

Recommitting to Ventilation Standards for Healthy Indoor Air Quality

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The history of ventilation is fraught, indeed. We are in the sick building era, ushered in by a historic mistake in the 1970s with the promulgation of a standard that lowered ventilation rates in nearly every building we spend our time, and which represented a gross departure from earlier health-focused higher ventilation targets.

THE SICK BUILDINGS ERA

In 1859, Florence Nightingale emphasized the critical role of ventilation in medical settings to combat infections: “Cleanliness and fresh air from open windows . . . are the only defense a true nurse either asks or needs.”^{1(p34)} Not long after, in 1893, and motivated by tuberculosis, a physician-scientist named John Shaw Billings proposed the first health-focused ventilation rate: 30 cubic feet per minute per person (30 cfm/p).² In 1895, this health-focused 30 cfm/p was adopted by a standards organization, American Society of Heating and Ventilation Engineers (ASHVE). By 1925, 22 states required a minimum of 30 cfm/p. Thus, health-focused ventilation became the basis for building design in the early

part of the 20th century, until a monumental and costly pivot away from health in the 1970s.

In 1973, ASHRAE, the standard-setting body that followed ASHVE, released a new standard for ventilation, ASHRAE 62. The earlier 30 cfm/p health-focused targets were lowered by half (or more), and were “based in part on the ventilation required to control odors from human bioeffluents.”³ In the 1981 version, the title of the standard was explicit that the focus was merely “acceptable” indoor air quality (“ASHRAE Standard 62-1981: Ventilation for Acceptable Indoor Air Quality”). The departure from earlier health-focused ventilation to lower “acceptable” ventilation targets based on odor control marks the birth of the sick building era, with the term “sick building syndrome” first appearing in the early 1980s.

The sick building era, unsurprisingly, caught the attention of researchers and spawned an entire field of study on indoor air quality (IAQ). In the 1980s and 1990s, the then-new field of IAQ generated research documenting that ventilation rates above this minimum standard were associated with many health benefits, and throughout the 1990s to 2000s, research efforts were

also underway to evaluate—and expand—the understanding and value proposition of better indoor air quality. Research studies documented higher ventilation rates associated with better math and reading scores in students,⁴ fewer missed school days for kids,⁵ fewer worker absences,⁶ lower risk of respiratory disease infection,⁷ higher cognitive function test scores,⁸ and better workplace performance.⁹ Lawrence Berkeley National Laboratory estimated that there were more than \$20 billion in benefits to the US economy with improvements to ventilation.¹⁰

The commentary by LaFay and Sampson in the August 2024 issue of *AJPH* argues that this focus on economic impacts of ventilation was a historic—and current—problem, holding back the advancement of higher ventilation standards.¹¹ But recent efforts by researchers to quantify the health benefits of ventilation in terms of economic benefits is in addition to—not at the expense of—the health argument. Focusing on health, and adding in an economic dimension, is good public health practice with a long history, dating back to the 1800s.¹²

Despite the accumulating research on health and economic benefits of higher ventilation rates, not much changed, and the standard for “acceptable” ventilation rates remained the basis for many building codes and industry practice. Within ASHRAE itself, there was controversy and lack of clarity that spanned two decades. There was “a membership petition in 1999 that called to restrict all ASHRAE IAQ and ventilation standards to make no claims regarding ‘health, comfort or occupant acceptability,’” and, as late as 2008, the ASHRAE Board of Directors was still debating the intent of the standard.^{3(p6)}

THE BEGINNING OF A NEW HEALTHY BUILDINGS ERA

The year 2020 marked a major turning point in the history of ventilation. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), spread predominantly indoors, found an ally in buildings designed to minimal “acceptable” ventilation standards. As early as February 2020, researchers raised concern over airborne transmission and highlighted that enhanced ventilation and filtration were key control strategies. In April 2020, ASHRAE also made recommendations for increasing ventilation.

Yet, in all these recommendations, there was still a glaring omission—there were recommendations made to increase ventilation rates, but no standard-setting body was willing to offer a recommended target ventilation rate. This omission left many organizations grappling with how much ventilation was recommended to safeguard against the virus.

In late 2020, the ASHRAE Epidemic Task Force convened a group of experts and gave them an explicit task of making recommendations on ventilation rate targets. This team submitted their first recommendations to the ASHRAE Epidemic Task Force in 2021, but the recommendations were never released to the public.

In the fall of 2022, the *Lancet* COVID-19 Commission released a report with recommended clean air rates for reducing exposure to airborne respiratory diseases.¹³ The *Lancet* Task Force used a “good/better/best” approach, and designated 30+ cfm/p as “best.” This report also revealed to the public the previously unreleased recommendations made by ASHRAE’s internal committee. The *Lancet*

Report was timed to coincide with the first-ever White House Summit on Indoor Air Quality, and it was shared with The White House Office of Pandemic Response and The White House Office of Science and Technology Policy. Shortly thereafter, ASHRAE announced they would produce a health-focused ventilation standard within six months.¹⁴

In June 2023, and one month after the official declaration of the end of the emergency phase of the pandemic, ASHRAE released ASHRAE Standard 241: Control of Infectious Aerosols, wherein they recommended a total “clean air” target (outdoor air + filtered/cleaned air) more in-line with historical, health-focused ventilation rates.¹⁵ Inexplicably, the standard was tempered by the inclusion of an “on/off switch” in the guidelines (what they call “risk management mode”), which suggested that enhanced ventilation could be discretionary and that baseline levels of influenza, COVID-19, and other respiratory diseases—which, for influenza alone, the Centers for Disease Control and Prevention estimates resulted in up to 41 million illnesses, 710 000 hospitalizations, and 51 000 deaths annually since 2010¹⁶—were somehow not worthy of being declared a full-time risk.

We are at a precipice. The World Health Organization has declared clean indoor air a fundamental human right, and ventilation is a key component of ensuring clean indoor air. The current standards governing our ventilation rates are not based on health and have not been for decades. There does seem to be alignment forming on health-focused ventilation targets. A group of more than 40 international experts wrote a commentary in *Science* in March 2024 proposing indoor air quality standards, wherein they recommended . . . 30 cfm/p¹⁷; the same target

recommended by The *Lancet* COVID-19 Commission,¹³ and the same health-focused ventilation target used 100 years ago. The lessons from our past combined with recent experiences present an unambiguous call to action: to recommit to ventilation not as a technical standard for minimally acceptable conditions but as a cornerstone of public health. *AJPH*

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CONFLICTS OF INTEREST

The author reports no conflicts of interest.

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