

Updated Preparedness and Response Framework for Influenza Pandemics



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Front cover photo: Police officers in Seattle, Washington, wear masks during the 1918 influenza pandemic. (Photo/National Archives and Records Administration)

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Updated Preparedness and Response Framework for Influenza Pandemics

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Summary

The complexities of planning for and responding to the emergence of novel influenza viruses emphasize the need for systematic frameworks to describe the progression of the event; weigh the risk of emergence and potential public health impact; evaluate transmissibility, antiviral resistance, and severity; and make decisions about interventions. On the basis of experience from recent influenza responses, CDC has updated its framework to describe influenza pandemic progression using six intervals (two prepandemic and four pandemic intervals) and eight domains. This updated framework can be used for influenza pandemic planning and serves as recommendations for risk assessment, decision-making, and action in the United States. The updated framework replaces the U.S. federal government stages from the 2006 implementation plan for the National Strategy for Pandemic Influenza (US Homeland Security Council. National strategy for pandemic influenza: implementation plan. Washington, DC: US Homeland Security Council; 2006. Available at <http://www.flu.gov/planning-preparedness/federal/pandemic-influenza-implementation.pdf>). The six intervals of the updated framework are as follows: 1) investigation of cases of novel influenza, 2) recognition of increased potential for ongoing transmission, 3) initiation of a pandemic wave, 4) acceleration of a pandemic wave, 5) deceleration of a pandemic wave, and 6) preparation for future pandemic waves. The following eight domains are used to organize response efforts within each interval: incident management, surveillance and epidemiology, laboratory, community mitigation, medical care and countermeasures, vaccine, risk communications, and statelocal coordination.

Compared with the previous U.S. government stages, this updated framework provides greater detail and clarity regarding the potential timing of key decisions and actions aimed at slowing the spread and mitigating the impact of an emerging pandemic. Use of this updated framework is anticipated to improve pandemic preparedness and response in the United States. Activities and decisions during a response are event-specific. These intervals serve as a reference for public health decision-making by federal, state, and local health authorities in the United States during an influenza pandemic and are not meant to be prescriptive or comprehensive. This framework incorporates information from newly developed tools for pandemic planning and response, including the Influenza Risk Assessment Tool and the Pandemic Severity Assessment Framework, and has been aligned with the pandemic phases restructured in 2013 by the World Health Organization.

Introduction

Planning for and responding to the range of possible consequences following the emergence of a novel influenza A virus is complex. These viruses can spread quickly and explosively worldwide, as did the influenza pandemics in 1918, 1957, 1968, and 2009 (1,2); cause limited outbreaks, such as the influenza A(H3N2) variant (H3N2v) virus in the United States

associated with agricultural fairs in the summer months of 2011, 2012, and 2013 (3); or continue causing limited animal-to-human transmission of virus, such as the influenza A(H5N1) and influenza A(H7N9) viruses in Asia (4,5). Furthermore, novel influenza A viruses, even when transmissible in a closed setting, do not always result in a pandemic, such as the 1976 influenza A(H1N1) outbreak in Fort Dix, New Jersey, and the 2011–2013 H3N2v outbreak in the United States (3,6). Identifying and responding to this wide range of situations require systematic frameworks that describe the progression of events; weigh the risk of emergence and potential public health impact of the novel virus; evaluate the potential for ongoing

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transmissibility, antiviral resistance, and disease severity; and can be used to develop time-sensitive decisions about interventions (e.g., community mitigation measures, medical countermeasures, and vaccines). Preparedness and response frameworks provide a common basis for planning across different jurisdictions and ensure transparency in decisions made and actions taken.

Significant progress has been made toward developing pandemic plans, as well as preparedness and response frameworks, during the past decade. Efforts by the World Health Organization (WHO), CDC, other U.S. government agencies, and state and local jurisdictions have addressed pandemic preparedness planning. Lessons regarding gaps in U.S. influenza decision-making frameworks have become evident with each event and exercise (7). The recent emergence of human disease caused by H3N2v in the United States (3) and H7N9 in China (5) has demonstrated the need to align existing documents and frameworks into one useful tool that can be used to guide ongoing planning and response efforts.

Background

Frameworks describing the progression of influenza pandemics have evolved over time. The 2005 WHO global pandemic plan introduced the concept of pandemic phases (8). Six phases were used to describe the evolving risk of efficient human-to-human transmission as a basis for defining a pandemic.

In November 2005, the president of the United States released a national strategy for pandemic influenza (9), and the associated implementation plan was released in May 2006 (10). These documents introduced the concept of using stages to determine the response to pandemic influenza, including stage 0 (new domestic animal outbreak in an at-risk country), stages 1–3 (human outbreaks suspected, confirmed, and widespread overseas), and stages 4–6 (first case in a human in North America, spread throughout the United States, and recovery and preparation for subsequent waves). The U.S. government stages provided greater specificity for U.S. preparedness and response efforts than the WHO phases and facilitated initial planning efforts by identifying objectives, actions, policy decisions, and message considerations for each stage. The stages provided a general overview of the approach to a pandemic response; however, detailed pandemic response planning requires a greater level of specificity to determine federal, state, and local response actions during the course of a pandemic. In addition, the stages framework presumed geographic spread from outside the United States into the United States. In 2007, CDC developed the CDC intervals,

a common framework from which CDC and other federal, state, and local governments and agencies could plan and coordinate their pandemic response actions. The 2007 CDC intervals refined the stages framework in the following ways:

- Provided greater detail to reflect the progression of a pandemic, including when decisions and actions might occur
- Provided improved definitions to identify the transition points between intervals to reduce variability in interpretation
- Considered that pandemic influenza might emerge inside or outside of the United States
- Accommodated the likely asynchrony of pandemic stages and progression in different jurisdictions to allow for local, state, regional, and national actions appropriate to jurisdiction-specific conditions
- Provided a structure that allowed for planning for multiple waves

The resulting document (*Proposal for the Use of Intervals, Triggers, and Actions in CDC Pandemic Influenza Planning, 2008*) was revised, published as an appendix to the U.S. Department of Health and Human Services pandemic influenza operational plan (11), and used during the 2009 H1N1 pandemic to describe progression of the pandemic and to help guide the response. This report provides an update to the 2008 framework to reflect experiences with 2009 H1N1 and recent responses to localized outbreaks of novel influenza A viruses.

The revised framework also incorporates the recently developed Influenza Risk Assessment Tool (IRAT) (12) and Pandemic Severity Assessment Framework (PSAF) (13). IRAT makes an assessment of potential pandemic risk for a novel virus on the basis of the likelihood of emergence and the public health impact if it were to emerge. Emergence refers to the risk of a novel (i.e., new in humans) influenza virus acquiring the ability to spread easily and efficiently in humans. Public health impact refers to the potential severity of human disease caused by the virus (e.g., deaths and hospitalizations), as well as the impact on society (e.g., missed workdays, strain on hospital capacity and resources, and interruption of basic public services) if a novel influenza virus were to begin spreading efficiently and sustainably among humans (12). After a novel virus has achieved efficient and sustained transmission, PSAF can be used to characterize the potential impact of a pandemic relative to previous influenza epidemic and pandemic experiences. PSAF replaces the Pandemic Severity Index as a severity assessment tool (13).

In 2013, WHO released interim guidance for pandemic influenza risk management, which includes restructured WHO phases (14). The revised WHO phases are based on virologic, epidemiologic, and clinical data. WHO uses the phases to describe evolving situations pertaining to the

circulation of novel influenza viruses. The WHO phases are distinct from declarations of either a public health emergency of international concern (15) or a pandemic and are not specifically aligned with national risk management decisions. In the interim guidance, WHO strongly advises countries to use local circumstances and information provided by the WHO global assessments to develop their own national risk assessments (13).

The framework described in this report is a revision of the 2008 CDC interim guidance (11) to 1) update the novel influenza virus pandemic intervals as the basis for U.S. planning efforts; 2) align the intervals with the new WHO phases; 3) add and align tools to aid in decision-making and actions throughout the progression of an event; 4) serve as recommendations for U.S. risk assessment, decision-making, and action as advised by WHO; and 5) replace the U.S. government stages with six intervals for pandemic influenza planning. This framework is designed for decision-making by federal, state, and local health authorities and is not meant to be prescriptive or comprehensive.

The framework was reviewed for accuracy, feasibility, and clarity by several stakeholders, including representatives of the Association of State and Territorial Health Officials, the National Association of County and City Health Officials, the Association of Public Health Laboratories, the Council of State and Territorial Epidemiologists, and the National Public Health Information Coalition. In addition, feedback also was incorporated from departments and agencies across the U.S. government.

Novel Influenza A Virus Pandemic Intervals

The novel influenza A virus pandemic intervals are based on what is known about past influenza transmission and on experience from recent events (e.g., 2009 H1N1 pandemic, H3N2v in the United States, H7N9 in China, and continuing sporadic human cases of H5N1). Typically, epidemic curves are used to monitor an outbreak as it is occurring, describe the outbreak retrospectively, and document the timing of interventions relative to the acceleration and deceleration of the outbreak. Modeled epidemic or pandemic curves also can be used to describe potential events over time. Using these models for forecasting purposes might be particularly valuable for anticipating conditions and identifying actions that might flatten or otherwise attenuate the epidemic or pandemic curve.

For the purposes of responding to novel influenza viruses and potential pandemics, the six intervals (investigation, recognition, initiation, acceleration, deceleration, and

preparation) represent events that occur along a hypothetical pandemic curve (Figure). Pandemic curves differ by duration and intensity depending on many factors, including the geographic area in which they occur, the season of their emergence, and related population dynamics. The WHO pandemic influenza phases, which can be used to describe and communicate worldwide disease progression, provide a general view of the emerging epidemiologic situation essentially by aggregating epidemic curves from around the world. The CDC intervals serve as additional points of reference to provide a common orientation and clearer epidemiologic picture of what is taking place and when to intervene. The intervals are flexible enough to accommodate the likely asynchrony of pandemic progression in different areas to allow for local, state, and federal actions appropriate to jurisdiction-specific conditions (e.g., a jurisdiction with cases versus a jurisdiction with no cases but that is close to an area with cases). State and local health authorities might even elect to implement interventions asynchronously within their jurisdictions by focusing early efforts on communities that are first affected. The state/local initiation, acceleration, deceleration, and preparation indicators can be asynchronous to the federal indicators (Appendix).

For state and local planning, the intervals describe the progression of the pandemic within communities and provide a detailed framework for defining when to respond with various actions and interventions at any point in a pandemic. These actions should be proportionate to the transmissibility and severity of the emerging virus. The intervals are further stratified into eight domains so that the trajectory of planning and response activities for any one domain can be more easily followed. The eight domains are incident management, surveillance and epidemiology, laboratory, community mitigation, medical care and countermeasures, vaccine, risk communications, and state/local coordination. The intervals also might be valuable as a common reference point because they can be used to link the status of a pandemic with specific interventions.

U.S. experiences during recent novel influenza events were useful for testing the concepts in the proposed intervals and the decisions and actions that were implemented during those intervals. The public health impact of novel influenza virus strains can differ substantially, both in geographic spread and mortality. For example, the 2009 H1N1 outbreak was caused by a highly transmissible novel influenza virus that emerged in North America and resulted in a pandemic (2), whereas the H3N2v virus, which also emerged in North America, caused approximately 300 cases in humans and limited outbreaks involving domestic animal-to-human transmission (3). The H7N9 outbreak was caused by a novel influenza virus that

emerged outside of U.S. borders and had high mortality but has not spread to other countries thus far (5). These experiences have provided opportunities to test the validity and usefulness of the intervals and the recommendations for public health actions triggered by each interval to ensure that they are applicable in a diverse range of scenarios.

Pandemic Interval Definitions

To define the intervals, the relationship between the timing of the broad WHO phases and the more detailed planning intervals was examined (Figure). In addition to the relationship to the WHO phases, the intervals are characterized by specific transmission-related indicators (Table) and by the types of response activities that should occur within each interval (Appendix).

Progression through the intervals is not exclusively linear. For example, identification of a novel influenza A virus does not necessitate progression to the next interval (the recognition interval) if the virus does not demonstrate the potential for ongoing transmission. Similarly, after the preparation interval, subsequent waves of outbreaks will prompt federal, state, and local public health officials to reenter the acceleration, deceleration, and preparation intervals. The duration of each pandemic interval might vary from weeks to months depending on the characteristics of the virus and the public health response.

Investigation Interval: Investigation of Novel Influenza Cases

The investigation interval is initiated by the identification and investigation of a novel influenza A infection in humans or animals anywhere in the world that is judged by subject-matter experts to have potential implications for human health

(Appendix [Table 1]). Public health actions focus on targeted surveillance and epidemiologic investigations to identify human infections and assess the potential for the virus to cause severe disease in humans, including person-to-person transmission, co-investigations of animal outbreaks with animal health representatives, and consideration of case-based control measures (i.e., antiviral treatment and antiviral postexposure prophylaxis of contacts for infected humans and isolation of humans and animals who are infected). After recognition of a case of novel influenza infection in a human, as occurred with the H7N9 and H3N2v viruses, animal investigations subsequently identified circulation of influenza viruses in birds and swine, respectively, and identified the reservoir of these previously unrecognized novel influenza viruses. CDC conducts an IRAT assessment during the investigation interval to characterize the potential for emergence, and if the virus does emerge, the severity of human infection (12). Generally, identification of human cases of novel influenza A infection are reported to WHO in accordance with the International Health Regulations (15).

Recognition Interval: Recognition of Increased Potential for Ongoing Transmission

The recognition interval is initiated when increasing numbers of human cases or clusters of novel influenza A infection are identified anywhere in the world, and the virus characteristics indicate an increased potential for ongoing human-to-human transmission (Appendix [Table 2]). Public health actions concentrate on control of the outbreak, with a focus on potential use of case-based control measures, including treatment and isolation of ill persons and voluntary quarantine of contacts.

FIGURE. Preparedness and response framework for novel influenza A virus pandemics: CDC intervals

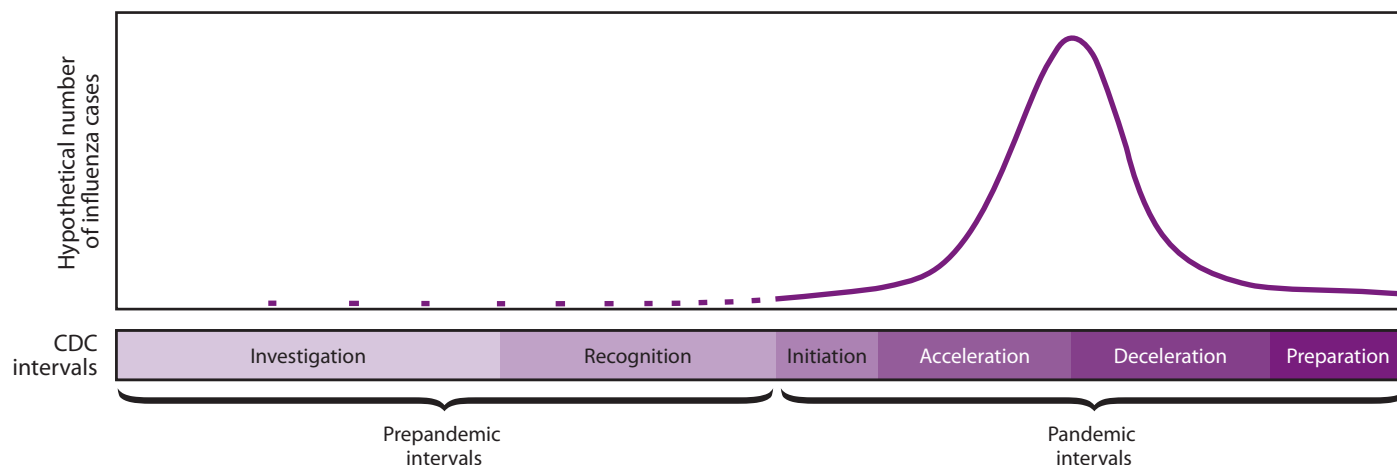


TABLE. Preparedness and response framework for novel influenza A virus pandemics: World Health Organization phases and CDC intervals, with federal and state/local indicators

World Health Organization phases	CDC intervals	Federal indicators for CDC intervals	State/Local indicators for CDC intervals
Interpandemic phase: Period between influenza pandemics Alert phase: Influenza caused by a new subtype has been identified in humans	Investigation: Investigation of novel influenza A infection in humans or animals	Identification of novel influenza A infection in humans or animals anywhere in the world with potential implications for human health	Identification of novel influenza A infection in humans or animals in the United States with potential implications for human health
	Recognition: Recognition of increased potential for ongoing transmission of a novel influenza A virus	Increasing number of human cases or clusters of novel influenza A infection anywhere in the world with virus characteristics, indicating increased potential for ongoing human-to-human transmission	Increasing number of human cases or clusters of novel influenza A infection in the United States with virus characteristics indicating increased potential for ongoing human-to-human transmission
Pandemic phase: Global spread of human influenza caused by a new subtype	Initiation: Initiation of a pandemic wave	Confirmation of human cases of a pandemic influenza virus anywhere in the world with demonstrated efficient and sustained human-to-human transmission	Confirmation of human cases of a pandemic influenza virus in the United States with demonstrated efficient and sustained human-to-human transmission
	Acceleration: Acceleration of a pandemic wave	Consistently increasing rate of pandemic influenza cases identified in the United States, indicating established transmission	Consistently increasing rate of pandemic influenza cases identified in the state, indicating established transmission
	Deceleration: Deceleration of a pandemic wave	Consistently decreasing rate of pandemic influenza cases in the United States	Consistently decreasing rate of pandemic influenza cases in the state
Transition phase: Reduction in global risk, reduction in response activities, or progression toward recovery actions	Preparation: Preparation for future pandemic waves	Low pandemic influenza activity but continued outbreaks possible in some jurisdictions	Low pandemic influenza activity but continued outbreaks possible in the state

Initiation Interval: Initiation of the Pandemic Wave

The initiation interval begins when human cases of a pandemic influenza virus infection are confirmed anywhere in the world with demonstrated efficient and sustained human-to-human transmission (Appendix [Table 3]). The definition of efficient and sustained transmission is established during an event based on the epidemiologic characteristics of the emerging virus. For example, efficient transmission could be defined as a household or an institutional attack rate of $\geq 20\%$ in more than two communities, and sustained could be defined as transmission of virus for three or more generations in more than one cluster. Continued implementation of case-based control measures and routine personal protective measures (e.g., hand hygiene) is essential, as is enhanced surveillance for detecting additional cases of the novel virus to determine when community mitigation measures will be implemented. If possible, PSAF results (13) should be used to ensure that actions are proportional to the severity of the disease caused by the virus.

Acceleration Interval: Acceleration of the Pandemic Wave

The acceleration interval is indicated by a consistently increasing rate of pandemic influenza cases identified in the United States, indicating established transmission (Appendix [Table 4]). Consideration of immediate initiation of appropriate community mitigation measures such as school and child-care facility closures and social distancing (16) in addition to the efficient management of public health resources (including medical countermeasures and vaccines, if available) are of primary importance in this interval (17) and are guided by PSAF results. Isolation and treatment of ill persons and voluntary quarantine of contacts continue as key mitigation measures. Historical analyses and mathematical modeling indicate that early institution of combined, concurrent community mitigation measures might maximize reduction of disease transmission and subsequent mortality in the affected areas (18–21).

Deceleration Interval: Deceleration of the Pandemic Wave

The deceleration interval is indicated by a consistently decreasing rate of pandemic influenza cases in the United States (Appendix [Table 5]). During this interval, planning for appropriate suspension of community mitigation measures and recovery begins. State or local health officials might rescind community mitigation measures in certain regions within their jurisdiction when no new cases are occurring or are occurring infrequently.

Preparation Interval: Preparation for a Subsequent Pandemic Wave

The preparation interval is characterized by low pandemic influenza activity, although outbreaks might continue to occur in certain jurisdictions (Appendix [Table 6]). Primary actions focus on discontinuing community mitigation measures; facilitating the recovery of the public health, health-care, and community infrastructure; resuming enhanced surveillance protocols to detect subsequent waves; evaluating the response to the initial wave; and preparing for potential additional waves of infection. Because this interval can last from weeks to months, planning and preparation for a subsequent pandemic wave should reflect this variability. A pandemic is declared ended when evidence indicates that influenza, worldwide, is transitioning to seasonal patterns of transmission (8). Like the 2009 H1N1 strain, pandemic strains might circulate for years after the pandemic, gradually taking on the behavior and transmission patterns of seasonal influenza viruses.

Assessing Risks to Enhance Decision-Making

In addition to describing the progression of a pandemic, certain assessments, interpretations, and findings (i.e., indicators) are used to define the transition points between the intervals (Table). Within each interval, certain actions can be determined for state, local, and federal governments. Each indicator also initiates a set of important decisions that affect actions in the current and subsequent intervals. These decisions can range from formal generation and analysis of options to more informal but equally important discussions among subject-matter experts, pandemic response leaders, and various stakeholders (Appendix).

Decisions about appropriate actions require information regarding the real or potential impact of the novel virus on public health. Within any interval, decisions about which actions should be considered should take into account

numerous factors, such as virus transmission parameters, severity of disease among different age and risk groups, availability and effectiveness of control measures and treatment options (e.g., community interventions, antivirals, and vaccines), and impact on health care, schools, businesses, and the community.

Although data needed to make decisions might be limited during the earliest intervals, delaying action might weaken the effectiveness of the response. Therefore, estimating the likelihood of risks, particularly the risks of transmissibility, severity, and antiviral resistance, is critical (12,13,22). In addition, certain actions, such as the decision to produce a pandemic vaccine, require extensive preparation or time to implement, mandating that decision-making be initiated and completed as early as possible before the intervals when those actions need to occur and usually long before adequate data are available to support the need for those actions with certainty.

CDC developed two risk assessment tools for the decision-making framework, IRAT (12) and PSAF (13). Both are designed to be used during the initial intervals when data are limited, to allow for iterative updates as new information becomes available and to accommodate various potential scenarios. Once completed, results of both tools are communicated to federal, state, and local decision-makers to guide public health actions (Appendix).

Influenza Risk Assessment Tool

When a novel influenza A virus is identified in humans but is not circulating widely in the human population, it is important to evaluate 1) the risk that the virus will develop efficient and sustained human-to-human transmission and 2) the risk that the virus will substantially affect public health. IRAT was developed to facilitate such an assessment (12). Therefore, the indicator for the investigation interval, which is a newly identified influenza A virus in animals or identification of a novel influenza A virus recovered from humans, can serve as an initial trigger to conduct IRAT scoring.

IRAT is used by the U.S. government and the WHO Global Influenza Surveillance and Response System as a risk assessment process that involves data gathering, discussion, and consensus building among subject-matter experts to assign a risk score. Ten predefined risk elements are given a risk score. These 10 elements fall into three categories: 1) attributes that pertain to the biologic properties of the virus (four elements), 2) attributes of the population (three elements), and 3) attributes of the ecology and epidemiology of the virus (three elements) (12). A team of experts assigned to each particular element provides a risk score for the virus for that element. A weight is then applied to the element scores for

each of the two risk questions (i.e., emergence and impact). The results of this process can be used to decide whether and how to act and communicate concerns regarding both emergence and potential public health impact. As new information becomes available, the scoring can be repeated. This process has been used to assess recently emerging viruses such as H3N2v and H7N9 for vaccine development, manufacturing, and stockpile decisions. After a novel virus has achieved efficient and sustained transmission, PSAF can then be used to characterize the potential impact of a pandemic relative to previous influenza epidemic and pandemic experiences.

Pandemic Severity Assessment Framework

Once a novel influenza virus has emerged and is circulating in human populations, the risk posed by the pandemic can be assessed. In 2007, as part of the interim guidance for community mitigation strategies, the Pandemic Severity Index was introduced as a tool to define the severity of a future influenza pandemic. To facilitate risk communication, the index had five categories similar to the hurricane severity scale, ranging in severity from category 1 (moderate severity) to category 5 (most severe) and was based on a hypothetical 30% attack rate and ranges of case-fatality ratios associated with a particular novel influenza virus (16). Experiences from the 2009 H1N1 pandemic identified that early data on the less severe but highly transmissible characteristics of the virus in the community were limited. Consequently, the Pandemic Severity Index, which based severity solely on mortality, tended to overestimate severity because more severe cases are likely to be reported at the initiation of a pandemic. Building on those lessons, PSAF was developed to characterize the potential impact of a pandemic relative to previous influenza epidemic and pandemic experiences (13). PSAF can be used early in a pandemic and assessments can be repeated as information changes. Although IRAT focuses on risk of emergence and potential for impact if emergence occurs, PSAF focuses on epidemiologic parameters of transmissibility and severity after a virus has emerged with efficient and sustained transmission and requires a sufficient number of cases and clusters in humans to allow for the assessment to be completed. Depending on the number of cases, size of clusters, and the geographic location of outbreaks, the trigger for using PSAF might be as early in the pandemic as the recognition interval but is more likely to be triggered during the initiation interval and regularly updated as the pandemic progresses.

PSAF is based on transmissibility and clinical severity parameters and uses different scales for initial assessments in an emerging pandemic, and for later, more refined assessments. The initial assessment, performed early in the outbreak when epidemiologic data are limited, uses a dichotomous scale

of low-moderate versus moderate-high transmissibility and severity. The later assessment, performed when more reliable data are available, is more refined, using a 5-point scale for transmissibility and a 7-point scale for clinical severity. After available data are assessed on these scales, the overall results are plotted with the measures of transmissibility along a y-axis and the measures of severity along an x-axis and compared with referent points such as previous pandemics or particularly severe influenza seasons (13). In the very early stages of an emerging pandemic, public health officials reiterate the importance of early treatment of ill persons as well as community mitigation measures to slow the spread of influenza, including voluntary isolation (i.e., ill persons staying home when sick), respiratory etiquette, hand hygiene, and guidance on treatment with antivirals. The results of PSAF assessments help national, state, and local decision-makers determine whether to implement additional community mitigation measures, including those that can be very disruptive and might have a more serious economic and societal impact on individual persons and communities (e.g., school dismissals or quarantine of contacts).

Using the Intervals, Influenza Risk Assessment Tool, and Pandemic Severity Assessment Framework

The use of transmission-defined intervals and tools such as IRAT and PSAF to assess risks and potential impact provides information that can guide decision-making and actions across different jurisdictions and levels of government and help inform appropriate risk communication strategies. A list of some of the key decisions and options for action that are triggered by progression through each interval are described (Appendix). Planning and response efforts for recent novel influenza A viruses and pandemics have been organized into eight domains to ensure that subject-matter expertise is properly applied to all aspects of the event. The decisions and actions are further stratified into these domains so that the trajectory of planning and response activities for any one domain can be more easily followed. The eight domains are incident management, surveillance and epidemiology, laboratory, community mitigation, medical care and countermeasures, vaccine, risk communications, and state/local coordination. The tables are not meant to be prescriptive or comprehensive but rather to identify numerous priority issues that need to be addressed during each interval. The circumstances of each situation dictate the timing of decisions and actions.

Discussion

The updated influenza pandemic framework provides six intervals and indicators for public health decision-making and actions during the progression of a novel influenza A virus from emergence through pandemic. The intervals are based on events that occur along a hypothetical epidemic curve. Although the actual shape of a future epidemic curve cannot be accurately predicted and might be modified by interventions, the use of an idealized curve permits generally applicable intervals to be defined. The concept of describing intervals of a pandemic can be applied to a single outbreak occurring in an individual state or a community, or information from multiple outbreaks can be aggregated to describe the situation at the national level.

Because the resources and demographics among different regions and states in the United States vary widely, defining detailed indicators that address every potential situation is impossible. Certain indicators might not be scalable to all levels of government, and others do not have corresponding actions from every participant group. However, the proposed intervals, triggers for decision-making, and actions are meant to be flexible enough to allow for the implementation of local, state, and federal actions appropriate to jurisdiction-specific conditions.

This framework is designed to assist with decision-making but does not diminish or replace the role of scientific expertise, particularly as a novel influenza outbreak unfolds. An effective pandemic response is based on numerous assumptions and actions that must be continuously reassessed with accumulated data as the pandemic progresses. The content of this framework is intended to support and organize planning and response efforts at the federal, state, and local levels. The use of common concepts is critical for tracking the course of the pandemic, for communication, and for implementing timely, coordinated response efforts.

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Influenza Pandemic Framework Workgroup

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Appendix

CDC Intervals for a Novel Influenza A Virus Pandemic: State/Local and Federal Indicators, Decisions, and Actions

The following tables provide a list of some key decisions and potential actions to consider in response to the spread of a novel influenza virus capable of causing a worldwide pandemic. Specific decisions and actions might be triggered as each jurisdiction moves from one interval to another. For many interventions and activities, federal, state, and local preparedness and response actions begun during one interval should be continued and enhanced during subsequent intervals. Because predicting how a particular virus will spread is exceedingly difficult, the examples that follow might need to be scaled back or otherwise modified so that responses are proportionate to the threat. The following tables are not meant to be prescriptive or comprehensive but rather to provide

examples of priority issues that should be addressed during each interval.

Planning for many of the actions suggested in the tables that follow should be part of ongoing pandemic preparedness programs at the federal, state, and local levels. This document assumes that previous pandemic planning has occurred in each jurisdiction; these plans should be reviewed, updated, and adapted to fit the characteristics of the emerging threat. Pandemic planning is based on numerous assumptions and actions that should be continuously reassessed as the pandemic progresses. The circumstances of each situation dictate the timing of decisions and actions.

Investigation Interval (Table 1)

State/Local indicator: Identification of novel influenza A infection in humans or animals in the United States with potential implications for human health.

Federal indicator: Identification of novel influenza A infection in humans or animals anywhere in the world with potential implications for human health.

TABLE 1. Novel influenza A virus pandemic (investigation interval): investigation of novel influenza A infection in humans or animals

Domain	State/Local	Federal
Incident management	<ul style="list-style-type: none"> • Review state/local response plans. • Coordinate activities and response plans with state animal health officials, as appropriate. • Review and exercise all aspects of influenza response. 	<ul style="list-style-type: none"> • CDC and the World Health Organization (WHO) convene international experts to implement the Influenza Risk Assessment Tool* to assess the risk for emergence of the novel virus, as well as the potential impact of the virus. • If the United States is affected, report human cases to WHO (per the 2005 International Health Regulations). • If the United States is affected, report animal cases to the World Organization for Animal Health (OIE) as required by OIE standards. • Identify priority preparedness activities and accelerate progress. • Consider activation of emergency operations centers.
Surveillance and epidemiology	<ul style="list-style-type: none"> • Maintain and enhance influenza and respiratory virus surveillance systems as needed. • Implement case-based investigation of novel influenza infections in humans and animals. • Assess contacts of ill persons to determine human-to-human transmission and risk factors for infection. • Report cases according to the Nationally Notifiable Diseases Surveillance System. • If only animal cases are identified, assess human exposures and risks for infection.† • Coordinate activities with state animal health representatives as appropriate. • Identify whether state or federal assistance is required to support surveillance systems, field investigation, laboratory, and animal control resources. 	<ul style="list-style-type: none"> • Support international investigation efforts. • If the United States is affected, support state and local investigation efforts. • Coordinate activities with animal health officials. • Maintain and enhance national surveillance for animal and human cases as needed. • Update guidance for surveillance measures as relevant to the situation.
Laboratory	<ul style="list-style-type: none"> • Assess and optimize laboratory capacity to detect and characterize influenza cases. • Coordinate activities with state/local veterinary diagnostic laboratories. • Share viruses with CDC and the U.S. Department of Agriculture (USDA). • Identify whether state or federal assistance is required to support laboratory activities. 	<ul style="list-style-type: none"> • Support international efforts to characterize the virus, including antiviral resistance profiles. • If the United States is affected, conduct laboratory confirmation of cases and monitor virus for transmission characteristics and resistance. • Develop and distribute test kits to states and other countries if indicated. • Identify genetic and antigenic relationship of virus to available vaccine candidates and to stockpiled vaccine. • Initiate actions to isolate virus; prepare candidate vaccine viruses for use in vaccine development. • Update select agent regulations and biosafety guidelines as appropriate for the situation.
Community mitigation	<ul style="list-style-type: none"> • Emphasize the importance of personal protective measures (e.g., voluntary isolation by staying home when ill, respiratory etiquette, and hand hygiene) in limiting spread of influenza. • If human-to-human transmission is suspected, consider recommending isolation of ill persons and voluntary quarantine of close contacts (e.g., household members). • Enhance all usual influenza pandemic preparedness activities with schools and businesses. 	<ul style="list-style-type: none"> • Promote community mitigation preparedness activities, especially voluntary home isolation of ill persons, respiratory etiquette, hand hygiene, and infection control. • Review all guidance documents and update as needed for the situation (e.g., recommendations on community mitigation measures and other nonpharmaceutical interventions designed to slow the spread of the virus in the community or within certain populations and settings at high risk for infection). • Provide guidance for border health and travelers' health activities as appropriate for the situation. • Evaluate the need to implement border controls, travel advisories, or both; conduct travel volume and pattern analyses.

See table footnotes on page 12.

TABLE 1. (Continued) Novel influenza A virus pandemic (investigation interval): investigation of novel influenza A infection in humans or animals

Domain	State/Local	Federal
Medical care and countermeasures	<ul style="list-style-type: none"> • Advise health-care providers statewide to promptly diagnose influenza and promptly treat ill persons. • Based on current recommendations, implement infection-control practices; distribute health advisory notices with information on case definitions and infection-control measures to hospitals and outpatient care centers. • If human-to-human transmission is suspected, monitor and assist with early access to postexposure chemoprophylaxis for case contacts per current recommendations. • Review all guidance documents, update as needed for the situation, and communicate with key stakeholders. • Conduct all usual influenza pandemic preparedness activities with health-care facilities. 	<ul style="list-style-type: none"> • Review all guidance documents and update as needed for the situation (e.g., comprehensive medical care and countermeasure guidance for policy makers, clinicians, health-care organizations, employers, and public health); disseminate guidance for diagnosis and treatment of ill persons and infection-control measures to states and professional organizations. • Consider which immediate steps are needed to establish medical countermeasure stockpiles (e.g., antivirals, respiratory protective devices, ventilators, and Emergency Use Authorizations).
Vaccine	<ul style="list-style-type: none"> • Evaluate all usual influenza pandemic preparedness activities, including a review and update of vaccine distribution and administration plans, process for rapid contract negotiation and staffing, mechanisms to identify and provide vaccine and document vaccination for critical infrastructure personnel and other possible priority groups for vaccination, and plans and staffing for mass vaccination clinics and points of dispensing. • Review all guidance documents, update as needed for the situation, and communicate to key stakeholders. 	<ul style="list-style-type: none"> • Evaluate whether findings from the Influenza Risk Assessment Tool and other information support initiation of development of vaccine candidates, manufacturing, vaccine stockpiling, or all of these. • Evaluate capability to make pandemic vaccine available with federal agencies and industry partners (e.g., activation of plans to develop, manufacture, and clinically evaluate pandemic vaccine). • Review all guidance documents, and update as needed using available data (e.g., vaccine allocation, distribution, prioritization, and administration, including monitoring vaccine adverse events). • Evaluate local and state preparedness level for a large vaccination campaign.
Risk communication	<ul style="list-style-type: none"> • Frequently update clinicians and veterinarians through the state health alert network. • Share information with key federal and local partners, such as animal and human health public affairs officers and other agencies or organizations. • Disseminate timely and relevant messages to the public as appropriate. • Work with CDC, USDA, and the Food and Drug Administration (FDA) to disseminate messages regarding food safety concerns as appropriate. 	<ul style="list-style-type: none"> • Disseminate relevant and timely messages in coordination with other key partner audiences, including local and federal agencies, the National Public Health Information Coalition, and USDA. • Work with FDA and USDA to disseminate messages regarding food safety concerns as appropriate.
State/Local coordination	<ul style="list-style-type: none"> • Determine whether state or federal assistance is required to support review and update of response plans. • Provide technical assistance as appropriate to regional and local partners for reviewing plans, guidance, and communication channels. 	<ul style="list-style-type: none"> • Provide technical assistance as appropriate for state, local, tribal, and territorial (SLTT) partners for reviewing and updating plans. • Facilitate effective and timely movement of information, providing open communication between federal and SLTT agencies and partners. • Evaluate the state and local preparedness level to respond to a potential pandemic, including methods to receive funds and use funds rapidly.

* **Source:** Trock SC, Burke SA, Cox NJ. Development of an influenza virologic risk assessment tool. *Avian Dis* 2012;56:1058–61.

† **Source:** CDC. Novel influenza A virus infections. 2014 case definition. CSTE Position Statement 13-ID-14. Atlanta, GA: CDC; 2014. Available at <http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=949&DatePub=1/1/2014%2012:00:00%20AM>.

Recognition Interval (Table 2)

State/Local indicator: Increasing number of human cases or clusters of novel influenza A infection in the United States with virus characteristics indicating increased potential for ongoing human-to-human transmission.

Federal indicator: Increasing number of human cases or clusters of novel influenza A infection anywhere in the world with virus characteristics indicating increased potential for ongoing human-to-human transmission.

Unaffected states should continue preparation efforts.

TABLE 2. Novel influenza A virus pandemic (recognition interval): recognition of increased potential for ongoing transmission

Domain	State/Local	Federal
Incident management	<ul style="list-style-type: none"> • Continue or initiate actions described for the investigation interval for all domains. • Consider activation of the state/local emergency operations center. • Forecast future resource needs for a potential response. 	<ul style="list-style-type: none"> • Continue or initiate actions described for the investigation interval for all domains. • Review all decisions previously made during the investigation interval to ensure they continue to be relevant to the emerging situation. • Repeat the Influenza Risk Assessment Tool, as indicated by new findings, to assess risk for emergence of the novel virus, as well as the potential impact. • Formulate and prioritize research needs (e.g., scientific preparedness). • Forecast future resource needs for a potential response. • Consider using the Pandemic Severity Assessment Framework* if sufficient data are available. • Convene group of U.S. Department of Health and Human Services leaders regularly to address policy issues and make national-level policy decisions; expand interagency and intergovernmental coordination. • Consider determination of a potential public health emergency. • Consider activation of emergency operations centers.
Surveillance and epidemiology	<ul style="list-style-type: none"> • Conduct enhanced novel influenza A surveillance. • Continue case-based investigation and control using standard methods. • Report cases according to the Nationally Notifiable Diseases Surveillance System. • If animal cases are identified, expand implementation of joint investigation plan with state agriculture officials. 	<ul style="list-style-type: none"> • Conduct enhanced novel influenza A surveillance for cases nationwide. • Refine criteria for reporting and investigating cases. • Provide technical assistance as needed. • Evaluate the need for border controls for animals or products if appropriate. • Consider whether use of a vaccine for animals is an acceptable option.
Laboratory	<ul style="list-style-type: none"> • Confirm all suspected cases at a public health laboratory. • Prepare specimen triage plans and implement surge plans if needed. 	<ul style="list-style-type: none"> • Continue to monitor the virus for transmission characteristics and antiviral resistance. • Evaluate virus susceptibility to potential late-stage development therapeutic options as a mitigation plan for drug shortages or drug resistance to already-approved therapeutics. • Stockpile diagnostic test kits and ancillary reagents; continue to distribute to state public health laboratories as needed. • Assess the performance of commercial rapid influenza diagnostic tests for detecting emerging novel influenza A.
Community mitigation	<ul style="list-style-type: none"> • Prepare for implementation of community mitigation measures, in addition to voluntary home isolation of ill persons, respiratory etiquette, hand hygiene, and infection control. These might include voluntary home quarantine of contacts, use of face masks, temporary closure of child care facilities and schools, and social distancing measures. 	<ul style="list-style-type: none"> • Review all guidance documents and update as needed for the situation (e.g., recommendations on community mitigation measures and other nonpharmaceutical interventions designed to slow the spread of the virus in the community or within certain populations and settings at high risk for infection). • Provide updated guidance for border health and travelers' health activities, including travel health notices, as appropriate for the situation. • Evaluate and implement required border control measures (entry, exit, or both) as appropriate for the situation; continue to conduct travel volume and pattern analysis.

See table footnotes on page 14.

TABLE 2. (Continued) Novel influenza A virus pandemic (recognition interval): recognition of increased potential for ongoing transmission

Domain	State/Local	Federal
Medical care and countermeasures	<ul style="list-style-type: none"> • Consider implementation of voluntary contact chemoprophylaxis based on current recommendations. • Educate clinicians about recommended treatment, prophylaxis, and infection-control guidelines. • Initiate contact with coordinators of the local or regional (or both) Strategic National Stockpile (SNS) regarding the potential receipt and distribution of SNS countermeasures, as appropriate. • Assess impact on medical care facilities; Identify whether medical resources are sufficient to manage ill persons and conduct case-based control efforts; determine if federal assistance is required. 	<ul style="list-style-type: none"> • Update and release guidance documents as needed for the situation (e.g., comprehensive medical care, infection-control, and countermeasure guidance for policy makers, clinicians, health-care organizations, employers, and public health officials). • Review options for provision of mass health care with scarce resources. • Consider development of prioritization procedures for materials that could be in short supply. • Continue with regulatory readiness steps (e.g., Emergency Use Authorizations [EUAs] for countermeasures). • Evaluate whether transmission and severity assessments merit deployment of SNS countermeasures or other therapeutics under EUA. • Evaluate whether SNS inventories require replenishment.
Vaccine	<ul style="list-style-type: none"> • Prepare for vaccine availability and vaccine campaign; refine vaccine distribution and administration plans if a campaign will be initiated, including mass vaccination initiatives and coordination with pharmacies and other groups, as appropriate. • Consider enrolling adult, obstetrical, and pediatric health-care providers, including pharmacies, to promote vaccine access to persons in all indicated age and risk groups and ability to identify and vaccinate critical infrastructure personnel. • Ensure that all identified vaccinators are authorized, and review policies and procedures regarding identification, authorization and training of nontraditional vaccinators. • Confirm vaccine providers have access to the immunization information system (IIS) or alternative systems. • Review capacity and capabilities of IIS for use by vaccine providers and in mass vaccination clinics for the required dosing schedule anticipated (1 or 2 doses with or without adjuvant). 	<ul style="list-style-type: none"> • Establish the decision framework for initiating a national vaccine campaign. • Evaluate implementation of vaccine manufacturing for distribution as appropriate. • Develop and provide technical support and guidance to state, local, tribal, and territorial and private sector partners in preparation for and during a potential pandemic vaccination response in the United States. • Engage the Advisory Committee on Immunization Practices regarding vaccination recommendations. • Implement systems to monitor vaccine distribution to end-user providers of CDC's vaccine distribution system. • Establish or update systems to monitor and assess pandemic vaccine adverse events, coverage, and effectiveness. • Consider which vaccine policies need to be developed or updated to support a vaccination response.
Risk communication	<ul style="list-style-type: none"> • Develop or update a media relations and outreach plan. • Disseminate risk communication messages, including what is known, what is not known, and what is being done by public health officials. • Disseminate messages for travelers, as well as community mitigation messages, when to seek care, and how to care for ill persons at home as appropriate. • Conduct briefings with local, regional, and state response partners, businesses, tribes, and health-care facilities on the potential for escalation, response actions underway, and preparedness steps that partners should consider. • Work with CDC, the U.S. Department of Agriculture, and the Food and Drug Administration to disseminate messages to address food safety concerns as appropriate. 	<ul style="list-style-type: none"> • Develop or update a media relations and outreach plan; disseminate risk communication messages. • Disseminate messages for travelers, as well as community mitigation messages, when to seek care, and how to care for ill at home as appropriate. • Collaborate, coordinate, and engage with partners and stakeholders.
State/Local coordination	<ul style="list-style-type: none"> • Continue to coordinate with all partners. 	<ul style="list-style-type: none"> • Continue to coordinate U.S. government interactions with state/local public health agencies and other partners. • Continue administrative preparedness activities. • Identify a source of financial support for states and localities to carry out a response.

* Source: Reed C, Biggerstaff M, Finelli L, et al. Novel framework for assessing epidemiologic effects of influenza epidemics and pandemics. *Emerg Infect Dis* 2013;19:85–91.

Initiation Interval (Table 3)

State/Local indicator: Confirmation of human cases of a pandemic influenza virus in the United States with demonstrated efficient and sustained human-to-human transmission.

Federal indicator: Confirmation of human cases of a pandemic influenza virus anywhere in the world with demonstrated efficient and sustained human-to-human transmission.

State and federal indicators can be asynchronous.

TABLE 3. Novel influenza A virus pandemic (initiation interval): initiation of pandemic wave

Domain	State/Local	Federal
Incident management	<ul style="list-style-type: none"> • Continue or initiate actions described for the recognition interval. • Consider activation of state/local emergency operations center. • Consider declaring a public health emergency. 	<ul style="list-style-type: none"> • Continue or initiate actions described for the recognition interval. • Consider declaring a public health emergency.
Surveillance and epidemiology	<ul style="list-style-type: none"> • If affected, continue enhanced surveillance; conduct case investigation and response. • If unaffected, prepare for investigation and response. • Consider surveillance for influenza hospitalizations and deaths if not already a component of state-based influenza surveillance. 	<ul style="list-style-type: none"> • Deploy federal responders to states that were initially affected as appropriate. • Conduct analyses and field studies; disseminate data regarding transmission, treatment, and prognosis.
Laboratory	<ul style="list-style-type: none"> • Continue to confirm all suspected cases at a public health laboratory, resources permitting; prepare a plan for limiting testing using surveillance criteria. 	<ul style="list-style-type: none"> • Remove select agent status and U.S. Department of Agriculture regulations for the novel influenza virus strain. • Continue monitoring virus characteristics to identify changes in virulence, transmission, or antiviral resistance markers.
Community mitigation	<ul style="list-style-type: none"> • Consider implementing appropriate community mitigation measures* in selected affected locations or institutions as indicated by the results of the Pandemic Severity Assessment Framework. 	<ul style="list-style-type: none"> • Maintain situation-appropriate border and travelers' health measures. • Evaluate recommendations for appropriate community mitigation measures.
Medical care and countermeasures	<ul style="list-style-type: none"> • Monitor the surge in health-care needs and assess whether assistance is needed to mitigate the surge. • Review and prepare to deploy a mortuary surge (mass mortality) plan. • Consider deployment of state/local caches. • Consider implementation of voluntary quarantine of contacts and chemoprophylaxis of exposed persons based on current recommendations. 	<ul style="list-style-type: none"> • Initiate targeted studies of the clinical course of the illness, treatment responses, and disease transmission. • Monitor the health-care surge and stress on the health-care system, including provision of key medical resources and tools, as needed. • Consider deployment of Strategic National Stockpile antiviral drugs and other material reserves.
Vaccine	<ul style="list-style-type: none"> • Implement stockpiled pandemic vaccination campaigns if a stockpiled pandemic vaccine is available, appropriate for the emerging virus, and the U.S. government has made the decision to do so. • Update the state distribution plan based on CDC prioritization guidelines, estimated state allocation of vaccine, and epidemiology of pandemic influenza in the state. 	<ul style="list-style-type: none"> • Provide technical support and guidance to state, local, tribal, and territorial (SLTT) and private sector partners in preparation for and during a potential pandemic vaccination response in the United States. • Implement and monitor vaccine distribution as appropriate. • Monitor and assess pandemic vaccine adverse events, coverage, and effectiveness. • Work with the Advisory Committee on Immunization Practices and others to refine policies for vaccine use and prioritization.
Risk communication	<ul style="list-style-type: none"> • Disseminate updated risk messages, including providing anticipatory guidance or information on what might be expected. • Share information regarding antivirals and the possibility of implementation of community mitigation measures as appropriate. • Continue to provide regular updates to key partners, stakeholders, elected officials, and the media. 	<ul style="list-style-type: none"> • Disseminate updated risk messages, including providing anticipatory guidance or information on what might be expected. • Share information regarding antivirals and the possibility of implementation of community mitigation measures as appropriate. • Continue to coordinate and provide regular updates to key partners, stakeholders, elected officials, and the media.
State/Local coordination	<ul style="list-style-type: none"> • Continue to coordinate with all partners. • Prepare to receive funds to support response, if available. 	<ul style="list-style-type: none"> • Continue to coordinate with SLTT public health and other partner organizations. • If funds are available to support an SLTT response, initiate action to award funds.

* **Source:** CDC. Interim pre-pandemic planning guidance: community strategy for pandemic influenza mitigation in the United States—early, targeted, layered use of nonpharmaceutical interventions. Atlanta, GA: CDC; 2007. Available at http://www.flu.gov/planning-preparedness/community/community_mitigation.pdf.

Acceleration Interval (Table 4)

State/Local indicator: Consistently increasing rate of pandemic influenza cases identified in the state, indicating established transmission.

Federal indicator: Consistently increasing rate of pandemic influenza cases identified in the United States, indicating established transmission.

State and federal indicators can be asynchronous.

TABLE 4. Novel influenza A virus pandemic (acceleration interval): acceleration of pandemic wave

Domain	State/Local	Federal
Incident management	<ul style="list-style-type: none"> • Continue or initiate actions described for the initiation interval. • Maintain processes to monitor effectiveness of response. 	<ul style="list-style-type: none"> • Continue or initiate actions described for the initiation interval. • Maintain processes to monitor effectiveness of response.
Surveillance and epidemiology	<ul style="list-style-type: none"> • If affected, transition surveillance from individual case confirmation to severe disease and syndromic surveillance as appropriate. • If unaffected, continue individual case confirmation. • Monitor for changes in epidemiology. 	<ul style="list-style-type: none"> • Maintain enhanced surveillance. • When appropriate, transition surveillance to severe disease and syndromic surveillance.
Laboratory	<ul style="list-style-type: none"> • Provide laboratory confirmation of only a sample of cases as required for virologic surveillance. • Implement revised specimen submission protocol per CDC guidance as appropriate. 	<ul style="list-style-type: none"> • Continue monitoring virus characteristics to identify changes in virulence, transmission, or antiviral resistance markers. • Transition to virologic testing of a sample of viruses submitted from states. • Distribute to state public health laboratories recommendations that outline revised specimen submission protocol as needed.
Community mitigation	<ul style="list-style-type: none"> • Consider activating (if not already implemented) or expanding (if already implemented) appropriate community mitigation measures for affected communities (such as temporary closure of child care facilities and schools, school and workplace social distancing measures, and postponement or cancellation of mass gatherings). • Monitor effectiveness of community mitigation measures. • Monitor adverse impact of community mitigation measures on society, and coordinate with local response agencies to address the impact if possible. 	<ul style="list-style-type: none"> • Maintain situation-appropriate border and travelers' health measures. • Continue or initiate exit screening if appropriate. • Provide, evaluate, and revise recommendations for use of community mitigation measures. • Deploy federal responders or assist states in other ways to evaluate the effectiveness and potential adverse effects of community mitigation measures.
Medical care and countermeasures	<ul style="list-style-type: none"> • Monitor and respond to surge in health-care needs, including setting up alternative care sites. • Educate clinicians and the public about the need for prompt treatment of ill persons. • Review and prepare to deploy mortuary surge (or mass mortality) plan. • Monitor antiviral use to identify possible shortages. • Consider deployment of state/local caches. 	<ul style="list-style-type: none"> • Monitor antiviral use, effectiveness, and adverse events. • Advise on implementation of mitigation strategies for the surge in health-care needs (e.g., activation of alternative care sites and modalities and implementation of situation-appropriate standards of care). • Monitor the health-care surge and stress on the health-care system, including provision of key medical resources and tools, as needed. • Modify guidance documents based on situation as appropriate. • Consider additional deployments of the Strategic National Stockpile antiviral drug reserve and other material.
Vaccine	<ul style="list-style-type: none"> • Implement vaccination campaigns if stockpiled pandemic or newly developed antigen-specific pandemic vaccine is available. • Monitor vaccination coverage levels and adverse events. 	<ul style="list-style-type: none"> • Implement vaccination campaigns if stockpiled pandemic or newly developed antigen-specific pandemic vaccine is available. • Monitor vaccination coverage levels, adverse events, and vaccine effectiveness.
Risk communication	<ul style="list-style-type: none"> • Disseminate updated risk messages. • Share updated information regarding vaccine. • Continue to provide regular updates to partners, stakeholders, elected officials, and the media. 	<ul style="list-style-type: none"> • Disseminate updated risk messages. • Share updated information regarding vaccine. • Continue to provide regular updates to partners, stakeholders, elected officials, and the media.
State/Local coordination	<ul style="list-style-type: none"> • Continue to coordinate with all partners. • Support maintenance of critical infrastructure and key resources as appropriate. 	<ul style="list-style-type: none"> • Continue to coordinate with state, local, tribal, and territorial public health and other partner organizations. • Provide guidance on maintaining critical infrastructure and key resources.

Deceleration Interval (Table 5)

State/Local indicator: Consistently decreasing rate of pandemic influenza cases in the state.

Federal indicator: Consistently decreasing rate of pandemic influenza cases in the United States.

State and federal indicators can be asynchronous.

TABLE 5. Novel influenza A virus pandemic (deceleration interval): deceleration of pandemic wave

Domain	State/Local	Federal
Incident management	<ul style="list-style-type: none"> Continue actions described for the acceleration interval as appropriate. Review plans, and evaluate whether response activities are proportionate to the situation. 	<ul style="list-style-type: none"> Continue actions described for the acceleration interval as appropriate. Review plans, and evaluate whether response activities are proportionate to the situation.
Surveillance and epidemiology	<ul style="list-style-type: none"> Continue severe disease and syndromic surveillance. Monitor for changes in epidemiology. 	<ul style="list-style-type: none"> Continue severe disease and syndromic surveillance. Continue enhanced surveillance.
Laboratory	<ul style="list-style-type: none"> Provide laboratory confirmation of only a sample of cases as required for virologic surveillance. Submit a sample of viruses or specimens to CDC per CDC guidance on revised specimen submission. 	<ul style="list-style-type: none"> Continue monitoring virus characteristics to identify changes in virulence, transmission, or antiviral resistance markers. Continue virologic testing of a sample of viruses or specimens submitted from states.
Community mitigation	<ul style="list-style-type: none"> Assess, plan for, and implement targeted cessation of community mitigation measures if appropriate. 	<ul style="list-style-type: none"> Assist with evaluating the effectiveness and adverse impact of community mitigation measures. Provide planning assistance with cessation of community mitigation and border health measures.
Medical care and countermeasures	<ul style="list-style-type: none"> Initiate targeted cessation of surge capacity strategies as appropriate. Maintain aggressive infection-control measures in the community. 	<ul style="list-style-type: none"> Provide planning assistance with cessation of surge capacity strategies.
Vaccine	<ul style="list-style-type: none"> Continue vaccination response as appropriate. 	<ul style="list-style-type: none"> Monitor vaccination coverage levels, adverse events, and vaccine effectiveness. Continue vaccination response as appropriate. Begin vaccine recovery planning if the U.S. government deems such planning necessary.
Risk communication	<ul style="list-style-type: none"> Disseminate updated risk messages. Provide information on measures to prepare for and respond to possible additional pandemic waves. 	<ul style="list-style-type: none"> Disseminate updated risk messages. Provide information on measures to prepare for and respond to possible additional pandemic waves.
State/Local coordination	<ul style="list-style-type: none"> Continue to coordinate with all partners. 	<ul style="list-style-type: none"> Continue to coordinate with state, local, tribal, and territorial public health and other partner organizations.

Preparation Interval (Table 6)

State/Local indicator: Low pandemic influenza activity with possible continued outbreaks in the state.

Federal indicator: Low pandemic influenza activity with possible continued outbreaks in certain jurisdictions.

TABLE 6. Novel influenza A virus pandemic (preparation interval): preparation for future pandemic waves

Domain	State/Local	Federal
Incident management	<ul style="list-style-type: none"> • Continue actions described for the deceleration interval as appropriate. • Consider deactivation of the state/local emergency operations center. • Prepare for subsequent waves. • Create an after-action report to document lessons learned. • Consider suspending the public health emergency declaration. 	<ul style="list-style-type: none"> • Continue actions described for the deceleration interval as appropriate. • Consider deactivation of the emergency operations center. • Prepare for subsequent waves. • Create an after-action report to document lessons learned. • Consider suspending the public health emergency declaration.
Surveillance and epidemiology	<ul style="list-style-type: none"> • Continue case confirmation of selected cases to monitor progress of the pandemic and to detect acceleration to the next wave. • Begin conducting routine interpandemic surveillance. 	<ul style="list-style-type: none"> • Return to routine interpandemic surveillance. • Evaluate and update ongoing research protocols as appropriate.
Laboratory	<ul style="list-style-type: none"> • Return to routine interpandemic virologic surveillance. • Assess and optimize laboratory capacity. 	<ul style="list-style-type: none"> • Return to routine interpandemic virologic testing. • Continue monitoring for viral drift and genetic mutations indicating changes in severity, transmission, or antiviral resistance.
Community mitigation	<ul style="list-style-type: none"> • Modify community mitigation measures as necessary. • Continue to promote community mitigation preparedness activities on standby for a subsequent wave. 	<ul style="list-style-type: none"> • Provide assistance with cessation or modification of community mitigation measures.
Medical care and countermeasures	<ul style="list-style-type: none"> • Monitor medical surge trends. • Replenish stockpiles or caches as able. • Monitor antiviral dispensing and usage trends. 	<ul style="list-style-type: none"> • Provide assistance with cessation of surge capacity strategies. • Replenish stockpiles as able. • Assist states/localities with replenishing stockpiles or caches of personal protective equipment, antivirals, and other materials.
Vaccine	<ul style="list-style-type: none"> • Participate in vaccine recovery as appropriate. • Continue to vaccinate, with a focus on hard-to-reach populations, in anticipation of a subsequent wave. 	<ul style="list-style-type: none"> • Begin vaccine recovery as appropriate.
Risk communication	<ul style="list-style-type: none"> • Disseminate updated risk messages, including information on measures to prepare for and respond to possible additional pandemic waves. 	<ul style="list-style-type: none"> • Disseminate updated risk messages, including information on measures to prepare for and respond to possible additional pandemic waves.
State/Local coordination	<ul style="list-style-type: none"> • Continue to coordinate with all partners. 	<ul style="list-style-type: none"> • Continue to coordinate with state, local, tribal, and territorial public health and other partner organizations.

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