



## Health-Care-Associated Infections

In your November issue, the editorial (“Ebola Outbreak Puts Hospital Protocols Under the Microscope,” [http://bit.ly/Arnold\\_1114](http://bit.ly/Arnold_1114)) and the opening paragraph of the article by Forrest Fencel (“Health-Care-Associated-Infection Control: Reducing Airborne Pathogens,” [http://bit.ly/Fencel\\_1114](http://bit.ly/Fencel_1114)) imply HVAC systems can be used to control health-care-associated-infection (HAI) rates. But, as a general rule, that’s not entirely true. Consider:

- We know air quality (cleanliness) has been correlated to lower surgical-site-infection (SSI) rates, particularly in longer procedures. But it is a correlation at best. There are not multiple controlled studies demonstrating air quality is a reliable means to reduce SSI rates.

- We know airborne disease transmission can be reduced by isolating patients in rooms with air controls (100-percent exhaust, negative pressure, anteroom). The number of airborne-transmitted diseases, however, is very small.

- We know HVAC measures (filters, air distribution, ultraviolet light) reduce concentrations of biological particles in air. But we have little or no data on the relevance of those concentrations to clinical outcomes. There are case studies indicating correlations, but they tend to be specific (e.g., *Aspergillus* in a neonatal intensive-care unit during construction) and not generalizable.

Unfortunately, HVAC engineers sometimes believe air systems are a keystone of infection prevention. This can be a bit counterproductive when it comes to spending. For example, one of our medical centers recently did an air-system audit and redesign. The purpose: Ebola preparedness. The design and facility engineers—with only the best intentions—planned to increase the number of isolation rooms with air controls. They looked at pressures, distribution, and air changes. They

proposed modifications to the system. The problem is Ebola isn’t an airborne disease. We caught this prior to construction funding, but the design fee already had been spent.

Everyone wants to do something about Ebola. But, as a health-care system, we can’t spend money on all things. We need to carefully identify measures that matter and then do them well. In the case of Ebola, air systems aren’t a key element. So, the best thing HVAC engineers can do is humbly stand to one side and let others do the work. Any funds spent on air systems for Ebola

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preparedness are funds that can’t be used in more meaningful work.

As health-care providers in the United States, we are challenged to radically redefine cost structures. To do that, we need to be diligent with every dollar in every program, including building systems. We need to ask tough questions: Why is this valuable? How does it affect patient outcomes? How do we know what works? Why should my monthly premium dollars go toward this instead of something else?

By the way, in general, I found Mr. Fencel’s article well-written, clear, well-cited, and informative. My only contention is with the opening paragraph, which is not atypical. In various trade journals, I often see similar openings, in which broad statements about HAI lead into an HVAC discussion. I ask that you keep an eye out for it in the future.

Thanks for your publication. Keep up the great work.

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## Remembering Bill Coad

The HVAC industry lost a great man with the passing of William J. “Bill” Coad in August (“HPAC Engineering Advisor and Past ASHRAE President Bill Coad Dies,” [http://bit.ly/Coad\\_0814](http://bit.ly/Coad_0814)). Bill contributed more to the HVAC industry through his engineering innovation and winsome example than most could ever hope to.

My first encounter with Bill was in the fall of 1985 at a National Science Foundation conference addressing the research needs of the HVAC industry. Bill gave a presentation characterizing two approaches to HVAC engineering design. One he called the erector-set approach, where existing off-the-shelf products (tinker toys) are patched together as best they can to meet a design objective. The other approach he called the first-principles approach, where one seeks to understand the fundamental requirements of a project and conceptualize the best equipment and materials (based on engineering fundamentals) to satisfy the basic needs. If the needed hardware, etc. exists, employ it; if it does not exist, invent it and get it built.

To this day, I share these two approaches with all under my instruction. While both approaches can work, it is the first-principles approach that establishes leadership in the industry.

In 1989, ASHRAE issued a new version of Standard 62, *Ventilation for Acceptable Indoor Air Quality*, that generally raised the outdoor-air (OA) requirement from 5 to 15 or 20 cfm per person, seriously elevating the tension between good energy stewardship and indoor environmental quality (IEQ). This caused Bill to conceptualize a system based on his first-principles approach.

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Parallel with but independent of Bill's work, my students and I were attacking the challenge of meeting ASHRAE's OA requirements without excessive overventilation of non-critical spaces. Eventually (around 1997), that work led to what is known as a dedicated outdoor-air system (DOAS).

It was at an ASHRAE meeting in about 1997 that Bill and I discovered our mutual interest and similar solution to the energy/IEQ dilemma. Bill's encouragement and support emboldened me to become a zealot for DOAS, resulting in many papers, ASHRAE lectures, short courses, and engineering graduates fluent in the technology.

In 2001, Bill was elevated to the office of ASHRAE president. Those familiar with ASHRAE politics know that those who ascend to leadership positions most often go along to get along. Bill, however, was a man of principles, one who executed assigned action only consistent with his core values. As a result, he served with distinction while inspiring many to excellence.

In 2006, ASHRAE began planning for the renovation of its Atlanta headquarters. I was asked to chair the HVAC-equipment advisory committee. Bill made himself available for that committee. The committee's guidelines resulted in DOAS becoming a central part of the renovation design, with Bill's complete support.

Lastly, I had several opportunities to address the St. Louis chapter of ASHRAE as an ASHRAE Distinguished Lecturer. In each case, Bill made a special effort to be present and to spend time after the meeting discussing technical issues.

Few humans have impacted my thinking and technical approach more than Bill. He truly was a giant in our industry.

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