



supplement 8 community disease control and prevention

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S8-I. RATIONALE

The initial response to the emergence of a novel influenza subtype that spreads between people should focus on containing the virus at its source, if feasible, and preventing a pandemic. Once spread beyond the initial focus occurs and with introduction of the virus into the United States, the foci of containment activities will be public health and individual measures that attempt to slow and limit viral transmission. For the purposes of this document, containment measures refer to measures that attempt to fully limit transmission as well as those that attempt to slow transmission. Containment strategies aimed at controlling and slowing the spread of the virus might include measures that affect individuals (e.g., isolation of patients and monitoring their contacts) as well as measures that affect groups or entire communities (e.g., cancellation of public gatherings; implementation of community-wide snow days). Guided by epidemiologic data, state and local authorities will implement the most appropriate of these measures in efforts to maximize impact on disease transmission and minimize impact on individual freedom of movement. HHS will provide assistance to states and localities as requested, including sharing experience of others and providing advice on decision-making as the situation evolves. Although states and localities have primary responsibility for public health matters within their borders, including isolation and quarantine, under the authority of Section 361 of the Public Health Service Act (42 USC 264), the HHS Secretary may make and enforce regulations necessary to prevent the introduction, transmission, or spread of communicable diseases from foreign countries into the United States or from one state or possession into another.

Containment measures applied to individuals (e.g., isolation and quarantine) may have limited impact in preventing the transmission of pandemic influenza, due to the short incubation period of the illness, the ability of persons with asymptomatic infection to transmit virus, and the possibility that early symptoms among persons infected with a novel influenza strain may be non-specific, delaying recognition and implementation of containment. Nevertheless, during the Pandemic Alert Period with a less efficiently transmitted virus, these measures may have great effectiveness, slowing disease spread and allowing time for targeted use of medical interventions. In addition, implementing these measures early in a pandemic when disease is first introduced into the U.S. and when the scope of the outbreak is focal and limited may slow geographical spread and increase time for vaccine production and implementation of other pandemic response activities. Later, when disease transmission is occurring in communities around the U.S., individual quarantine is much less likely to have an impact and likely would not be feasible to implement. Thus, community-based containment measures (e.g., closing schools or restricting public gatherings) and emphasizing what individuals can do to reduce their risk of infection (e.g., hand hygiene and cough etiquette) may be more effective disease control tools.

Although there are few data from past pandemics to guide containment efforts, the potential effectiveness of strictly implemented movement restrictions is supported by historical accounts that describe the use of such measures in American Samoa and in some Alaskan villages during the pandemic of 1918-1919. American Samoa banned inbound and outbound travel and mail service and (unlike Western Samoa) remained influenza-free. In Alaska, quarantine and isolation measures apparently delayed introduction of pandemic influenza into the Alaskan interior for several months, and some isolated villages were completely spared. Today, much more extensive international and domestic travel and the interdependence between communities make it unlikely that strict restrictions could be effectively imposed and that, except in unique settings, communities could prevent outbreaks from occurring. Preliminary mathematical modeling results suggest that travel restrictions would need to be about 99% effective to delay introduction into a country by one to two months. Based on these results, the goals of containment activities during a pandemic should be to slow the spread of disease early after introduction into the U.S. and to limit the number of persons who become infected in community outbreaks throughout the pandemic.

S8-II. OVERVIEW

Supplement 8 provides recommendations to state and local partners on the use of disease containment strategies to prevent or decrease transmission at different phases of an influenza Pandemic Alert Period and Pandemic Period. Recommendations for the Interpandemic and Pandemic Alert Periods focus on preparedness planning for implementation of containment measures. They also outline actions that may be taken during the earliest stage of a pandemic when the first potential cases or disease clusters are detected. In this setting, individual-level containment measures (e.g., patient isolation and identification, monitoring, quarantine of contacts) may be useful in slowing the spread of pandemic influenza and may be used without causing undue strain on limited public health and other healthcare resources.

Recommendations for the Pandemic Period focus on measures that may be beneficial and practical when there is a large number of cases and extensive viral transmission. In such a setting, individual-level measures may no longer be effective or feasible (e.g., if most contacts cannot be traced in time to prevent further exposures; if staffing constraints make contact tracing impractical). In this setting, state and local health departments might consider measures that decrease social contact within groups or whole communities (e.g., self-shielding, cancellation of public events, snow days, quarantine of groups of exposed persons, widespread community quarantine). Effective use of community containment measures during a pandemic will require periodic assessment of the properties of the pandemic virus and the distribution and clinical presentation of the cases. Guidance on containment recommendations will be updated, as needed.

S8-III. RECOMMENDATIONS FOR THE INTERPANDEMIC AND PANDEMIC ALERT PERIODS

A. Community preparedness for implementation of pandemic influenza containment measures

Both individual and community-based containment measures raise legal, logistic, and social challenges that should be addressed during the Interpandemic Period. This section provides information on planning for disease control and containment, legal preparedness, planning for potential use of influenza hotlines (preparing for influenza clinics is discussed in Supplement 3), and the role of communications in preparing the public to accept the possible need for restrictive measures to reduce the spread of pandemic influenza. Appendix 2 provides additional guidance on these topics, as well as on preparedness activities related to management of cases and contacts, non-hospital-based isolation of cases, and implementation of community containment measures. Information on hospital preparedness for patient isolation is provided in Supplement 3.

1. Planning for disease control and containment

Experience during the 2003 SARS outbreak (Appendix 3) suggests that local officials will face logistic, economic, ethical, legal, social, and psychological challenges in implementing disease control and containment measures during a Pandemic Alert and Pandemic Period. Although individual quarantine as a control measure is likely only to be used during the Pandemic Alert and very early during the Pandemic Period—for example, among communities where initial cases are introduced into the U.S.—all state and local health departments and tribal authorities should anticipate and prepare for the challenges of effectively implementing this measure by working with community partners to review the steps involved in establishing and maintaining quarantine facilities and procedures.

Key activities include (see Appendix 2):

- Identifying and engaging traditional partners (e.g., public health and healthcare workers) and non-traditional community partners (e.g., transportation workers) and inviting them to participate in preparedness planning and in pandemic influenza containment exercises and drills
- Identifying potential isolation and quarantine facilities

- Establishing procedures for medical evaluation and isolation of quarantined persons who exhibit signs of influenza-like illness (ILI)
- Developing tools and mechanisms to prevent stigmatization and provide mental health services to persons in isolation or quarantine, as well as to family members of affected persons and other community members
- Establishing procedures for delivering medical care, food, and services to persons in isolation or quarantine. These efforts should take into account the special needs of children and persons with disabilities.
- Developing protocols for monitoring and enforcing quarantine measures
- Ensuring legal authorities and procedures exist for various levels of movement restrictions
- Establishing procedures for issues related to employment compensation and job security

2. Legal preparedness

States, localities, and tribes have primary responsibility for public health matters within their borders, including isolation and quarantine. Current quarantine laws, regulations, and enforcement procedures vary widely from state to state. Many of these laws date to the 19th century. In response to a request from CDC, the Center for Law and the Public's Health at Georgetown and Johns Hopkins universities has developed a draft Model State Emergency Health Powers Act (www.publichealthlaw.net/MSEHPA/MSEHPA2.pdf) to assist state and local health agencies in reviewing emergency public health powers to ensure they are adequate to respond to modern disease and bioterrorism concerns.

Under the authority of Section 361 of the Public Health Service Act (42 USC 264), the HHS Secretary may make and enforce regulations necessary to prevent the introduction, transmission, or spread of communicable diseases from foreign countries into the United States or from one state or possession into another. Under authority delegated by the HHS Secretary, the CDC Director may isolate and quarantine persons who have been exposed to or are infected with certain specified communicable diseases and are arriving into the United States from a foreign country or traveling from one state or possession into another (42 CFR 71.32(a) & 42 CFR 70.6). The communicable diseases for which individuals may be subject to federal quarantine are specified in an Executive Order of the President, upon recommendation of the HHS Secretary in consultation with the Surgeon General. The most recent Executive Order is Executive Order 13295 of April 4, 2003, as amended by Executive Order 13375 of April 5, 2005. The April 5 amendment added influenza that is causing or has the potential to cause a pandemic to the list of federal quarantinable diseases (<http://www.cdc.gov/ncidod/dq/index.htm>). In addition, under section 311 of the PHS Act (42 USC 243), HHS may cooperate with and aid state and local authorities in the enforcement of their quarantine and other health regulations.

New International Health Regulations (IHR) were recently adopted by the World Health Assembly, which requires member states to report cases of human infection caused by a new subtype. When WHO has determined that a particular event constitutes a public health emergency, the IHR require WHO to make a "real-time" response to the emergency. Based on the details specific to the emergency, the Director General of WHO will recommend measures for implementation by the affected state as well as by other states. These time-limited recommendations are made available to states and, subsequently, made public. Depending on the evidence, recommended measures could be modified or ended.

3. Planning for influenza clinics and hotlines

An influenza pandemic is likely to put great stress on the healthcare delivery system, in particular emergency departments. To prevent overwhelming demand from compromising the function of emergency departments, healthcare providers, organizations, and public health authorities should consider optimal methods for delivering assessment and care to individuals with probable influenza. This may include designating certain offices or clinics or otherwise discrete areas for screening, triage, and care of individuals with influenza-like illness. While the large majority of outpatient care during a pandemic will be provided by patients' usual medical care practitioner, health authorities may decide to establish special facilities (*influenza clinics*) to provide rapid medical assessment of potentially infected persons, as part of efforts to control and contain small,

well defined disease clusters (see S8-III.C), or in geographical areas that are medically underserved. Ill persons will be encouraged to call special *influenza hotlines* that provide advice on whether to stay home or to seek medical care. Local public health systems supporting hotlines as triage and information systems must be aware of the healthcare resources available in the community. These "community triage" efforts may help prevent hospitals from being overwhelmed with patients who do not require hospital-level care. Moreover, community triage efforts may also reduce the number of uninfected persons who mingle with infected persons at clinics and hospitals. Preparedness planning for establishing influenza hotlines includes:

- Establishing telephone hotline numbers that people can call to report specific symptoms (e.g., fever) that will be specified by the state health department and CDC
- Identifying sites, staff members, and volunteers
- Developing protocols for hotline staff members that include training components and triage decision trees or algorithms
- Establishing communication systems with influenza clinics, if they are established

Organization of outpatient care in a community and potential establishment of influenza clinics is discussed in **Supplement 3**.

4. Public understanding of disease containment measures

Community preparedness for implementation of both individual and community control measures can be enhanced during the Interpandemic Period by improving public understanding of the dangers of pandemic influenza and the benefits of community-wide disease control practices, including social-distancing measures that can prevent illness and death (Appendix 4). Strategies for disease control will be facilitated by clear communication of the rationale for—and duration of—containment measures.

Local public health education campaigns that involve community partners can build public confidence in the ability to cope with an influenza pandemic. Partners may include schools, faith-based organizations, community-based organizations, and other "civil society" institutions that can help educate the public and provide support to families and persons who are incapacitated by illness.

Local public health campaigns should explain how individual action (e.g., strict compliance with respiratory hygiene, staying home when ill) and community efforts (e.g., implementation of snow days and self-shielding) can help reduce disease transmission. Education campaigns can describe the criteria, justification, role, methodology, and duration of quarantine and the social, medical, and psychological ways in which persons will be supported during the quarantine period. They can also explain that quarantine—which temporarily restricts personal movement—is a collective action implemented for the common good. In addition, they can allay public concerns about privacy issues related to the provision of medical information to healthcare workers and public health officials. These key messages should be translated and modified as required to address the cultural and linguistic needs of local neighborhoods.

Key messages prepared for use during the Interpandemic Period can be adapted for use during an actual pandemic (see Appendix 5 and Supplement 10.)

5. Enforcement and support of community containment measures

Experience from the 2003 SARS outbreak suggests that quarantine applied on a voluntary basis can be sufficient to reduce disease transmission (see Appendix 3). This idea is in accordance with data from modeling studies that suggest that quarantine and other community-based measures may be effective even if compliance is less than perfect.¹ Nevertheless, states, localities, and tribes should be prepared to enforce individual and community-based containment measures, if needed. The role of other Federal agencies in enforcing community containment measures will be detailed in the Federal Pandemic Influenza Plan.

¹ Meltzer MI, Damon I, LeDuc JW, Millar JD. Modeling potential responses to smallpox as a bioterrorist weapon. EIF.2001. Nov-Dec:7(6):959-69.

B. Management of patients infected with novel strains of influenza and their contacts

In this document, the term "novel strains of influenza" is used to refer to avian or animal influenza strains that can infect humans (like influenza A [H5N1]) and new or reemergent human viruses that cause cases or clusters of human disease. Guidance on the detection and identification of persons who might be infected with novel strains of influenza is provided in [Supplement 1](#). Guidance on the clinical management of persons with novel influenza infection is provided in [Supplement 5](#).

The choice of measures to contain the spread of novel strains of influenza during the Pandemic Alert Period will vary depending on the assessment of risk, as reflected in the three Pandemic Alert Phases described by WHO ([Box 2](#)).

1. Patient isolation

Infection control precautions and procedures for isolating influenza patients—at home or in a residence, community facility, or hospital—are described in [Supplement 4](#). The patient will be admitted to a hospital if clinically indicated, if public health needs require it, or if isolation at home or in a community facility cannot be achieved safely and effectively. Information for evaluating the suitability of homes and facilities for patient isolation is provided in [Appendix 6](#).

The state or local health department, in consultation with federal agencies, will advise the healthcare provider and healthcare facility on additional steps that may be taken, before and after laboratory test results become available, via the state public health laboratory or CDC.

2. Management of close contacts

In most situations—even at the earliest stages of a pandemic—it will not likely be possible to trace and quarantine close contacts of suspected or confirmed cases within 48 hours (the average incubation period for human influenza). However, in certain situations, especially during the later phases of the WHO Pandemic Alert Period ([Box 2](#)), efforts to identify exposed individuals or groups might be recommended. Examples might include:

- Suspected or confirmed cases of novel influenza. For example, a suspected or confirmed case of avian influenza A (H5N1) in persons who have traveled to an H5N1-affected country and have been exposed to sick poultry (either through handling or eating poultry products) or a laboratory-confirmed human case of H5N1 influenza
- Suspected or confirmed cases of avian influenza A (H5N1) or another novel strain of influenza in travelers on airplanes or cruise ships about to arrive in the United States (see [Supplement 9](#))
- Suspected or confirmed cases of avian influenza of any type in persons with known exposure to sick poultry or birds in the United States
- Clusters of avian influenza A (H5N1) or another novel strain of influenza in small, well defined settings, such as a military base
- Cases of laboratory exposure to avian influenza A (H5N1) or influenza viruses with the potential to cause a pandemic (e.g., influenza A [H2N2])

Decisions on whether to trace a patient's contacts and how to manage them will be made on a case-by-case basis by local and/or state public health departments, in consultation with CDC, taking into consideration:

- Likelihood that the suspected case is due to a novel influenza strain (based on symptoms and travel history, if laboratory results are not yet available)
- Likelihood that the causative virus is transmitted from person-to-person with a moderate or high efficiency (as reflected in the designated Pandemic Alert phase)

- Feasibility of conducting contact-tracing given the short incubation period for influenza

A patient's close contacts may include family, friends, work colleagues, classmates, fellow passengers, and/or healthcare providers. Management of contacts might include passive or active monitoring without activity restrictions and/or quarantine at home or in a designated facility. In the Pandemic Alert Period, especially during Phase 3 or 4 when little or limited person-to-person transmission has been documented, quarantine of contacts should be implemented **only when there is a high probability that the ill patient is infected with a novel influenza strain that may be transmitted to others.**

Contacts who are quarantined should be monitored by a health department official (or designee) at least once a day—by phone or in person—to assess symptoms and address any needs. Frequent monitoring (e.g., twice a day) will facilitate early detection, reducing the interval between the onset of symptoms and the isolation of the sick person. Early signs of influenza include fever, respiratory symptoms, and chills, rigors, myalgia, headache, or diarrhea. Quarantine may be lifted as soon as the exposed contact has remained without signs or symptoms of disease for a complete incubation period for influenza disease. (Experience with seasonal influenza suggests the incubation period is 1–4 days, with an average length of 2 days. However, the clinical behavior of a novel influenza virus may be different and could potentially be as long as 10 days. Pandemic influenza preparedness activities should plan for containment measures that may last between 1–10 days. For the purposes of this document, 10 days is referred to as the incubation period; however, public health authorities should be prepared to adjust the time frame as more is known about the virus.) Additional information on monitoring and evaluating persons in quarantine is provided in Appendix 6.

3. Data collection

Public health officials or designees should collect information on cases and contacts, including:

- Number of contacts identified per case
- Information on each contact:
 - Relationship to the case-patient
 - Nature and time of exposure
 - Whether the contact was vaccinated or on antiviral prophylaxis
 - Underlying medical conditions
- Number of contacts (including any in quarantine) that become ill
- Number of days between onset of symptoms and reporting to health officials

These data will guide decision-making on whether to implement more stringent containment measures.

C. Containment of small clusters of infection with novel strains of influenza

Community-based control measures that state and local health officials might use to contain small clusters of infection with novel strains of influenza (during the later Pandemic Alert phases or when cases are first introduced into the U.S.) include targeted chemoprophylaxis and early detection of new cases by use of influenza hotlines and clinics. These approaches may be implemented in small, well defined settings. They are not likely to be useful once a pandemic is underway.

1. Targeted chemoprophylaxis of disease clusters

This intervention includes investigation of disease clusters, administration of antiviral treatment to persons with confirmed or suspected pandemic influenza, and provision of drug prophylaxis to all likely exposed persons in the affected community. CDC will assist state health departments in these efforts, as needed.

Targeted chemoprophylaxis also requires intensive disease surveillance to ensure coverage of the entire affected area, effective communication with the affected community, and rapid distribution and administration of antivirals because they are most effective when provided within 48 hours of symptom onset or when used as post-exposure prophylaxis before onset of illness

2. Influenza hotlines and clinics

During the later phases of a Pandemic Alert, in a community experiencing a disease cluster, a combination of self-assessment and establishment of influenza hotlines may be effective in detecting potential influenza disease and conducting "community triage" to direct persons with symptoms to the appropriate site and level of care. This intervention includes asking all members of the affected community to monitor their symptoms in accordance with instructions from the state health department and CDC. For example, all members of the community might be asked to take their temperature (and the temperature of their household members) once or twice daily. Persons with temperatures above a certain level may be asked to either stay home and phone a designated influenza hotline for a medical referral, or proceed to a neighborhood influenza clinic established by local public health and healthcare authorities.

Healthcare workers at the clinic will determine whether the patient's symptoms are likely due to pandemic influenza, to a different contagious disease, or to a noncontagious condition. If a person is judged likely to be infected with pandemic influenza, they will be referred for isolation and care as needed.

The establishment of hotlines and influenza clinics requires preparation to identify sites and personnel and to facilitate the procurement and distribution of thermometers and other supplies. Clinic personnel should be prepared to keep records and report cases, as requested, by state health departments and CDC.

S8-IV. RECOMMENDATIONS FOR THE PANDEMIC PERIOD

During the Pandemic Period, control measures such as contact tracing and quarantine applied to individuals may have limited impact in decreasing influenza transmission. In addition, individual-level measures may no longer be feasible. During this stage, state and local health departments should consider measures that decrease social contact within groups or whole communities (e.g., self-shielding, cancellation of public events, snow days) and measures that individuals can take personally to decrease their risk of infection

Box 2 outlines measures that may be employed at different stages of a pandemic, as disease becomes more widespread. These begin with containment activities for individuals and move on, as needed, to community-based measures. Depending on the specific circumstances of an epidemic, these steps may not necessarily be taken in sequential order.

A. Containment measures for individuals

1. Patient isolation

As noted above, a patient with a suspected or confirmed case of pandemic influenza should be separated from persons who are well, using infection control measures described in **Supplement 4**. If a surge in patients overwhelms healthcare capacity or if home isolation is not feasible, health departments may need to use alternative facilities for isolation of influenza patients. Guidance on use of alternative facilities for isolation of influenza patients is provided in **Appendix 7**.

2. Management of contacts

Contact tracing, contact monitoring, and quarantine of close contacts may be effective only in special situations during the earliest stages of a pandemic. Because the usefulness and feasibility of these measures will be limited once the pandemic has started to spread, health authorities should consider community-based measures that reduce disease transmission by increasing social distance.

B. Community-based containment measures

If disease transmission in the community is significant and sustained, state and local public health authorities should consider implementing community-based containment measures. CDC will promote an active process of engagement and discussion to help states and localities decide what actions to take as the situation evolves. Community-based containment measures can be grouped into two broad categories: measures that affect groups of exposed or at-risk persons and measures that affect entire communities.

Table 1 lists quantifiable factors that may influence decisions on where and when to impose community-based containment measures. Social considerations—including levels of community cooperation and mobility—will also inform local decision-making.

1. Measures that affect groups of exposed or at-risk persons

Measures that affect groups of exposed or at-risk persons include:

- Quarantine of groups of exposed persons
- Containment measures that apply to use of specific sites or buildings

These measures should be considered when:

- There is limited disease transmission in the area.
- Most cases can be traced to contact with an earlier case or exposure to a known transmission setting (e.g., a school or workplace where a person has fallen ill).
- The intervention is likely to either significantly slow the spread of infection or to decrease the overall magnitude of an outbreak in the community.

a) Quarantine of groups of exposed persons

The purpose of quarantine is to reduce influenza transmission by separating exposed persons from others, monitoring exposed persons for symptoms, and providing medical care and infection control precautions as soon as symptoms are detected. Groups that might be quarantined include:

- Persons who might have been exposed to an influenza case
 - Via family members
 - At a public gathering
 - On an airplane or cruise ship or other closed conveyance (see also Supplement 9)
 - At their school or workplace
- Healthcare providers who work at a facility where influenza cases receive care

Group quarantine (like patient isolation) is optimally performed on a voluntary basis, in accordance with instructions of healthcare providers and health officials. However, many levels of government (local, state, federal) have the basic legal authority to compel mandatory isolation and quarantine of individuals and groups when necessary to protect the public's health (see below). Recommendations for quarantine and monitoring of quarantined persons in different situations (home quarantine, quarantine in a designated facility, working quarantine) are provided in Appendix 6.

b) Measures that apply to use of specific sites or buildings

Two ways of increasing social distance activity restrictions are to cancel events and close buildings or to restrict access to certain sites or buildings. These measures are sometimes called "focused measures to increase social distance." Depending on the situation, examples of cancellations and building closures might include:

- Cancellation of public events (concerts, sports events, movies, plays)
- Closure of recreational facilities (community swimming pools, youth clubs, gymnasiums)

2. Measures that affect communities

Measures that affect entire communities (including both exposed and non-exposed persons), include:

- Promotion of community-wide infection control measures (e.g., respiratory hygiene/cough etiquette)
- Snow days and self-shielding
- Closure of office buildings, shopping malls, schools, and public transportation (e.g., subways, buses; see Supplement 9)
- Widespread community quarantine (*cordon sanitaire*)

Measures that affect whole communities should be considered when:

- There is moderate to extensive disease transmission in the area.
- Many cases cannot be traced to contact with an earlier case or known exposure.
- Cases are increasing among contacts of influenza patients.
- There is a significant delay between the onset of symptoms and the isolation of cases because of the large number of ill persons.

As community outbreaks of pandemic influenza occur, community-wide infection control measures may decrease the overall magnitude of the outbreak (see Box 3). Community-based measures may also include school closures, snow days, and self-shielding.

a) Community-wide infection control measures

Throughout a pandemic, public health authorities will encourage all persons with signs and symptoms of a respiratory infection, regardless of presumed cause, to:

- Cover the nose/mouth when coughing or sneezing.
- Use tissues to contain respiratory secretions.
- Dispose of tissues in the nearest waste receptacle after use.
- Perform hand hygiene after contact with respiratory secretions and contaminated objects or materials.

Persons at high risk for complications of influenza will be advised to avoid public gatherings (e.g., movies, religious services, public meetings) when pandemic influenza is in the community. They should also avoid going to other public areas (e.g., food stores, pharmacies); the use of other persons for shopping or home delivery service is encouraged.

Disposable surgical-type masks are used by healthcare workers taking care of ill patients to prevent splashes and droplets of potentially infectious material (e.g., from coughs and sneezes) from reaching the mucous membranes of the healthcare worker's nose or mouth. The benefit of wearing masks by well persons in public settings has not been established and is not recommended as a public health control measure at this time. In contrast to healthcare workers who necessarily have close contact with ill patients, the general public should try to avoid close contact with ill individuals.

Nevertheless, persons may choose to wear a mask as part of individual protection strategies that include cough etiquette, hand hygiene, and avoiding public gatherings. Mask use may be most important for persons who are at high risk for complications of influenza and those who are unable to avoid close contact with others or must travel for essential reasons such as seeking medical care. Public education should be provided on how to use and dispose of masks appropriately. In addition, this education should emphasize that mask use is not a substitute for social distance or other personal protection measures (see also Supplement 4). Supply issues should be considered so that mask use in communities does not limit availability for healthcare settings where the importance and effectiveness of this use has been documented.

b) Snow days and self-shielding

Implementation of “snow days”—asking everyone to stay home—involves the entire community in a positive way, is acceptable to most people, and is relatively easy to implement. Snow days may be instituted for an initial 10-day period, with final decisions on duration based on an epidemiologic and social assessment of the situation. States and local authorities may wish to consider recommendations to the public for acquisition and storage of necessary provisions including type and quantity of supplies needed during snow days. Snow days can effectively reduce transmission without explicit activity restrictions (i.e., quarantine). Consideration should be given to personnel who maintain primary functions in the community (e.g., law enforcement personnel, transportation workers, utility workers [electricity, water, gas, telephone, sanitation]). Compliance with snow days might be enhanced by “self-shielding” behavior (i.e., many people may stay home even in the absence of an official snow day [“reverse quarantine”]).

c) Closure of office buildings, shopping malls, schools, and public transportation

Closure of office buildings, stores, schools, and public transportation systems may be feasible community containment measures during a pandemic. All of these have significant impact on the community and workforce, however, and careful consideration should be focused on their potential effectiveness, how they can most effectively be implemented, and how to maintain critical supplies and infrastructure while limiting community interaction. For example, when public transportation is cancelled, other modes of transportation must be provided for emergency medical services and medical evaluation.

Although data are limited, school closures may be effective in decreasing spread of influenza and reducing the overall magnitude of disease in a community. In addition, the risk of infection and illness among children is likely to be decreased, which would be particularly important if the pandemic strain causes significant morbidity and mortality among children. Children are known to be efficient transmitters of seasonal influenza and other respiratory illnesses. Anecdotal reports suggest that community influenza outbreaks may be limited by closing schools. Results of mathematical modeling also suggest a reduction of overall disease, especially when schools are closed early in the outbreak. During a Pandemic Period, parents should be encouraged to consider child care arrangements that do not result in large gatherings of children outside the school setting.

d) Widespread community quarantine (*cordon sanitaire*)

In extreme circumstances, public health officials may consider the use of widespread or community-wide quarantine, which is the most stringent and restrictive containment measure. Strictly speaking, “widespread community quarantine” is a misnomer, since “quarantine” refers to separation of exposed persons only and (unlike snow days) usually allows provision of services and support to affected persons. Like snow days, widespread community quarantine involves asking everyone to stay home. It differs from snow days in two respects: 1) It may involve a legally enforceable action, and 2) it restricts travel into or out of an area circumscribed by a real or virtual “sanitary barrier” or “*cordon sanitaire*” except to authorized persons, such as public health or healthcare workers.

Implementation of this measure during a pandemic is unlikely to prevent the introduction or spread of pandemic disease except in uncommon or unique circumstances (such as in a community able to be completely self-sufficient). In many cases, other less restrictive approaches such as snow days can be implemented to slow disease spread or decrease its magnitude in

a community. Because of this, *cordon sanitaire* is not recommended during a pandemic unless a community is in a setting where it is likely to be applied effectively and has planned with neighboring jurisdictions how such an approach would be implemented and maintained during a pandemic.

3. Scaling back community containment measures

The decision to discontinue community-level measures must balance the need to lift individual movement restrictions against community health and safety. Premature removal of containment strategies can increase the risk of additional transmission. Decisions should be based on evidence of improving local/regional control, such as:

- Consistent decrease in the number of confirmed cases
- Reduction in the number of probable and known cases
- Effective protective countermeasures are in place (e.g., high coverage with a pandemic influenza vaccine)

General recommendations are to withdraw the most stringent or disruptive measures first (e.g., widespread community quarantine, snow days, mass transit interruptions).

BOX 1. CONTAINMENT MEASURES: TERMS AND DEFINITIONS

Isolation is the separation and restriction of movement or activities of ill infected persons (patients) who have a contagious disease, for the purpose of preventing transmission to others.

Quarantine is the separation and restriction of movement or activities of persons who are not ill but who are believed to have been exposed to infection, for the purpose of preventing transmission of disease. Individuals may be quarantined at home or in designated facilities; healthcare providers and other response workers may be subject to quarantine when they are off duty.

Quarantine of close contacts refers to the quarantine of individuals exposed to patients with communicable diseases (e.g., family members, work or school mates, healthcare workers).

Quarantine of groups of exposed persons refers to quarantine of people who have been exposed to the same source of illness (e.g., a case of influenza at a public gathering, on an airline, train, or cruise ship, at a school or workplace or apartment complex, or at a recently visited store or office).

Widespread or community-wide quarantine refers to the closing of community borders or the erection of a real or virtual barrier around a geographic area (a cordon sanitaire) with prohibition of travel into or out of the area.

Self-shielding refers to self-imposed exclusion from infected persons or those perceived to be infected (e.g., by staying home from work or school during an epidemic).

Snow days are days on which offices, schools, transportation systems are closed or cancelled, as if there were a major snowstorm.

Influenza clinics are special facilities that may be established during a pandemic to provide rapid medical assessment of potentially infected persons. Ill persons would be encouraged to call influenza hotlines that provide advice on whether to stay home or seek help at an influenza clinic. Persons who come to an influenza clinic will be advised on whether they may be best served by hospital care or home care.

Individual-level containment measures include isolation of patients and management of their close contacts.

Focused measures to increase social distance (or decrease social contact) includes measures applied to groups rather than individuals or whole communities (e.g., quarantine of groups of exposed persons and measures that apply to the use of specific sites or buildings).

Containment measures that apply to use of specific sites or buildings include cancellation of public events (e.g., concerts, sports events, movies and plays), closure of office buildings, apartment complexes, or schools; and closure of subways or bus lines. These measures may also involve restricting entrance to buildings or other sites (e.g., requiring fever screening or use of face masks before entry to schools, worksites, or airplanes).

Community-based measures to increase social distance include measures applied to whole neighborhoods, towns, or cities (e.g., snow days, establishment of fever clinics, and community-wide quarantine).

BOX 2. GRADED IMPLEMENTATION OF COMMUNITY CONTAINMENT MEASURES

Level of influenza activity	Response
No novel influenza strains of public health concern in global circulation	Preparedness planning
Limited novel influenza virus ² transmission abroad; all local cases are either imported or have clear epidemiologic links to other cases	Quarantine of close contacts
Limited novel influenza virus transmission in the area, with either a small number of cases without clear epidemiologic links to other cases or with increased occurrence of influenza among their close contacts	Quarantine of close contacts
Sustained novel influenza virus transmission in the area, with a large number of cases without clear epidemiologic links to other cases; control measures aimed at individuals and groups appear to be effective	Focused measures to increase social distance; ³ consider community-based measures
Sustained novel influenza activity in the area, with a large number of cases in persons without an identifiable epidemiologic link at the time of initial evaluation; control measures are believed to be ineffective	Community-level measures to increase social distance; consider snow days and community-wide quarantine
Decreases in the number of new cases, unlinked (or "unexpected") cases, and generations of transmission	Quarantine of contacts
Transmission has been controlled or eliminated; no new cases reported	Active monitoring in high-risk populations; continue for 2-3 incubation periods after control or elimination of transmission.

² "Novel influenza viruses" include avian or animal influenza strains that can infect humans (like avian influenza A [H5N1]) and new or reemergent human viruses that cause cases or clusters of human disease.

³ "Focused measures to increase social distance" include measures applied to groups rather than individuals or whole communities (e.g., quarantine of groups of exposed persons and measures that apply to the use of specific sites or buildings)

TABLE 1. THRESHOLD DETERMINANTS FOR THE USE OF COMMUNITY CONTAINMENT MEASURES

Data on cases and contacts—as well as on depletion of healthcare and public health resources over the course of a pandemic—can help state and local health authorities decide when to implement community-level containment measures. As part of preparedness planning, state and local health agencies and healthcare partners may estimate at what point in the pandemic—in terms of such variables as numbers of cases and numbers of unoccupied hospital beds—that more extensive measures may be imposed. During an actual pandemic, state and local departments may also evaluate social considerations, such as levels of community cooperation and mobility.

Potential parameters	Variable
Cases and contacts	<ul style="list-style-type: none"> Number of cases (absolute or estimated) Rate of incident cases Number of hospitalized cases Number and percentage of cases with no identified epidemiologic link Morbidity (including disease severity) and mortality Number of contacts under surveillance and/or quarantine
Healthcare resources	<ul style="list-style-type: none"> Hospital/facility bed capacity Staff resources Patient/staff ratio Number of ill or absent staff members Availability of specifically trained specialists and ancillary staff members Availability of ventilators Availability of other respiratory equipment Availability of personal protective equipment and other measures Availability of therapeutic medications (influenza and non-influenza specific)
Public health resources	<ul style="list-style-type: none"> Investigator to case and contact ratios Number of contacts under active surveillance Number of contacts under quarantine Ability to rapidly trace contacts (number of untraced/interviewed contacts) Ability to implement and monitor quarantine (staff member to contact ratio) Ability to provide essential services (food, water, etc.)
Community cooperation, mobility, and compliance	<ul style="list-style-type: none"> Degree of compliance with voluntary individual isolation Degree of compliance with active surveillance and voluntary individual quarantine Degree of movement out of the community Degree of compliance with community-containment measures

APPENDIX 1. INTERVENTIONS FOR COMMUNITY CONTAINMENT

Contacts of pandemic influenza patients can be managed by use of a range of interventions, all of which are designed to facilitate early recognition of illness in persons at greatest risk of becoming infected and thereby prevent transmission to others. Whereas many of these interventions are applied individually to persons identified as contacts of a person with possible or known influenza disease, others are applied to larger groups of persons, or communities, that share a similar risk of exposure. Measures applied to individuals may not be feasible during the Pandemic Period, when quarantining individuals and tracing close contacts may not be possible. The range of interventions includes the following:

Passive Monitoring

<i>Definition</i>	The contact is asked to perform self-assessment at least twice daily and to contact authorities immediately if respiratory symptoms and/or fever occur.
<i>Application</i>	Situations in which 1) the risk of exposure and subsequent development of disease is low, and 2) the risk to others if recognition of disease is delayed is also low
<i>Benefits</i>	Requires minimal resources Places few constraints on individual movement
<i>Challenges</i>	Relies on self-reporting Affected persons may not perform an adequate self-assessment
<i>Resources Required</i>	Supplies (thermometer; symptom log; written instructions) Hotline to notify authorities about symptoms or needs Staff to receive telephone reports and provide in-person evaluation and care Plans and procedures for rapid isolation of persons who develop symptoms
<i>Partners</i>	Household members
<i>Forms/Templates</i>	Symptom logs Instructions for patients and healthcare workers

Active Monitoring without Explicit Activity Restrictions

<i>Definition</i>	A healthcare or public health worker evaluates the contact on a regular (at least daily) basis by phone and/or in person for signs and symptoms suggestive of influenza
<i>Application</i>	Situations in which 1) the risk of exposure to and subsequent development of disease is moderate to high, 2) resources permit close observation of individuals, and 3) the risk of delayed recognition of symptoms is low to moderate
<i>Benefits</i>	Places few constraints on individual liberties
<i>Challenges</i>	Requires adequate staffing Requires a system to track information and to verify monitoring and appropriate actions based on findings
<i>Resources Required</i>	Trained staff to provide in-person and/or telephone evaluations Plans and procedures for rapid isolation of persons who develop symptoms Contingency plans for managing noncompliant persons Hotline to notify authorities about symptoms or needs

Partners Professional and lay healthcare workers to perform evaluations on behalf of the health department
Possible need for law enforcement to assist with management of noncompliant persons

Forms/Templates Checklist for assessment of active monitoring
Template for recording results of clinical evaluation

Active Monitoring with Activity Restrictions (Quarantine)

Definition The contact remains separated from others for a specified period (up to 10 days after potential exposure), during which s/he is assessed on a regular basis (in person at least once daily) for signs and symptoms of influenza disease. Persons with fever, respiratory, or other early influenza symptoms require immediate evaluation by a trained healthcare provider. Restrictions may be voluntary or legally mandated; confinement may be at home or in an appropriate facility.

No specific precautions are required for those sharing the household with a person in quarantine as long as the person remains asymptomatic. Because onset of symptoms may be insidious, it may be prudent to minimize interactions with household members during the period of quarantine, if feasible

Application Situations in which the risk of exposure and subsequent development of disease is high and the risk of delayed recognition of symptoms is moderate

Benefits Reduces risk of spread from persons with subacute or subclinical presentations or from delayed recognition of symptoms

Challenges May infringe on personal movement
May lead to a feeling of isolation from family and friends
May lead to loss of income or employment
Requires plans/protocols for provision of essential services
Requires plan for provision of mental health support
Risk of noncompliance, particularly as duration increases
May require enforcement for noncompliance

Resources Required Staff for monitoring and evaluation
Appropriate facility if home setting is unavailable or inadequate
Staff, funding, and goods for provision of essential services
Hotline for notification of symptoms or personal needs
Mechanisms to communicate with family members outside the household or facility
Mental health and social support services
Delivery systems for food and other essential supplies

Partners Professional and lay healthcare workers to perform assessments on behalf of the health department
Community volunteers/workers to assist with provision of essential services
Potential need for law enforcement to assist with noncompliant persons

<i>Forms/Templates</i>	<ul style="list-style-type: none"> Checklist for active monitoring Template for recording results of clinical evaluation Checklist and guidelines for evaluation of homes for quarantine Checklist and guidelines for evaluation of community-based sites for quarantine Guidelines for monitoring compliance with home quarantine Guidelines for monitoring compliance with quarantine in community-based facilities Forms for recording compliance with quarantine
<i>Examples</i>	<ul style="list-style-type: none"> Home quarantine (voluntary or mandatory) Facility quarantine (voluntary or mandatory)

Working Quarantine

<i>Definition</i>	<p>Employees are permitted to work but must observe activity restrictions while off duty. Monitoring for influenza-like illness before reporting for work is usually required. This may change based on the clinical presentation of the pandemic strain. Use of appropriate PPE while at work is required (see Supplement 4)</p>
<i>Application</i>	<p>Persons for whom activity restrictions (home or facility quarantine) are indicated but who provide essential services (e.g., healthcare workers)</p>
<i>Benefits</i>	<ul style="list-style-type: none"> Reduces risk of community spread from high-risk contacts while minimizing adverse impact of activity restrictions on provision of essential services Clinical monitoring at work reduces the staff required for active monitoring at the quarantine site
<i>Challenges</i>	<ul style="list-style-type: none"> Need for close and consistent pre-shift monitoring at the work site to prevent inadvertent exposures May require means of transporting persons to and from work site to minimize interactions; persons in working quarantine should wear appropriate PPE during transport. (See Supplement 4) Must maintain close cooperation and communication between work site and local health authorities Need to provide mental health services to address concerns about isolation from family and friends
<i>Resources Required</i>	<ul style="list-style-type: none"> Appropriate facility for off-duty quarantine if home is unavailable or inadequate Staff, funding, and goods for provision of essential services Personal protective equipment (see Supplement 4) Hotline for notification of symptoms and personal needs System to track results of work-site monitoring and location(s) of off-duty quarantine Mental health, psychological, and behavioral support services, especially if work includes care of influenza patients
<i>Partners</i>	<ul style="list-style-type: none"> Work-site administrators and infection control personnel Community volunteers/workers Staff/volunteers to assist with transportation to and from work Mental health professionals Potential need for law enforcement to assist with noncompliant persons

<i>Forms/Templates</i>	<ul style="list-style-type: none"> Guidelines and instructions for persons in working quarantine Instructions for supervisors of persons in working quarantine Checklist to evaluate homes for quarantine Guidelines for monitoring compliance Checklist for active monitoring at work site Template for recording results of clinical evaluation Forms for recording compliance
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Focused Measures to Increase Social Distance

<i>Definition</i>	Intervention applied to specific groups, designed to reduce interactions and thereby transmission risk within the group. When focused, the intervention is applied to groups or persons identified in specific sites or buildings, most but not necessarily all of whom are at risk of exposure to influenza.
<i>Examples</i>	<ul style="list-style-type: none"> Quarantine of groups of exposed persons Cancellation of public events Closure of office buildings, schools, and/or shopping malls; closure of public transportation such as subways or bus lines
<i>Application</i>	Groups or settings where transmission is believed to have occurred, where the linkages between cases is unclear at the time of evaluation, and where restrictions placed only on persons known to have been exposed is considered insufficient to prevent further transmission
<i>Benefits</i>	<ul style="list-style-type: none"> Applied broadly, reduces the requirement for urgent evaluation of large numbers of potential contacts to determine indications for activity restrictions May enable reductions in transmission among groups of persons without explicit activity restrictions (quarantine)
<i>Challenges</i>	<ul style="list-style-type: none"> May be difficult to solicit cooperation, particularly if popular buildings are closed or popular events are cancelled Requires excellent communication mechanisms to notify affected persons of details and rationale May need to provide replacement for affected activities (e.g., school, essential services) Generally relies on passive monitoring
<i>Resources Required</i>	<ul style="list-style-type: none"> Systems to communicate relevant messages May require enforcement, particularly if closure of buildings or gathering places is necessary Requires resources for passive monitoring Hotlines to report symptoms and obtain follow-up instructions Transportation for medical evaluation, with appropriate infection control precautions
<i>Partners</i>	<ul style="list-style-type: none"> News media and communication outlets Law enforcement Community groups
<i>Forms/Templates</i>	<ul style="list-style-type: none"> Messages for affected persons Messages for employers of affected persons Messages for persons supplying essential services

Community-Wide Measures to Increase Social Distance

<i>Definition</i>	Intervention applied to an entire community or region, designed to reduce personal interactions and thereby transmission risk. The prototypical example is implementation of a "snow day," in which offices, schools, and transportation systems are cancelled as for a major snowstorm.
<i>Examples</i>	Snow days
<i>Application</i>	All members of a community in which 1) extensive transmission of influenza is occurring, 2) a significant number of cases lack clearly identifiable epidemiologic links at the time of evaluation, and 3) restrictions on persons known to have been exposed are considered insufficient to prevent further spread
<i>Benefits</i>	Reduces need for urgent evaluation of large numbers of potential contacts to determine indications for activity restrictions May enable reductions in transmission among groups without explicit activity restrictions (quarantine) "Snow days" are familiar concepts and thus are easy to implement on short notice
<i>Challenges</i>	May be difficult to solicit cooperation Requires excellent communication mechanisms to notify affected persons of details and rationale May need to provide replacement for affected activities (e.g., school, essential services) May need to address mental health and financial support issues When an entire community is involved, requires cooperation with neighboring jurisdictions that may not be using a similar intervention, particularly in situations where persons live in one city and work in another and only one locale is affected by the intervention Generally relies on passive monitoring Social and economic impact of public transportation closures
<i>Resources Required</i>	Communication outlets Enforcement Resources for passive monitoring Hotlines and other communication systems to report symptoms and obtain follow-up instructions
<i>Partners</i>	News media and other communication outlets Law enforcement and transportation officials to enforce restrictions (e.g., closure of bridges, roads, or mass transit systems) and plan for provision of critical supplies and infrastructure
<i>Forms/Templates</i>	Messages for affected persons Messages for employers of affected persons Messages for persons supplying essential services

Widespread Community Quarantine, Including Cordon Sanitaire

<i>Definition</i>	Legally enforceable action that restricts movement into or out of the area of quarantine of a large group of people or community; designed to reduce the likelihood of transmission of influenza among persons in and to persons outside the affected area. When applied to all inhabitants of an area (typically a community or neighborhood), the intervention is referred to as <i>cordon sanitaire</i> (sanitary barrier).
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<i>Application</i>	All members of a group in which 1) extensive transmission is occurring, 2) a significant number of cases lack identifiable epidemiologic links at the time of evaluation, and 3) restrictions placed on persons known to have been exposed are considered insufficient to prevent further spread. Widespread quarantine is unlikely to be necessary because other less restrictive measures (e.g., snow days) may be equally effective.
<i>Benefits</i>	Reduces need for urgent evaluation of large numbers of potential contacts to determine indications for activity restrictions
<i>Challenges</i>	<p>Controversial because of the degree that individual movement is restricted</p> <p>Difficult to solicit cooperation for extended periods, particularly if the rationale is not readily apparent or was not clearly explained</p> <p>Requires excellent communication mechanisms to inform affected persons and to maintain public confidence in the appropriateness of the chosen course of action</p> <p>Need to ensure continuation of essential services</p> <p>Need to provide financial support and mental health support services for the affected population</p> <p>When an entire community is involved, requires cooperation with neighboring jurisdictions that may not be using a similar intervention, particularly in situations where persons live in one city and work in another and only one locality is affected by the intervention</p> <p>Need to provide mechanisms for isolating symptomatic persons with minimal delay</p>
<i>Resources Required</i>	<p>Systems to communicate relevant messages</p> <p>Enforcement to maintain security at borders</p> <p>Transportation for persons requiring medical evaluation, with appropriate infection control precautions</p> <p>Staff and supplies to maintain access to and availability of essential services and goods, including food, water, medicine, medical care, and utilities</p> <p>Psychological support staff</p> <p>Plan to divert flow of critical infrastructure supplies and materials that normally transit through quarantined area</p>
<i>Partners</i>	<p>News media and other mass communication outlets</p> <p>Public and private groups, industries, and officials to coordinate supply and provision of essential services to affected area</p> <p>Law enforcement to maintain security at borders and to enforce movement restrictions</p> <p>Transportation industry</p>
<i>Forms/Templates</i>	<p>Messages for affected persons</p> <p>Messages for employers of affected persons</p> <p>Messages for persons supplying essential services</p>
<i>Examples</i>	<p>Quarantine (<i>cordon sanitaire</i>) of a city or town</p> <p>Quarantine of occupants of a housing complex or office building</p>

APPENDIX 2. PREPAREDNESS CHECKLIST FOR COMMUNITY CONTAINMENT MEASURES

General

- Establish an incident command structure that can be used for influenza response.
- Establish a legal preparedness plan.
- Establish relationships with partners, such as law enforcement, first responders, healthcare facilities, mental health professionals, local businesses, and the legal community.
- Plan to monitor and assess factors that will determine the types and levels of response, including the epidemiologic profile of the outbreak, available local resources, and level of public acceptance and participation.
- Develop communication strategies for the public, government decision-makers, healthcare and emergency response workers, mental health professionals, and the law enforcement community.
- Invite key partners to participate in pandemic influenza containment exercises and drills.

Management of cases and contacts (including quarantine)

- Develop protocols, tools, and databases for:
 - Case surveillance
 - Clinical evaluation and management
 - Contact tracing, monitoring, and management
 - Reporting criteria
- Develop standards and tools for home and non-hospital isolation and quarantine.
- Establish supplies for non-hospital management of cases and contacts.
- Establish a telecommunications plan for "hotlines" or other services for:
 - Case and contact monitoring and response
 - Fever triage
 - Public information
 - Provider information
- Plan to ensure provision of essential services and supplies to persons in isolation and quarantine, keeping in mind the special needs of children. Services and supplies include:
 - Food and water
 - Shelter
 - Medicines and medical consultations
 - Mental health and psychological support services
 - Other supportive services (e.g., day care or elder care)
 - Transportation to medical treatment, if required
- Plan to address issues of financial support, job security, and prevention of stigmatization.
- Establish procedures for medical evaluation and isolation of quarantined persons who exhibit signs of illness.

- ❑ Develop protocols for monitoring and enforcing quarantine measures, such as:
 - Protocols for follow-up of persons who cannot be reached by telephone. These may include a threshold period for nonresponsiveness that should trigger a home visit or other means to locate the person. Partnerships with law enforcement and other community-based resources will be helpful in tracing the whereabouts of persons who have violated restrictions.
 - Protocols for monitoring persons who cannot or will not comply with voluntary home quarantine. These may include:
 - Issuing official, legally binding quarantine orders
 - Posting a guard outside the home
 - Using electronic forms of monitoring
 - Using guarded facilities
 - Protocols for using checkpoints to restrict travel between neighborhoods.

Temporary emergency facilities for patient isolation quarantine, and assessment of patients with fever (see Appendix 7 for a list of facility characteristics)

- ❑ Identify appropriate community-based facilities for isolation of patients who have no substantial healthcare requirements.
- ❑ Develop policies related to use of these facilities.
- ❑ Identify facilities for persons for whom home isolation is indicated but who do not have access to an appropriate home setting, such as travelers and homeless populations.
- ❑ Ensure that required procedures for assessment of potential isolation or quarantine sites are available and up to date.
- ❑ Identify potential quarantine facilities and prepare contingency plans for staffing and equipping them.
- ❑ Identify potential sites for fever clinics and prepare contingency plans for staffing and equipping them, including the ability to dispense antiviral drugs to identified cases in the priority groups.

Community containment measures

- ❑ Ensure that legal authorities and procedures are in place to implement the various levels of movement restrictions as necessary.
- ❑ Establish procedures for medical evaluation and isolation of quarantined persons who exhibit signs of illness. (Additional information on medical evaluation is provided in Supplement 5.)
- ❑ Develop tools and mechanisms to prevent stigmatization and provide mental health services to persons in isolation or quarantine.
- ❑ Identify key partners and personnel for the implementation of movement restrictions, including quarantine, and the provision of essential services and supplies:
 - Law enforcement
 - First responders
 - Other government service workers
 - Utilities
 - Transportation industry
 - Local businesses
 - Schools and school boards

Establish procedures for delivering medical care, food, and services to persons in isolation or quarantine. Examples of services that will require the help of non-traditional partners include:

- Training for responders and healthcare workers, as necessary, in use of personal protective equipment
- Plans for the mobilization and deployment of public health and other community-service personnel

General

- Establish an incident command structure that can be used for influenza response.
- Establish a legal preparedness plan.
- Establish relationships with partners, such as law enforcement, first responders, healthcare facilities, mental health professionals, and the legal community.
- Plan to monitor and assess factors that will determine the types and levels of response, including the epidemiologic profile of the outbreak, available local resources, and level of public acceptance and participation.
- Develop communication strategies for the public government decision-makers, healthcare and emergency response workers, mental health professionals, and the law enforcement community. These strategies should consider privacy concerns.
- Invite key partners to participate in pandemic influenza containment exercises and drills.

Management of cases and contacts (including quarantine)

- Develop protocols, tools, and databases for management of cases and contacts, considering account security and privacy concerns. These may include protocols for:
 - Case surveillance
 - Clinical evaluation and management
 - Contact tracing, monitoring, and management
 - Reporting criteria
- Develop standards and tools for home and non-hospital isolation and quarantine.
- Establish supplies for non-hospital management of cases and contacts.
- Establish a telecommunications plan for "hotlines" or other services for case and contact monitoring and response
 - Fever triage
 - Public information
 - Provider information
- Plan to ensure provision of essential services and supplies to persons in isolation and quarantine, including:
 - Food and water
 - Shelter
 - Medicines and medical consultations
 - Mental health and psychological support services
 - Other supportive services (e.g., day care or elder care).
 - Transportation to medical treatment, if required
- Plan to address issues of financial support, job security, privacy concerns and prevention of stigmatization.

APPENDIX 3. RECENT EXPERIENCE WITH QUARANTINE: THE 2003 SARS OUTBREAK

Large-scale quarantine strategies were implemented during the 2003 SARS outbreak in several severely affected countries. Strategies included quarantine of close contacts in healthcare and household settings, work and school contacts, travelers arriving from other SARS-affected areas, and in some cases, of entire apartment complexes or areas of a city. Other strategies used to control and prevent SARS transmission in these countries included 1) requiring fever screening before entry to schools, work sites, and other public buildings; 2) requiring use of face masks in certain settings, such as public transportation systems; 3) implementing population-wide temperature monitoring and SARS fever hotlines and referral services; and 4) implementing community-level disinfection strategies.

The impact and effectiveness of individual isolation and quarantine measures and community- and population-level interventions undertaken to contain the SARS epidemic globally are not yet fully understood, but some important generalizations can be made. Overall, strategies associated with timely and successful control of local outbreaks were characterized by rapid and aggressive use of case and contact identification and community containment strategies.

Other lessons learned from this modern experience with community containment include the following:

- Strict infection control measures were needed for isolation of SARS patients; these may be difficult to implement in home and community settings.
- Community control measures such as cancellation of public events and other "snow day" measures may have reduced the risk of exposure to SARS at the population level by limiting social interactions.
- Although quarantine of individual contacts was an integral part of SARS control in most settings, quarantine of large groups was used only in selected settings where transmission was extensive.
- To be effective, quarantine did not have to be mandatory and compliance did not have to be 100%; voluntary compliance with quarantine requests was >90% in most settings.
- A variety of quarantine strategies (e.g., home quarantine, working quarantine) were used, depending on specific needs.
- Isolation and quarantine raised legal, social, financial, psychological, and logistical challenges (e.g., financial support, provision of services, prevention of stigmatization and discrimination) that should be anticipated and addressed in the future. Meeting the social, financial, and psychological needs of persons in isolation and quarantine and their contacts was key to the successful application of containment measures.
- Effective implementation of quarantine required a clear understanding of the roles and legal authorities of local, state, and federal public health officials.
- Effective implementation of quarantine required identification and engagement of appropriate traditional and non-traditional partners (e.g., law enforcement) in coordinated planning and response.
- The financial, social, and psychological impact of quarantine measures is substantial; preparedness planning should include measures to reduce this impact.
- Obtaining and maintaining public trust are key to successful implementation of these measures; clear messages about the criteria, justification, role, and duration of quarantine and ways in which persons will be supported during the quarantine period will help generate public trust.

APPENDIX 4. PRINCIPLES OF MODERN QUARANTINE

The goal of quarantine is to protect the public by separating those exposed to a dangerous communicable disease from the general population. It represents collective action for the common good that is predicated on aiding individuals who are already infected or exposed and protecting others from inadvertent exposure. Principles of modern quarantine⁴ include:

Principle 1. Modern quarantine is used when:

- A person or a well defined group of people has been exposed to a highly dangerous and highly contagious disease
- Resources are available to care for quarantined people
- Resources are available to implement and maintain the quarantine and deliver essential interventions

Principle 2. Modern quarantine encompasses a range of disease-containment strategies, including:

- Short-term, voluntary home-curfew
- Restrictions on the assembly of groups of people (e.g., school events)
- Cancellation of public events
- Suspension of public gatherings and closings of public places (e.g., theaters)
- Restrictions on travel (air, rail, water, motor vehicle, pedestrian)
- Closure of mass transit systems
- Snow days
- "Cordon sanitaire" (a guarded barrier restricting passage in and out of an area)

Principle 3. Modern quarantine is used in combination with other interventions and public health tools, including:

- Enhanced disease surveillance and symptom monitoring
- Rapid diagnosis and treatment for those who fall ill
- Preventive interventions for quarantined individuals, including vaccination or prophylactic treatment, depending on the disease

Principle 4. Quarantined individuals will be sheltered, fed, and cared for under the supervision of trained healthcare professionals. They will also be among the first to receive all available medical interventions to prevent and control disease, including:

- Vaccination (e.g., in the case of smallpox)
- Antibiotics (e.g., in the case of plague)
- Early and rapid diagnostic testing and symptom monitoring
- Early treatment if symptoms appear

Quarantined people may be cared for at home, in a designated emergency facility, or in a specialized hospital, depending on the disease and the available resources.

⁴ These principles apply to the use of quarantine as a control measure against a wide variety of infectious diseases.



Principle 5. Modern quarantine lasts only as long as necessary to protect the public by providing public health interventions (e.g., immunization or drug treatment, as required) and ensuring that quarantined persons do not become ill or infect others.

Principle 6. Modern quarantine does not have to be absolute to be effective. Modeling exercises suggest that partial quarantine can be effective in slowing the rate of smallpox spread, especially when combined with vaccination. The goal is to reduce the reproductive rate (the number of secondary cases from an index case) to < 1 to extinguish an epidemic.

Principle 7. Modern quarantine is more likely to involve limited numbers of exposed persons in small area, than to involve large numbers of persons in whole neighborhoods or cities. The small areas may be thought of as “boxes” or “concentric circles” drawn around individual disease cases. Logistical issues will vary in each case, depending on the size and location of the boxes.

Examples of “boxes” include:

- People on an airplane or cruise ship on which a passenger is ill with a suspected quarantinable disease
- People who have contact with a contagion-infected person whose source of disease exposure is unknown

Principle 8. Implementation of modern quarantine requires a clear understanding of public health roles at the local, state, and federal levels, based on well understood legal authorities at each level.

Principle 9. Implementation of modern quarantine requires coordinated preparedness planning by many public and private response partners, including agencies and groups involved in public health, healthcare, transportation, emergency response, law enforcement, and security.

Principle 10. Implementation of modern quarantine requires the trust and participation of the general public, who must be informed about the dangers of quarantinable diseases before an outbreak occurs, as well as during an actual event.

APPENDIX 5. FREQUENTLY ASKED QUESTIONS ABOUT QUARANTINE

If an influenza pandemic occurs, will my community be quarantined?

Community-wide quarantine is only one of a spectrum of actions that may be considered during an influenza pandemic in the United States. Although rapid control is likely to require bold and swift action, measures that are less drastic than legally enforced quarantine may suffice, depending on the epidemiologic characteristics of the pandemic. For example, active monitoring without activity restrictions may be adequate when most cases are either imported or have clear epidemiologic linkages at the time of initial evaluation. When the epidemiology of the outbreak indicates a need for stronger measures, jurisdictions can adopt a voluntary quarantine approach and reserve compulsory measures for only extreme situations. When an outbreak progresses to include large numbers of cases for which no epidemiologic linkages can be identified, community-level interventions may become necessary. Even at this stage, however, measures designed to increase social distance, such as snow days, may be preferred alternatives to quarantine. Wider use of quarantine is generally reserved for situations in which all other control measures are believed to be ineffective.

The choice of containment measures requires frequent and ongoing assessment of an outbreak and evaluation of the effectiveness of existing control measures. Officials must be prepared to make decisions based on limited information and then modify those decisions as additional information becomes available.

Does the effectiveness of containment measures require 100% compliance?

No. Containment measures, including quarantine, are effective even if compliance is less than 100%. Although health officials should strive for high compliance, even partial or “leaky” quarantine can reduce transmission. Therefore, strict enforcement is not always needed; in most cases, jurisdictions can rely on voluntary cooperation. The incremental benefit of quarantine approaches a maximum at a compliance rate of approximately 90%, with little additional benefit from higher rates of compliance. Therefore, containment measures can be important components of the response to a communicable disease outbreak even when compliance is not 100%.

Does “quarantine” always mean using a legal order to restrict someone’s activity?

No. The term “quarantine” is often defined narrowly to refer to the legally mandated separation of well persons who have been exposed to a communicable disease from those who have not been exposed. Although the precise legal definition of quarantine may differ from jurisdiction to jurisdiction, when used clinically or programmatically, quarantine may be defined more broadly to include all interventions, both mandatory and voluntary, that restrict the activities of persons exposed to a communicable disease. Therefore, whenever an exposed person is placed under a regimen of monitoring that includes an activity restriction, even when those restrictions are voluntary, the person is said to be under quarantine.

Must quarantine be mandatory to be effective?

Although the federal government and nearly all states have the basic legal authority to place persons exposed to certain communicable diseases under quarantine and enforce the required restrictions on activity, use of this authority may not always be necessary or practical. Previous experiences with the use of quarantine, including those during the 2003 SARS outbreak, suggest that the majority of persons comply voluntarily with requests from health authorities to remain in quarantine and observe the recommended activity restrictions. In the event voluntary measures are not successful, it may be necessary to implement mandatory containment measures.

Does being placed in quarantine increase a person's risk for acquiring disease?

One of the fundamental principles of modern quarantine is that persons in quarantine are to be closely monitored so that those who become ill are efficiently separated from those who are well. A second principle is that persons in quarantine should be among the very first to receive any available disease-prevention interventions. Adherence to these two principles of modern quarantine should prevent an increase in risk for acquiring disease while in quarantine.

Is quarantine really necessary if everyone who develops symptoms is rapidly placed in isolation?

Although theoretically true, it would be unrealistic to believe that even the most efficient system for initiation of isolation will minimize delays to the extent required to prevent transmission. Among the factors contributing to delays in recognition of symptoms are the insidious nature of disease onset and denial that symptoms have developed. Early in the 2003 SARS outbreak in Singapore, the average delay from onset of symptoms to initiation of isolation was 7 days. Officials were able to reduce this delay only to 3 days, even with an aggressive public awareness campaign on the importance of symptom recognition and isolation.

Quarantine helps to reduce transmission associated with delays in isolation in two ways. First, quarantine enables health officials to quickly locate symptomatic persons who should be placed in isolation. Second, although quarantine locations may not be as efficient as isolation facilities in preventing transmission, quarantine reduces the number of persons who might be exposed while awaiting transfer to an isolation facility. If quarantine was not used, symptomatic and infectious persons could move about freely in public places, potentially exposing large numbers of additional persons and thereby fueling the outbreak.

Is quarantine useful only for diseases that are spread by the airborne route?

No. Quarantine simply refers to the separation and restriction of activity of persons exposed to a communicable disease who are not ill. It is designed to minimize interactions between those exposed to a disease and those not yet exposed. As such, quarantine can be used for any disease that is spread from person to person. In practice, however, because of the activity restrictions associated with quarantine, the intervention is generally reserved for diseases like SARS or pandemic influenza that are easily and rapidly spread from person to person. The indication for quarantine for diseases purely transmitted by the airborne route is clear. However, this tool can also be useful where transmission can occur through close personal contact with secretions or objects contaminated by an ill person. Smallpox is an excellent example of a disease where quarantine can be effective in controlling spread although transmission may occur by means other than the airborne route.

Will the public accept the use of quarantine?

Yes. The negative connotations associated with quarantine likely stem from its misuse or abuse in the past. Although inappropriate use of quarantine, either voluntary or mandatory, would not and should not be accepted by the public, efforts should be made to gain public acceptance when use of this measure is indicated. Experiences with the use of quarantine during the SARS outbreaks of 2003 suggest that public acceptance of quarantine may be greater than previously thought. For example, during the 2003 SARS outbreak in Canada, almost all persons asked to observe quarantine restrictions did so willingly, with only a small number requiring a legal order to gain cooperation. In all cases, cooperation and acceptance was achieved through clear and comprehensive communication with the public about the rationale for use of quarantine.

APPENDIX 6. RECOMMENDATIONS FOR QUARANTINE

(Note: Recommendations on patient isolation are provided in Supplement 3.)

General considerations

- Monitor each quarantined person daily, or more frequently if feasible, for fever, respiratory symptoms, and other symptoms of early influenza disease.
- Monitor compliance with quarantine through daily visits or telephone calls.
- Provide a hotline number for quarantined persons to call if they develop symptoms or have other immediate needs.
- If a quarantined person develops symptoms suggestive of influenza, arrangements should be in place for separating that person from others in quarantine and ensuring immediate medical evaluation.
- Provide persons in quarantine with all needed support services, including 1) psychological support, 2) food and water, 3) household and medical supplies, and 4) care for family members who are not in quarantine. Financial issues, such as medical leave, may also need to be considered.
- Collect data related to quarantine activities to guide ongoing decision-making including information on each person quarantined:
 - Relationship to the case-patient
 - Nature and time of exposure
 - Whether the contact was vaccinated or on antiviral prophylaxis or using PPE
 - Underlying medical conditions
 - Number of days in quarantine
 - Symptom log
 - Basic demographics
 - Compliance with quarantine

Based on current available data, the recommended duration of quarantine for influenza is generally **10 days** from the time of exposure. (This period may be adjusted based on available information during a pandemic.) At the end of the designated quarantine period, contacts should have a final assessment for fever and respiratory symptoms. Persons without fever or respiratory symptoms may return to normal activities.

Home quarantine

Whenever possible, contacts should be quarantined at home. Home quarantine requires the fewest additional resources, although arrangements must still be made for monitoring patients, reporting symptoms, transporting patients for medical evaluation if necessary, and providing essential supplies and services. Home quarantine is most suitable for contacts with a home environment that can meet their basic needs and in which unexposed household members can be protected from exposure. Other considerations include:

- Persons in home quarantine must be able to monitor their own symptoms (or have them monitored by a caregiver).
- The person's home should be evaluated for suitability before being used for quarantine, using a questionnaire administered to the quarantined person or the caregiver. Additional guidance on use of a residence for quarantine is provided in Appendix 7.

- Quarantined persons should minimize interactions with other household members to prevent exposure during the interval between the development and recognition of symptoms. Precautions may include 1) sleeping and eating in a separate room, 2) using a separate bathroom, and 3) appropriate use of personal protective equipment (see Supplement 4).
- Persons in quarantine may be assessed for symptoms by either active or passive monitoring. Active monitoring of contacts in quarantine may overcome delays resulting from the insidious onset of symptoms or denial among those in quarantine.
- Household members may go to school, work, etc., without restrictions unless the quarantined person develops symptoms. If the quarantined person develops symptoms, household members should remain at home in a room separate from the symptomatic person and await additional instructions from health authorities.
- Household members can provide valuable support to quarantined persons by helping them feel less isolated and ensuring that essential needs are met.
- Immediate and ongoing psychological support services should be provided to minimize psychological distress.
- Quarantined persons should be able to maintain regular communication with their loved ones and healthcare providers.

Quarantine in designated facilities

In some cases, affected persons may not have access to an appropriate home environment for quarantine. Examples include travelers; persons living in dormitories, homeless shelters, or other group facilities; and persons whose homes do not meet the minimum requirements for quarantine. In other instances, contacts may have an appropriate home environment but may not wish to put family members at risk. In these situations, health officials should identify an appropriate community-based quarantine facility. Monitoring of quarantined persons may be either passive or active, although active monitoring may be more appropriate in a facility setting. Facilities designated for quarantine of persons who cannot or choose not to be quarantined at home should meet the same criteria listed for home quarantine. Evaluation of potential sites for facility-based quarantine is an important part of preparedness planning (see Appendix 7).

Working quarantine

This type of quarantine applies to healthcare workers or other essential personnel who are at occupational risk of influenza infection. These groups may be subject to quarantine either at home or in a designated facility during off-duty hours. When off duty, contacts on working quarantine should be managed in the same way as persons in quarantine at home or in a designated facility. Local officials should:

- Monitor persons in working quarantine for symptoms during work shifts
- Promptly evaluate anyone who develops symptoms
- Provide transportation to and from work, if needed
- Develop mechanisms for immediate and ongoing psychological support

At the end of the designated quarantine period, contacts should receive physical (fever and respiratory symptoms) and psychological health assessments. Persons without fever or respiratory symptoms may return to normal activities. Persons who exhibit psychological distress should be referred to mental health professionals for additional support services.

APPENDIX 7. EVALUATION OF HOMES AND FACILITIES FOR ISOLATION AND QUARANTINE

ISOLATION FACILITIES

Home isolation

Ideally, persons who meet the criteria for a case of pandemic influenza and who do not require hospitalization for medical reasons should be isolated in their homes. The home environment is less disruptive to the patient's routine than isolation in a hospital or other community setting.

If feasible—especially during the earliest stages of a pandemic—a home being considered as an isolation setting should be evaluated by an appropriate authority, which could be the patient's physician, health department official, or other appropriate person to verify its suitability. The assessment should center on the following minimum standards for home isolation of an influenza patient:

Infrastructure

- Functioning telephone
- Electricity
- Heating, ventilation, and air conditioning (HVAC)
- Potable water
- Bathroom with commode and sink
- Waste and sewage disposal (septic tank, community sewage line)

Accommodations

- Ability to provide a separate bedroom for the influenza patient
- Accessible bathroom in the residence; if multiple bathrooms are available, one bathroom designated for use by the influenza patient

Resources for patient care and support

- Primary caregiver who will remain in the residence and who is not at high risk for complications from influenza disease
- Meal preparation
- Laundry
- Banking
- Essential shopping
- Social diversion (e.g., television, radio, Internet access, reading materials)
- Masks, tissues, hand hygiene products, and information on infection control procedures
- Educational material on proper waste disposal

Isolation in a community-based facility

When persons requiring isolation cannot be accommodated either at home or in a healthcare facility, a community-based isolation facility will be required. The availability of a community-based facility will be particularly important during a large outbreak (See also <http://www.ahrq.gov/research/altsites.htm>).

Much of the work in identifying and evaluating potential sites for isolation should be conducted in advance of an outbreak as part of preparedness planning. Each jurisdiction should assemble a team (including infection control specialists, public health authorities, engineers, sanitation experts, and mental health specialists) to identify appropriate locations and resources for community influenza isolation facilities, establish procedures for activating them, and coordinate activities related to patient management. The team should consider the use of both existing and temporary structures. Options for existing structures include community health centers, nursing homes, apartments, schools, dormitories, and hotels. Options for temporary structures include trailers, barracks, and tents. Considerations include:

Basic infrastructure requirements

- Meets all local code requirements for a public facility
- Functioning telephone system
- Electricity
- Heating, ventilating, and air conditioning (HVAC)
- Potable water
- Bathroom with commode and sink
- Waste and sewage disposal (septic tank, community sewage line)
- Multiple rooms for housing ill patients (individual rooms are preferred)

Access considerations

- Proximity to hospital
- Parking space
- Ease of access for delivery of food and medical and other supplies
- Handicap accessibility
- Basic security

Space requirements

- Administrative offices
- Offices/areas for clinical staff
- Holding area for contaminated waste and laundry
- Laundry facilities (on- or off-site)
- Meal preparation (on- or off-site)

Social support resources

- Television and radio
- Reading materials

To determine priorities among available facilities, consider these features:

- Separate rooms for patients or areas amenable to isolation of patients with minimal construction
- Feasibility of controlling access to the facility and to each room
- Availability of potable water, bathroom, and shower facilities
- Facilities for patient evaluation, treatment, and monitoring
- Capacity for providing basic needs to patients
- Rooms and corridors that are amenable to disinfection
- Facilities for accommodating staff
- Facilities for collecting, disinfecting, and disposing of infectious waste
- Facilities for collecting and laundering infectious linens and clothing
- Ease of access for delivery of patients and supplies
- Legal/property considerations

Additional considerations include:

- Staffing and administrative support
- Training
- Ventilation and other engineering controls
- Ability to support appropriate infection control measures
- Availability of food services and supplies
- Ability to provide an environment that supports the social and psychological well-being of patients
- Security and access control
- Ability to support appropriate medical care, including emergency procedures
- Access to communication systems that allow for dependable communication within and outside the facility
- Ability to adequately monitor the health status of facility staff

QUARANTINE FACILITIES

Home quarantine

A person's residence is generally the preferred setting for quarantine. As with isolation, home quarantine is often least disruptive to a person's routine. Because persons who have been exposed to influenza may need to stay in quarantine for as long as 10 days (may be modified based on information about the virus), it is important to ensure that the home environment meets the individual's ongoing physical, mental, and medical needs. An evaluation of the home for its suitability for quarantine should be performed, ideally before the person is placed in quarantine. This evaluation may be performed on site by a health official or designee. However, from a practical standpoint, it may be more convenient to evaluate the residence through the administration of a questionnaire to the individual and/or the caregiver. Factors to be considered in the evaluation include:

- Basic utilities (water, electricity, garbage collection, and heating or air-conditioning as appropriate)
- Basic supplies (clothing, food, hand-hygiene supplies, laundry services)
- Mechanism for addressing special needs (e.g., filling prescriptions)

- Mechanism for communication, including telephone (for monitoring by health staff, reporting of symptoms, gaining access to support services, and communicating with family)
- Accessibility to healthcare workers or ambulance personnel
- Access to food and food preparation
- Access to supplies such as thermometers, fever logs, phone numbers for reporting symptoms or accessing services, and emergency numbers (these can be supplied by health authorities if necessary)
- Access to mental health and other psychological support services.

Quarantine in a community-based facility

Although the home is generally the preferred setting for quarantine, alternative sites for quarantine may be necessary in certain situations. For example, persons who do not have a home situation suitable for this purpose or those who require quarantine away from home (e.g., during travel) will need to be housed in an alternative location. Because persons who have been exposed to influenza may require quarantine for as long as 10 days, it is important to ensure that the environment is conducive to meeting the individual's ongoing physical, mental, and medical needs. Ideally, one or more community-based facilities that could be used for quarantine should be identified and evaluated as part of influenza preparedness planning. The evaluation should be performed on site by a public health official or designee. Additional considerations, beyond those listed above for home quarantine, include:

- Adequate rooms and bathrooms for each contact
- Delivery systems for food and other needs
- Staff to monitor contacts at least daily for fever and respiratory symptoms
- Transportation for medical evaluation for persons who develop symptoms
- Mechanisms for communication, including telephone (for monitoring by health staff, reporting symptoms, gaining access to support services, and communicating with family)
- Adequate security for those in the facility

Services for removal of waste. No special precautions for removal of waste are required as long as persons remain asymptomatic.