Addressing Air Quality and Health as a Strategy to Combat Climate Change

Poor air quality contributes to and is a consequence of global warming. The burning of fossil fuels to power our homes, businesses, and automobiles contributes to air pollution. When released into our atmosphere, some forms of pollution trap heat, leading to temperature elevation, and air pollution has direct effects on health, such as worsening cardiopulmonary disease (1). In this week’s Annals, the American College of Physicians calls for action to combat climate change and its effects on health, including governmental action to reduce greenhouse gas emissions, health care sector implementation of environmentally sustainable and energy-efficient practices, physician advocacy for policies and practices that reduce emissions, and expanded education and research funding on climate change and its effects on health (2).

Combating climate change is a geopolitical issue involving the highest levels of government, with complex international negotiations and treaties. Can individual health care providers and institutions really do something meaningful?

We began asking ourselves this question not long ago. Because of Utah’s mountainous geography, our region (the Wasatch Front) is subject to winter “temperature inversions,” where the trapping of colder air below a warmer cap impedes atmospheric flow and results in the accumulation of air pollutants (Figure). Levels of particulate matter, nitrogen oxides, sulfur dioxide, carbon monoxide, and ground-level ozone increase, frequently exceeding the “safe level” designated by the U.S. Environmental Protection Agency, as reflected in an elevated Air Quality Index (>100). Winter inversions last an average of 14 days but can range from 1 to more than 30 days. In the summer, sunlight drives the creation of ground-level ozone from nitrogen oxides and volatile organic compounds; it is generally worse in hot, sunny weather and later in the day.

Ozone exposure results in airway inflammation and places patients with established respiratory disease at particularly high risk for harm. Particulate matter causes pulmonary and systemic inflammation and oxidative stress and is associated with adverse cardiovascular effects, including vascular and endothelial dysfunction, alterations in heart rate variability, coagulation, and cardiac autonomic function (3). Thus, changes in air quality are routinely palpable in our community. What could we do?

Mounting evidence linking poor air quality with adverse health outcomes, coupled with the distinctly visible effect of air pollution on our community, prompted our health care system to form the Intermountain Air Quality and Health Workgroup in 2014 to achieve 3 aims: support ongoing research to further our understanding of air pollution exposure and health outcomes, expand sustainability efforts to reduce Intermountain’s environmental impact on the community, and address physician and patient education about outdoor air quality and health outcomes.

Studies in the Wasatch Front community by members of our workgroup have further evaluated the effect of air pollution on cardiovascular outcomes in our patients; specifically, the likelihood of myocardial infarction and unstable angina increases by 4.5% for every 10-μg/m³ increase in fine particulate matter level. Of note, this risk was primarily identified among patients with existing coronary artery disease (4). The occurrence of ST-segment elevation myocardial infarction and decompensated heart failure requiring hospitalization also seems to be increased in association with increasing fine particulate matter levels in our community (5, 6).

The second prong of our system’s efforts, aimed at addressing climate change and air quality, began with a charge from our chief executive officer: We must limit our own health system’s effect on our environment. In response, Intermountain is transitioning its automobile fleet from gasoline to natural gas, hybrid, and electric. Driver tracking devices on fleet vehicles have reduced idling by more than 500 hours per year. Employee use of public transportation has contributed to a reduction in emissions of 3.5 million pounds. The addition of rooftop solar panels has saved an additional 45 tons of carbon. In addition, Intermountain set a goal for all new facilities to achieve Leadership in Energy and Environmental Design Silver certification and be Energy Star-certified. The Office of Sustainability also addresses
Addressing Air Quality and Health as a Strategy to Combat Climate Change

EDITORIAL

The health effects of air pollution are associated with disease exacerbation. If the Air Quality Index enters the moderate zone (51 to 100), the recommendation is to limit outdoor play time (or to play indoors if the child is symptomatic) and consider keeping a fast-acting inhaler nearby. If the Air Quality Index tops 100, the recommendation is to play indoors.

We hope that efforts focused on energy conservation will serve as an example to other businesses in our local community and in the broader health care community to reduce the effect of health care on the environment while adapting to the challenges of climate change.

Combating climate change requires initiatives beyond the control of individual health care systems, clinicians, and patients, but we, as health care systems, clinicians, and patients, can bring about meaningful change if we act locally.

Elizabeth A. Joy, MD, MPH
Intermountain Healthcare
Salt Lake City, Utah

Benjamin D. Horne, PhD, MPH
Intermountain Heart Institute
Salt Lake City, Utah

Steven Bergstrom, BS
Intermountain Healthcare
Midvale, Utah

Disclosures: Authors have disclosed no conflicts of interest.

References


**Current Author Addresses:**  
Dr. Joy: Medical Director, Community Health, Intermountain Healthcare, 36 South State Street, Salt Lake City, UT 84111.  
Dr. Horne: Intermountain Heart Institute, 5121 South Cottonwood Street, Salt Lake City, UT 84107.  
Mr. Bergstrom: Intermountain Healthcare, 7302 South Bingham Junction Boulevard, Midvale, UT 84047.