PUTTING INDOOR AIR QUALITY IN ITS PLACE

Outspoken consultants Ronald Gots and Edward Sowinski warn of the dangers of overreacting to indoor air quality concerns. They say more science and less emotion should guide the IAQ debate.

By Gregg LaBar

Ronald E. Gots, an occupational physician, cringes when he hears people say that indoor air quality problems are an emerging occupational health epidemic or that approximately 1 million public and commercial buildings in this country may be "sick" due to inadequate ventilation and/or low levels of specific contaminants. Although Gots believes that indoor air quality's (IAQ) impact on worker health deserves the attention of employers and building managers, he complains that many people's concerns are overblown or misguided. For example, while he regards IAQ-associated problems as "building-related symptoms," many other people use terms like "sick building syndrome" or "tight building syndrome."

"As soon as you call something a syndrome, people think the worst," said Gots, M.D., Ph.D., founder and president of his own medical and toxicology consulting firm, National Medical Advisory Service (NMAS), Bethesda, Md. "There is this perception about indoor air quality that it is an enormous problem, but as far as I can tell, that is a hyped-up concept with little scientific evidence. Indoor air quality in public and commercial buildings is related to comfort and discontent, not whether or not people are going to get cancer.

Over the years, there have been a couple of serious outbreaks of building-related illness, including 29 deaths from Legionnaire's disease in a Philadelphia hotel in 1976. There are also instances where poor ventilation and/or specific environmental contaminants have resulted in illness but nonetheless adverse health effects.

These outcomes are relatively rare, however, according to Gots, whose work includes providing expert testimony on behalf of businesses defending themselves in IAQ-related litigation. He estimated that in 70 percent of IAQ cases he's investigated, the indoor air concerns involve either "a nonexistent" or "a nonidentifiable problem." More than half the time, he said, psychological factors like stress and job satisfaction, as well as ergonomics and "work area lighting, are at least as important to people's perceptions about the quality of the air at the time as the quality of the air at the time."

In an interview with Occupational Hazards, Gots and Edward E. Sowinski, Ph.D., D.A.B.T.C.H., of Environmental Health Management and Science Inc. (EHMS), a Hudson, Ohio, affiliate of NMAS, criticized those who say that IAQ problems are a major occupational and environmental health threat. In many cases, they said, the breadth of the problem in U.S. office buildings and the risks to occupants are being overstated.

Nonetheless, they urged employers and building managers to implement comprehensive IAQ management programs, which they said should be performance-oriented, "reasonable," and based on "good science." Mirroring a position paper recently developed by the American Industrial Hygiene Assn. (AIHA), these programs, they said, should cover ventilation system design and maintenance, identification of causes of IAQ problems, implementation of changes it necessary, and employee participation.

"The vast majority of indoor air issues involve the fine-tuning of worker health," Gots said. "Where reasonable improvements can be made, they should be made."

Here are answers, from the NMAS-EHMS perspective, to some key questions regarding the relationship between indoor air quality and worker health:

OH: What has sparked all of the interest in this subject?

NMAS-EHMS: Gots offered a number of reasons, including "some very real situations" in which people have developed serious illnesses as a result of inadequate airflow or from breathing air that contains bacteria, fungi, or hazardous chemicals. Not surprisingly, such cases have resulted in extensive media coverage, which has further fueled concerns. Sometimes, Gots said, the coverage has gone too far and led people to believe that their building may have similar problems.

In addition, Gots said "solution sellers"—consultants, product manufactur-
The idea of having a 'program' may sound soft, but that is the key to solving indoor air quality problems.

—Ed Sowinski

The concern about indoor air is in direct relation to the diminution of more serious problems, Sowinski said. "In Eastern Europe, which is faced with massive environmental contamination, it would be a joke to say you're concerned about indoor air. But, in the U.S., we're looking in more obscure corners for the sophisticated and subtle issues." Another reason for the IAQ treaty: Consumers and workers, Gott said, are all too willing to believe that indoor air is a serious problem and that an expensive solution is needed. "People perceive themselves as being victimized," he explained. "The fact that they smell something or that you can find 100 bad-smelling chemicals in every indoor environment doesn't mean a whole lot. But people just assume they're in danger, and they want to see you do something about it."

Gott said, "All these reasons taken together have a tremendous amount of force." Added Sowinski, "To a certain extent, indoor air is an emerging issue because people are beating the drum and saying it's important."

"How big a problem is indoor air quality?"

NMAE-EHMS: Gots doesn't agree with the oft-quoted statistics that between 800,000 and 1.2 million public and commercial buildings in the U.S. may have indoor air quality problems and that they cost American business some $20 billion annually. He doesn't offer alternative numbers because he argues that there is currently "very little good data" to support any estimates. "Mostly what we have are anecdotes," Gott said. "You can't extrapolate that out to the universe of buildings."

Gott noted that it's very difficult to establish cause-and-effect relationships between indoor environmental conditions and symptoms. Many times, he said, it's even possible to conclude that certain symptoms are the result of any IAQ problem at all.

OH: What kinds of problems exist?

NMAE-EHMS: Despite questioning the overall relationship between IAQ and worker health, Gott acknowledged that some buildings do have significant IAQ problems that need to be addressed. He said that they can result in a variety of symptoms, including eye irritation, dry throat, runny nose, fatigue, skin irritation, shortness of breath, cough, and dizziness.

According to Gott, most indoor air problems involve the heating, ventilation, and air conditioning (HVAC) system — that it was not designed and installed properly, is not being adequately maintained, or is simply wearing out. He said these problems are most common in buildings designed to minimize the intake of outside air during the energy-conscious 1970s. "Despite people's perceptions to the contrary, there are few occasions when symptoms are actually caused by contaminants like formaldehyde or volatile organic compounds," he said. "Most of the time, if there is a problem at all and you can identify it, it is with the HVAC system."

Gott said there are, however, cases where specific agents like chemicals, micro-organisms, and environmental tobacco smoke are the root of indoor air problems. For example, Gott recalled a school environment where the use of a petroleum-based product to remove floor tiles resulted in symptoms among students and teachers.

He also offered the example of a large building which had its intake ducts located on top of a flower bed. As a result, molds and peat were being sucked into the office building, which resulted with workers with allergies to experience eye irritation, runny nose, and other symptoms.

OH: What role do psychological factors, like perceptions about indoor air quality?

NMAE-EHMS: Gots estimates that at least 50 percent of the concerns that people associate with indoor air are really manifestations of psychosocial factors. In some cases, he said, people discharged with their jobs or suffering from stress perceive that there is something wrong with the air. In other cases, one or two people experience a real problem with the air, and when they tell their coworkers, everyone develops problems.

Gott mentioned the case of one worker in a large office building in California complaining to his coworkers that he smelled a chemical and that he thought he was being poisoned. Within a couple of days, some 100 people had experienced fainting or dizziness episodes. No IAQ problem was ever identified.

"It's very important not to lose sight of emotional factors," Gott said. "If you go into a workplace and tell workers that you smell what may be a harmful chemical, you will have a lot of sick people on your hands. If you have people who have already decided what their problem is, that can be difficult to overcome."

OH: What should employers and/or building managers do to ensure the quality of indoor air?

NMAE-EHMS: "Everyone should have a management program that is tailor-made for a particular building," Sowinski said. He said for small buildings, an IAQ management program can be about as simple as the one he has for the air conditioning system in his house — "Once every two months, I go down in the basement to make sure the filter is clean," he said.

Larger buildings, he continued, need comprehensive, written programs, as suggested in guidelines developed by EPA/NIOSH and AIHA. The AIHA guidelines, which Sowinski helped draft to be used as a model for regulations, highlight four key elements of an IAQ management program:

- Design and performance of HVAC equipment
- General building conditions, including sanitation
- Determination of contaminant indicators and -tall factors,
- Effective control of building occupants' complaints -time frame

The idea of having a 'program' may sound soft, but the Sowinski, suggested that the onus of an IAQ regime should address indoor air to the approach taken in other performance-oriented I -standard.

OH: Who should develop a program?

NMAE-EHMS: Ou "team approach" to program, included on the team: employers, building owners, building engineers, building managers, employee representatives, maintenance crews. The program itself, Sowinski said, should probably be a combination of a health and safety management back-ground, especially the "If you have an IAQ problem, that may be a performance problem." "You need to have all the other things involved up front and that's why you have to talk with the -sowinski said management and building engineers. "I sense a degree of discomfort among some who don't see it in a meaningful way."
MANAGING INDOOR AIR: AIHA'S ADVICE

Design and performance of HVAC equipment
An HVAC system inspection should include checking filters, drip pans, drainage piping, heating and cooling coils, outdoor air intakes, supply diffusers, return grilles, exhaust grilles, humidifiers, and controls. The inside of air ducts and plenums should be checked periodically for signs of rust, microbial growth, or other contamination.

General building conditions
Structural modifications, introduction of new furnishings, and the use of chemical products can all have a significant impact on indoor air quality. A management program should include procedures to plan for these developments and to address them when they're in process.

Determination of airborne contaminant indicators
Results of monitoring for specific biological and chemical contaminants cannot always be clearly interpreted. Where monitoring is called for, it should focus on carbon dioxide, volatile organic compounds, formaldehyde, combustion byproducts (nitrogen dioxide and carbon monoxide), particulate matter, and microbiological contamination.

Effective communication concerning building occupant complaints
There should be a standard procedure for receiving, evaluating, and acting on complaints from building occupants. Businesses might consider the 15-day response period in the Toxic Substances Control Act as a benchmark for responding to employee concern about indoor air.

or not to conduct air monitoring in indoor air situations, Sowinski, the industrial hygienist and toxicologist, said monitoring can be useful to put indoor air in perspective but is seldom able to identify specific problems. In almost all cases, he noted, levels of contaminants in office buildings will be well below OSHA's permissible exposure limits (PELs) for industry, no matter how bad the IAQ problem is. Thus, Sowinski and Gots do not advocate comparing indoor air levels to existing exposure limits, other than for the purpose of putting air levels in perspective. Nor do they support the idea of developing lower-level exposure limits just for indoor air.

"If you put too much stock in the monitoring, you can end up with a lot of data you can't interpret," Gots said. "The fact that you're at one-tenth of the PEL is not very meaningful from a toxicological standpoint." He said it would be "dangerous" to attempt to set a sub-PEL exposure limit designed to assure "something as subjective as people's comfort."

OH: What still needs to be known about the relationship between indoor air quality and health effects?

NMAS-EHMS: "I'm not sure there are a lot of things we really need to know to solve individual problems because most of them are related to the HVAC system," Gots said.

According to Gots, however, much more study is needed on one key, controversial topic — multiple chemical sensitivity (MCS), the idea that some people can become hypersensitive to chemicals to the point where they suffer from constant fatigue, memory loss, and various physical problems. The issue has divided medical experts and been the subject of a significant amount of litigation.

From Gots' perspective, "At the moment, there are no data to support the proposition that MCS is real. This is an area where theory has been put into practice very quickly. That's not uncommon in medical history, but the history of medicine is littered with the rubble of failed scientific theories."

He estimated that more than 50 percent of the people who believe they're suffering from multiple chemical sensitivities actually have severe psychological problems not related to chemical exposure. "I believe there are a lot of people who are frankly being mistreated," he said. "If it is true that there is a subset of people who really have this disorder, there is also a much larger subset of people who are being treated for the wrong thing."

According to Sowinski, in addition to attempting to settle the MCS debate, research should focus on: standardizing air sampling and analytical procedures; demonstration of HVAC technologies within model buildings; methods for determining product emissions prior to marketing; and measurement protocols for carbon dioxide, which can be an indicator of ventilation adequacy.

"Thanks to great advances in the field of analytical chemistry, the methods are there to measure indoor air," Sowinski said. "Advances in toxicology haven't kept up, which is why we don't know what it means when you find a part per billion of 10 or 12 trace contaminants. That is an area where more progress is needed.

OH: In light of what is and isn't known, is it time for the government to step in and regulate indoor air?

NMAS-EHMS: "I think there ought to be some regulations," Sowinski said. "It would be negligent for a large office building to get away with not having an IAQ management program."

Sowinski said OSHA is in the best position to regulate indoor air quality and should do so with a generic performance-oriented standard, analogous to the baseline standard and the IAQ guidelines developed by EPA/NIOSH and ASHRAE. Because there are currently no federal IAQ standards, Sowinski said he's especially concerned about a developing "patchwork quilt of state regulations" — including action in California, Maine, Missouri, New York, New Jersey, Oregon, and Washington. As part of this effort, some states are considering setting sub-PEL standards.

Said Gots, "Good science has to be a part of any regulatory approaches. Setting limits is not good science, but people are trying because of the perception that indoor air is a widespread threat to the public health. I don't think that's accurate. Even if it is, the major thing one would do about it would be to have a management program in place to take care of the HVAC system."

According to Gots and Sowinski, indoor air quality needs to be addressed, but with caution and from the perspective that it is a quality-of-life, not a life-or-death, issue.