CLIMATE CHANGE AND HEALTH

Health Care System Adaptation and Resilience During the Wildfire Crisis

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The catastrophic wildfires that devastated Los Angeles County in January 2025 represent an unprecedented convergence of extreme weather conditions and urban vulnerability. Within a span of hours, the Palisades and Eaton fires, propelled by record-breaking Santa Ana winds reaching 150 miles per hour, consumed more than 37 000 acres, destroyed more than 16 000 structures, and claimed 29 lives.[1,2] All told, greater than 186 000 residents were placed under evacuation orders.[2,3] The increasing frequency and severity of wildfires present unprecedented challenges to health care delivery systems, particularly in regions prone to these disasters.[4] Staffing shortages, burnout, and disaster fatigue are all exacerbated and emergency preparedness remains problematic for resource-constrained health systems with thin operating margins.[4] This analysis examines critical components of health care system response during wildfire emergencies, offering evidence-based recommendations for institutional preparedness and adaptation.

The Kaiser Permanente Southern California regional command center activated in the early afternoon of January 7, 3 hours after the Palisades fire reportedly began. Early activation proved beneficial for (1) monitoring dynamic situations (eg, patient surge, staffing issues, air quality needs, evacuation orders) at the 4 Kaiser Permanente Southern California service areas that serve the communities most affected by the wildfires; (2) rapid decision-making regarding mobilization of resources to assist with on-site medical support at evacuation and resource centers throughout the county; (3) tracking affected staff in an effort to rapidly deploy financial assistance and wraparound care programs; and (4) ensuring consistent communication and messaging to patients, staff, and surrounding communities based on coordinated media surveillance and information-gathering efforts.

In the early days of the incident, the 2 major fires remained difficult to control, and multiple fires arose throughout the county, resulting in frequent expansion and contraction of evacuation areas. Nearby fires fueled rumors among the medical community regarding impending hospital evacuations. Coordinated communication directed toward staff was effective at stemming these rumors, potentially preventing staffing shortages. However, a lack of consistent coordination between county officials and the different health care organizations prompted ultimately unnecessary decompression strategies in anticipation of potentially absorbing large volumes of evacuated patients from nearby medical centers.

Traditionally, public sector–managed incident response briefings are restricted to public service departments. However, given the outsized role the medical community often plays during the initial phase of large-scale incident response, it may be more efficient to formally include representatives from local health care systems under the auspices of Emergency Support Function #8 as outlined in the National Response Framework.[5] This procedure would improve coordination of response and provide a more accurate assessment of needs through the engagement of the clinicians caring for evacuated patients in shelters, as well as managing incident-related patient surge in both inpatient and ambulatory settings.[6]

The integration of real-time monitoring systems, such as specialized wildfire tracking applications, has emerged as a crucial tool for both decision-making and staff safety management. These technologies enable health care facilities to anticipate patient surge patterns and manage staff availability while ensuring that personnel can monitor threats to their own residences, thereby maintaining workforce well-being and stability.

Successes

The experience in Los Angeles County demonstrates the value of maintaining dual-purpose resources: facilities and personnel who can transition between routine operations and emergency response functions. This approach is exemplified by Kaiser Permanente's successful deployment of mobile health vehicles and the use of clinically trained administrative leaders in direct patient care roles during crisis events.[7]

Key elements of successful resource mobilization include
1. maintenance of readily convertible clinical resources;
2. integration of clinical professionals in leadership positions;
3. development of preestablished staff redistribution protocols; and
4. implementation of comprehensive employee support programs.

Kaiser Permanente was able to leverage and repurpose 3 unique components of its clinical and organizational structure to rapidly respond to the expanded medical needs. First, mobile health vehicles boasting indoor clinical space up to 46.5 m^2 and normally used at community health events were repurposed for acute care services and positioned to provide medical support at key evacuation center locations. Second, Kaiser Permanente elevates physicians and nursing staff to leadership roles at every level within its administrative structure. Physician leaders maintain a dual schedule, including both clinical practice and administrative responsibilities. They had both the skills and opportunity to rapidly transition to providing volunteer medical services on-site at the Pasadena Convention Center evacuation shelter and in the mobile health vehicles. Third, Kaiser Permanente has a large network of clinicians spread across Northern and Southern California, as well as 6 additional regions across the country, which provided a vast pool of additional volunteer clinicians from outside the affected area. Redistribution of these resources was integral to Kaiser Permanente's ability to rapidly respond and support the medical needs of the community.[7]

Clinical Service Delivery Innovation

The wildfire crisis necessitated innovative approaches to clinical service delivery, particularly in addressing the needs of displaced populations. The establishment of 24-hour medical services within evacuation centers, including comprehensive clinical assessment, pharmacy services, and mental health support, proved essential in managing both acute and chronic health care needs while reducing burden on emergency departments.[8]

Several critical innovations emerged:

1. Integration of psychological first aid at all service points
2. Establishment of respite centers for health care workers and first responders
3. Development of mobile pharmacy services for displaced populations
4. Implementation of infection control protocols in temporary care settings

On the morning of January 10, 2025, at the request of local public response agencies, Kaiser Permanente and AltaMed (a community health network) each established on-site medical services inside the Pasadena Convention Center, the largest wildfire evacuation shelter, which was housing 900 evacuees. With the support of more than 400 volunteers from its Northern and Southern California regions, Kaiser Permanente provided comprehensive services, including 24-hour physician and nursing coverage, as well as daytime pharmacy, mental health, and chaplain services. This program remained operational for 18 days until the American Red Cross and International Medical Corps were able to mobilize enough staffing resources to take over this critical community service. In that time, Kaiser Permanente clinicians amassed 1389 patient encounters, including 119 infectious disease isolation cases (48 COVID-19 cases, 50 gastrointestinal illness cases, and 21 influenza cases). Only 46 (3.3%) of those 1389 patients required transport to local emergency departments. As infectious disease cases became apparent, Kaiser Permanente infection prevention specialists worked diligently on-site with AltaMed, local Department of Public Health officials, and the American Red Cross to isolate patients and adjust infection control practices within the shelter.

Kaiser Permanente mobile health vehicles, which also provided on-site physician and nursing care, were operational for 8-hour daytime shifts at various locations throughout Los Angeles County. Mobile health vehicle services added an additional 397 patient encounters.

Finally, starting on January 11, 2025, the first 2 floors of Kaiser Permanente's Pasadena headquarters were converted into a community support center for first responders, shelter volunteers, and affected community members and families. This center provided food and respite services to 266 visitors during a 2-week period before transitioning the space into the Voluntary Organizations Active in Disaster resource hub.

Kaiser Permanente is a national health care organization with 8 regional markets comprising 40 hospitals and greater than 600 medical office buildings internally staffed with more than 240 000 employees. This staffing includes in excess of 76 000 nurses and 25 000 physicians of various medical specialties.[9] Kaiser Permanente operates in compliance with federal and state oversight regulations, including those from the Centers for Medicare & Medicaid Services.[10]

Some aspects of Kaiser Permanente's incident response, such as the ability to rapidly mobilize large numbers of clinically trained volunteers to staff several community aid platforms during an extended period, can be partially attributed to its size and access to organizational resources. Other aspects, such as the ability to rapidly establish mobile and on-site multispecialty medical care and transportation services, are a function of its comprehensive vertically integrated structure. However, most successful incident response strategies discussed here can be replicated by health care organizations of all sizes.

Challenges

Organizational Framework and Communication Systems

Health care organizations must develop robust and redundant communication infrastructures that support both internal operations and external interagency coordination.[5,11] The implementation of early incident command systems at facility and regional levels is essential for maintaining operational coherence.[4] Effective communication frameworks serve 3 critical functions: information gathering, message consistency, and rumor management. However, the current paradigm of closed incident briefings may impede optimal resource allocation and coordination among health care clinicians.[6]

Interorganizational Coordination

Current frameworks for health care system coordination during disasters reveal significant gaps, particularly in the management of patient transfers from skilled nursing facilities and long-term care centers.[4] A 2023 survey by the US Department of Health and Human Services Office of Inspector General found that of the 199 nursing homes randomly sampled, 153 (77%) reported challenges in emergency preparedness, including 99 (50%) reporting evacuation to suitable facilities as a challenge.[12] Despite this finding and federal reforms aimed at improving nursing home emergency response,[12,13] many long-term care residents were nevertheless evacuated to settings that were poorly equipped to address their complex needs.[13] Failure to activate established mass casualty incident transportation protocols for facility evacuations led to suboptimal patient distribution patterns, placing a disproportionate burden on a few nearby hospitals. Many other long-term care residents initially were transferred to evacuation shelters without adequate resources to maintain their medical needs until incident responders were able to find alternative placement options.[4]

Although incident-specific factors such as high stress and limited destination availability played a role, the outcome may also be indicative of knowledge gaps among facility staff and transport personnel regarding proper recognition of facility evacuations as mass casualty events and the understanding that coordination is necessary to ensure that assistance capabilities at evacuation destinations match or exceed those of the evacuating facility.

Infrastructure Resilience

Health care facilities in wildfire-prone regions must develop robust infrastructure adaptation strategies, particularly concerning power supply management and air quality control systems. The experience demonstrates the critical importance of maintaining sufficient backup energy sources and environmental control systems in inpatient, ambulatory, and long-term care settings.[4,8,12,13]

Federal Emergency Management Agency
Recent media reports suggest that the Federal Emergency Management Agency should be eliminated or restructured. Although total elimination would likely create insurmountable challenges, an adjusted response and funding model could enhance disaster resilience at the local level, strengthening the initial incident response while maintaining the scalability of the agency.[14]

Recommendations

In accordance with this analysis, we propose several policy recommendations.

Develop formal agreements. Health care systems should establish preincident memoranda of understanding with county medical offices and emergency response organizations to streamline resource deployment during crises.

Enhance cross-training programs implementation involving county agencies, the American Red Cross, and local health care systems to ensure consistency in evacuation shelter operations and transitions. Inclusion of health care systems in regular multiagency planning and in tabletop and full-scale drills should be prioritized.

Standardize crisis response protocols development for staff redistribution and facility evacuation, including clear triggers for implementation and chain-of-command structures.[4]

Prioritize infrastructure investment focusing on power reliability and environmental control systems in health care facilities within high-risk zones.

Conclusions

Future health care system preparedness efforts should concentrate on developing formal cross-organizational agreements, enhancing training programs, and implementing standardized crisis response protocols. These improvements, combined with strategic infrastructure investments, will enhance health care system resilience in the face of increasing environmental challenges.

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