Wildfire exposure and health care use among people who use durable medical equipment in Southern California

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Background: Climate change-induced wildfires cause trauma, stress, and injury in affected communities, while exposing 70% of the US population to smoke particulate matter (PM2.5) annually and exacerbating cardiorespiratory disease. Few studies examine wildfire smoke exposure in vulnerable populations, and none evaluate residence near a fire.

Methods: We identified 236,732 Kaiser Permanente Southern California members who used electricity-dependent durable medical equipment (DME). DME use is associated with respiratory illness and disability, indicating vulnerability to smoke exposure and difficulty evacuating disaster zones. Daily counts of outpatient, inpatient, and emergency healthcare visits made by DME users from 2016-2020 were linked with daily estimates of wildfire generated PM2.5  by residential ZIP code. We used historical maps to identify ZIPs within 20 km of the the 2018 and 2019 Getty and Woolsey fires. We performed negative binomial regression analyses using direct and lagged effects of wildfire PM2.5 and difference-in-differences analyses to evaluate the association between direct wildfire exposure and health care visit frequency. We adjusted for temperature, temporal effects, non-wildfire PM2.5, and spatial confounders.

Results: Residence within 20 km of the Woolsey Fire was associated with fewer outpatient and more inpatient visits (RR = 0.98, 95% CI: 0.78, 0.87, RR = 1.45, 95% CI: 1.01, 2.11), while Getty Fire evacuation exposure was not associated with visit frequency. In contrast, increases in wildfire PM2.5 were associated with small and constant increases in outpatient visits 2-6 days after a change. Wildfire PM2.5 was not associated with frequency of inpatient or emergency visits at any lag.

Conclusion: DME users, presumed vulnerable to wildfire smoke exposure, may have sheltered in place during fires or took other precautions. However, the Woolsey Fire (which was 10 times larger than the Getty) may have produced health concerns in those directly affected when evacuation was necessary and sheltering in place impossible.