isolate HVAC system in area where work is being done to prevent contamination of duct system.</li> <li>Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement containment cart (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.</li> <li>Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.</li> <li>Seal holes, pipes, conduits, and punctures.</li> <li>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 work site.</li> <li>All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.</li> <li>Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Dept</li> </ol>	<ol style="list-style-type: none"> <li>Remove barrier material carefully to minimize spreading of dirt and debris associated with construction.</li> <li>Contain construction waste before transport in tightly covered containers.</li> <li>Cover transport receptacles or carts. Tape covering unless solid lid</li> <li>Vacuum work area with HEPA filtered vacuums.</li> <li>Wet mop area with disinfectant.</li> <li>Remove isolation of HVAC system in areas where work is being performed.</li> </ol>

Construction Project Type				
Patient Risk Group	TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	III/IV
MEDIUM Risk Group	I	II	III	IV
HIGH Risk Group	I	II	III/IV	IV
HIGHEST Risk Group	II	III/IV	III/IV	IV

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	INFECTION CONTROL RISK GROUP
		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		<ol style="list-style-type: none"> <li>Execute work by methods to minimize raising dust from construction operations.</li> <li>Immediately replace any ceiling tile displaced for visual inspection.</li> </ol>	<ol style="list-style-type: none"> <li>Minor Demolition for Remodeling</li> </ol>		
CLASS II		<ol style="list-style-type: none"> <li>Provides active means to prevent air-borne dust from dispersing into atmosphere</li> <li>Water mist work surfaces to control dust while cutting.</li> <li>Seal unused doors with duct tape.</li> <li>Block off and seal air vents.</li> <li>Wipe surfaces with disinfectant.</li> </ol>	<ol style="list-style-type: none"> <li>Contain construction waste before transport in tightly covered containers.</li> <li>Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.</li> <li>Place dust mat at entrance and exit of work area.</li> <li>Remove or isolate HVAC system in areas where work is being performed.</li> </ol>		
CLASS III		<ol style="list-style-type: none"> <li>Obtain infection control permit before construction begins.</li> <li>Isolate HVAC system in area where work is being done to prevent contamination of the duct system.</li> <li>Complete all critical barriers or implement containment cart before construction begins.</li> </ol>	<ol style="list-style-type: none"> <li>Vacuum work with HEPA filtered vacuums.</li> <li>Wet mop with disinfectant</li> <li>Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.</li> <li>Contain construction waste before transport in tightly covered containers.</li> <li>Cover transport receptacles or carts. Tape covering.</li> <li>Remove or isolate HVAC system in areas where work is being performed/</li> </ol>		
<b>Date</b>		<ol style="list-style-type: none"> <li>Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.</li> </ol>			
<b>Initial</b>		<ol style="list-style-type: none"> <li>Do not remove barriers from work area until complete project is thoroughly cleaned by Env. Services Dept.</li> </ol>			
CLASS IV		<ol style="list-style-type: none"> <li>Obtain infection control permit before construction begins.</li> <li>Isolate HVAC system in area where work is being done to prevent contamination of duct system.</li> <li>Complete all critical barriers or implement containment cart before construction begins.</li> </ol>	<ol style="list-style-type: none"> <li>All personnel entering work site are required to wear shoe covers</li> <li>Do not remove barriers from work area until completed project is thoroughly cleaned by the Environmental Service Dept.</li> <li>Vacuum work area with HEPA filtered vacuums.</li> <li>Wet mop with disinfectant.</li> <li>Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.</li> <li>Contain construction waste before transport in tightly covered containers.</li> <li>Cover transport receptacles or carts. Tape covering.</li> <li>Remove or isolate HVAC system in areas where work is being performed.</li> </ol>		
<b>Date</b>		<ol style="list-style-type: none"> <li>Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.</li> </ol>			
<b>Initial</b>		<ol style="list-style-type: none"> <li>Seal holes, pipes, conduits, and punctures appropriately.</li> <li>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.</li> </ol>			
Additional Requirements: _____					
Date Initials _____			_____ Exceptions/Additions to this permit Date Initials are noted by attached memoranda		
Permit Request By: _____			Permit Authorized By: _____		
Date: _____			Date: _____		



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