Handout 1

INFECTION CONTROL CHECKLIST FOR RISK ASSESSMENT AND PRECAUTIONS FOR CONSTRUCTION & RENOVATION

Step 1:

Using the following table, identify the type of construction project activity (Type A-D)

TYPE A	**Inspection and Non-Invasive Activities** **Includes, but is not limited to:** • **Removal of ceiling tiles for visual inspection limited to one tile per 50 square feet;** • **Painting (but not sanding); or** • **Wall covering, electrical trim work, minor plumbing and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.**
TYPE B	**Small scale, short duration activities which create minimal dust** **Includes, but is not limited to:** • **Installation of telephone and computer cabling;** • **Access to chase spaces; or** • **Cutting of walls or ceilings where dust migration can be controlled**
TYPE C	**Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies** **Includes, but is not limited to:** • **Sanding of walls for painting or wall covering removal of floorcoverings, ceiling tiles and casework;** • **New wall construction;** • **Minor duct work or electrical work above ceilings;** • **Major cabling activities; or** • **Any activity which cannot be completed within a single work shift.**
TYPE D	**Major demolition and construction projects** **Includes, but is not limited to:** • **Activities which require consecutive work shifts;** • **Heavy demolition or removal of complete cabling systems; or** • **New construction.**

Step 2:
Using the following table, identify the patient risk groups that will be affected. If more than one risk group will be affected, select the higher risk group:

Low Risk	Medium Risk	High Risk	Highest Risk
• Office areas	• Cardiology • Echocardiography • Endoscopy • Nuclear Medicine • Physical Therapy • Radiology/MRI • Respiratory Therapy	• CCU • Emergency Room • Labor & Delivery • Laboratories (specimen) • Newborn Nursery • Outpatient Surgery • Pediatrics • Pharmacy • Post Anesthesia Care Unit • Surgical Units	• Any area caring for immunocompromised patients • Burn Unit • Cardiac Cath Lab • Central Sterile Supply • Intensive Care Units • Medical Unit • Negative pressure isolation rooms • Oncology • Operating rooms including C-section rooms

Step 3: *Match* the patient risk group (*Low, Medium, High, Highest*) with the planned construction project type (*A, B, C, D*) on the following matrix to find the class of precautions (*I, II, III or IV*) or level of infection control activities required.

IC Matrix - Class of Precautions: Construction Project
By Patient Risk 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**	**II**	**IV**
High Risk Group	**I**	**II**	**III/IV**	**IV**
Highest Risk Group	**II**	**III/IV**	**III/IV**	**IV**

Note: Infection control approval will be required when the construction activity and risk level indicate that **Class III** or **Class IV** control procedures are necessary.

Step 3: _____

Description of Required Infection Control Precautions by Class During Construction Project upon Completion of Project

	During Construction Project	Upon Completion
Class I	1. Use methods to minimize rising dust from construction operations. 2. Immediately replace ceiling tiles displaced for visual inspection	
Class II	1. Provide an active means to prevent airborne 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. Place a dust mat at the entrance to and exit from the work area. 6. Remove or isolate HVAC systems in areas where work is being performed.	1. Wipe work surfaces with disinfectant. 2. Contain construction waste before transport in tightly covered containers. 3. Wet mop and/or vacuum with HEPA-filtered vacuum before leaving work area. 4. Remove isolation of HVAC system in areas where work is being performed.
Class III	1. Remove or isolate HVAC systems in areas where work is being done to prevent contamination of the duct system. 2. Use critical barriers (i.e. sheetrock, plywood, plastic) to seal areas from non-work areas or implement a control cube method (i.e., a cart with a plastic covering and a sealed connection to the work site with a HEPA vacuum to clean the area prior to exit from the area) before construction begins. 3. Maintain negative air pressure within the work site using HEPA-equipped air filtration units. 4. Contain construction waste before transport in tightly covered containers. 5. Cover transport receptacles or carts. If the cover is not solid, the cover must be taped closed.	1. Do not remove barriers from work areas until the completed project is inspected by the Infection Control Department and thoroughly cleaned by the Environmental Services Department. 2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 3. Vacuum work area with HEPA-filtered vacuums. 4. Wet mop area with disinfectant. 5. Remove isolation of HVAC system in areas where work is being performed.
Class IV	1. Isolate HVAC systems in areas where work is being done to prevent contamination of duct system. 2. Use critical barriers (i.e. sheetrock, plywood, plastic) to seal areas from non-work areas or implement control a cube method (i.e., a cart with a plastic covering and a sealed connection to the work site with a HEPA vacuum to clean the area prior to exit from the area) before construction begins. 3. Maintain negative air pressure within the work site using HEPA-equipped air filtration units. 4. Seal holes, pipes, conduits and punctures appropriately. 5. Construct an anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving the work site or provide cloth or paper coveralls that can be removed each time they leave the work site. 6. Require all workers entering the work site to wear shoe covers. Shoe covers must be changed each time workers exit the work area. 7. 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.	1. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction. 2. Contain construction waste before transport in tightly covered containers. 3. Cover transport receptacles or carts. If the cover is not solid, the cover must be taped closed. 4. Vacuum work area with HEPA-filtered vacuums. 5. Wet mop area with disinfectant. 6. Remove isolation of HVAC system in areas where work is being performed.

Step 4: Review areas surrounding the construction area and determine the project's potential impact.

Unit Below	Unit Above	Lateral Unit	Lateral Unit	Unit Behind	Unit in Front
Risk Group	Risk Group	Risk Group	Risk Group	Risk Group	Risk Group

Step 5: Identify specific site of activity (e.g., patient rooms, medication room, etc).

_____

Step 6: Identify issues related to: ventilation, plumbing and electricity in terms of the occurrence of probable outages.

_____

Step 7: Identify containment measures, using prior assessments. What types of barriers (e.g., solid wall barriers) are needed? Is HEPA filtration required?

_____

(Note: Renovation/construction areas shall be isolated from the occupied areas during construction and must be negative with respect to surrounding areas.)

Step 8: Consider the potential risk of water damage. Is there a risk due to compromising structural integrity (e.g., wall, ceiling, roof)?

_____

Step 9: Work hours: can or will the work be done during non-patient care hours?

_____

Step 10: Do the plans allow for an adequate number of isolation/negative airflow rooms?

_____

Step 11: Do the plans allow for the required number and type of hand washing sinks?

_____

Step 12: Does the infection control staff agree with the minimum number of sinks for this project?

_____

Step 13: Does the infection control staff agree with plans regarding clean and soiled utility rooms?

_____

Step 14: Are plans in place to deal with containment issues (e.g., traffic flow, housekeeping, debris removal) and how and when will these issues be addressed?

_____

Steps 1-3 adapted with permission V Kennedy, B Barnard, St Luke's Episcopal Hospital, Houston, TX, C Fine, CA
Steps 4-14 adapted with permission Fairview University Medical Center, Minneapolis, MN.
Forms modified and provided courtesy of J Bartley, ECSI Inc., 2002.

Handout 2
INFECTION CONTROL MATRIX WORKSHEET

Directions: Work with your group to complete the following tables.

Classes of Work	**Type of work** **Being Performed**
Type A Inspection and non-invasive activities	
Type B Small scale, short duration (minimal dust)	
Type C Demolition or removal of any fixed building components (moderate to high level of dust)	
Type D Major demolition and construction projects	

Handout 2
INFECTION CONTROL MATRIX WORKSHEET

Complete the following table by identifying the areas of a hospital based on the level of risk.

Patient Risk Groups			
Low Risk	**Medium Risk**	**High Risk**	**Highest Risk**

Use the following table to answer the following questions

Patient Risk Group	Type A	Type B	Type C	Type D
Low Risk Group	**I**	**II**	**II**	**III/IV**
Medium Risk Group	**I**	**II**	**II**	**IV**
High Risk Group	**I**	**II**	**III/IV**	**IV**
Highest Risk Group	**II**	**III/IV**	**III/IV**	**IV**

1. What are the criteria for a class one construction project?

2. What are the criteria for a class two construction project?

3. What are the criteria for a class three construction project?

Handout 2
INFECTION CONTROL MATRIX WORKSHEET

4. What are the criteria for a class four construction project?

Handout 3

WORKPLACE SCENARIOS

Instructions: Carefully read through each scenario to determine the precaution class associated with the work being performed. Once the precaution class has been determined, write a brief description as to the steps that should be taken to safely complete the task.

Scenario 1

Minor duct work repair above a drop ceiling In the offices of the cardiology unit

Scenario 2

Major renovation to a critical care unit

Scenario 3

Replacement of faulty water lines running through a wall above a cardiac cath lab

Scenario 4

Renovation of hospital offices

Scenario 5

Minor floor work in a radiology/MRI unit

Scenario 6

Major renovations to an outpatient surgery waiting room

Handout 4
WORK PRACTICES

Control Measures

There are three main groupings of control measures: Administrative, Engineering, and work practices. Administrative controls consist of the hospitals: rules and regulations, training, and Infection Control Administrator. Engineering Controls consist of: establishing a negative air environment, removal or isolation of the HVAC system, and the setting up of a decontamination area. Work Practice controls consist of: certain work practices related to the actual construction work being performed, the cleaning of the work site once all work is completed, and the disposal of contaminated materials and clothing.

Administrative Controls

The overall responsibility for controlling and preventing the spread of diseases rests with all of the people involved in project development and execution. The hospital's infection control administrator should serve as the single point of contact and should put together a multifaceted team to evaluate the infection control from project conception to completion. Infection control staff should coordinate demolition, construction, and renovation projects and educate both the construction team and health-care staff in immunocompromised patient-care areas regarding the risk associated with construction projects, dispersal of fungal spores during such activities, and methods to control the dissemination of fungal spores. Also, they are responsible for the relocation of patients whose rooms are adjacent to work zones, depending on their immune status, the scope of the project, the potential for generation of dust or water aerosols, and the methods used to control these aerosols. Infection control staff should provide construction crews with designated entrances, corridors, and elevators wherever practical; essential services (e.g., toilet facilities) and convenience services (e.g., vending machines); protective clothing (e.g., coveralls, footgear, and headgear) for travel to patient-care areas; and a space for their removal from the work zone. The hospital infection control administrator shall use a checklist or similar procedures to determine the type and risk associated with the planned project. That information will determine the project's class. The project class determines the specific minimum infection control requirements of the project. After a project's class has been determined, infection control staff must ensure compliance with daily audits of the work zones and weekly meetings with construction management.
Another form of administrative control is training. It is becoming widely accepted that all workers shall have at a minimum of 8 hour Infection Control awareness training and that all supervisors shall have a minimum of 24 hours of supervisor and containment building training.

Engineering Controls

Engineering Controls are methods used to control the amount of construction dust exposure to the rest of the hospital through mechanical means. These means include ventilation systems, setting up negative pressure environments, and containment devices.

Ventilation System – Negative Pressure Enclosure

Negative pressure is created by a ventilation system within an enclosure that acts like a vacuum, drawing the dust from inside the area out through the ventilation system. This new ventilation system must be equipped with HEPA filters to make sure that all the microorganisms contained within the dust are captured before they are released into the outside air. This system should be in operation during all class III, class IV and some class II construction work. Constant negative pressure within the zone should be monitored with an alarmed device. The device should be well maintained and constantly monitored by the competent person. . The pressure differential between the construction area and other rooms must be greater than 0.01" water gauge or 2.5 Pascal.

Decontamination Areas – Anteroom

Anterooms are areas between the construction project and the rest of the hospital. All construction personal must pass through this area during Class IV and some Class III projects. This is the area where construction workers will remove dust contamination from their bodies and equipment. All foot and full body coveralls should be removed in this area and each worker should vacuum themselves with an HEPA vacuum.

Work Practices

All work should be executed in way to minimize raising dust from construction operations. Operations during Class II, Class III, and Class IV should include water misting or vacuuming whenever possible. All construction waste should be transported in tightly sealed receptacles or carts.

All workers working within a hospital should adhere to our code of conduct and the hospitals code of conduct. In most cases this means properly dressed, proper language and no tobacco products on site. The bottom line is that, you are working on their property and you will follow their rules. Not to mention that you represent all laborers while you are on the job site not just yourself.

Housekeeping

During construction work and upon completion all surface areas must be vacuumed and/or wet mopped with disinfectant. Any vacuuming performed in the work area must be performed with a HEPA filtered vacuum. The vacuum must be used and emptied in a way that minimizes the re-entry of any dust back into the work place.

Personal Hygiene

Personal Hygiene is a work practice control, which every worker is personally responsible for. Patients within hospitals are often exposed to microorganisms unknowingly from contaminated clothing and shoes of construction workers. When workers follow good hygiene, it significantly reduces the risk of exposure for all the patients within the hospital.

Handout 5
CONTROL MEASURES

Directions: Complete the table below using written descriptions of the following control measures.

CONTROL MEASURES	
Administrative Controls	
Infection control Administrator	
Training	
Engineering Controls	
Ventilation System	
Negative Pressure Enclosure	
Decontamination Area – Anteroom	
Work Practices	
Housekeeping	
Personal Hygiene	

Handout 6
AIR CHANGES PER HOUR

Basic Volume Calculations

Instructions: Complete all calculations. Determine how many units you might need based off CFM

Volume = H x W x L

ACH: Air Changes per Hour
CFM: Cubic Feet per Minute
CFM = volume x ACH/60

1. Calculate the volumes of areas with the following dimensions:
    a. Length = 70, width = 25, Height = 10
    b. Length = 57, width = 12, Height = 12
    c. Length = 70, width = 27, Height = 14

2. Calculate the volume of air that is required to be moved in order to achieve 12 air changes an hour using the calculations from question 1?

3. Calculate the number of negative air units needed for each job if the negative air machines that are to be used have a manufacturer's rated capacity of 1,200 CFM.

HANDOUT 7
DAILY INFECTION CONTROL

Construction Site Monitoring
Worksite Location_____
Date/Time_____
Reviewer_____

Item	Met	Not Met	Corrective Action
General cleanliness of work area			
Work areas separated from patient areas			
Work barriers intact and seam sealed			
Doors and openings closed			
All holes and penetrations covered			
Vents blocked or filtered			
Ceiling tiles intact			
Negative pressure machines running			
Clean dust mats/sticky mats in work areas			
Clean dust mats/sticky mats at entrance areas			
Adjacent areas clean (i.e., no dust tracks)			
No debris or unsecured tools			
Construction debris removed from site			
Debris removed in covered container with seal			
Brick removal and debris wet and covered			
Compressed gas cylinders tied off			
Fire detection and suppression equipment operable			
Exits and corridors clear and unobstructed			
Fire extinguishers accessible in construction area			
Temporary access and egress routes identified and clear			
Roads unobstructed for public and emergency access			
Signage in place (Not an Exit, Construction Area, etc.)			

Handout 8
PROJECT INFECTION CONTROL PLAN

Directions: Use the following steps to develop a 5-10 minute presentation based on the scenario and room placement.

Once your group has received its scenario you must follow a series a steps:

1. Identify the type of construction project, the patient risk group and which level of precautions that must be taken to complete the construction project
2. Establish a negative pressure enclosure around your work area
3. Check the size of your work area to determine if there are enough air changes per hour
4. Develop worksite cleaning procedures
5. Develop noise control measures
6. Determine how communication between hospital ICRA staff and crew will be conducted
7. Consider the following worksite issues:
    a. Pre job assessments and daily meetings
    b. Dust control - vacuuming
    c. Debris removal
    d. Traffic control plan
    e. Worksite security, badges and signage
    f. Tool and clothing cleaning
    g. Worksite monitoring and inspections

Project Scenarios

Group One – Renovate a section of the hospital adjacent the burn unit

Group Two- Minor duct repair work in the labor and delivery unit

Group Three – Demolish the old respiratory therapy unit adjacent to the new respiratory therapy unit

Group Four – Install new computer cabling in the cardiac cath lab