

Indoor Air Quality for Hospitals

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Indoor air quality is becoming one of the leading issues facing engineers and managers of health care facilities. Due largely to widespread media coverage over the past decade, both staff and patients are increasingly aware of potential indoor air quality problems and are reporting health and comfort complaints that they believe to be caused or aggravated by health care facilities.

For the past 20 years our firm has provided consulting services specializing in indoor and outdoor environmental quality issues. We are frequently called upon to deal with indoor air issues in hospitals and health care facilities. Based on extensive experience, we have found that indoor air complaints generally include lack of fresh air, stuffiness, poor temperature control and unpleasant odours and are accompanied by symptoms of eye, nose and throat irritation, headache, fatigue, nausea, dizziness and skin irritation.

The single most frequent cause of indoor air quality complaints is inadequate control of the indoor environment by the mechanical ventilation system. Other problems include unbalanced air distribution systems and the presence of barriers to effective air movement such as partitioning of a space or occupant blocking of diffusers themselves.

However, conditions in health care facilities can present more serious in-

door air quality hot spots than generally found in other commercial and residential buildings. The following are some notable examples to be aware of:

- The migration of contaminants from one area of a building to another: because of the many special use areas, this problem is more pervasive in hospitals and health care facilities than in other mixed use buildings. Specific areas where cross contamination can be particularly troublesome are laboratories and isolation rooms.
- The presence of strong point sources in certain hospital locations requiring control by local exhaust systems: common point source contaminants include: ethylene oxide, anesthetic gasses, formaldehyde, glutaraldehyde, antineoplastics, pentamidine, asbestos, Freon, mercury, solvents, cytotoxics, sterilants and germicides.

- Microbial contamination: we have found that microbial contamination occurs from two principle sources: standing water within the HVAC system (e.g. a blocked condensate drainage tray; and an episode of water leakage or flooding), or patients with infectious diseases. The combined effect of these sources can magnify the problem. For ex-

ample, the threat of tuberculosis is again appearing. Research is under way to determine the potential spread of this bacterium through the HVAC system.

- Other microbial hot spots in hospitals include portable room humidifiers and high efficiency filters. Portable humidifiers are a perfect medium for the growth of bacterium. If this bacterium is aerosolized it can be inhaled and pose an infectious hazard. Recent studies have shown that fungus colonization can occur in high efficiency filters used in special care units and serve as a source of potential infection. For example, in 1987, four bone marrow transplant recipients in a U.S. medical center became colonized with chaetomium species caused by contamination of the filters in the special care unit.

How serious is the indoor air quality problem in health care facilities? The US Centers for Disease Control estimates that 5% of patients in acute care facilities acquire infections often as a result of indoor air contamination. They have estimated the cost of additional hospitalization due to these infections exceeds 4 billion dollars a year. Clear-

ly poor IAQ can have serious economic consequences for hospitals.

The Workers Compensation Board of British Columbia is adopting landmark indoor air quality regulations which come into effect January 1, 1998. These regulations apply to hospitals and other health care facilities.

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The regulations:

1. establish ventilation, temperature and humidity requirements,
2. require indoor air quality investigation, and
3. require the implementation of a preventative maintenance program to avoid indoor air quality problems.

The most effective method of avoiding the high cost of extensive indoor air quality investigations that are required after a problem occurs is to implement a well planned indoor air quality management program. An indoor air quality management program will have the added benefit of demonstrating compliance with workplace regulations. Engineers and managers of health care facilities should begin planning an indoor air quality management program now for implementation when the new WCB indoor air quality regulations take effect.