Executive Summary

Purpose

This document provides interim planning guidance for State, territorial, tribal, and local communities that focuses on several measures other than vaccination and drug treatment that might be useful during an influenza pandemic to reduce its harm. Communities, individuals and families, employers, schools, and other organizations will be asked to plan for the use of these interventions to help limit the spread of a pandemic, prevent disease and death, lessen the impact on the economy, and keep society functioning. This interim guidance introduces a Pandemic Severity Index to characterize the severity of a pandemic, provides planning recommendations for specific interventions that communities may use for a given level of pandemic severity, and suggests when these measures should be started and how long they should be used. The interim guidance will be updated when significant new information about the usefulness and feasibility of these approaches emerges.

Introduction

The Centers for Disease Control and Prevention, U.S. Department of Health and Human Services in collaboration with other Federal agencies and partners in the public health, education, business, healthcare, and private sectors, has developed this interim planning guidance on the use of nonpharmaceutical interventions to mitigate an influenza pandemic. These measures may serve as one component of a comprehensive community mitigation strategy that includes both pharmaceutical and nonpharmaceutical measures, and this interim guidance includes initial discussion of a potential strategy for combining the use of antiviral medications with these interventions. This guidance will be updated as new information becomes available that better defines the epidemiology of influenza transmission, the effectiveness of control measures, and the social, ethical, economic, and logistical costs of mitigation strategies. Over time, exercises at the local, State, regional, and Federal level will help define the feasibility of these recommendations and ways to overcome barriers to successful implementation.

The goals of the Federal Government's response to pandemic influenza are to limit the spread of a pandemic; mitigate disease, suffering, and death; and sustain infrastructure and lessen the impact on the economy and the functioning of society. Without mitigating interventions, even a less severe pandemic would likely result in dramatic increases in the number of hospitalizations and deaths. In addition, an unmitigated severe pandemic would likely overwhelm our nation's critical healthcare services and impose significant stress on our nation's critical infrastructure. This guidance introduces, for the first time, a Pandemic Severity Index in which the case fatality ratio (the proportion of deaths among clinically ill persons) serves as the critical driver for categorizing the severity of a pandemic. The severity index is designed to enable better prediction of the impact of a pandemic and to provide local decision-makers with recommendations that are matched to the severity of future influenza pandemics.

It is highly unlikely that the most effective tool for mitigating a pandemic (i.e., a well-matched pandemic strain vaccine) will be available when a pandemic begins. This means that we must be prepared to face the first wave of the next pandemic without vaccine and potentially without sufficient quantities of influenza antiviral medications. In addition, it is not known if influenza antiviral medications will be effective against a future pandemic strain. During a pandemic, decisions about how to protect the public before an effective vaccine is available need to be based on scientific data, ethical

considerations, consideration of the public's perspective of the protective measures and the impact on society, and common sense. Evidence to determine the best strategies for protecting people during a pandemic is very limited. Retrospective data from past influenza pandemics and the conclusions drawn from those data need to be examined and analyzed within the context of modern society. Few of those conclusions may be completely generalizable; however, they can inform contemporary planning assumptions. When these assumptions are integrated into the current mathematical models, the limitations need to be recognized, as they were in a recent Institute of Medicine report (Institute of Medicine. Modeling Community Containment for Pandemic Influenza. A Letter Report. Washington, DC.: The National Academies Press; 2006).

The pandemic mitigation framework that is proposed is based upon an early, targeted, layered application of multiple partially effective nonpharmaceutical measures. It is recommended that the measures be initiated early before explosive growth of the epidemic and, in the case of severe pandemics, that they be maintained consistently during an epidemic wave in a community. The pandemic mitigation interventions described in this document include:

1. Isolation and treatment (as appropriate) with influenza antiviral medications of all persons with confirmed or probable pandemic influenza. Isolation may occur in the home or healthcare setting, depending on the severity of an individual's illness and /or the current capacity of the healthcare infrastructure.
2. Voluntary home quarantine of members of households with confirmed or probable influenza case(s) and consideration of combining this intervention with the prophylactic use of antiviral medications, providing sufficient quantities of effective medications exist and that a feasible means of distributing them is in place.
3. Dismissal of students from school (including public and private schools as well as colleges and universities) and school-based activities and closure of childcare programs, coupled with protecting children and teenagers through social distancing in the community to achieve reductions of out-of-school social contacts and community mixing.
4. Use of social distancing measures to reduce contact between adults in the community and workplace, including, for example, cancellation of large public gathering and alteration of workplace environments and schedules to decrease social density and preserve a healthy workplace to the greatest extent possible without disrupting essential services. Enable institution of workplace leave policies that align incentives and facilitate adherence with the nonpharmaceutical interventions (NPIs) outlined above.

All such community-based strategies should be used in combination with individual infection control measures, such as hand washing and cough etiquette.
Implementing these interventions in a timely and coordinated fashion will require advance planning. Communities must be prepared for the cascading second- and third-order consequences of the interventions, such as increased workplace absenteeism related to child-minding responsibilities if schools dismiss students and childcare programs close.

Decisions about what tools should be used during a pandemic should be based on the observed severity of the event, its impact on specific subpopulations, the expected benefit of the interventions, the feasibility of success in modern society, the direct and indirect costs, and the consequences on critical infrastructure, healthcare delivery, and society. The most controversial elements (e.g., prolonged

dismissal of students from schools and closure of childcare programs) are not likely to be needed in less severe pandemics, but these steps may save lives during severe pandemics. Just as communities plan and prepare for mitigating the effect of severe natural disasters (e.g., hurricanes), they should plan and prepare for mitigating the effect of a severe pandemic.

Rationale for Proposed Nonpharmaceutical Interventions

The use of NPIs for mitigating a community-wide epidemic has three major goals: 1) delay the exponential growth in incident cases and shift the epidemic curve to the right in order to "buy time" for production and distribution of a well-matched pandemic strain vaccine, 2) decrease the epidemic peak, and 3) reduce the total number of incident cases, thus reducing community morbidity and mortality. Ultimately, reducing the number of persons infected is a primary goal of pandemic planning. NPIs may help reduce influenza transmission by reducing contact between sick and uninfected persons, thereby reducing the number of infected persons. Reducing the number of persons infected will, in turn, lessen the need for healthcare services and minimize the impact of a pandemic on the economy and society. The surge of need for medical care that would occur following a poorly mitigated severe pandemic can be addressed only partially by increasing capacity within hospitals and other care settings. Reshaping the demand for healthcare services by using NPIs is an important component of the overall mitigation strategy. In practice, this means reducing the burdens on the medical and public health infrastructure by decreasing demand for medical services at the peak of the epidemic and throughout the epidemic wave; by spreading the aggregate demand over a longer time; and, to the extent possible, by reducing net demand through reduction in patient numbers and case severity.

No intervention short of mass vaccination of the public will dramatically reduce transmission when used in isolation. Mathematical modeling of pandemic influenza scenarios in the United States, however, suggests that pandemic mitigation strategies utilizing multiple NPIs may decrease transmission substantially and that even greater reductions may be achieved when such measures are combined with the targeted use of antiviral medications for treatment and prophylaxis. Recent preliminary analyses of cities affected by the 1918 pandemic show a highly significant association between the early use of multiple NPIs and reductions in peak and overall death rates. The rational targeting and layering of interventions, especially if these can be implemented before local epidemics have demonstrated exponential growth, provide hope that the effects of a severe pandemic can be mitigated. It will be critical to target those at the nexus of transmission and to layer multiple interventions together to reduce transmission to the greatest extent possible.

Pre-Pandemic Planning: the Pandemic Severity Index

This guidance introduces, for the first time, a Pandemic Severity Index, which uses case fatality ratio as the critical driver for categorizing the severity of a pandemic (Figure 1, abstracted and reprinted here from figure 4 in the main text). The index is designed to enable estimation of the severity of a pandemic on a population level to allow better forecasting of the impact of a pandemic and to enable recommendations to be made on the use of mitigation interventions that are matched to the severity of future influenza pandemics.

Future pandemics will be assigned to one of five discrete categories of increasing severity (Category 1 to Category 5). The Pandemic Severity Index provides communities a tool for scenario-based contingency

planning to guide local pre-pandemic preparedness efforts. Accordingly, communities facing the imminent arrival of pandemic disease will be able to use the pandemic severity assessment to define which pandemic mitigation interventions are indicated for implementation.

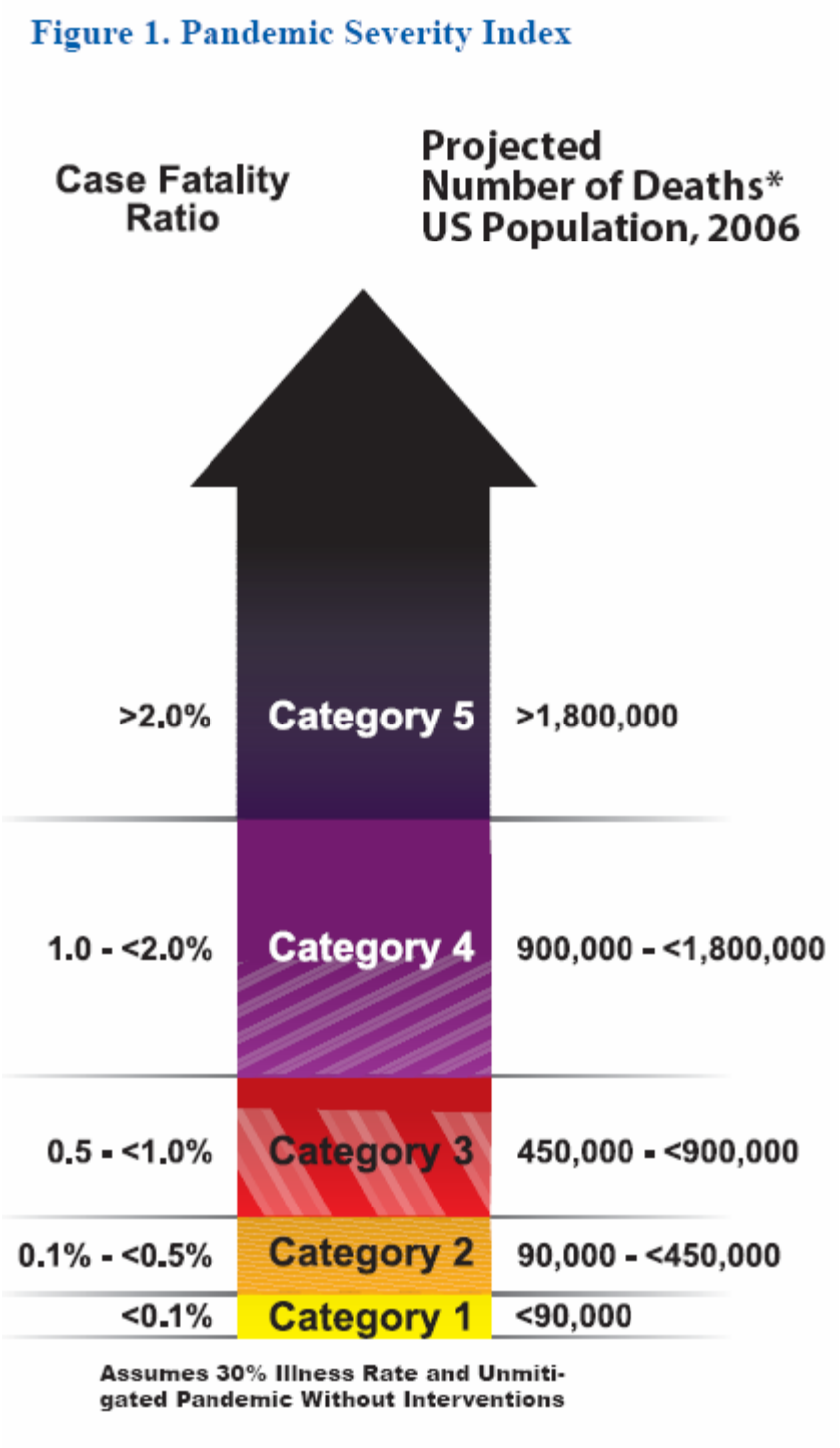
Use of Nonpharmaceutical Interventions by Severity Category

This interim guidance proposes a community mitigation strategy that matches recommendations on planning for use of selected NPIs to categories of severity of an influenza pandemic. These planning recommendations are made on the basis of an assessment of the possible benefit to be derived from implementation of these measures weighed against the cascading second- and third-order consequences that may arise from their use. Cascading second- and third-order consequences are chains of effects that may arise because of the intervention and may require additional planning and intervention to mitigate. The term generally refers to foreseeable unintended consequences of intervention. For example, dismissal of students from school may lead to the second-order effect of workplace absenteeism for child minding. Subsequent workplace absenteeism and loss of household income could be especially problematic for individuals and families living at or near subsistence levels. Workplace absenteeism could also lead to disruption of the delivery of goods and services essential to the viability of the community.

For Category 4 or Category 5 pandemics, a planning recommendation is made for use of all listed NPIs (Table 1, abstracted and reprinted here from Table 2. in the main text). In addition, planning for dismissal of students from schools and school-based activities and closure of childcare programs, in combination with means to reduce out-of-school social contacts and community mixing for these children, should encompass up to 12 weeks of intervention in the most severe scenarios. This approach to pre-pandemic planning will provide a baseline of readiness for community response. Recommendations for use of these measures for pandemics of lesser severity may include a subset of these same interventions and potentially for shorter durations, as in the case of social distancing measures for children.

For Category 2 and Category 3 pandemics, planning for voluntary isolation of ill persons is recommended; however, other mitigation measures (e.g., voluntary quarantine of household members and social distancing measures for children and adults) should be implemented only if local decision-makers determine their use is warranted due to characteristics of the pandemic within their community. Pre-pandemic planning for the use of mitigation strategies within these two Pandemic Severity Index categories should be done with a focus on a duration of 4 weeks or less, distinct from the longer timeframe recommended for the more severe Category 4 and Category 5 pandemics. For Category 1 pandemics, voluntary isolation of ill persons is generally the only community-wide recommendation, although local communities may choose to tailor their response to Category 1-3 pandemics by applying NPIs on the basis of local epidemiologic parameters, risk assessment, availability of countermeasures, and consideration of local healthcare surge capacity. Thus, from a pre-pandemic planning perspective for Category 1, 2, and 3 pandemics, capabilities for both assessing local public health capacity and healthcare surge, delivering countermeasures, and implementing these measures in full and in combination should be assessed.

Figure 1. Pandemic Severity Index



Triggers for Initiating Use of Nonpharmaceutical Interventions

The timing of initiation of various NPIs will influence their effectiveness. Implementing these measures prior to the pandemic may result in economic and social hardship without public health benefit and over time, may result in "intervention fatigue" and erosion of public adherence. Conversely, implementing these interventions after extensive spread of pandemic influenza illness in a community may limit the public health benefits of employing these measures. Identifying the optimal time for initiation of these interventions will be challenging because implementation needs to be early enough to preclude the initial steep upslope in case numbers and long enough to cover the peak of the anticipated epidemic curve while avoiding intervention fatigue.

This guidance suggests that the primary activation trigger for initiating interventions be the arrival and transmission of pandemic virus. This trigger is best defined by a laboratory-confirmed cluster of infection with a novel influenza virus and evidence of community transmission (i.e., epidemiologically linked cases from more than one household).

Defining the proper geospatial-temporal boundary for this cluster is complex and should recognize that our connectedness as communities goes beyond spatial proximity and includes ease, speed, and volume of travel between geopolitical jurisdictions (e.g., despite the physical distance, Hong Kong, London, and New York City may be more epidemiologically linked to each other than they are to their proximate rural provinces/areas). In order to balance connectedness and optimal timing, it is proposed that the geopolitical trigger be defined as the cluster of cases occurring within a U.S. State or proximate epidemiological region (e.g., a metropolitan area that spans more than one State's boundary). It is acknowledged that this definition of "region" is open to interpretation; however, it offers flexibility to State and local decision-makers while underscoring the need for regional coordination in pre-pandemic planning.

From a pre-pandemic planning perspective, the steps between recognition of a pandemic threat and the decision to activate a response are critical to successful implementation. Thus, a key component is the development of scenario-specific contingency plans for pandemic response that identify key personnel, critical resources, and processes. To emphasize the importance of this concept, the guidance section on triggers introduces the terminology of *Alert, Standby, and Activate*, which reflect key steps in escalation of response action. *Alert* includes notification of critical systems and personnel of their impending activation, *Standby* includes initiation of decision-making processes for imminent activation, including mobilization of resources and personnel, and *Activate* refers to implementation of the specified pandemic mitigation measures. Pre-pandemic planning for use of these interventions should be directed to lessening the transition time between *Alert, Standby,* and *Activate*. The speed of transmission may drive the amount of time decision-makers are allotted in each mode, as does the amount of time it takes to fully implement the intervention once a decision is made to *Activate*. For the most severe pandemics (Categories 4 and 5), *Alert* is implemented during WHO Phase 5/U.S. Government Stage 2 (confirmed human outbreak overseas), and *Standby* is initiated during WHO Phase 6/Stage 3 (widespread human outbreaks in multiple locations overseas). *Standby* is maintained through Stage 4 (first human case in North America), with the exception of the State or region in which a cluster of laboratory-confirmed human pandemic influenza cases with evidence of community transmission is identified. The recommendation for that State or region is to *Activate* the appropriate NPIs when identification of a cluster with community transmission is made. Other States or regions *Activate* appropriate interventions

Table 1. Summary of the Community Mitigation Strategy by Pandemic Severity

Interventions* by Setting	Pandemic Severity Index		
	1	2 and 3	4 and 5
Home **Voluntary isolation** of ill at home (adults and children); combine with use of antiviral treatment as available and indicated	Recommend†§	Recommend†§	Recommend†§
Voluntary quarantine of household members in homes with ill persons¶ (adults and children); consider combining with antiviral prophylaxis if effective, feasible, and quantities sufficient	Generally not recommended	Consider**	Recommend**
School **Child social distancing**			
-dismissal of students from schools and school based activities, and closure of child care programs	Generally not recommended	Consider: ≤4 weeks††	Recommend: ≤12 weeks§§
-reduce out-of-school social contacts and community mixing	Generally not recommended	Consider: ≤4 weeks††	Recommend: ≤12 weeks§§
Workplace / Community **Adult social distancing**			
-decrease number of social contacts (e.g., encourage teleconferences, alternatives to face-to-face meetings)	Generally not recommended	Consider	Recommend
-increase distance between persons (e.g., reduce density in public transit, workplace)	Generally not recommended	Consider	Recommend
-modify postpone, or cancel selected public gatherings to promote social distance (e.g., postpone indoor stadium events, theatre performances)	Generally not recommended	Consider	Recommend
-modify work place schedules and practices (e.g., telework, staggered shifts)	Generally not recommended	Consider	Recommend

Generally Not Recommended = Unless there is a compelling rationale for specific populations or jurisdictions, measures are generally not recommended for entire populations as the consequences may outweigh the benefits.
Consider = Important to consider these alternatives as part of a prudent planning strategy, considering characteristics of the pandemic, such as age-specific illness rate, geographic distribution, and the magnitude of adverse consequences. These factors may vary globally, nationally, and locally.
Recommended = Generally recommended as an important component of the planning strategy.
*All these interventions should be used in combination with other infection control measures, including hand hygiene, cough etiquette, and personal protective equipment such as face masks. Additional information on infection control measures is available at www.pandemicflu.gov.
†This intervention may be combined with the treatment of sick individuals using antiviral medications and with vaccine campaigns, if supplies are available
§Many sick individuals who are not critically ill may be managed safely at home
¶The contribution made by contact with asymptomatically infected individuals to disease transmission is unclear. Household members in homes with ill persons may be at increased risk of contracting pandemic disease from an ill household member. These household members may have asymptomatic illness and may be able to shed influenza virus that promotes community disease transmission. Therefore, household members of homes with sick individuals would be advised to stay home.
**To facilitate compliance and decrease risk of household transmission, this intervention may be combined with provision of antiviral medications to household contacts, depending on drug availability, feasibility of distribution, and effectiveness; policy recommendations for antiviral prophylaxis are addressed in a separate guidance document.
††Consider short-term implementation of this measure—that is, less than 4 weeks.
§§Plan for prolonged implementation of this measure—that is, 1 to 3 months; actual duration may vary depending on transmission in the community as the pandemic wave is expected to last 6-8 weeks.

when they identify laboratory-confirmed human pandemic influenza case clusters with evidence of community transmission in their jurisdictions.
For Category 1, 2, and 3 pandemics, *Alert* is declared during U.S. Government Stage 3, with step-wise progression by States and regions to *Standby* based on U.S. Government declaration of Stage 4 and the identification of the first human pandemic influenza case(s) in the United States. Progression to *Activate* by a given State or region occurs when that State or region identifies a cluster of laboratory-confirmed human pandemic influenza cases, with evidence of community transmission in their jurisdiction.

Duration of Implementation of Nonpharmaceutical Interventions

It is important to emphasize that as long as susceptible individuals are present in large numbers, Disease spread may continue. Immunity to infection with a pandemic strain can only occur after natural infection or immunization with an effective vaccine. Preliminary analysis of historical data from selected U.S. cities during the 1918 pandemic suggests that duration of implementation is significantly associated with overall mortality rates. Stopping or limiting the intensity of interventions while pandemic virus was still circulating within the community was temporally associated with increases in mortality due to pneumonia and influenza in many communities. It is recommended for planning purposes that communities be prepared to maintain interventions for up to 12 weeks, especially in the case of Category 4 or Category 5 pandemics, where recrudescent epidemics may have significant impact. However, for less severe pandemics (Category 2 or 3), a shorter period of implementation may be adequate for achieving public health benefit. This planning recommendation acknowledges the uncertainty around duration of circulation of pandemic virus in a given community and the potential for recrudescent disease when use of NPIs is limited or stopped, unless population immunity is achieved.

Critical Issues for the Use of Nonpharmaceutical Interventions

A number of outstanding issues should be addressed to optimize the planning for use of these measures. These issues include the establishment of sensitive and timely surveillance, the planning and conducting of multi-level exercises to evaluate the feasibility of implementation, and the identification and establishment of appropriate monitoring and evaluation systems. Policy guidance in development regarding the use of antiviral medications for prophylaxis, community and workplace-specific use of personal protective equipment, and safe home management of ill persons must be prioritized as part of future components of the overall community mitigation strategy. In addition, generating appropriate risk communication content/materials and an effective means for delivery, soliciting active community support and involvement in strategic planning decisions, and assisting individuals and families in addressing their own preparedness needs are critical factors in achieving success.

Assessment of the Public on Feasibility of Implementation and Compliance

A Harvard School of Public Health public opinion poll on community mitigation interventions, conducted with a nationally representative sample of adults over the age of 18 years in the United States in September and October 2006, indicated that most respondents were willing to follow public health recommendations for the use of NPIs, but it also uncovered financial and other concerns. More information on the poll is available at the “Pandemic Influenza and the Public: Survey Findings” available at http://www.keystone.org/Public_Policy/Pandemic_control.html.

The Public Engagement Project on Community Control Measures for Pandemic Influenza (see link at http://www.keystone.org/Public_Policy/Pandemic_control.html), carried out in October and November 2006, found that approximately two-thirds of both citizens and stakeholders supported all the nonpharmaceutical measures. Nearly half of the citizens and stakeholders supported implementation when pandemic influenza first strikes the United States, and approximately one-third of the public supported implementation when influenza first strikes in their State.

Although the findings from the poll and public engagement project reported high levels of willingness to follow pandemic mitigation recommendations, it is uncertain how the public might react when a pandemic occurs. These results need to be interpreted with caution in advance of a severe pandemic that could cause prolonged disruption of daily life and widespread illness in a community. Issues such as the ability to stay home if ill, job security, and income protection were repeatedly cited as factors critical to ensuring compliance with these NPI measures.

Planning to Minimize Consequences of Community Mitigation Strategy

It is recognized that implementing certain NPIs will have an impact on the daily activities and lives of individuals and society. For example, some individuals will need to stay home to mind children or because of exposure to ill family members, and for some children, there will be an interruption in their education or their access to school meal programs. These impacts will arise in addition to the direct impacts of the pandemic itself. Communities should undertake appropriate planning to address both the consequences of these interventions and direct effects of the pandemic. In addition, communities should pre-identify those for whom these measures may be most difficult to implement, such as vulnerable populations and persons at risk (e.g., people who live alone or are poor/working poor, elderly [particularly those who are homebound], homeless, recent immigrants, disabled, institutionalized, or incarcerated). To facilitate preparedness and to reduce untoward consequences from these interventions, Pandemic Influenza Community Mitigation Interim Planning Guides have been included (see Appendices 4-9) to provide broad planning guidance tailored for businesses and other employers, childcare programs, elementary and secondary schools, colleges and universities, faith-based and community organizations, and individuals and families. It is also critical for communities to begin planning their risk communication strategies. This includes public engagement and messages to help individuals, families, employers, and many other stakeholders to prepare.

The U.S. Government recognizes the significant challenges and social costs that would be imposed by the coordinated application of the measures described above. It is important to bear in mind, however, that if the experience of the 1918 pandemic is relevant, social distancing and other NPI strategies would, in all likelihood, be implemented in most communities at some point during a pandemic. The potential exists for such interventions to be implemented in an uncoordinated, untimely, and inconsistent manner that would impose economic and social costs similar to those imposed by strategically implemented interventions but with dramatically reduced effectiveness. The development of clear interim pre-pandemic guidance for planning that outlines a coordinated strategy, based upon the best scientific evidence available, offers communities the best chance to secure the benefits that such strategies may provide. As States and local communities exercise the potential tools for responding to a pandemic, more will be learned about the practical realities of their implementation. Interim recommendations will be updated accordingly.

Testing and Exercising Community Mitigation Interventions

Since few communities have experienced disasters on the scale of a severe pandemic, drills and exercises are critical in testing the efficacy of plans. A severe pandemic would challenge all facets of governmental and community functions. Advance planning is necessary to ensure a coordinated communications strategy and the continuity of essential services. Realistic exercises considering the effect of these proposed interventions and the cascading second- and third-order consequences will identify planning and resource shortfalls.

Research Needs

It is recognized that additional research is needed to validate the proposed interventions, assess their effectiveness, and identify adverse consequences. This research will be conducted as soon as practicable and will be used in providing updated guidance as required. A proposed research agenda is outlined within this document.

Conclusions

Planning and preparedness for implementing mitigation strategies during a pandemic are complex tasks requiring participation by all levels of government and all segments of society. Community-level intervention strategies will call for specific actions by individuals, families, employers, schools, and other organizations. Building a foundation of community and individual and family preparedness and developing and delivering effective risk communication for the public in advance of a pandemic are critical. If embraced earnestly, these efforts will result in enhanced ability to respond not only to pandemic influenza but also to multiple other hazards and threats. While the challenge is formidable, the consequences of facing a severe pandemic unprepared will be intolerable. This interim pre-pandemic planning guidance is put forth as a step in our commitment to address the challenge of mitigating a pandemic by building and enhancing community resiliency.