Exposure to wildfire smoke may affect patients undergoing surgery

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Nearly 100 wildfires are currently raging throughout the country,
burning more than 2 million acres. The rising frequency of these fires poses a special concern for anesthesiologists—the potential for increased rates of adverse outcomes from anesthesia and surgery among patients exposed to wildfire smoke, according to a special article in the Online First edition of *Anesthesiology*.

"Wildfire smoke causes inflammation and is known to worsen heart and lung disease and pregnancy outcomes," said senior author Vijay Krishnamoorthy, M.D., M.P.H., Ph. D., chief of the Critical Care Medicine Division and associate professor of anesthesiology and population health sciences at Duke University School of Medicine in Durham, North Carolina. "At a time of rising global exposure, anesthesiologists need to be equipped to manage the potential adverse effects of wildfire smoke exposure on perioperative outcomes."

Over the past two decades, about 60% of countries have experienced increased wildfires and smoke exposure. Wildfire smoke contains a complex mix of fine particles and chemicals producing inflammation and oxidative stress (low antioxidant levels). Once inhaled, particles enter the circulatory system and can damage the heart, lungs and other organs.

Inhaled particles can also injure the lining of blood vessels (endothelium), as well as activate platelets and inflammatory cells and clotting abnormalities in small blood vessels. Exposure to fine-particle air pollution has documented effects on cardiovascular disease, including heart attack, heart rhythm abnormalities, heart failure, and stroke.

All these factors lead to increased rates of underlying health conditions (comorbidity) among patients undergoing surgery. A previous study in *Anesthesiology* reported that among young children with asthma-like symptoms, risk for adverse respiratory events under anesthesia is increased during periods of poor air quality due to wildfire smoke.
"Wildfire smoke poses significant health risks, particularly in people with pre-existing heart and lung disease, obese patients, infants and young children, and other vulnerable groups," said Dr. Krishnamoorthy. "We hope our paper will inform anesthesia clinicians about the potential impact of wildfire smoke on patient outcomes, and the urgent need for information and action to better understand and manage these risks."

In general, little is known about how wildfire smoke negatively affects the risks of anesthesia and surgery. Key knowledge gaps include a lack of information on the broader impacts on patient outcomes—which might be addressed by linking geographic smoke exposure data to databases that include surgical outcomes. Dr. Krishnamoorthy's research group is developing a mathematical model to better understand the effects of exposure to high levels of particulate pollutants.

This and other lines of research may enable anesthesiologists to develop guidelines for assessing and managing the risks to patients scheduled for surgery who have been exposed to wildfire smoke. For example, adjusting the timing of surgery based on predicted levels of wildfire smoke exposure might provide a way to improve outcomes and reduce complications in patients at risk.

More information: Impact of Wildfire Smoke on Acute Illness, Anesthesiology (2024).

Provided by American Society of Anesthesiologists

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