# Purpose

Hospital construction and renovation projects pose particular risks to immune compromised patients, visitors and staff who may inhale airborne dust particles that can carry fungal spores such as *Aspergillus,* and other medically important mycotic agents. This policy provides a comprehensive plan to significantly reduce the risk of infection associated with construction and renovation projects and ensure a safe environment of care in areas where construction and renovation are being performed.

# Policy

It shall be the policy of Samet Corporation that all construction/renovation activities will be performed in accordance with this policy, using the specified methods outlined in this document to minimize dust generation and dispersal. Construction projects in, near, or potentially impacting patient care areas will be evaluated by the hospital’s infection prevention department or their agents prior to the beginning of the project. Such evaluation may be performed directly by the infection prevention personnel with Samet Corporation EHS manager. It is the responsibility of the designated project manager and or project superintendent to ensure compliance with this policy by subcontractors preforming work on the project.

# Procedure

* 1. **Pre-Construction Meetings** – Where available, hospital infection prevention personnel will attend pre- construction meetings so infection prevention issues can be discussed prior to the start of construction. Samet Corporation EHS manager also has the authority to carry out this policy and other infection prevention risk assessment processes. Pre- Construction meetings should involve multidisciplinary teams that may include hospital plant operations and maintenance, hospital construction safety, nursing, infection prevention, environmental services and other departments affected by the construction/renovation project. Issues discussed at these meetings shall include but not be limited to: (1) risk assessment, including identification of areas where high- risk patients are treated or housed; (2) determination of whether construction poses sufficient increased risk to recommend that patients be moved to an area in which no construction is occurring; (3) coordination of the relocation of affected patients and pedestrian traffic routes to avoid construction areas; (4) determination of optimal routes for construction traffic, including transport of construction supplies and waste; (5) types of infection prevention measures and barriers required (e.g., fire-retardant plastic or solid); (6) scheduling removal of barriers and final cleaning; (7) proposed start and end dates.
  2. **Plan Review** – The hospital or medical facility infection prevention department with Samet Corporation EHS manager, project team member and others as appropriate must review plan for construction and renovation projects that are in, near or may impact patient care areas. Plan review includes, but is not limited to: assessment of handwashing sink placement, traffic flow, waste disposal, and separation of clean areas from dirty areas. Recommendations made by the infection prevention department and Samet Corporation EHS will be forwarded to the hospital’s construction facilities representative who will be overseeing the project prior to the start date of construction. Hospital’s facilities project representative will ensure that all recommendations have been reviewed and implemented as appropriate.
  3. **Risk Assessment -** For all projects that are in, near, or may impact patient care areas, the Hospital Construction Safety department representative with Samet Corporation EHS will complete a Pre-Construction Risk Assessment (PCRA) that will determine the need for an Infection Control Risk Assessment (ICRA). Samet Corporation EHS will perform ICRAs as required and infection prevention department representative must approve ICRAs for concurrent and ongoing quality review. Joint site visits and/or review of project details may also occur based upon project scope, complexity and risk ratings. The ICRA assists in identifying patient populations at risk and preventive measures to be implemented. After approval by the infection prevention department and Samet Corporation EHS manager, the ICRA is complete. The construction project manager and or project superintendent is responsible for ensuring that all infection prevention requirements on the risk assessment form are discussed with affected department managers and subcontractors. The project manager and project superintendent are responsible for ensuring the infection prevention requirements are implemented as required throughout the duration of the project. The Risk Assessment describes four (4) levels of construction activity and four (4) risk groups, ranging from lowest to highest risk. Appropriate infection prevention measures are identified by matching the construction activity with the risk group.
  4. **Construction Site Rounds** – As a means of assessing compliance with this policy, regularly scheduled visits to construction sites in or affecting patient care areas will be performed by Samet Corporation EHS manager and/or Project Executive. The infection prevention department representative may also schedule a site visit to audit compliance with the infection prevention measures. The project manager is responsible for ensuring that deficiencies presenting a significant infection risk are corrected immediately or within 24 hours (depending on the seriousness of the deficiency). Construction/renovation activity may be halted when a significant breach in safety measures is identified.

# Products, Materials and Procedures for Reducing Infection Risks

## Products and Materials

1. **Barrier products** which are approved:
   1. Sheet Plastic: Fire retardant polyethylene, minimum 6-mil thickness.
   2. Dry wall with metal studs. Temporary sheetrock wall surfaces facing occupied spaces must be at least primer painted in a neutral color that coordinates with overall interior decor and all wall surfaces must be washable/cleanable. Unfinished, paper-face sheetrock is prohibited in occupied spaces.
   3. Solid core, wooden doors in metal frames, preferably varnished or painted. All door surfaces facing occupied spaces must be washable/cleanable.
   4. Portable dust containment system uses a series of support poles to secure plastic sheeting between ceiling, floor and walls. In addition to the support poles, the sheeting must be tightly secured against the floor, ceiling and walls, either by means of tape or equivalent means. Care must be taken to create an overlapping entrance with weighted flap at least 2 feet in width when using this type of barrier.
   5. A flexible, vinyl, portable, ceiling access module can be used for limited ceiling access.
   6. Confirm intended barrier products with hospital infection prevention staff (or other authorized hospital personnel) during the Pre-Construction meeting.
2. **HEPA-filtered ventilation units:** Unit will be maintained and filters will be changed in accordance with manufacturer’s recommendations and as necessary. HEPA filters must be 99.97% efficiency at 0.3 micrometers.
3. **Exhaust hoses:** Heavy duty flexible steel reinforced ventilator/blower hose.
4. **Adhesive walk-off mats:** Provide mats with a minimum size of 24 inches X 36 inches.
5. **Disinfectants:** Subcontractors will use EPA approved hospital disinfectants.

## Dust Reduction and Containment Measures

1. **Barriers**
   1. Construction activities causing disturbances of existing dust or creating additional dust will be conducted in tight enclosures designed to prevent the flow of dust into adjacent areas.
   2. Barriers shall be in compliance with applicable fire codes.
   3. Dust barriers will be completed prior to work beginning.
   4. Project manager and project superintendent will be responsible for routinely monitoring the integrity of barriers (e.g., periodic checklists).
   5. Construction supervisors shall ensure that gaps or breaks in barrier joints are repaired immediately.
   6. Where containment is possible utilizing existing walls and doors, the doors must be kept closed and sealed with tape to prevent the escape of dust. The construction entrance door shall be kept closed except during entrance/egress.
   7. In areas where containment is not possible utilizing existing walls and doors, the following methods of containment may be used. **If the project includes any high-risk construction activities (i.e., torch cutting, welding, burning), non-combustible barriers (i.e., sheet rock, gypsum board, slag barriers) should be used instead of plastic barriers.**
      1. Drywall barriers. Seams or joints will be covered or sealed to prevent dust and debris from escaping. Self-closing (e.g., metal spring) construction site entrance doors will be used for areas with drywall barriers. Prior to building drywall barriers, a temporary plastic barrier shall be placed to prevent dust contamination of areas outside the construction site. Barriers must be tightly sealed at top, bottom and sides with duct tape or equivalent, with an overlapping entrance.
      2. An anteroom or double entrance opening should be considered in very high-risk areas (e.g., Surgical Services). Anterooms shall be of sufficient size to accommodate workers and building materials brought into and out of the construction area.
      3. Airtight plastic barriers extending from floor to ceiling decking, or to the ceiling tiles if ceiling tiles will not be removed. Plastic barrier seams will be sealed with duct tape. Plastic barriers requiring an entrance will have an overlapping, weighted flap, minimally 2 feet wide for personnel access. Portable dust containment units such as Zip Wall (or equivalent) may be used, with polyethylene pulled tight against floor, ceiling and walls with duct tape or equivalent. An overlapping entrance is required.
   8. Tightly sealed barriers (e.g., plastic) will be placed at penetration of ceiling envelopes, chases and ceiling spaces. Dust barriers should be erected at elevator shafts or stairways within the construction area, allowing for emergency egress. Holes, pipes, conduits, punctures and penetrations of existing perimeter walls shall be sealed with appropriate sealants.
   9. Replace any ceiling tile displaced for inspection immediately when unattended if outside the construction barrier.
   10. Windows, doors, plumbing penetrations, electrical outlets and intake and exhaust vents should be sealed with plastic and duct taped within the construction/renovation area.

## Ventilation

* 1. An isolation strategy is usually a necessary condition for effective infection prevention in construction areas, but it is made more feasible to achieve when pollutant emissions are also controlled through material selection and installation strategies. One method is by maintaining airflow into the construction areas from occupied spaces by means of a dedicated ventilation/exhaust system for the construction area. Locations of ventilation equipment, exhaust discharge relative to existing fresh air intakes and filters, as well as the disconnection and sealing of existing air ducts, should be reviewed as required by an Infection Control Risk Assessment (ICRA).

A complete physical enclosure to the construction area shall be created when high risk zones are subject to construction exposure. These high-risk areas may include, but are not limited to, critical care units, emergency rooms, labor and delivery, newborn nurseries, outpatient surgery facilities, areas serving pediatric patients, pharmacies, surgical nursing units, post- anesthesia care units, areas serving immunocompromised patients, burn units, cardiac catheterization labs, central sterile supply, airborne infection isolation rooms, protective environment rooms, oncology units, operating rooms, cesarean delivery rooms, and dietary preparation areas.

Using High-Efficiency Particulate Air (HEPA) filtered exhaust fans (“negative air machines”), establish a containment zone under negative pressure with airflow from the hospital clean areas to construction dirty areas. The air within the construction area will be negative with respect to surrounding areas and with no disruption of air systems of adjacent areas. Pressure relationships are monitored to ensure the containment zone is under negative pressure and that the construction zone beyond the containment area is under negative pressure relative to all surrounding occupied spaces on the same and on adjacent floors.

The supply air to the construction area may also need to be shut down. Seal all return ducts to ensure that contaminants do not enter the Heating, Ventilation and Air Conditioning (HVAC) system.

Exhaust air from construction areas should be directed outside with no recirculation if possible. Ensure that exhausted contaminants do not re-enter the building through open windows or air intakes of the HVAC system. If exhaust air must tie into a re-circulated air system, a pre-filter and HEPA filter (99.97% efficiency at 0.3 micrometers) shall be used before exhaust to prevent contamination of the ducts. If the existing building system or portion thereof is used to achieve this requirement, the system shall be thoroughly cleaned prior to occupancy of the construction area.

## Cleanliness and Surface Disinfection

* 1. Walk-off mats will be used inside and outside of exits and entrances to the work area. Cover sufficient area so both feet contact the mat. Adhesive walk- off mats will be changed daily and more frequently as needed (e.g., when no longer preventing dusty footprints outside the work area). Carpeted walk-off mats are not acceptable except in emergent situations.
  2. When construction is in an occupied area, the construction area will be HEPA vacuumed or damp-mopped at the end of each work day and more frequently as needed.
  3. Ensure that patient care equipment and supplies are protected from dust exposure by use of plastic or material covers.
  4. Vacuum cleaners shall have HEPA filters. Vacuum cleaners and NOT brooms shall be used outside of fully enclosed construction areas.
  5. Work methods shall be so designed to minimize dust from construction operations. Water mist work surfaces to control dust when cutting, when feasible. If dust control is not possible, relocate cutting operations to negative-pressure construction site or to outside.
  6. Keep dust and accumulated dirt in the work site to a minimum. Use EPA- approved hospital disinfectants to wipe soiled or dusty surfaces. Keep area around site clean. Any dust tracked outside the barrier must be removed immediately. Wet mop with EPA-approved hospital disinfectant to minimize dust and debris in and around work site.
  7. The wheels of carts used for waste transport will be kept clean to avoid dust tracking outside the site.
  8. If construction supplies or materials are visibly dusty, cover or bag and tie them during transport into and out of the facility and the work site.

## Traffic Control

* 1. Transport routes will be planned in advance of the job beginning. Construction traffic will be routed to avoid patient transport routes. Construction waste will be placed in covered containers prior to transport. Ideally, debris will be removed at the end of each work shift.
  2. Pedestrian traffic from construction areas will be directed away from patient care areas to minimize tracking of dust into patient care areas.
  3. If possible, designate an elevator for the sole use of construction workers. Construction workers shall not use elevators designated “for patient use.”
  4. Clean and sterile patient care items should not be transported through construction/renovation areas.

## Storage of Building Supplies

* 1. Construction materials such as drywall will be stored in clean, dry areas to prevent growth of bacteria and fungi. Care should be taken to visibly inspect materials prior to entering area for any contaminants, wetness, growth, or any other potential hazards.
  2. Ductwork materials will be stored in a clean, dry area to prevent the accumulation of dust in the ductwork prior to installation. Stored HVAC components such as ducts, mixing boxes, plenums, etc. will be sealed to prevent contaminants from entering while components are stored.
  3. Storage of construction related equipment and supplies should be within the construction area (i.e., within the barriers or in a location approved by the project manager and project superintendent).

## Protective Clothing

* 1. In some highly sensitive areas, such as Surgical Suites, protective clothing (e.g., coveralls, hair covers, shoe covers) may be required. Protective clothing will be removed any time the worker leaves the immediate work area.
  2. Used protective clothing will be disposed of in non-regulated waste containers located near work zone exits.

## Post Construction

* 1. Contractors will use HEPA vacuum and clean all surfaces in the completed construction area, rendering them free of visible soil and dust prior to the removal of barriers.
  2. Barrier materials shall be removed carefully to minimize spreading of dirt and debris. Materials shall be damp wiped, HEPA vacuumed or water misted prior to removal and shall be discarded as construction debris.
  3. Hospital Environmental Services will oversee final cleaning of construction/renovation areas before allowing patients to enter the areas.
  4. All blockages from the air systems will be removed.
  5. The ventilation system will be balanced, as necessary, to conform to design specifications. Ensure the ventilation system is functioning properly and is free from contamination with construction debris/dust after construction/renovation is complete.
  6. HVAC equipment and filters will be examined by Hospital Plant Operations and Maintenance for blockage and/or leakage.

## Special Precautions for Water Handling (Plumbing Alterations)

* 1. Caution will be used when handling fluids (i.e., removing plumbing pipes and fixtures) to prevent wetting and/or contamination of building materials or work areas.
  2. Before an area is released for patient occupancy/use, plant operations and maintenance will ensure appropriate water temperature and potability.

## Supplemental Information

* 1. If mold is discovered during construction, stop all work that would disturb the mold, isolate area and contact hospital construction facilities representative for guidance.
  2. Prior to the start of renovation or construction projects, hospital personnel must remove medical waste, including sharps containers, from the area to be renovated or constructed.

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