



Environmental Sustainability in Anesthesia Pollution Prevention and Patient Safety

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Keywords

- Anesthesia • Ecological sustainability • Pollution prevention • Patient safety
- Life cycle assessment • Environmental engineering

Key points

- Health care pollution is a hidden patient safety issue. In 2013, the US health care sector contributed nearly 10% of the nation's greenhouse gas (GHG) emissions.
- Anesthesiology is a resource-intensive specialty, providing opportunities for leadership to reduce health care pollution. Inhaled anesthetics are potent GHG, accounting for 2.5% of the UK's health sector GHG emissions.
- Many strategies are immediately available for reduction of waste and pollution from operating rooms and perioperative areas.
- The environmental sustainability of anesthetic practice varies considerably between nations, even without differences in patient outcomes. Exploration of why this occurs could be financially and environmentally rewarding.
- The research base of hospital sustainability is at an early stage; considerable opportunities lie ahead.

Do the best you can until you know better. Then when you know better,
do better.

—Maya Angelou

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INTRODUCTION

Health care pollution is a hidden patient safety issue that can no longer be ignored. The US health sector presently accounts for 17% of national gross domestic product, and is highly interconnected with industrial activities that significantly contribute to national emissions to air, water, and land. In 2013, the US health care sector contributed nearly 10% of the nation's greenhouse gas (GHG) emissions [1,2]. If the US health sector were a country itself, it would rank 13th in the world for GHG emissions. These emissions stem from the entire life cycle of products and services ("cradle to grave"), including direct care and purchases (46%), as well as indirect supply chain activities (54%). Similar reporting from the United Kingdom noted that, of the National Health Service (NHS) GHG emissions, 22% stemmed from pharmaceuticals (excluding waste anesthetic gas) and 13% from medical devices [3,4]. Inhaled anesthetics alone accounted for 2.5% of the entire NHS health sector GHG emissions [5]. Environmental health is linked critically to human health, and because anesthesiology is a resource-intensive specialty, there is much that anesthesiologists can do to lessen the disease burden that stems from clinical care itself. If the current trajectory of modern medicine is left unmitigated, the costs of "business as usual" will contribute to the worsening of public health and an increase in the demand for health services. Anesthesiologists have both an opportunity for and obligation to pollution prevention, to protect patients and society.

Climate change

The World Health Organization named climate change the defining issue for health systems in the 21st century [6]. The United Nations Framework Convention on Climate Change recognizes 6 disease categories linked to climate change: cardiovascular disease, asthma and respiratory disease, infectious disease, compromised food and water security, increased weather disturbances, and threat to blood supply through changing vectors for blood borne illnesses [7]. Currently, an estimated 150,000 patients die annually in the world owing to climate change-related disease, and if left unchecked a predicted 500,000 will die per year by 2050 [2]. The World Health Organization calls on physicians to use their authority to lead mitigation, and protect public health [6]. Although GHG are a critical category of emissions that threaten human health and society [6], there are several other categories of environmental pollution important to consider.

Chemical pollution

Each year, the US produces or imports nearly 860 million tons of chemicals [8–10]. Pharmaceutical and industrial chemical pollutants have become widespread in the environment and food chains, and are also found in humans. Unlike pharmaceuticals, current regulation of industrial chemicals in the United States is covered under the Toxic Substance Control Act of 1976 and does not require safety testing before introduction into the marketplace. The Centers for Disease Control and Prevention only recently began

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