

News and Perspectives

As Wildfires Rise Across the West, New Tools Aim to Protect At-Risk Populations

Virginia Gewin, JMIR Correspondent

Abstract

Wildfire frequency and intensity continues to increase in California, putting vulnerable populations at increased risk of adverse health outcomes. In this *News and Perspectives* article, JMIR Correspondent Virginia Gewin reports on a proactive initiative by UC Davis Health physicians to mitigate that risk.

Key Takeaways:

- After multiple California wildfires, physicians developed a proactive strategy to prevent adverse health outcomes among at-risk patients.
- The Population Health Wildfire Preparedness and Management model identifies at-risk populations via electronic medical records and sends tailored information and alerts in response to Air Quality Index triggers.
- The model is expanding to other University of California Health Centers as well as Kaiser Permanente.

When the [2018 Camp fire](#) destroyed the entire city of Paradise, California—killing 85 people and decimating over 18,000 structures—it signaled the unfortunate dawn of a new normal.

As luck would have it, Brooks Kuhn, MD, MAS in clinical research, associate professor of clinical medicine at UC Davis Health, had launched a dedicated chronic obstructive pulmonary disease (COPD) clinic in 2018. As ash rained down on cars and the Air Quality Index crept up into a danger zone, Kuhn's patients were miserable. "We were caught handing out prednisone and dealing with the downstream effects," he says. In that dire circumstance, "we weren't helping them any more than primary care could do."

That was just the beginning. Between 2018 and 2021, six of the state's [most destructive wildfires](#) took place in the same region of central and northern California. Smoke from burning trees contains a cocktail of tiny particulates, nitrogen dioxide, carbon monoxide, and trace minerals. But fires that engulf urban areas add a wider array of chemicals from burned buildings, cars, plastics, and all the other toxic trappings of life. As fires became more prevalent, Kuhn and colleagues began brainstorming how best to respond. "We have to get proactive, not reactive," he said.

For those with asthma and COPD, the most at-risk populations, repeat exposures to poor air quality can prove deadly. [One study](#) in Spain found that the frequency of COPD flare-ups involving shortness of breath or heavy cough dramatically lowers survival probability over time. "Over one's life span, the long-term effect is inflammation of the lung," says Reshma Gupta, MD, MSHPM, chief of Population Health and Accountable Care at UC Davis Health. "We felt an urgent need for safety," she says. And that meant

finding a way to arm patients with knowledge and tools—as soon as a wildfire erupts.

A team, led by Gupta and Kuhn, swiftly created the [Population Health Wildfire Preparedness and Management Model](#) to send tailored health information to at-risk patients as soon as the air quality worsens.

Identifying At-Risk Patients

UC Davis Health serves a patient population of over 6 million individuals. The region encompasses a long, flat valley, and includes counties that routinely have some of the worst air quality in the state, which correlates with the areas of lowest health as measured by the [Healthy Places Index](#).

The first step was to identify the most at-risk populations using a variety of well-validated medical registries. "We started with COPD and asthma," says Gupta. They developed a targeted risk model to predict who would likely end up in the emergency room due to respiratory-related symptoms during a wildfire. The model identified 1300 patients considered high-risk. Of those, the 300 super high-risk patients have an assigned care manager who can discuss how to build a do-it-yourself air filter or talk through worsening symptoms, how to increase or adjust medications, and when to go to the emergency room. They are also including patient registries of pregnant women and individuals with advanced cardiovascular diseases—reaching a total of 20,000 patients.

“

*We have to get proactive,
not reactive.*

Brooks Kuhn, MD, MAS

The model integrates air quality data from the US Environmental Protection Agency’s [AirNow](#) website into electronic medical records—as well as data from the Healthy Places Index for California zip codes. Validated population health methods are also used to mine clinicians’ notes to identify patients with COPD or asthma. The integrated data help identify patients in areas with the greatest exposure to active fires or smoke, and therefore the highest risk of disease exacerbation.

During May, which is Wildfire Awareness Month, at-risk patients receive messages providing, for example, recommendations of how best to maintain a clean room to preserve air quality in the home or instructions for “go bags” with appropriate medications and supplies. Once the Air Quality Index hits 100 in a specific location, at-risk patients can receive additional messages describing symptoms to be mindful of, including increasing cough and increasing or changing color of sputum, as well as information on local resources and safety measures to take to reduce adverse health outcomes.

Successes and Challenges

In a [recent presentation](#), Gupta reported on a recent survey the team conducted that found that 74% of respondents are aware of air quality index measurements. Prior to the 2018 Camp fire, Kuhn estimates very few, if any, patients had a clean room or an action plan, but awareness has significantly improved. The survey revealed that around 40% of the at-risk population now have a clean room.

“The main challenge we encountered was the granularity of air quality data,” says Gupta. “We couldn’t cover every

region with the data that was publicly available but it did give us enough information to take action that was clinically meaningful,” she says. Ground-based Environmental Protection Agency air monitors are quite expensive and therefore limited in scope.

The most vulnerable populations have been particularly difficult to identify. “One of the challenges has been defining the at-risk population,” says Kuhn. “When a COPD or asthma patient is in front of me, I can distinguish them all day long, but it’s really difficult from data alone,” he says. One reason it is so challenging is because diagnosis relies on pulmonary function tests—which many patients haven’t had because access can be limited—so misdiagnosis and missed diagnoses are common. “If we build rules that only identify people with pulmonary function tests, that’s a subtle bias against the most vulnerable population,” says Kuhn. Moving forward, they plan to integrate AI to more accurately identify patients.

Rapid Adoption

Kuhn and Gupta are now exploring how to expand the UC Davis model broadly across the entire UC Health system. Kuhn expects UCLA will have their system up and running this year. “The bottleneck is IT and executive support,” he says.

Kaiser Permanente is one of several other health systems building their own models. “We are actively developing our member alert system for wildfire smoke and heat,” says Laura Myers, MD, MPH, a research scientist at Kaiser Permanente Research, Northern California, and a pulmonary critical care physician. She expects it will be up and running in 2027—with the goal to expand to all of the geographic areas that Kaiser Permanente serves.

To get there, they have to tackle some technical challenges, such as the best platform to do the outreach and how to customize the alert thresholds across microclimates. For example, unlike the valley landscape that UC Davis serves, northern California is a diverse expanse of coastal and mountainous regions. “We have to be thoughtful about deciding alert thresholds because people might experience heat and air quality differently across the United States depending on the humidity level and access to adaptation measures such as central air conditioning,” she says.

They are also ensuring that the messages are written in plain language with actionable advice. “This is the way of the future in terms of trying to combine population health with public health. As extreme heat and poor air quality events from wildfires only get worse in the coming years, it’s going to be important to have a system up and running to help patients be able to protect themselves,” says Myers.

Keywords: wildfires; air pollution; air quality; preventive medicine; population health; public health; vulnerable populations; electronic health records; risk assessment

Please cite as:

Gewin V

As Wildfires Rise Across the West, New Tools Aim to Protect At-Risk Populations

J Med Internet Res 2026;28:e107243

URL: <https://www.jmir.org/2026/1/e107243>

doi: [10.2196/107243](https://doi.org/10.2196/107243)

© JMIR Publications. Originally published in the Journal of Medical Internet Research (<https://www.jmir.org>), 24.Jul.2026