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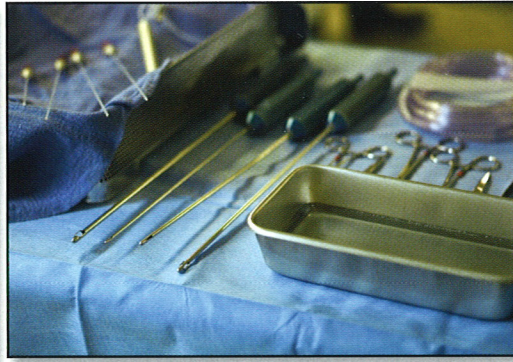
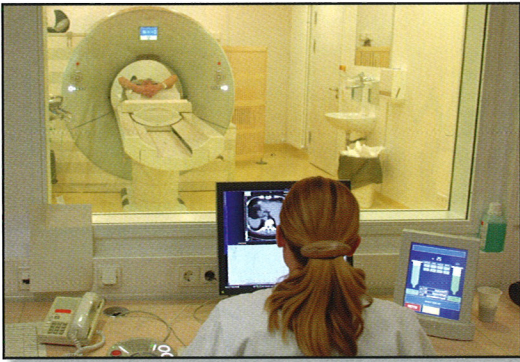
DucTALES

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Maintaining Hospital HVAC Systems

**IAQ IS A CONSTANT FOCUS
IN HEALTH CARE SETTINGS**

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When Working in a Hospital, **Containment and Safety Issues** Come First

By Alexis Andrews

HVAC maintenance professionals realize that hospitals cannot be treated like any other commercial building. When it comes to maintaining hospital HVAC systems, the challenges and safeguards associated with this type of work make it an area best handled with caution.



“The process of cleaning duct work isn’t any different in a hospital. It’s what you’re doing to protect the people in the environment that is different.”

— Charles Cochrane



Hospitals contain many different types of environments, including public areas, sterilization facilities, operating rooms, intensive-care units, and pediatric care units—and each of these needs to be addressed individually.

Since hospital patients may be more likely to become sick from contaminants in the air, IAQ is a constant focus for personnel in health care settings. In order to assure that IAQ is excellent, hospitals enforce strict regulations surrounding the cleaning and maintenance of hospital HVAC systems.

In hospitals, the HVAC systems transports air at about 15 to 30 cubic feet per minute, which is a considerable amount when compared to the average commercial building, which delivers about 5 to 15 cubic feet per minute (Babineau).

Charles Cochrane, of Cochrane Ventilation in Wilmington, Mass., said hospital HVAC cleaning is a rewarding niche for those who want to do it and are prepared to do it well. Cochrane has been a NADCA member since 1990, and about one-third of his company's jobs are in health care settings.

"A lot of homework needs to be done before you start cleaning hospitals," Cochrane said. "Having only a little bit of knowledge is dangerous. You might never get caught for making little mistakes or cutting corners, but you wouldn't be doing the right thing for the hospital and its patients."

Compliance with a hospital's Infection Control Risk Assessment (ICRA) is a major consideration, said Cochrane. Each hospital has its own ICRA, which examines the risks posed by projects on a case-by-case basis. HVAC maintenance contractors are expected to implement the ICRA requirements, which can take many elements into account, including any possible disruption to the environment or patients, and the prevention of cross-contamination.

"When you're working around patients, you have to make sure what you're doing won't be injurious to them. You can't just open a ceiling panel like you would normally," Cochrane said. "Yet the process of cleaning duct work isn't any different in a hospital. It's what you're doing to protect the people in the environment that is different."

Barry Harris, of Professional Abatement & Remediation Technologies (PART) in St. Louis, Mo., said since his company was established, it has focused largely on hospital HVAC inspection, maintenance and restoration. PART has been a NADCA member since 2001, and Harris said the company has relied heavily on the ACR Standard.

Harris said hospital work is unique due to the focus on preparation and contamination. "Also, everyone is watching what you're doing, and that includes safety managers, infection control representatives and other personnel."

Containment is a major focus of HVAC cleaning in a hospital. In some hospitals, Harris said, HVAC maintenance contractors must always work in a pop-up cube, no matter where they are in the building. Harris said every time a ceiling tile is moved, there must be a containment center.

During the takedown of containments, particular attention is paid to odor control, while anti-microbials also come under a significant amount of scrutiny and are not allowed in all hospitals, Harris said.

Cochrane said technicians need to get in the safety practice of cleaning themselves off before walking out of the contained area. "As soon as a person walks out who has been lifting ceiling tiles or similar work, they have just usurped the environment," he added.

Hospital regulations vary, Cochrane said, so the HVAC maintenance contractor must always be sure their equipment would pass the most stringent guidelines. "Even when you think you're being good and taking extra precaution by purchasing new equipment, you still have to test and be extremely careful," Cochrane said.

He added, "Companies should seriously consider testing on-site before you start working in the hospital setting. Otherwise, you could have a huge liability on your hands. At the very least, the customer is expecting you to do the job right, and the prudent contractor needs to be thinking about whether their equipment passes for the job."

From the Hospital's Perspective

George Player, engineering director at Brigham and Women's Hospital (BWH) in Boston, Mass., said in his experience, the most important aspect of HVAC cleaning projects is successfully coordinating communications between the staff and the contractors. "The contractors need to understand that they cannot spread contaminants, and safety is the utmost important thing in a patient environment."

Player said all HVAC maintenance contractors at BWH must go through a training and orientation program before they are given badges to work in the facility. In addition, HVAC contractors should be aware that the hospital may hire outside environmental and safety experts to oversee the cleaning.

Florida Hospital in Orlando is an acute health care system in the central region of the state, with more than 3,000 beds. Larry Nielson, Florida Hospital's Administrative Director of Safety and Security said that when hiring an HVAC maintenance contractor, it is important for a company to have a good, verifiable reputation in the area.

"Because we are dealing with health care, normal contractors need the proper licensing and insurance, and we want the equipment to be well maintained," said Nielson. "For HVAC work, we also educate contractors about the process of working around our patients."

Nielson added, "Patients can pick up diseases from mold spores, and one of the big steps we emphasize is that contractors know to set up barriers with negative pressure when they are doing any kind of work that would generate dust." Nielson said that if an HVAC contractor is opening part of a ceiling, it can't be more than one tile every 50 square feet in a patient occupied area.

Some hospitals have begun to use ultraviolet light as an additional measure against airborne microbial contaminants. Florida Hospital uses UV lights in many of its HVAC systems, and is going through the process of placing them throughout the entire ventilation network. Cleveland Clinic in Ohio also uses UV lights in its ventilation system, which includes more than 200 air handlers. HVAC technicians working around UV lighting systems must take proper precautions to protect against eye injuries from exposure to UV, and should also be have a response plan in place in the event a UV lamp breaks.

Basic preventative maintenance is also important in hospitals. Staff members at Cleveland Clinic change pre-filters every four months and final filters every 12 months. Mike Duncan, associate director of facilities engineering said, "We found by keeping up with regularly scheduled filter changes, it ensures our duct work is well-maintained."

HVAC contractors should understand the significance of the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), which has standards regulating the environment of care in hospital settings. The Joint Commission doesn't have specific regulations for air duct cleaning, but if an accredited hospital organization decides to have this work done, testing is completed to verify the cleanliness and pressure relationships, said John Maurer, associate director of the organization's Engineer Standards Interpretation Group.

Maurer said, "We would ask an organization for documentation showing that all the safety measures and procedures were in place at the time of the cleaning. When planning HVAC maintenance, the hospital would use a risk criteria assessment to define the scope of the work."

The Joint Commission exists to ensure that a hospital is implementing its own safety measures and policies. Since accreditation through the Joint Commission is voluntary, each organization's policy is submitted and reviewed.

Regulating Hospital HVAC Maintenance

It is common for hospitals to adopt the National Fire Protection Association's (NFPA) Standard 90-A, Cochrane said, which covers the maintenance of systems for air conditioning and ventilating, including filters, ducts, and related equipment, to protect life and property from fire, smoke, and gases.

The ANSI/ASHRAE/ASHE Standard 170-2008, "Ventilation of Health Care Facilities" also addresses duct cleanliness. Section 8.6 states:

"The duct supply system shall meet the following requirements for cleanliness:

The duct system shall be free of construction debris. New supply duct system installations shall comply with level 'B,' the Intermediate Level of SMACNA Duct Cleanliness for New Construction Guidelines.

The supply diffusers in the Class B & C operating rooms shall be opened and cleaned before the space is used.

The permanent HVAC systems shall not be operated unless protection from contamination of the air distribution system is provided."

An annex of the standard (which is not part of the standard itself) recommends that filters and filter frames be inspected for pressure drop and bypass on a monthly basis. It also recommends that fan-coil unit and heat pump drain pans under cooling coils be cleaned monthly, or on an effective preventative maintenance cycle.

Proceed Only When Fully Prepared

Cochrane encourages HVAC maintenance professionals to take classes to prepare for work in hospital environments if this is not a familiar area. NFPA and some health care organizations have educational sessions as well, he said. In addition, Cochrane said contractors should be prepared to submit their employees for testing to clear them of tuberculosis and other diseases.

"Hospitals are very cautious that new diseases are not brought in. You'll probably have to wear a badge saying you were tested for TB before you can begin working in the hospital," Cochrane said.

Harris said the training level needed for hospital work is worth it, because the crew members take pride in the level of skill they have attained. Harris said his company focuses on crew retention, since so much time is spent training.

"We have to give our technicians an opportunity to be successful and grow with the company," Harris said. "We try to make them realize they are professionals in what they do. They take a certain pride and respect about what they have learned and become leaders in their own right. It's important to have quality control at a very high level, because you can't just throw people in there."

Still, Cochrane cautions, "Cleaning hospitals is not anything that someone should take on lightly. Think long and hard before you start doing this kind of work, because it takes a lot of planning and effort. There could feasibly be a whole certification just dedicated to ICRA alone and how to clean hospitals in accordance with their risk assessment."

Despite the risks and the training needed, Cochrane does recommend hospital work if you are willing to make the effort. "I definitely think it's worth it," he said. ●

References: ANSI/ASHRAE/ASHE Standard 170-2008. "Ventilation of Health Care Facilities" 2008. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Section 8.6, Annex A1.4, A2.1.

The Role of HVAC Insulations in Health Care. Heating, Piping and Air Conditioning (HPAC) Engineering. April 2008. By Francis (J.R.) Babineau.