

## The Prospect of Using Alternative Medical Care Facilities in an Influenza Pandemic

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**Alternative care facilities (ACFs) have been widely proposed in state, local, and national pandemic preparedness plans as a way to address the expected shortage of available medical facilities during an influenza pandemic. These plans describe many types of ACFs, but their function and roles are unclear and need to be carefully considered because of the limited resources available and the reduced treatment options likely to be provided in a pandemic. Federal and state pandemic plans and the medical literature were reviewed, and models for ACFs being considered were defined and categorized. Applicability of these models to an influenza pandemic was analyzed, and recommendations are offered for future ACF use. ACFs may be best suited to function as primary triage sites, providing limited supportive care, offering alternative isolation locations to influenza patients, and serving as recovery clinics to assist in expediting the discharge of patients from hospitals.**

**R**ECENTLY, the federal government and most states have released plans to address medical and community preparedness in the event of an influenza pandemic. While the surge capacity of hospitals is acknowledged as central to the medical response, these plans also recognize that this capacity will likely be overwhelmed during a pandemic. Most plans call for the creation of "alternative care facilities" (ACFs) to augment community surge capacity once the surge capacity of hospitals is exceeded by patient demand.

There are different forms of "surge capacity" that apply during a medical emergency. "Hospital surge capacity" has been defined as the ability of a hospital in a mass casualty incident to augment bed availability by maximizing resources and discharging as many patients as safely possible.<sup>1</sup> "Community surge capacity" refers to local or regional-level activities undertaken to bolster the response of a community's healthcare facilities to mass casualties.<sup>2</sup> Alternative care facilities could serve as a component in augmenting the surge capacity of hospitals or communities.

This article reviews current models of ACFs, particularly their application in pandemic influenza preparedness and response, and is intended for pandemic response planners and hospital leaders. Recommendations are offered regarding how hospitals and communities might best plan for the use of alternative care facilities in a pandemic.

### BACKGROUND

Historically, alternative care facilities have been established in the U.S. when natural disasters, large-scale accidents, or terrorist attacks have caused casualties beyond the ability of hospitals to handle them. These sites have served a variety of functions intended to relieve pressure on local healthcare systems by serving as triage stations, caring for the "walking wounded," or providing patient care when local healthcare facility infrastructure is damaged.

For example, in the aftermath of Hurricane Katrina in September 2005, a large alternative care site was set up at

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the Pete Maravich Assembly Center in Baton Rouge, Louisiana, to provide medical care for New Orleans evacuees. Originally intended as a medical triage facility, it was transformed into a surge hospital<sup>3</sup> and eventually served 6,000 patients, thus becoming the largest acute care field hospital in U.S. history.<sup>4</sup>

Within hours of the terrorist attacks on September 11, 2001, an emergency triage site was created at Chelsea Piers in New York City with the assistance of several local hospitals to handle an anticipated influx of victims from the World Trade Center.<sup>5</sup> About 200 patients were treated at this facility.<sup>6</sup> It was closed less than 24 hours after the attacks as it became apparent that few victims would be rescued.

During the 1918 influenza pandemic, “emergency hospitals” were created at alternative sites (e.g., airplane hangars, churches, schools) in order to provide basic supportive care.<sup>7</sup> Although the precise numbers of patients treated are difficult to obtain and proof of the effectiveness of the facilities is unknown, there is evidence that many people were treated at these facilities around the country.

While many current pandemic influenza response plans call for the establishment of alternative care facilities, little public information is available regarding the specific intended purposes or functions of ACFs in an infectious disease epidemic. Can influenza patients be effectively screened, treated, or directed to other resources at these ACFs? What are the most appropriate concept of operations and scope of care for ACFs, given the likely clinical and epidemiologic features of an influenza pandemic? These and other questions prompted this review and analysis.

## METHODS

In late July 2006, the authors conducted searches for references to “alternative care facilities” in the pandemic preparedness plans of all 50 states, Los Angeles County, New York City, Canada, the United Kingdom, Hong Kong, and the U.S. Department of Health and Human Services. We searched documents and plans that had been publicly posted online. When the search term was not found, we tried other terms or manually searched plans for relevant references. These references to ACFs were catalogued and, when possible, categorized into the generalized models described below.

Many plans briefly mention the planned establishment or use of ACFs during a pandemic but do not further articulate their role in community surge response. Some plans provide descriptions of the purpose and function of ACFs, and others offer operational and logistical details. In only a few cases do planners examine the role of ACFs

in their communities and assess the feasibility of their function.

In addition, we conducted MEDLINE searches for “alternative care facilities” and similar terms and examined references of related articles. This yielded past research on regional care and acute care center models for bioterrorism response and the use of shuttered hospitals to bolster surge capacity. These ACF models were not developed specifically for pandemic response but were included in this review because of their potential applicability in a pandemic.

## FINDINGS

There are multiple definitions of and concepts underlying the term “alternative care facility.” At a general level, “alternative care facilities” were defined as locations, preexisting or created, that serve to expand the capacity of a hospital or community to accommodate or care for patients or to protect the general population from infected individuals during mass casualty incidents. But at a more specific level, we were able to group the various ACF concepts into seven distinct models.

### *1. Overflow Hospital Providing Full Range of Care*

Alternative care facilities would be established to serve as overflow sites for acute care hospitals and would provide care for acutely ill patients who would otherwise be admitted to hospitals. These ACFs would be intended to bolster community surge capacity by replicating a full range of hospital services. They could be fully functional, mobile hospital units<sup>8</sup> or formerly shuttered hospitals that would be rapidly reopened during health emergencies.<sup>9</sup>

### *2. Patient Isolation and Alternative to Home Care for Influenza Patients*

Another model would have alternative care facilities exclusively dedicated to isolating infectious patients,<sup>10</sup> based on the premise that it would be useful and possible to group influenza patients together and separate them from noninfluenza patients within hospital wards (a practice mentioned in many state and national pandemic influenza plans). This model is commonly envisioned as a motel-like environment for influenza patients who require minimal, if any, medical care.<sup>11</sup> These facilities would be intended to support patients who would otherwise return home but could not do so (e.g., they are unable to care for themselves, they share a residence with an immunocompromised individual, etc.). Food, laundry, and other living necessities would be provided to patients housed at these ACFs. The Canadian pandemic prepared-

ness plan refers to this as “domiciliary care, for individuals unable to care for themselves at home.”<sup>8</sup> This model is espoused in many state pandemic plans, with several states even describing it as an “alternate lodging facility” for influenza patients.<sup>12</sup>

### **3. Expanded Ambulatory Care**

A third model of alternative care facilities focuses on expanding outpatient services and preexisting ambulatory facilities to relieve pressure on hospitals and permit them to concentrate on sicker patients.<sup>2</sup> This concept is built on the premise that “a system of effective outpatient management may reduce the demand for inpatient care.”<sup>13</sup>

During a disaster, outpatient care facilities may experience a surge of patients suffering from indirect effects of the incident; they may receive requests for assistance from less seriously ill patients or patients who were discharged early from hospitals to make room for critically ill patients. The opening of outpatient ACFs in this model would be intended to facilitate the rapid distribution of necessary medications and vaccines, assist in caring for the “walking wounded,” and help better manage a community’s nonacute patients who are seeking care. For example, pandemic preparedness plans from New Jersey and Ohio recommend expanded ambulatory care “for [influenza] patients to receive hydration, intravenous antibiotics, or monitoring”<sup>14</sup> at “short stay” outpatient sites.

### **4. Care for Recovering, Noninfluenza Patients**

In this model, hospitals could establish “policies to expedite the discharge . . . of patients not infected with influenza to alternative care sites”<sup>12</sup> that are created specifically to serve as “‘step-down’ unit[s] for the care of stable [recovering] patients”<sup>8</sup> who are not yet ready for home discharge.

This is based on the premise that hospital bed capacity could rapidly be increased by discharging patients who are near accepted discharge standards.<sup>1,15,16</sup> Traditionally, hospital patients are often discharged to nursing homes, rehabilitation facilities, or home care.

### **5. Limited Supportive Care for Noncritical Patients**

The Modular Emergency Medical System, a model developed by a Department of Defense study, describes the creation of specific sites as nonhospital facilities to provide noncritical supportive care during mass casualty events.<sup>17</sup> Patients seeking care would undergo an initial triage and screening at a hospital emergency department, and those with critical medical conditions such as heart attack, trauma, or severe exacerbations of chronic conditions would be treated in hospitals. Patients with lesser or

specific injuries would be immediately transferred from the triage site to an acute care center. Treatment at these acute care facilities would be restricted to four areas that are logistically straightforward: antibiotics, hydration, bronchodilators, and pain management.

### **6. Primary Triage and Rapid Patient Screening**

Another model, which many state plans intend to adopt, depicts alternative care facilities as primary triage sites that would provide rapid medical screening of possible influenza patients. In this approach, these primary triage sites may be ideally located near but physically separate from hospital emergency departments in order to minimize exposure of hospitalized patients to influenza. All patients with influenzalike illness (i.e., fever, cough, muscle aches) would be directed to these “fever clinics” (so termed by some states as the central site where all patients with fevers should first seek assistance), where they would undergo an initial assessment. Critically ill patients would then be transferred to hospitals for care. Other influenza patients would be discharged from the triage facility to home, provided supportive care, or transferred to other healthcare facilities, depending on the community’s established pandemic response protocol. Hong Kong has adopted this model by planning to “set up designated clinics and protocol for triaging patients with influenza-like illness at the primary care level . . . [and] isolate and treat confirmed cases in designated hospitals.”<sup>18</sup>

### **7. Quarantine**

Quarantine involves the separation of asymptomatic, but possibly exposed, individuals from the general population. This model, mentioned by several state pandemic plans, calls for the consideration of “alternative facilities available for quarantine.”<sup>19</sup> Alternative housing facilities such as hotels might be converted to quarantine sites, similar to housing for homeless tuberculosis patients, in order to minimize the spread of disease throughout the general population.<sup>20</sup> There is evidence that the use of quarantine during a pandemic is likely to be ineffective.<sup>21,22</sup> New Jersey’s pandemic preparedness guidance for hospital surge capacity recommends against quarantine, noting that “several substantial challenges may limit their usefulness during an influenza outbreak.”<sup>14</sup> Since influenza patients may be infectious with mild, atypical, or no symptoms, quarantining suspected individuals at ACFs is problematic.<sup>23,24</sup>

### **Plans Not Mentioning or Considering Alternative Care Facilities**

The pandemic plans of the United Kingdom and of several states do not call for the establishment of ACFs.

The New York pandemic preparedness plan makes clear that city planners did consider the use of ACFs but that the idea was discounted “given the difficulty of adequately staffing, supplying, supervising, and providing adequate medical care using appropriate infection control procedures in non-hospital settings during a pandemic.”<sup>25</sup> The New York City plan intends for patient care to be delivered either at home, in outpatient facilities, or in hospitals. It concludes that “[i]t is unlikely that patients sick enough to require hospital-level care will be willing to go to an alternate facility, as the level of care will not be equivalent to a hospital.”<sup>25</sup>

## CONCLUSIONS

The establishment of alternative care facilities in a pandemic could provide critical hospital-related and community services, but the technical and logistical barriers to safely and effectively implementing a number of the models being considered would be formidable or prohibitive. The following are our analysis and judgments regarding how communities might make the best use of alternative care facilities in pandemic planning, based on our view of the most sensible ideas developed in current plans and our judgments regarding what is feasible and most likely to be effective.

*1. Communities could usefully establish alternative care facilities as primary triage sites and influenza clinics to offer initial assessment and limited supportive care for suspected influenza patients.*

Alternative care facilities established as “influenza clinics” could serve as primary triage locations for all individuals with influenzalike illness who are seeking care and provide limited supportive care for patients who can be rapidly discharged home (the “treat and release” patient). Supportive care would consist of oral hydration and/or IV fluids, which could be rapidly and easily administered on an outpatient basis. In patients who are febrile and dehydrated, these facilities could serve an assessment role in helping to distinguish those who are truly critically ill. Administration of oral hydration or IV fluids might be essential in differentiating between patients who could be discharged home and those who require hospital admission for critical care. Patients with significant oxygen desaturation on screening pulse oximetry would logically be referred for hospital admission given the logistical difficulties associated with treating patients with respiratory distress outside of hospitals or established clinical settings.

All individuals with influenzalike illness could be directed to seek initial care at designated community in-

fluenza clinics. After an initial screening and assessment, noncritical patients would be discharged directly home or provided supportive care before being discharged home or to an alternative lodging facility. Critically ill patients requiring more than supportive care would be transferred and admitted to a hospital for acute care.

Infection control of influenza could involve separating patients into influenza and noninfluenza cohorts and preventing the exposure of noninfected individuals to suspected influenza patients.<sup>26</sup> These influenza clinics preferably should be located near, though physically separate from, hospitals.

While rapid antigen influenza tests are a tool to be used during a pandemic, they should supplement clinical criteria and judgment in triaging suspected influenza patients. To date, rapid antigen influenza tests are relatively insensitive at detecting H5N1 influenza infections and lack specificity.<sup>27,28</sup> Neither clinical criteria nor rapid testing is foolproof in separating patients into influenza and noninfluenza cohorts. For example, some influenza patients who present atypically may be misdiagnosed with another condition,<sup>29</sup> while noninfected patients with influenzalike symptoms may be misdiagnosed with influenza. Patients with influenza may not display symptoms if presenting during the virus’s incubation period. Although the separation of patients into cohorts would likely be imperfect, influenza clinics created as “treat and release” facilities providing limited supportive care while functioning as triage sites will serve to minimize the exposure of noninfected patients.

*2. Hospitals and communities could expand ambulatory care and create specific alternative care facilities for noninfected patients.*

In the event of a pandemic, hospitals would seek to increase inpatient capacity by rapidly transferring as many patients as possible in order to free beds for the expected influx of influenza patients. Certain outpatient centers (e.g., those that typically perform specific elective outpatient procedures) would likely be underutilized in a pandemic and could assist in surging ambulatory care capacity.

In addition, specific ACFs could be designated or established to bolster expanded ambulatory care for noninfected, recovering hospital patients who are approaching criteria for discharge home. These patients could then be provided with intermediate care—likely limited to oral medications—while minimizing their exposure to influenza patients in the hospital environment and maximizing available surge capacity in hospitals.

*3. Communities could consider alternative care facilities for convalescent care of recovering influenza patients who are unable to care for themselves at home.*

While home recovery would be preferred for noncritical infected individuals, limited alternative lodging facilities could be created for specific influenza patients who are unable to recover alone or care for themselves at home. This might include infected homeless individuals or those living alone and unable to conduct self-care. The facilities would serve primarily as “hotels” where recovering patients would be provided a bed, food, laundry service, and other necessities, until they are deemed noncontagious and able to care for themselves. The purposes of these facilities would be to isolate infected patients from noninfected individuals and to offer living arrangements for those patients who cannot care for themselves at home.

*4. Communities will have great difficulty setting up alternative care facilities that could safely provide additional mechanical ventilation.*

In a pandemic caused by a highly pathogenic influenza virus like the currently circulating H5N1 strain, influenza patients may present with unique epidemiologic and clinical features that require care that differs from that traditionally provided to seasonal influenza patients or disaster victims. This level of care may not be compatible with some of the ACF models being considered.

In recent case reports, anecdotal evidence indicated that nearly 80% of patients with H5N1 infection required mechanical ventilation.<sup>28,30</sup> There is very little spare capacity of ventilators throughout the U.S. healthcare system,<sup>31</sup> and a number of models have suggested that a pandemic will overwhelm available U.S. supplies of ventilators.<sup>32,33</sup> Even if the percentage of patients requiring ventilation in a pandemic is not as high as predicted by these models, there will be few spare units available for alternative care facilities.

Other research has recommended portable ventilators to augment existing ventilator stores during mass casualty events,<sup>31</sup> but the use of mechanical ventilators, even basic units, in an ACF environment by inexperienced personnel would be hazardous. Simple portable ventilators also may lack the sophistication required for the most seriously ill patients.<sup>34</sup> Patients deteriorating on such ventilation would need to be seen urgently by experienced respiratory personnel and may require sophisticated equipment available only in a modern ICU to survive. In addition, portable ventilators themselves would be in short supply for hospitals that did not procure such units before a pandemic.

While supplemental oxygen is readily available in hospital settings, rapidly creating an infrastructure for providing oxygen support at an ACF would be an engineering challenge; it also would be expensive and would raise significant safety issues.<sup>35</sup> It is unreasonable to expect

that ACFs would be able to adequately provide positive airway pressure and supplemental oxygen in a pandemic.

*5. Communities and hospital leaders should recognize hospitals as the focal point of care for all critically ill patients.*

The clinical features of critically ill influenza patients require that resources for the advanced treatment of these patients be concentrated at hospitals. Surge capacity for mechanical ventilation, ICUs, and supplemental oxygen should be focused within hospitals rather than spread throughout ACFs because of the limited availability of resources and expert personnel. In addition, the necessary infrastructure for supplemental oxygen and suction is difficult to recreate outside of preexisting critical care facilities. Thus, the goal of hospitals should be to provide all necessary critical care and surgery and to transfer noninfluenza patients to recovery clinics as soon as possible while discharging influenza patients who no longer require critical care to alternative lodging facilities or home.

*6. Community pandemic response planners will need to have plans to address the shortage of trained personnel for ACFs.*

There will likely be a shortage of medical personnel and other staff to run ACFs, given that hospital, public health, and emergency response agencies will be relying on these same key people. Absenteeism of personnel because of the fear of working in a healthcare setting during an epidemic would likely further depress staffing capability. Since a pandemic will affect several communities simultaneously, ACFs cannot rely on established medical personnel assistance programs (such as the Medical Reserve Corps, National Disaster Medical System, or Emergency System for Advance Registration of Volunteer Health Professionals), because these people will likely be needed to serve at their own community's medical facilities. Other volunteers may need to be used at ACFs as surge personnel, such as medical and nursing students, paramedics, retired healthcare professionals, and other volunteers with minimal medical backgrounds who can be rapidly trained (e.g., firemen, military corpsmen). The protection of healthcare workers in ACFs, as in hospitals, should be stressed and given high priority by stockpiling, training, and monitoring the use of appropriate personal protective equipment and by procuring and administering vaccines and antivirals to these personnel when appropriate and if available. The most experienced medical personnel should remain at hospitals where the sickest patients will require the greatest medical expertise.

7. *Pandemic preparedness could be enhanced by consideration of multiple models of alternative care facilities in an integrated system.*

Most current pandemic preparedness plans are typically considering the implementation of only a single ACF model, but these plans would be most effective if all the recommended models were examined and combined into a comprehensive strategy. Further development and progress in pandemic planning should include consideration of how these component models can be effectively and seamlessly integrated with hospital, public health, and emergency response in communities.

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