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How to prepare for environment-of-care inspection for infection control by health-care accrediting organizations

Hospital Accreditation for Airborne Infection Control



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Periodically, health-care facilities are inspected for compliance with requirements for licensure and eligibility for insurance and government funding. The Joint Commission for Accreditation of Healthcare Organizations (JCAHO) is considered the primary accreditation organization for health-care facilities. JCAHO actively pursues compliance for issues ranging from credentialing of medical staff, patient-care procedural practice, medical records, and other factors, including those associated with safety in the environment of care. Infection-control practice as a part of building systems has become an important issue in health care. The role of infection in patient care can be devastating. There are 2.5 million patients afflicted by nosocomial (hospital acquired) infections each year and 90,000 fatalities¹. Most of these infections are from issues related to hand washing, but an increasing number are due to failures in the conditions in the environment of care. This is especially

true for facilities housing severely immunocompromised patients (see the sidebar “High-Risk Patients”).

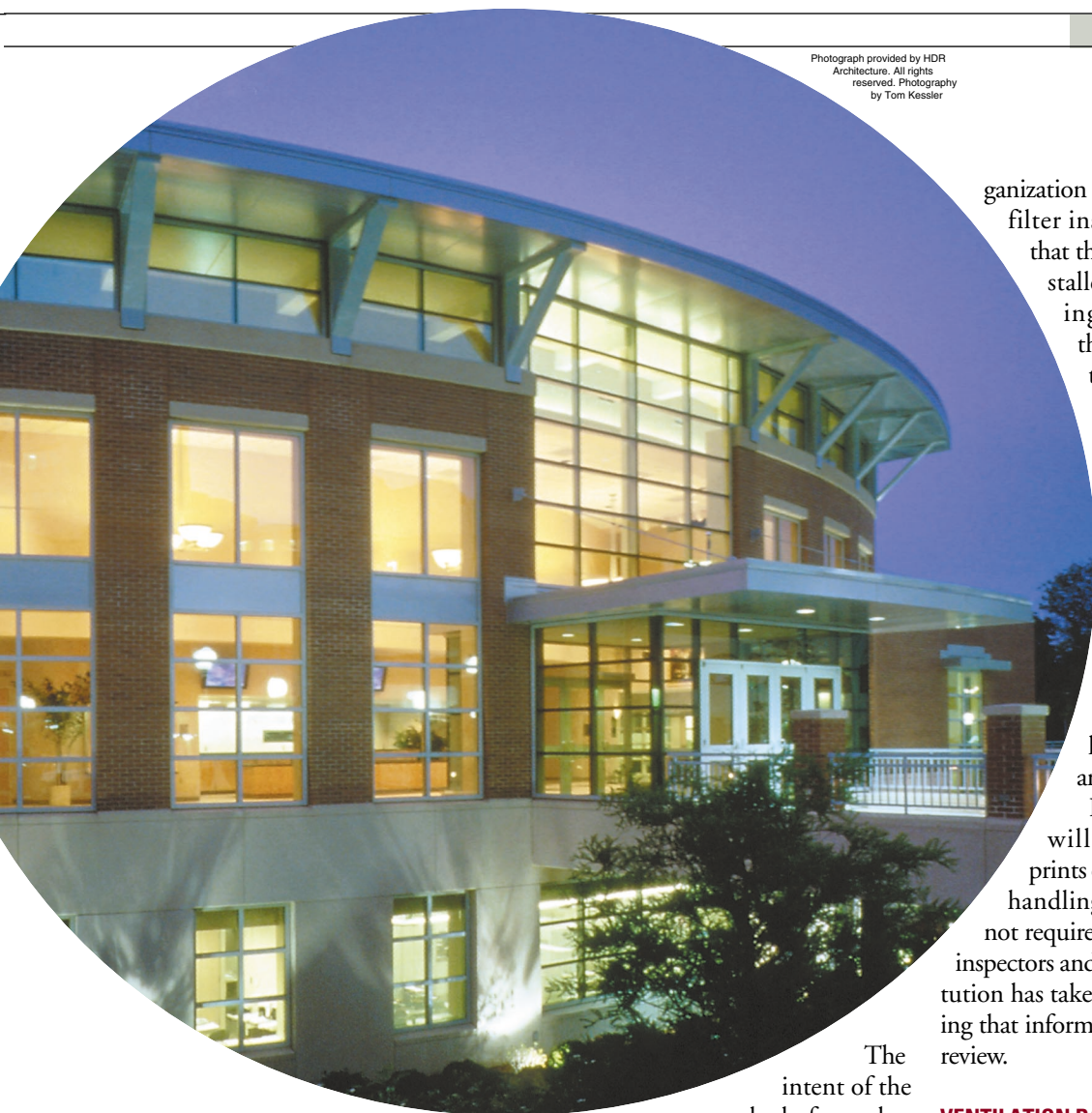
AIA GUIDANCE

Since 1996, the American Institute of Architects’ (AIA) Guidelines for Design and Construction of Hospital and Health Care Facilities has included specific suggestions for planning for facility upgrades. This document has also provides specific design requirements for respective patient-care areas for mechanical systems such as ventilation. Ventilation requirements are especially important for the control of airborne contamination. This airborne contamination may be in the form of chemicals, particles, and odors. The particles are especially important for the control of the airborne spread of infectious diseases.

Such particles must be managed with engineering controls and operational procedures that em-

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phasize contamination control.

STANDARD OF CARE

The JCAHO bases its “standard of care” for infection control within hospitals on guidance from consensus and scientific groups that have experience with the best methods for patient care within a specific area of expertise. In the case of airborne infectious disease, the need to define a protective or airborne infection isolation environment is necessary using objective parameters. The Centers for Disease Control and Prevention (CDC) and AIA have defined the ventilation parameters, as well as procedural practice, for limiting exposure.² Too often, the ventilation deficiencies are discovered at the time of an infection caused by a lack of attention or priority for managing the mechanical systems.

The intent of the standard-of-care-defining agencies is to provide a priority to minimize the potential for opportunistic airborne infection and diminish the potential loss of resources due to litigation.

DESIGN PARAMETERS

At the time of building acceptance, ventilation parameters, such as air exchanges, are tested by a contractor who is independent from the builder or mechanical contractor. This contractor must verify filtration and pressure. This data can serve as a baseline for future reference as a comparison. For example, if a health-care facility was built in 1999 and verified that year that the operating rooms were functioning as designed, the occurrence of surgical wound infection from a suspicious microbe such as *Aspergillus fumigatus* would dictate an evaluation of the ventilation system. Of course, if the or-

ganization had been monitoring the filter installation and verifying that the filters were properly installed by use of gauge readings and particle counts, there would be documentation to substantiate the standard of care. This way, the mechanical systems for the operating rooms could be “ruled out” as the conduit for the infection.

The incorporation of ventilation service-area prints can be very useful to mechanics and inspectors in that they illustrate the service-area of an air-handling system.

Progressive institutions will provide color-coded prints of the service area of all air handling systems. While this is not required, it does demonstrate to inspectors and employees that the institution has taken proactive steps by having that information readily available for review.

VENTILATION PARAMETERS AND TESTING

EC 1.7 in the JCAHO Manual for Healthcare Facility Accreditation requests assurance that the ventilation parameters of pressure, air exchanges, and filtration are verified.

The parameters established by the AIA and CDC are as follows:

- Special ventilation rooms are airborne-infection isolation rooms or protective environments for high-risk patients.
- Pressure relationships for airflow should be from clean to dirty, depending on the requirement of the respective room. Special-ventilation-room pressure should be greater than 0.01 in. water gauge.
- Minimum air exchanges for special-ventilation rooms should be 12 per hour or greater, depending on the heat-load

High-Risk Patients

High-risk patient groups should be part of epidemiological analysis to determine infection-control risk. If the facility has high-risk patients, those patients should be followed with clinical microbiology data specific for airborne fungal and water bacteria infections.

A listing of some of the at-risk patients would include:

- Bone-marrow transplants patients
- Leukemia-treatment patients
- Solid-organ-transplants patients
- Premature babies
- High-dose steroid treatment patients
- Chronic obstructive pulmonary disease patients
- HIV infection patients

calculations. This information is gathered and should be on a list and posted for these rooms.

- The ventilation data should be collected as part of commissioning “punch list” data and recommissioned after filter changes or ventilation manipulation. The pressure relationships may be variable depending on the changes in the air-handling system due to a variety of mechanical or climate conditions.

DOCUMENTATION FOR REVIEW

Ventilation complaints are usually in the form of “hot” or “cold” conditions. These may describe a symptom that is more extensive than just comfort. The hot complaint may actually indicate a lack of adequate ventilation, which, if not improved, could be problematic because of minimal dilution ventilation. Complaint response should follow the protocol outlined by Naumann and Lamecker.³ This is an excellent response program that provides a three-tiered approach for IAQ assurance in health-care settings. Keep in mind your response should be documented in files available for retrospective review. The complaints do not always focus on comfort, and the need to provide infection-control analysis is often caused by an epidemiological outcome that requires an environmental investigation. All of this information can get lost if a log of complaints and response is not maintained in a specific location for review and update. The areas with specific infection-control conditions should have this information in the infection-control and maintenance department documents.

When dealing with a filtration requirement, the verification data should be reflected with objective analysis by providing airborne-particle comparison with the specifications of filter efficiency for fan systems. The objective analysis available today should provide functioning pressure gauges, inspection information of the filter banks, and objective particle analysis of filters for filtration leaks. The particle-analysis procedures at this

What Happens if the Health-Care Facility Gets "Dinged"?

The process for JCAHO review involves inspection and a level of acceptance with degrees of recommendations. If the recommendation is sufficient to cause concern, the JCAHO may choose to have a follow-up response or reinspection. As part of validation with the federal funding agencies a condition of participation is evaluated by respective state health departments. This validation occurs at about 5 percent of total inspections. If citizen complaints are made to state agencies, then inspections are initiated. As a result of these inspections, potential response from funding agencies may jeopardize actual hospital reimbursements. It pays to be careful and thorough!

time are not standardized but yet the comparison of before versus after filter tests with atmospheric dust particle sizing will help to assure that the 90-percent-efficient filter is removing 90 percent of the particles greater than 0.5 μm .⁴

When there is an increase in infection on the patient-care ward caused by an airborne-spread microbe such as *Aspergillus*, the documentation must reflect a thoughtful analysis of the environment. Such analysis is dependent on the severity of the individuals affected. While these "sentinal events" are often hard to document, the event causing the infection-control problems must be classified. For example, moving an ice machine that has floor tile buckling underneath may be host to a loci of growth caused by the water damage. Disturbing such colonies of growth may release large numbers of opportunistic fungal colonies into the air. This would not be considered a sentinel event unless the disturbance caused infection. However, the time lapse between the disturbance and the outbreak makes it difficult to determine cause and effect.

CONSTRUCTION CONSIDERATIONS

Infection-control risk assessments should be documented. If the health-care facility decides that, after the training of personnel and contractors, the need to do Level 1 and 2 construction risk assessments is not necessary, then the emphasis should be placed on the level 3 and 4 risks. Levels 1 through 4 ascend from Low, Medium, High to Highest risk.⁵ This is all contingent on the type of patient care that might be at the greatest risk for opportunistic infections. Procedures are necessary to manage mold, and these can be found on the Internet (www.debs.umn.edu/iaq/sop.html.) These plans and procedures must be incorporated into the standard operating procedures of the facility through thoughtful documentation and training, all of which should be available for review and observation.

The coordination of life-safety and infection-control measures can be beneficial for an institution under normal conditions. The normal conditions of, course, are present during the continual upgrade of the utility systems during renovation or new construction. The combination of code-like issues can

Ventilation and Airborne Biological-Exposure-Control Factors

- Evaluate control options for critical ventilation areas:
 - 1) airborne-infection isolation rooms.
 - 2) emergency rooms.
 - 3) areas which can be depressurized to create negative pressure.
- Assess filtration:
 - 1) pressure-gauge operation.
 - 2) visual inspection of filter alignment and light test for filter leaks.
 - 3) objective analysis with particle counter.
- Damper function for areas ventilation isolation:
 - 1) supply-damper function.
 - 2) 100 percent outside air (no recirculation).
- Assess building air balance:
 - 1) neutral status to slightly positive building pressure.
- Planned maintenance and training:
 - 1) update emergency plan, policies, and procedures.
 - 2) train HVAC personnel.
 - 3) perform preventive maintenance.

provide further justification for careful control of the environment of care. Of course, occupancy of a health-care facility is 24/7, further complicating the respective projects. This success of high occupancy is a nemesis for health care. At the same time, the desired model for growth prescribed by most administrative and medical staff conflicts with safety during construction. However, the desire for high occupancy and financial stability must be moderated by safety and risk analysis.

The review processes of various inspecting organizations are varied, but often require an inspector to show up and begin to ask to see the documents or in-use procedures. The JCAHO review process is under review to attempt to follow a patient through their stay in a health-care facility. What this means may include admission-to-discharge analysis, with emphasis on clinical and environmental assurances of those processes. This is going to likely change the current JCAHO protocol regarding the safe environment of care beginning in 2004.

CONCLUSION

The intent of risk assessment and documentation is to provide the rationale for a safe environment of care for severely immunocompromised patients. The assurance for the ventilation parameters and construction management will help to prepare a health-care facility for other disaster preparedness, which will potentially minimize the effects of terrorism attack. The reality of microorganisms in our everyday life means we need to be protected, especially if we are susceptible to the opportunistic infection caused by common environmental microbes. Preparing the environment of care for patients at risk will help prepare



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the facility for uncertain dangers.

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