




Concepts in Disaster Medicine

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Utilization of Alternate Care Sites During the COVID-19 Surge and Mass Care: California, 2020–2021

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Abstract

The coronavirus disease (COVID-19) pandemic caused critical hospital bed and staffing shortages in parts of California for most of 2020 and 2021. Alternate Care Sites (ACS) were established in several regions to alleviate the hospital patient surge and to maximize staffed bed capacity. Over 1900 patients were successfully provided medical care (with physician, nursing, respiratory therapy, oxygen, and pharmacy services) in relatively austere settings. This paper examines the challenges faced at these ACS facilities and how adaptations were incorporated according to the changing dynamics of the COVID-19 pandemic to successfully manage higher acuity patients. ACS facilities were 1 approach to California's surge of COVID-19 patients, despite limited medical supplies and staffing.

In February 2020, COVID-19 case numbers were rising and the state of California was the first to receive and manage a large group of exposed and infected patients from a cruise ship.¹ The Emergency Medical Services Authority (EMSA) and its disaster medical branch, the California Medical Assistance Teams (CAL-MAT), working closely with the Governor's Office of Emergency Services (Cal OES), began to formulate and activate strategic plans for Alternate Care Sites (ACS) throughout the state in anticipation of a medical surge. Historically, the ACS model had been unofficially employed in the United States following several large-scale public health emergencies, notably in several cities severely impacted by the 1918 influenza pandemic when citizens and voluntary organizations repurposed abandoned and other non-health care buildings as temporary emergency influenza hospitals.^{2,3} The terrorist attacks of 9/11 triggered expansion of hospital surge capacity and enhancement of community care capacity for all-hazards preparedness and formally defined a new model for ACS. In 2008, the California Department of Public Health produced guidelines further defining government-authorized ACS services during large-scale public health emergencies: "In California, a government-authorized Alternate Care Site is defined as: A location that is not currently providing healthcare services and will be converted to enable the provision of healthcare services to support, at a minimum, inpatient and/or outpatient care required after a declared catastrophic emergency."^{2,4}

ACS locations were identified as suitable by the state through evaluation of available state and local land resources. Some ACS locations were utilized more robustly than others, with patient censuses ranging from 25 for the short-term mission to treat cruise ship passengers, to 569 in Imperial County. By the end of February 2021, the ACS and CAL-MAT had cared for approximately 1900 patients [Table 1]. This is in stark contrast to the underutilization of many of the ACS in other parts of the United States, in part due to stringent admission criteria.^{4–7}

The primary goal of ACS operating in California during 2020–2021 was to provide medical ward level support in order to decompress hospitals overwhelmed by a large number of critically ill COVID-19 patients. By early 2021, there were 5 ACS in California, utilizing repurposed hotels, gymnasiums, and previously shuttered state-owned government long-term care facilities, located from Northern California to the southern border of the state. The state spans 163 696 square miles (423 970 square kilometers) and is home to a population of nearly 40 million residents.

This article describes the challenges of providing medical care and shelter during the COVID-19 pandemic in a variety of non-traditional settings. The key to the success of an ACS is the adaptability of the model to accommodate challenges outside of the infrastructure

Table 1. Totals of Treated Patients at California CAL-MAT ACSs 2020–2021

ACS Location	COVID-19 ACS		
	Total Patients Treated	Start Date	End Date
Asilomar Hotel	25	3/10/20	3/29/20
San Mateo	85	3/10/20	6/24/20
Imperial 1	213	5/18/20	8/22/20
Imperial 2	356	10/30/20	4/23/21
Imperial Total:	569		
Fairview 1	114	4/18/20	9/30/20
Fairview 2	219	12/15/20	3/17/21
Fairview Infusion Clinic	224	1/31/21	3/10/21
Fairview Total:	557		
Porterville 1	102	6/30/20	9/15/20
Porterville 2	104	12/14/20	3/17/21
Porterville Infusion Clinic	30	1/28/21	2/27/21
Porterville Total:	236		
Sleep Train 1	9	4/18/20	7/1/20
Sleep Train 2	187	12/9/20	3/21/21
Sleep Train Infusion Clinic	45	2/5/21	3/19/21
Sleep Train Total:	241		
Palomar	188	12/21/20	6/15/21
ACS Total:	1901		

of hospital environments.^{6–9} The goal of this paper is to provide communities with a model to effectively manage a surge of patients in order to decompress hospitals. By employing an adaptive model that can respond in a timely manner to an evolving public health emergency, care providers and response agencies can maximize the utility of ACS resources in disaster and pandemic settings.

Discussion

In February 2020, the Asilomar Hotel and Conference Grounds in northern California became California's first ACS to serve the needs of Grand Princess cruise ship passengers requiring isolation or quarantine.¹ Staffing was provided by CAL-MAT members, volunteer medical professionals who become temporary state employees when deployed. They rapidly created observation, surveillance, isolation, and supportive care protocols and standards, laying the foundation for future COVID-19 ACS operations.^{8,10} Importantly, at this time in early 2020, personal protective equipment (PPE), COVID-19 testing, and therapeutic treatments were severely limited or non-existent.

Following the Asilomar mission with the Grand Princess passengers, the need for additional ACS locations became evident. ACS were located in a variety of existing, often vacant structures, including 2 gymnasiums with patient beds in large communal spaces. Another ACS operated in a repurposed hotel, where each patient had her and his own private room. Two additional ACS were in previously shuttered residential state facilities, with hospital-style wards and semi-private rooms.

Four other sites were opened due to rising infections throughout California. The San Mateo ACS opened in late April 2020, followed by the Porterville, Fairview (Orange County), Sleep Train (Sacramento-State Operation), and Imperial County ACS (Figures 1–4). Upon request, CAL-MAT and EMSA also

assisted facilities with staffing, erecting surge tents on hospital grounds, as well as the establishment of Federal Medical Stations. As variability shifted in the surge of COVID-19 cases and hospital bed shortages in regions, some ACS were transitioned to a “warm closure” with minimal staff and supplies on standby (see Warm Closure below). The overall infrastructure of the ACS was maintained in the event that reopening was necessary due to surge needs. As cases of COVID-19 accelerated in the summer and fall of 2020, the ACS sites reopened within 72 hours, which permitted expeditious resumption of operations.

Admission Criteria

Patient selection is important to appropriately and safely care for ACS patients with limited staffing and resources. Original ACS plans suggested ACS use for ambulatory, low-acuity discharged patients to support their isolation and/or medical needs prior to returning home. However, California's initial ACS admission criteria were found to be too restrictive, requiring COVID-19 patients to be ambulatory, noncombative, with no wound care needs, and less than 4 liters per minute (LPM) of oxygen to maintain oxygen saturation above 94%. This proved insufficient to alleviate the hospitals' overcapacity due to the high acuity of COVID-19 patients. Less stringent admission criteria, as well as treatment protocols for higher acuity patients, were quickly developed to accommodate the treatment of more acutely ill COVID-19 patients while maintaining patient safety.

Patients were referred from local hospitals, emergency departments and clinics, with transportation coordinated through a centralized state dispatch transfer center. The majority of these patients were unable to be discharged home because of an ongoing need for oxygen therapy, or because skilled nursing facilities required consecutive, negative COVID-19 polymerase chain reaction test results during the early months of the pandemic. Some patients were unable to complete COVID-19 isolation at home with a private bathroom, were unable to secure in-home care services or home oxygen, or had other complicating medical needs preventing discharge. Some had lost their bed in a skilled nursing facility, their family refused to take them back for fear of contagion, or they had pre-existing homelessness. The shelter needs of patients who were inadequately housed or experiencing homelessness presented additional challenges for discharge coordinators resulting in prolonged inpatient stays at the ACS beyond medical need.

The variety of patient needs, the evolving science for COVID-19 treatment, and the changing intensity of the pandemic required a very flexible approach to admission standards, care provided, and discharge strategies. As the pandemic worsened, the criteria for admission were expanded to permit patients receiving higher levels of oxygen at the time of hospital transfer, from 4 LPM up to 10 LPM. As the need grew for COVID-19 patients on dialysis, further adjustments were made to accommodate these patients as well.

Population Served

The patient population profile primarily consisted of uninsured, low-income adults. Latinos are the largest ethnic minority group in California and Spanish was often the primary language spoken. However, patients from a variety of countries necessitated interpretation and translation services. Some patients also had culturally specific dietary needs or preferences, which initial meal planning did not adequately accommodate. For example, a patient

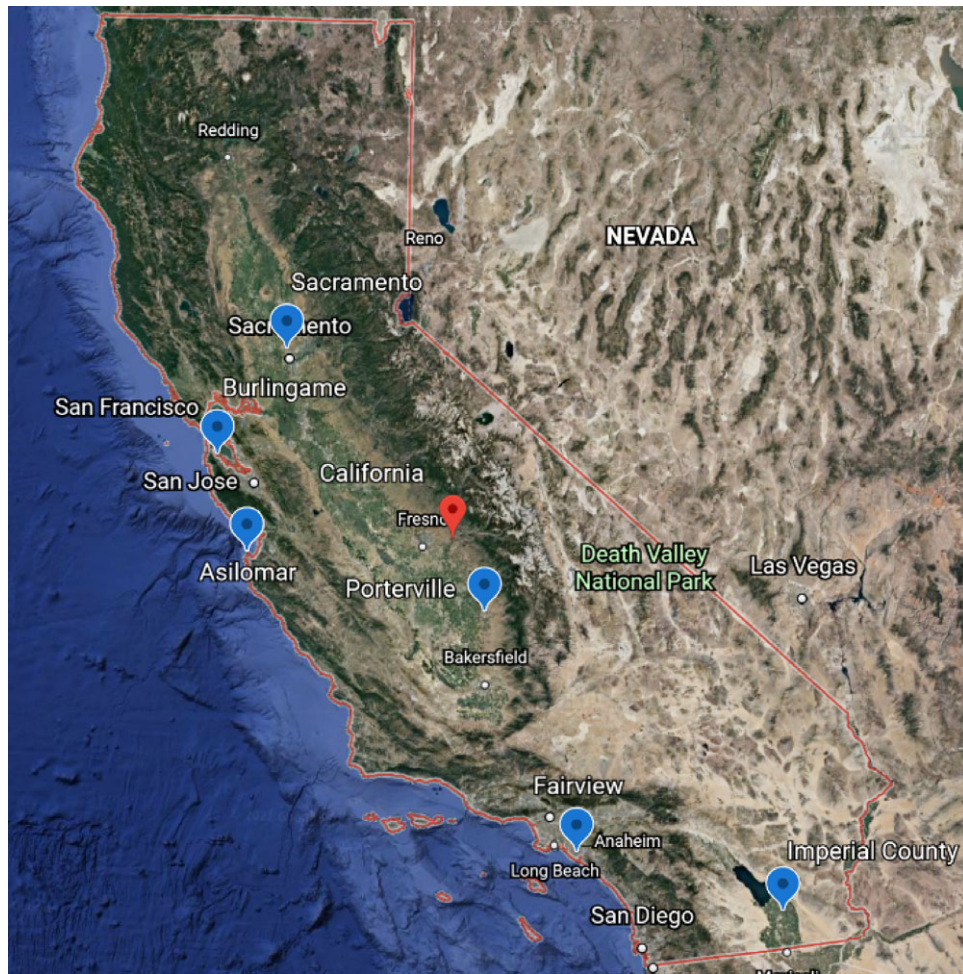


Figure 1. Alternate care site locations in California, 2020.



Figure 2. Fairview 2021.



Figure 3. Imperial Valley College ACS 2021.

from the Middle East at the Fairview ACS was losing weight due to distaste for the regular ACS food and a desire for traditional foods. There were many requests for meals cooked from home by patients, but because of COVID-19 exposure and transmission

risks to families, the sites were not open to public visitation. Therefore, a solution for home-cooked meals was arranged with the contracted food caterer. Patients' families brought meals to the caterer's place of business, then the caterer transported the



Figure 4. Imperial Valley College ACS 2021.

family meals in the delivery vehicle to the ACS along with other contracted meals. Among those patients who took advantage of this option, nutritional intake, emotional, and other psychological outcomes were significantly improved.

Care Provided in the ACS

One of the greatest challenges for the ACS in California was defining the niche for medical care that could be practically and safely provided in an environment with fewer resources than a traditional hospital. The main care provided was pulmonary rehabilitation, with hypoxemia as the primary COVID-19 issue requiring ongoing medical support. Oxygen and individualized weaning plans were developed. Close monitoring for oxygen desaturation was a care priority since some patients experienced worsening hypoxia that necessitated emergent hospital transfer by EMS, who were often present on site or readily available. At 1 ACS, up to 24% of patients required transfer to a hospital due to patient acuity on arrival at the site.¹¹ Respiratory therapists rounded at least once daily, walked patients to assess oxygen needs with activity, and provided nebulizer treatments when a safe outdoor setting was available to reduce aerosol exposure risk to providers working indoors.^{9,12}

Standard COVID-19 treatments including Remdesivir and steroids were administered according to clinical condition and hospital transfer orders. Some sites also later provided outpatient monoclonal antibody infusions for the newly diagnosed and/or mildly symptomatic COVID-19 patients who did not require hospitalization or ACS care. Over 300 outpatients were provided antibody treatment free of charge at the ACS, likely preventing numerous hospitalizations.^{10,13}

Another challenge was the lack of an electronic health record (EHR) in the setting of the ACS, leading by necessity to duplication of charts in the hot zone and the medical provider room. The implementation of an EHR in disaster or emergency settings is a goal for CAL-MAT and will increase efficiency and reduce the chance of medical error.

While many of the ACS care guidelines were based on standardized hospital care, some had to be developed *de novo* due to resource limitations. Because the ACS did not provide ventilator support, policies and procedures for transporting patients back to the hospital due to decreasing oxygen saturation were developed. Several sites established a contract provider to come to

the site upon request to provide radiological and laboratory services with results available online; however, results were often delayed for 1 to 2 days. ACS were also limited in their ability to evaluate new medical issues or fine-tune preexisting conditions. Despite this, diabetes and hypertension were managed at all ACS. The combination of a COVID-19 infection, steroid treatment, and (sometimes unknown) preexisting diabetes often resulted in difficult-to-control blood glucose levels. This necessitated the development of algorithms and protocols for managing blood glucose in the ACS setting. The Chief Medical Officers (CMOs—the physicians in charge of medical care at each site) shared their expertise and experience with each other to develop a common set of protocols for care across California's ACS. This ongoing collaboration maximized California's COVID-19 capacity to care for the greatest number of people.

Clinical Staffing

Providers included physicians, nurse practitioners, and physician assistants. Also essential were the ACS pharmacists and respiratory therapists, usually 1 per site. On occasion, behavioral health professionals were also on site and available by telehealth consultation. Discharge planners were critical in making sure that the clients could be safely discharged once their isolation and treatment process was concluded.

Contract providers and nurses from various agencies, as well as National Guard members, teamed with CAL-MAT clinical staff to provide care for patients. Paramedics often performed some tasks traditionally assigned to Registered Nurses (RNs), while Emergency Medical Technicians (EMTs) performed some tasks traditionally assigned to Certified Nurse Assistants (CNAs). At some ACS, the paramedics were authorized to administer medications and document in the Medication Administration Record (MAR). An expanded scope of practice for many providers was allowed under Governor Gavin Newsom's Executive Order of March 12, 2020,^{12,14} which was preceded by the Proclamation of a State of Emergency on March 4, 2020.^{13,15} The RN-to-patient ratio was lower in the ACS compared to traditional hospital settings due to limited availability of RNs. RNs supervised all para-professionals working in the ACS care units. Some ACS also received staffing assistance from local medical students, residents and fellows, state health care volunteers, state and National Guard members, military personnel from the USNS Mercy, the Commissioned Corps of the U.S. Public Health Service, and nongovernmental organizations. Staffing levels were determined by patient acuity, patient census, staff rest cycles, as well as staff absences. These numbers were adjusted frequently with the addition of cross-training, which enabled staff to carry out new tasks, depending on scope of practice and periodic staffing shortages, particularly for RNs. An example of 24-hour clinical and support personnel staffing for a 25-patient ward includes: 1 physician and 1 physician assistant (PA) or nurse practitioner (NP)/Advance Practice Registered Nurse (APRN), plus night shift staffing of 2 RNs plus 5 CNAs/Hospital Health Aides, and day shift staffing consisting of 2 RNs, 5 CNAs/Hospital Health Aides. The medical staff was supported by approximately 10 Mission Support Team (MST) personnel and Administrative Staff.

Staff arrived from many parts of the state and country, representing a variety of cultural and social backgrounds with different expectations. Many worked in a scope of practice new to them, with overlap between RNs and paramedics. Each site faced a

myriad of issues, such as scope of practice, staff-patient ratios, level of experience and training, and interpersonal staff dynamics that required continuous novel solutions. Regular communication and discussion of staffing issues with ongoing collaboration and the support of the state agency made it possible to address these issues in constructive ways while maintaining a high standard of medical care and endeavoring to sustain staff morale.

Joint Command Relationships

Unlike traditional hospital care, the ACS depends on strong partnerships with local emergency medical service (EMS) agencies, California Department of Public Health (CDPH), and Cal OES, that aided in the transportation, testing, pre-arrival, and post-disposition care of COVID-19-infected patients. Each of these entities is accustomed to functioning independently with its own missions and protocols. Defining and pursuing common goals at the ACS were necessary for success in the non-traditional medical environment with a prolonged operational status. Maintaining open and respectful lines of communication while adhering to Incident Command System (ICS) fundamentals with dual operational and medical leadership (the CMO and the MST) working in a model of unified command created a shared and effective framework of authority for the organizational structure.

Environmental Challenges

The ACS faced numerous unexpected environmental issues due to the non-traditional settings, aged infrastructure, and supply limitations. Several were housed in buildings constructed in the 1950s and experienced recurrent problems with water, heating, cooling, and electricity essential for maintaining patients using oxygen concentrators. Power outages were common. Dedicated safety officers at each site worked diligently to minimize the risks of overloading electrical circuits and potential electrical fires while securing on-site backup electrical generators and developing appropriate emergency response plans for managing power failures. Older plumbing at 1 facility led to recurrent waste-water flooding, necessitating rapid responses for evacuation and relocation of all patients to other unaffected wards. When needed, staff were able to execute transfers of patients using oxygen. At times, oxygen shortage was critical due to the limited supply of oxygen cylinders.¹² During a period when oxygen was in especially short supply statewide, the respiratory therapists and providers created innovative solutions to mitigate this shortage.^{9,12} All of these ongoing challenges required timely collaboration and mitigation strategies to maintain patient safety. Adhering to ICS and communication pathways resulted in clear and responsive decision-making processes followed by rapid implementation.

Because the ACS facilities were caring for people with active COVID-19 infections, it was also critical to set up and maintain strict PPE donning and doffing procedures. One site had a dedicated safety officer in charge of the donning and doffing station, to make sure that safe procedures were followed.

Closing Facilities—Warm Versus Cold Closures

The Federal Healthcare Resilience Task Force Alternate Care Site Toolkit defines a warm closure as operationally unused and ready for a COVID-19 medical surge capacity response.^{14,16} The ACS Toolkit identifies 2 options for warm closure: The first option is to “Preserve in Place” which is how the various ACS in California

were temporarily shuttered in a warm closure status. The second option is to “Store to Surge” when the agencies involved disassemble the site and store the medical equipment for future rapid activation. In the context of a fluctuating pandemic, the flexibility provided by warm closures enabled CAL-MAT to quickly respond to regional hospital patient overflow during surges. Three of the 5 ACS were put in warm closure between peak surges of the pandemic, then reopened as the pandemic increased the burden on hospitals. One example was the Sleep Train Arena ACS in Sacramento, which was reopened within 72 hours after a warm closure on December 7, 2020. Medical equipment was inventoried and stored in the main arena, which is in close proximity to the patient care area of 65 beds. This allowed the first patient to be admitted within 4 days after reopening with 187 total patients subsequently admitted to the facility. In a “cold closure,” all equipment is removed and the site is vacated.

Cost

According to an Associated Press request for information from the Department of Finance and General Services of the Health and Human Services Agency, California spent US \$43 million to establish and run 8 sites, US \$48 million to hire contract employees, and US \$96 million to operate ACS from 2020–2021. This equates to approximately US \$98 369.27 per patient compared to the cost of US \$89 874 to US \$155 619 for an average COVID-19 patients hospitalized for 6 to 10 days. Mortality and long-term benefits of the ACS have yet to be determined due to difficulty with follow-up of the population managed within the ACS.

Conclusion

While it cannot be proven that the ACS prevented mortality that would have occurred in overburdened medical systems, the California ACS were successful in off-loading hospitals and skilled nursing facilities by effectively and safely providing pulmonary support before discharge to home or other care facilities. California’s ACS experience during 2020–2021 pandemic surge cycles demonstrates the critical importance of a resilient and creative team ready to address daily challenges by operating within a clearly defined command structure capable of rapidly executing necessary changes. Through close team collaboration, clear and redundant communication strategies, and problem solving, all patients were provided with the additional medical support needed for their COVID-19 diagnosis and treatment. Whether ACS will remain an effective long-term surge strategy for pandemics requires further assessment and prospective evaluation.

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References

1. Moriarty LF, Plucinski MM, Marston BJ, *et al.* Public health responses to COVID-19 outbreaks on cruise ships—worldwide, February–March 2020. *Morb Mortal Wkly.* 2020;69(12):347–352. doi: [10.15585/mmwr.mm6912e3](https://doi.org/10.15585/mmwr.mm6912e3)
2. Stetler C. The 1918 Spanish influenza: three months of horror in Philadelphia. *Pennsylvania History: A Journal of Mid-Atlantic Studies.* 2017;84(4):462–487. doi: [10.5325/pennhistory.84.4.0462](https://doi.org/10.5325/pennhistory.84.4.0462)
3. Jones MM. The American Red Cross and local response to the 1918 influenza pandemic: a four-city case study. *Public Health Rep.* 2010; 125(Suppl 3):92–104. doi: [10.1177/00333549101250S312](https://doi.org/10.1177/00333549101250S312)
4. Standards and Guidelines for Healthcare Surge During Emergencies: Volume II: Government-Authorized Alternate Care Sites. California Department of Public Health. Published 2007. Accessed July 20, 2021. https://www.cidrap.umn.edu/sites/default/files/public/php/258/258_acs.pdf
5. Kadri SS, Sun J, Lawandi A, *et al.* Association between caseload surge and COVID-19 survival in 558 U.S. hospitals, March to August 2020. *Ann Intern Med.* Published online July 6, 2021. doi: [10.7326/M21-1213](https://doi.org/10.7326/M21-1213)
6. Mathews K, Podlog M, Greenstein J, *et al.* Development and implementation of an alternate care site during the COVID-19 pandemic. *Cureus.* 2020;12(10):e10799. doi: [10.7759/cureus.10799](https://doi.org/10.7759/cureus.10799)
7. Bell SA, Krienke L, Quanstrom K. Alternate care sites during the COVID-19 pandemic: policy implications for pandemic surge planning. *Disaster Med Public Health Prep.* Published online July 23, 2021. doi: [10.1017/dmp.2021.241](https://doi.org/10.1017/dmp.2021.241)
8. Maslanka M, Carlson JC, Gershanik E, *et al.* Unconventional care at a convention center: an overview of patient focused care at a COVID-19 alternative care site in New Orleans. *Disaster Med Public Health Prep.* Published online May 3, 2021. doi: [10.1017/dmp.2021.138](https://doi.org/10.1017/dmp.2021.138)
9. Baughman AW, Hirschberg RE, Lucas LJ, *et al.* Pandemic care through collaboration: lessons from a COVID-19 field hospital. *J Am Med Dir Assoc.* 2020;21(11):1563–1567. doi: [10.1016/j.jamda.2020.09.003](https://doi.org/10.1016/j.jamda.2020.09.003)
10. Mayberry R. Cal OES provides update on state alternative care sites. Cal OES News. Published July 1, 2020. Accessed July 20, 2021. <https://news.caloes.ca.gov/cal-oes-provides-update-on-state-alternative-care-sites/>
11. Meghoo C, Zhang FW, Staats KL, *et al.* Reduction in hospital transfers at a US COVID-19 alternate care site: maintaining surge capacity support in Imperial County, California. *Disaster Med Public Health Prep.* 2021 [forthcoming].
12. Devereaux A, Backer H, Salami A, *et al.* Oxygen and ventilator logistics during California's COVID-19 surge—when oxygen becomes a scarce resource. Published August 16, 2021. Accessed July 20, 2021. <https://doi.org/10.1017/dmp.2021.267>
13. Bariola JR, McCreary EK, Wadas RJ, *et al.* Impact of bamlanivimab monoclonal antibody treatment on hospitalization and mortality among nonhospitalized adults with severe acute respiratory syndrome coronavirus 2 infection. *Open Forum Infect Dis.* 2021;8(7):ofab254. doi: [10.1093/ofid/ofab254](https://doi.org/10.1093/ofid/ofab254)
14. Governor Gavin Newsom. *Executive Order N-25-20.* Sacramento, CA: Executive Department State of California; March 12, 2020.
15. Governor Gavin Newsom. *Proclamation of a State of Emergency.* Sacramento, CA: Executive Department State of California; March 4, 2020.
16. Federal Healthcare Resilience Task Force. Alternate Care Site (ACS) Toolkit: Third Edition. *ASPR TRACIE.* U.S. Department of Health & Human Services. Published 2020. Accessed July 20, 2021. <https://files.asprtracie.hhs.gov/documents/acs-toolkit-ed1-20200330-1022.pdf>