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Creating a Healing Environment for Healthcare’s Sensitive Populations

Written By Rachel Belew and Paul Bates

Primum non nocere. First, do no harm.

These three famous words from the Hippocratic Oath are among the most powerful tenets of modern medicine. They define not only the doctor’s responsibility to his or her patient—but also the role and responsibility of the environment in which the patient heals. A healing environment whose integrated design, construction, and fit-out are grounded in techniques to optimize human health will help nurture patients on the road to recovery.

O f course, it’s important to remember that hospitals, nursing homes, rehabilitation facilities, physicians’ offices, and clinics have unique indoor environmental needs:

• They house a large number of people who have heightened susceptibility to infections, respiratory distress, and other problems associated with air contaminants.
• Their high occupant density results in an increased concentration of biological contaminants, such as viruses and bacteria.
• Their high occupant density results in close proximity between at-risk patients and infectious individuals.

In an effort to address the unique needs of healthcare facilities, sustainable design, construction, and maintenance practices that are specific to healing environments have been developed and implemented across the North America. In fact, green building in the healthcare sector has experienced remarkable growth in recent years, due largely to the influence of green building rating systems, such as LEED for Healthcare, and guidance from sustainable building programs, like the Center for Maximum Building Potential’s Green Guide for Healthcare.

THE GRAY AREA OF GREEN HEALTHCARE DESIGN

Yet, while green attributes like energy efficiency, water conservation, and waste reduction are important for outdoor environmental protection, a common pitfall of sustainable building construction is the unintended oversight of indoor air quality (IAQ). Research shows that poor indoor air quality is a significant risk factor for acute and chronic health effects, including asthma, upper respiratory complications, headache, nausea, irritation of the mucous membranes, flu-like symptoms, and even rare forms of cancer.

Unfortunately, one of the greatest misconceptions in the marketplace today is that “green” equals “healthy.” In fact, products, materials, and techniques used to design, construct, and maintain high-performance, energy-efficient buildings can sometimes conflict with efforts to optimize indoor air quality, leading to “green” buildings that suffer from indoor air pollution.
Airtight insulation techniques used to maximize energy efficiency, for example, can have the unintended corollary of reducing outdoor air exchange, which enables the build-up of airborne pollutants, including biological contaminants and hazardous chemicals. Recycled content materials, while stewards of waste reduction, can sometimes introduce toxins into the indoor environment by way of off-gassing—especially if the materials’ original use was never intended for the indoors (e.g., automotive tires recycled into flooring). And low-VOC paints, almost universally considered “green” alternatives to standard paints, can still off-gas potentially harmful chemicals indoors. Why? Because they are not assessed for their impact on indoor environments; rather, they’ve been evaluated based on their ability to react with sunlight and cause ground-level ozone—an outdoor environmental issue.

So, you see, going “green” isn’t so black and white.

What You Can’t See May Hurt You

Indoor air is an intriguing, complex environment that contains a myriad of visible and invisible contaminants; in fact, it is often two to five times more polluted than outdoor air. Among the contaminants most commonly found in healthcare settings are particulates, or particles that suspend in the air (e.g., dust; mold spores; pollen; dander; asbestos fibers) and VOCs, or volatile organic compounds, which originate from interior products and turn to gas at room temperature (e.g., formaldehyde; acetaldehyde; benzene; toluene). While large particles get caught in the nose and throat and are cleared from the respiratory tract by coughing or swallowing, VOCs turn to gas at room temperature (e.g., formaldehyde; benzene; toluene) and even can cancer. Some VOCs produce offensive odors. Others have the potential to chemically react with other compounds in the air, giving rise to additional VOCs that may also be a threat. As a result, even though the concentration of individual VOCs may be below odor thresholds or known toxicity levels, their presence in complex mixtures may pose unexpected health risks.

Children, the elderly, and people with chronic illnesses or suppressed immune systems are especially vulnerable to the negative health impacts of VOC exposure. As these sensitive populations are likely to spend considerable time in a healthcare setting, special consideration must be given to the design, construction, and maintenance of their indoor environments.

Children and IAQ

Children’s heightened VOC exposure risk is rooted in their physiology. Their immune, respiratory, and neurological systems are still developing; they breathe in a greater volume of air than adults do with respect to their body size; and their heart rate is faster, allowing their bodies to metabolize more chemicals more rapidly. This is what’s known as a greater body burden: pound for pound, children’s bodies simply absorb more chemicals than adults’ bodies do.

Childhood exposure to VOCs is also linked to asthma the third-ranking cause of hospitalization in children, according to the Asthma and Allergy Foundation of America. In fact, a 2004 study out of Australia found that children exposed to high levels of VOCs were four times more likely to develop asthma than adults. What’s more, a growing body of science suggests that exposure even to low concentrations of VOCs can have negative effects on fetuses, newborns, and children including disruptions to the endocrine system (hormones), gene activation, and brain development.

The Elderly, the Sick, and IAQ

Similarly, the elderly and the sick are at an increased risk for adverse health effects from exposure to indoor air pollutants. According to the Merck Manual of Geriatrics, as people age, their arsenal of germ-fighting white blood cells shrinks, delaying and weakening their bodies’ response to certain antigens, or toxins. The same holds true for the sick or fatigued, whose immune systems can be compromised due to external stressors. Consequently, when elderly or ill individuals encounter a new antigen, their bodies are less able to recognize and defend against it.

Studies show that exposure to indoor air pollution later in life can also increase the risk of developing respiratory complications including asthma, chronic obstructive pulmonary disease (COPD), bronchitis, and emphysema as well as neurologic and cognitive problems, such as motor dysfunction and loss of visual acuity.

Controlling and Managing Airborne Chemical Exposure

One of the simplest and most cost-effective ways to ensure optimal indoor air quality in a healthcare environment is to practice source control. Just as the name suggests, source control is the act of controlling the various sources of pollutants in an interior space. In other words, it’s the strategic selection and use of products, materials, and techniques that proactively limit number of contaminants that can enter a building, thereby minimizing the risk of compromised indoor air quality.

To minimize exposure to VOCs, a healthcare facility’s owners, managers, and designers should specify as many low-emitting products and materials as possible. This is because dodging the sources of airborne chemicals helps ensure a healthier interior space from the onset. Sources of VOCs include everything from work stations, case goods, and office seating to mattresses, wall covering, flooring, and cleaning products. In fact, the specification and use of low-emitting cleaning products is particularly important, as high concentrations of cleaning chemicals can have a detrimental effect on indoor air quality even if all other sources of VOCs are well-controlled.

It is also critical to ensure that the building’s heating, ventilating, and air conditioning (HVAC) system is in proper working order. Mechanical ventilation systems help usher in fresh outdoor air, which helps dilute indoor air contaminants, and high efficiency air filters help block out particulates. Diligent plumbing upkeep and regular maintenance can help prevent mold and moisture problems in the facility, as well.

Healthier Hospitals, Healthier Patients

It all boils down to this: the healthier the healthcare environment is the healthier its patients and staff will be. By thoughtfully considering a building’s potential impact on occupant health, and by planning for, designing, and constructing the building to proactively address that impact, building professionals can do their part to fulfill the Hippocratic Oath and truly practice what healthcare professionals preach: first, do no harm.

About the Author

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