Public Health Guidance for
Community-Level Preparedness and Response to
Severe Acute Respiratory Syndrome (SARS)

*Draft – October 2003*

The Centers for Disease Control and Prevention (CDC) is making this document available in draft form to assist local and state public health and healthcare officials in their preparations for a possible reemergence of SARS during the approaching respiratory disease season. The proposed framework and strategies for SARS preparedness and response are based on lessons learned from the 2003 global SARS epidemic and the advice and suggestions of domestic and international public health and healthcare partners. The document is currently undergoing external review by partner organizations and other federal agencies and will be updated as necessary to incorporate comments from reviewers and to reflect increased understanding of SARS-CoV transmission dynamics and the availability of improved prevention tools. CDC invites interested public health partners to submit comments on the draft document to: sars-plan@cdc.gov.
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EXECUTIVE SUMMARY

On March 12, 2003, the World Health Organization (WHO) issued a historic global alert for severe acute respiratory syndrome (SARS), a deadly new infectious disease with the potential for rapid spread from person to person and via international air travel. WHO and its partners, including the Centers for Disease Control and Prevention (CDC), promptly initiated a rapid, intense, and coordinated investigative and control effort that led within 2 weeks to the identification of the etiologic agent, SARS-associated coronavirus (SARS-CoV), and to a series of decisive and effective containment efforts. By the time SARS-CoV transmission was brought to an end in July 2003, more than 8,000 cases and 780 deaths had been reported to WHO.

The emergence of SARS provided a fresh illustration of the potential for a new disease to suddenly appear and spread, leading to widespread health, social, and economic consequences. Fortunately, the world also witnessed the power of traditional public health measures—including surveillance, infection control, isolation, and quarantine—to contain and control an outbreak. Although the United States had a limited SARS outbreak, it is clear that we are susceptible to the more widespread outbreaks experienced in other countries. It is not possible to predict whether SARS will reappear, but it could from its original animal reservoir, persistent infection in humans, or the laboratory. To achieve the type of rapid and effective response that is required to control a SARS outbreak, we must be prepared.

Public Health Guidance for Community-Level Preparedness and Response to Severe Acute Respiratory Syndrome (SARS) outlines a framework and approach to assist public health and healthcare officials in preparing for and responding rapidly and decisively to the appearance of SARS in a healthcare facility or a community. The document has its basis in the United States Government Interagency SARS Concept of Operations Plan (CONPLAN), which outlines the Federal government’s strategy for a coordinated national response to an outbreak of SARS. The CONPLAN provides planning guidance for a timely, coordinated response by federal agencies to a SARS emergency and serves as a foundation for the development of operational plans and procedures at the national, state, and local levels.

Whereas the focus of the CONPLAN is interagency and intergovernmental coordination, CDC’s Public Health Guidance for Community-Level Preparedness and Response to Severe Acute Respiratory Syndrome (SARS) provides planning guidance, strategies, and tools for the local public health and healthcare officials who provide the first line of readiness and action in detecting and containing a SARS outbreak. The guidance has been prepared in close collaboration with domestic and international partners and incorporates many of the concepts and approaches that were successfully used to contain SARS outbreaks in the United States and other countries with more widespread outbreaks. In addition, it integrates and builds on preparedness and response plans for other public health emergencies, such as pandemic influenza and bioterrorism.

The basic strategy that controlled SARS outbreaks worldwide was rapid and decisive surveillance and containment. The keys to successful implementation of such a strategy are up-to-date information on local, national, and global SARS activity; rapid and effective institution of control measures; and the resources, organizational and decision-making structure, and trained staff vital to rapid and decisive implementation. This guidance document accounts for two important features of
SARS outbreaks: 1) they are neither regional nor national but rather confined to limited geographic – and even institutional – settings, and 2) they are dynamic, meaning that the characteristics of an outbreak can change quickly.

The document is divided into four levels of increasingly detailed information: the executive summary, the core plan, stand-alone supplements that address the key measures for SARS preparedness and response, and attachments to each supplement that provide guidance and tools for local-level preparedness and response activities. The document provides guidance on each of the following key components of SARS preparedness and response:

- Command and Control
- Surveillance of Cases and Contacts
- Preparedness and Response in Healthcare Facilities
- Community Containment Measures, Including Non-Hospital Isolation and Quarantine
- Management of International Travel-Related Transmission Risk
- Laboratory Diagnostics
- Communication
- Information Technology

Using this guidance document, localities can develop operational SARS preparedness and response plans that reflect consistent approaches among and within jurisdictions to SARS outbreaks of similar characteristics, while taking into account available healthcare and public health resources and other factors that are unique to each community. The document will be updated as necessary to reflect increased understanding of SARS-CoV transmission dynamics and availability of improved prevention tools.
I. **Introduction**

Severe acute respiratory syndrome (SARS) is a newly recognized, severe febrile respiratory illness caused by a previously unknown coronavirus, SARS-associated coronavirus (SARS-CoV). SARS emerged in the southern Chinese province of Guangdong in November 2002, but the worldwide epidemic was triggered in late February 2003 when an ill physician from Guangdong infected several other guests at a hotel in Hong Kong. These persons subsequently became the index patients for large outbreaks of SARS in Hong Kong, Vietnam, Singapore, and Canada.

Recognition of this new microbial threat prompted the World Health Organization (WHO) to issue a historic global alert for SARS on March 12, 2003. WHO coordinated a rapid and intense worldwide response, which led to the identification of the etiologic agent, SARS-CoV, in less than 2 weeks and implementation of control measures that contained the worldwide outbreak within 4 months. On July 5, WHO announced that SARS had been controlled and ended the global public health emergency response. During the epidemic, a total of 8,427 probable SARS cases and 813 deaths were reported to WHO from 29 countries.

The official end of the global public health emergency affirmed the rapid and monumental response effort but also signaled the need for continued vigilance. The rapidity of the spread of disease and the high levels of morbidity and mortality associated with SARS call for careful monitoring for the reappearance of SARS-CoV and preparations for the rapid implementation of appropriate control measures. Although the United States had only eight documented cases of SARS-CoV infection and no significant local spread, it is clear that we are susceptible to the types of outbreaks experienced in Hong Kong, Singapore, Taiwan, and Toronto.

In the absence of a vaccine, effective drugs, or natural immunity to SARS-CoV, the only currently available public health strategies to limit the impact of SARS are rapid identification of infected persons and activation of the control measures that have proven effective in preventing transmission in other locales. These measures include global and community surveillance, detection and isolation of cases, identification and monitoring of contacts, adherence to infection control precautions, and, in some instances, measures (e.g., quarantine) to restrict the movement of potentially infected persons. These are the traditional public health tools used to prevent the spread of any infectious disease, and they constitute the fundamental strategy for controlling SARS.

The SARS outbreak during the spring of 2003 convincingly showed that undetected SARS cases can trigger rapid transmission of SARS-CoV and generate substantial health, social, and economic consequences. Rapid detection of SARS cases and contacts and prompt implementation of control measures can, however, interrupt and contain transmission. Given the possibility that SARS might reappear, the healthcare and public health systems need to be prepared to quickly detect and
control disease transmission and minimize the impact of SARS outbreaks. This document is designed to address this need.

II. Overview of the Guidance Document

A. Purpose and Scope

This document presents a strategic framework for communities and healthcare facilities to plan and prepare for the reappearance of SARS and respond to a SARS outbreak. Directed to state and local health departments, healthcare facilities, and healthcare personnel, the document provides strategies, guidance, and tools for SARS preparedness and response. It addresses both the rationale and the strategies for SARS preparedness and response and provides a foundation for the development of more detailed operational plans and procedures for responding to SARS at the local level. Suggested activities include those needed to prepare for an introduction of SARS, to quickly detect possible SARS cases and clusters, and to prevent and contain SARS-CoV transmission.

Public Health Guidance for Community-Level Preparedness and Response to Severe Acute Respiratory Syndrome (SARS) has its basis in the United States Government Interagency SARS Concept of Operations Plan (CONPLAN), which outlines the Federal government’s strategy for a coordinated national response to an outbreak of SARS. The CONPLAN provides planning guidance for a timely, coordinated response by federal agencies to a SARS emergency and serves as a foundation for the development of operational plans and procedures at the national, state, and local levels. Whereas the focus of the CONPLAN is interagency and intergovernmental coordination, CDC’s Public Health Guidance for Community-Level Preparedness and Response to Severe Acute Respiratory Syndrome (SARS) provides planning guidance, strategies, and tools for the local public health and healthcare officials who provide the first line of readiness and action in detecting and containing a SARS outbreak.

Many of the approaches and activities for preparedness and response to SARS are similar or identical to those involved in combating other infectious diseases, such as pandemic influenza and intentionally spread smallpox or plague. Therefore, topics covered in this document may be relevant to or already addressed in other local emergency preparedness plans.

B. Development Process

The document was prepared by CDC’s SARS Preparedness Committee, which was assembled to prepare for the possibility of future SARS outbreaks. The Committee includes eight working groups, each of which addressed a component of SARS preparedness and response: Surveillance, Clinical Management, Preparedness in Healthcare Facilities, Community Response, Laboratory Diagnostics, Information Technology, Communication and Education, and Special Studies. The working groups derived the guidance document from lessons learned from the 2003 epidemic, other CDC preparedness and response plans, and the advice, suggestions, and comments of state and local health officials and representatives of professional organizations, convened by means of teleconferences and meetings. Meetings were held on August 12-13, 2003 (public health preparedness and response), September
C. Objectives

The strategies, guidelines, and tools included in this document are designed to enable states and communities to achieve the following objectives:

- Rapidly and efficiently identify SARS cases and their exposed contacts
- Ensure rapid information exchange among clinicians, public health officials, and administrators of healthcare facilities about potential SARS cases
- Rapidly and effectively implement measures to prevent the transmission of SARS-CoV
- Continuously monitor the course and characteristics of a SARS outbreak and promptly revise control strategies as needed
- Implement effective communication and education strategies for the public, the media, community officials, healthcare communities, and public health communities to ensure an appropriate response to SARS
- Coordinate and integrate SARS preparedness and response planning efforts with other preparedness plans and systems

III. Approach to SARS Preparedness and Response

The proposed approach to SARS preparedness and response reflects what has been learned to date about SARS-CoV transmission and the interventions that were used to contain the 2003 global outbreaks.

A. Lessons Learned

- SARS is a serious, often fatal, infectious disease with the potential for rapid spread.
- The vast majority of febrile respiratory illnesses will not be SARS.
- Laboratory tests, although sensitive and specific, do not reliably detect SARS-CoV early in the course of disease.
- Clinical features of SARS are nonspecific, but diagnosis can be guided by a history of exposure risk.
- In the absence of effective drugs or a vaccine, SARS can be controlled by the rapid and efficient use of the basic public health control strategies of surveillance and containment.
- SARS-CoV transmission is neither regional nor national but rather confined to limited geographic – and even institutional – settings; response strategies must therefore reflect local characteristics and resources.
- SARS response activities can inundate public health and healthcare resources.
- The potentially substantial health, social, and economic impact of SARS requires a swift and bold response that is appropriate to the situation yet minimizes unnecessary disruptions and respects human dignity.

B. Basic and Enhanced Response Elements
The foundation of the proposed approach is a set of fundamental elements on which communities might base their preparedness and response activities. Examples of these basic response elements are:

- Surveillance for SARS cases or suspicious clusters of atypical pneumonia, with appropriate diagnostic testing
- Rapid isolation and appropriate management of potential SARS cases
- Rapid and efficient identification, evaluation, and monitoring of contacts
- Issuance of travel alerts/advisories, screening of ill travelers at airports, and other border control measures to prevent international spread
- Timely dissemination of communication messages to the public health and healthcare communities and the public

Communities may supplement these basic elements with enhanced control measures that might be needed to address an escalating outbreak, changing transmission patterns or characteristics, variations in compliance, uncertainties about the effectiveness of basic control measures, feasibility and acceptability of specific interventions, or political pressures. Possible enhanced activities might include:

- Establishment of designated sites for evaluation of possible SARS patients
- Screening of incoming and/or departing passengers at airports, ports, and land border crossings
- Quarantine of close contacts of cases or of persons potentially exposed to SARS by their presence at a particular function, setting, or institution
- Closing schools, canceling large gatherings, or implementing other “snow day”-type measures for increasing social distance as temporary measures to slow transmission in an affected community

C. Information for Action

As the level of SARS-CoV transmission during an outbreak is dynamic, response activities, by necessity, must also be dynamic. The key to understanding transmission dynamics and knowing when to escalate the response at the local level is a surveillance system that provides ready access to timely information on the number of new cases, the likely source of exposure for cases, the number of cases not previously identified as contacts, and the number of contacts (prospective cases) with high-risk exposures to known cases.

D. Coordination and Consistency

Although jurisdictions will need to adjust the types and level of response measures to local conditions and resources, they will also need to coordinate with adjacent jurisdictions to ensure consistency among responses and minimize confusion or mistrust that may derive from inexplicable differences in outbreak control strategies.

IV. Key Measures for SARS Preparedness and Response

A. Surveillance
The SARS surveillance strategy is founded on complete and rapid identification of cases -- the key to which is maintaining an appropriate index of suspicion for SARS based on risk of exposure. With no known source of transmission, the most likely sites of SARS-CoV recurrence are: 1) locations where SARS-CoV transmission previously occurred, 2) the original site of introduction of SARS-CoV from animals to humans, 3) large international travel hubs serving as interconnecting nodes to high-risk locations, and 4) laboratories in which a break in technique leads to laboratory-acquired infections.

The predilection for SARS-CoV transmission to occur among international travelers and in healthcare settings and to cause unusual clusters of pneumonia provides a focus for surveillance in the absence of known SARS activity (i.e., patients hospitalized for pneumonia, pneumonia in healthcare workers, unusual clusters of pneumonia among travelers). If SARS reappears, then patients or known sites of SARS-CoV transmission become the most likely source of exposure. Contact tracing -- the identification and evaluation of persons who had close contact with a potential SARS case or were exposed to locations with known SARS-CoV transmission -- is important for the identification of persons at risk for SARS and the initiation of appropriate measures to reduce the possible spread of infection.

### Goals

- Ensure early detection of cases and clusters of respiratory infections that might signal the global re-emergence of SARS
- If the re-emergence of SARS is confirmed, maintain prompt and complete identification and reporting of potential cases to facilitate control and management of the outbreak
- Identify and monitor contacts of SARS cases to enable early detection of illness in persons at greatest risk for disease

### Priority Activities

- Educate clinicians and public health workers on features that can assist in early recognition of SARS and on guidelines for reporting SARS cases
- Develop tools to identify, evaluate, and monitor contacts of SARS patients
- Establish an efficient data management system that links clinical, epidemiologic, and laboratory data on SARS cases and contacts and allows rapid sharing of information
- Identify surge capacity for investigation of cases and identification, evaluation, and monitoring of contacts in the event of a large SARS outbreak

### B. Isolation and Infection Control in Healthcare Facilities

In most settings with large SARS outbreaks in 2003, healthcare facilities accounted for a large proportion (often >50%) of cases. In addition to healthcare workers who cared for patients, other hospital patients and visitors were often affected and in many instances propagated the outbreaks in the hospital and into the community. Therefore, rapid isolation of SARS cases and strict adherence to infection control precautions are critical; prompt use of these measures has consistently been a key and effective part of SARS control strategies. Each hospital in a community should be prepared to identify, triage, and manage SARS patients. Hospital-specific infection control policies related to SARS should guided by the level of SARS activity in the community and the hospital. Identifying adequate resources and staff for an effective response and surge capacity, if needed, are priorities.
Goals

- Rapidly identify and isolate all potential SARS patients
- Implement strict infection control practices to prevent transmission
- Strengthen communications in healthcare facilities and between healthcare facilities and health departments

Priority Activities

- Organize a planning committee to develop an institutional preparedness and response plan.
- Develop surveillance, screening, and evaluation strategies for various levels of SARS activity.
- Develop plans to implement effective infection control measures.
- Determine the current availability of infrastructure and resources to care for SARS patients and strategies for meeting increasing demands.
- Determine how the staffing needs for the care of SARS patients will be met.
- Determine strategies to communicate with staff, patients, and the health department and to educate staff and patients.

C. Community Containment

Community containment strategies, including isolation and quarantine, are basic infectious disease control measures that proved to be critically important for control of the most severe SARS outbreaks in 2003. Isolation of SARS patients separates them from healthy persons and restricts their movement to prevent transmission to others, preventing healthy persons from becoming ill. It also allows for the focused delivery of specialized health care to ill persons. Quarantine of persons who have been exposed to SARS but are not ill is intended to prevent further transmission in the event that they develop SARS by reducing the interval between the onset of symptoms and the institution of appropriate precautions.

Because most SARS patients have a clearly identified exposure to other SARS patients or to a setting with SARS-CoV transmission, quarantine of exposed persons is a highly effective strategy if performed selectively, carefully, and with respect for human dignity. Isolation and quarantine are optimally performed on a voluntary basis, but many levels of government (local, state, federal) have the basic legal authority to compel mandatory isolation and quarantine of persons and communities when necessary to protect the public's health. Broader community containment through “snow day” measures, such as cancellation of public gatherings and closure of school and businesses, can also be used to reduce transmission by limiting social interactions at the population level. The rationale for such measures, as well as mechanisms to ensure due process and prevent stigmatization of affected persons, need to be clearly articulated.

Goals

- Reduce the risk of exposure to SARS by separating and restricting the movement of persons suspected to have SARS (isolation)
- Reduce the risk of transmission of SARS-CoV by restricting the movement of persons who have been exposed to infectious SARS patients but who are not yet ill (quarantine)
- Reduce the overall risk of transmission at the population level by limiting social interactions and preventing inadvertent SARS exposures
Priority Activities
- Isolate SARS patients and suspects in homes, hospitals, or designated community-based settings.
- Monitor contacts of SARS cases, and consider quarantine of contacts if needed.
- Implement community-based control measures, such as cancellation of public events and closure of schools, depending on the extent of the outbreak and the availability of resources.
- Establish the infrastructure to deliver essential goods and services to persons in quarantine and isolation.

D. Prevention of International Travel-Related Risk

In the absence of control measures, SARS can spread rapidly on a global scale through international travel. Screening and evaluating passengers for SARS-like symptoms, educating them about SARS, and reporting illnesses in travelers can decrease the risk of travel-associated infections.

Goals
- Prevent the introduction of SARS (and spread from an introduction) into the United States from SARS-affected areas.
- Prevent exportation of SARS from the United States if domestic transmission presents an increased risk of exportation.
- Prevent the transmission of SARS-CoV to passengers on a conveyance with a SARS patient, and evaluate and monitor other passengers to detect SARS-like illness and prevent further spread.

Priority Activities
- Screen incoming travelers from SARS-affected areas, and provide guidance about monitoring their health and reporting illness.
- Provide guidance to outbound travelers about active SARS-affected areas and measures to reduce risk of acquiring SARS-CoV infection during travel.
- If SARS-CoV transmission in the United States presents an increased risk for exportation of SARS, then screen outbound travelers to prevent such exportation.
- Ensure the appropriate evaluation and management of SARS cases and potentially exposed passengers and crew members on conveyances.

E. Laboratory Diagnostics

Laboratory diagnostics are essential for detecting and documenting a resurgence of SARS, responding to and managing SARS outbreaks, and managing concerns about SARS in patients with other respiratory illnesses. The identification of the etiologic agent, SARS-CoV, led to rapid development of enzyme immunoassays (EIA) and immunofluorescence assays (IFA) for SARS antibody and reverse-transcriptase PCR (RT-PCR) assays for SARS-CoV RNA. These assays can be very sensitive and specific for detecting antibody and RNA, respectively, but are less sensitive for detecting infection, especially early in illness. Diagnostic assays for other respiratory pathogens may be helpful in differentiating SARS from other illnesses, but SARS patients may be simultaneously infected with SARS-CoV and another respiratory pathogen. CDC’s laboratory diagnostics plan is based on the following goals and activities:
Goals

- Provide the public health community with ready access to high-quality SARS diagnostics
- Ensure that SARS laboratory diagnostics are used safely and appropriately and that results are interpreted appropriately

Priority Activities

- Improve the ability to detect SARS-CoV infection by optimizing the selection and timing of specimen collection and processing
- Provide SARS assays for RT-PCR testing through Laboratory Response Network (LRN) laboratories and for serologic testing to state public health laboratories
- Distribute proficiency panels and questionnaires to participating laboratories to determine the ability of laboratories to provide valid SARS diagnostics
- Provide guidance on laboratory safety for SARS and other respiratory diagnostic testing and for potentially SARS-containing specimens submitted for other tests
- Provide guidance for interpreting test results, taking into account the possibility of false-positive and false-negative results and clinical and epidemiologic information
- Identify surge capacity for laboratory testing in the event of a large SARS outbreak

F. Communication

Rapid and frequent communication of crucial information about SARS -- such as the level of the outbreak worldwide and recommended control measures -- are vital components of efforts to contain the spread of SARS. Specific communication needs and key messages will vary substantially by level of SARS activity. In the absence of SARS globally, the preparation and dissemination of messages and materials are designed to maintain vigilance in the healthcare community and general awareness among all parties about the possibility of a SARS outbreak and the steps that would be indicated in such an event. The emergence of SARS anywhere in the world will generate immediate and intense media attention and require an enormous effort to respond to the demand from the public, the media, policymakers, and healthcare providers for information and guidance. A domestic outbreak of SARS will result in even greater demands to manage media requests, disseminate up-to-date outbreak information and messages, assist local hospitals and healthcare providers in responding to the public, and respond to inquiries from special interest groups.

Goals

- Instill and maintain public confidence in the nation’s public health system and its ability to respond to and manage a SARS outbreak
- Contribute to the maintenance of order, minimization of public panic and fear, and facilitation of public protection through the provision of accurate, rapid, and complete information
- Provide accurate, consistent, and comprehensive information about SARS
- Address rumors, inaccuracies, and misperceptions as quickly as possible, and prevent stigmatization of specific groups.
Priority Activities

- Identify key messages about SARS for specific audiences (e.g., public, healthcare providers) and the most effective methods (e.g., websites, hotlines) to deliver these messages
- Issue local public health announcements and updated information on the outbreak and response
- Provide a location for state, local, and federal communication and emergency response personnel to meet and work side-by-side in developing key messages and handling media inquiries
- Respond to frequently occurring media questions by preparing fact sheets, talking points (key messages), and question-and-answer documents
- Coordinate requests for spokespersons and subject matter experts

G. Information Technology

During the 2003 epidemic, the internet played an important part in global efforts to identify the etiologic agent of SARS and control its spread. Unfortunately, in many outbreak settings, the lack of useful information management systems made outbreak control less efficient in many areas and in some instances may have actually delayed the containment and control of SARS. Although a web-based system to manage all aspects of a SARS outbreak would be ideal, issues of confidentiality, data security, data ownership, and availability of technical expertise to support new information systems make the ideal system a long-term goal. In the short term, a web-based case reporting system -- plus efficient means to link clinical, epidemiologic, and laboratory data -- will provide an efficient process for quickly recording and reporting the status of SARS activity in the United States for federal, state, and local response needs.

Rapid identification, tracking, evaluation, and monitoring of contacts of SARS cases will be key to early detection of symptoms in persons at greatest risk of SARS, and development of a data management system to facilitate this process is vital. Contact tracing can be particularly challenging and resource intensive in large-scale outbreaks or among highly mobile populations such as international travelers. Ideally, such a system should be integrated with the case reporting system to allow rapid exchange of information. Finally, the tracking of contacts of SARS cases on conveyances (e.g., airplanes) will require rapid availability of electronic passenger manifests that provide information on the proximity of the contact to the case. This information needs to be rapidly assimilated and disseminated to a large number of state and local health departments for notification and monitoring of contacts.

Goal

- Deploy an integrated data management system that efficiently and effectively supports SARS outbreak response needs at the federal, state, and local levels.

Priority Activities

- Develop and deploy a case-reporting system for SARS surveillance that supports federal, state, and local health department needs and makes data readily available to the submitting health department. The system can be based on either web-based data entry or data downloads.
- Implement an outbreak-management system that can track and link clinical, laboratory, and epidemiologic data and can be used to monitor all aspects of
an outbreak response at the local level. The system should allow state and local health departments to track the monitoring and follow-up of contacts for clinical illness and compliance with isolation and quarantine measures, as applicable.

- Collaborate with the Department of Transportation to rapidly obtain passenger manifests for conveyances with ill travelers.
- Develop mechanisms (e.g., Epi-X, Health Alert Network) to disseminate contact information to state and local health departments.

V. Organization of the Guidance Document

The document is organized into four levels of progressively more detailed information: 1) executive summary; 2) core document; 3) stand-alone supplements that address the key measures for SARS preparedness and response; and 4) attachments to each supplement that provide guidance and tools for local-level preparedness and response activities.

The Supplements included in this document are:

- Supplement A: Command and Control
- Supplement B: SARS Surveillance
- Supplement C: Preparedness and Response in Healthcare Facilities
- Supplement D: Community Containment Measures, Including Non-Hospital Isolation and Quarantine
- Supplement E: Managing International Travel-Related Transmission Risk
- Supplement F: Laboratory Diagnosis
- Supplement G: Communication

Each Supplement outlines, and in some cases describes in some detail, many of the interrelated and multifaceted activities that need to or could be undertaken at the local level to prepare for and respond to the reemergence of SARS. Also included are guidelines and resource materials to assist public health officials and healthcare facilities in planning and implementing a response. To address the dynamic nature of a SARS outbreak and each jurisdiction’s unique situation, each Supplement considers, as applicable:

- Recommendations for preparedness and contingency planning that should occur prior to the reappearance of SARS
- Strategies for a basic level of response in U.S. communities to the reappearance of SARS in other parts of the world
- Options for enhancing the intensity and scope of local strategies to address changing dynamics of the outbreak or response
- Options for modifying the response in reaction to new information on transmission dynamics, improved diagnostic testing, or introduction of new therapeutic or prophylactic interventions
- Criteria and approaches for de-escalating the response as SARS-CoV transmission is controlled and eliminated

Using this guidance document, localities can develop operational SARS preparedness and response plans that reflect consistent approaches among and within jurisdictions to outbreaks of similar characteristics, while taking into account available healthcare and public health resources, public perceptions, and other factors that are unique to
each community. The document will be updated as necessary to reflect increased understanding of SARS-CoV transmission dynamics and availability of improved prevention tools.
Appendices to the Core Document

Appendix 1
Clinical, Epidemiologic, and Virologic Features of SARS

Appendix 2
Terminology and Concepts
Appendix 1
Clinical, Epidemiologic, and Virologic Features of SARS

Emergence of SARS
SARS first came to global attention on February 11, 2003, when Chinese officials informed WHO of the occurrence of 305 cases of atypical pneumonia and 5 deaths in Guangdong Province since November 2002. On February 21, a Chinese physician with SARS traveled from Guangdong to Hong Kong and spent the night in a hotel there. During the next two days, he developed increasingly severe respiratory symptoms and was hospitalized in a Hong Kong hospital, where he died from his illness. His one-night stay in a Hong Kong hotel led to infection by yet unexplained mechanisms in several other guests, who subsequently traveled to and seeded SARS outbreaks in Vietnam, Singapore, Hong Kong, and Canada. In these areas, local spread was initiated and maintained in hospitals, where healthcare personnel, patients, and visitors – unaware of the emergence of a new disease – acquired SARS-CoV from persons with unrecognized infection. During March-May, the spread of the virus from Guangdong to other parts of China established additional foci of infection, such as Beijing and Taiwan.

Once SARS was recognized in these locations and widespread community transmission was noted in several outbreak sites, the spread of SARS-CoV was controlled by aggressive community infection control measures including active case finding, contact tracing and monitoring, travel restrictions, and quarantine and other containment strategies. These measures were implemented in many geopolitical jurisdictions and involved intense, sustained collaboration among institutions and persons beyond the traditional public health infrastructure. Areas with high transmission rates experienced severe economic consequences and social disruption rivaling that seen in other global epidemics (e.g., plague) of centuries past.

On March 14, 2003, CDC launched an emergency public health response and established national surveillance for SARS to identify case-patients in the United States and discover if domestic transmission was occurring. Through July 2003, a total of 159 suspect and 33 probable cases had been reported in the United States. Of the 33 probable cases, only 8 had laboratory evidence of SARS-CoV infection. All of the 8 cases with documented SARS-CoV infection occurred in persons who had traveled to SARS-affected areas. One of these case-patients might have acquired infection either abroad or from her spouse, who was one of the other 7 SARS-CoV-positive cases. Except for this one person with possible transmission from a household contact, no evidence of SARS-CoV infection was detected by serologic testing of household contacts of SARS cases or of healthcare workers who cared for SARS patients.

During the global epidemic, transmission of SARS-CoV in hospitals was a major factor in the amplification of outbreaks and the initiation of spread into the community. In areas characterized by extensive outbreaks, early SARS-CoV transmission occurred predominantly among healthcare workers, patients, and visitors; these groups accounted for 18% to 58% of all SARS cases in the five countries with the largest outbreaks. The concentration of illness in previously healthy hospital staff placed an enormous strain on hospital facilities and staff. The apparent ease of nosocomial transmission – added to the far-reaching public health ramifications of SARS-CoV transmission in single hospitals – posed great challenges for healthcare institutions in maintaining high levels of vigilance and infection control.
Clinical Features
The median incubation period for SARS appears to be approximately 4 to 6 days; most patients become ill within 2 to 10 days after exposure. The clinical presentation of SARS-CoV infection has some but not enough distinctive features to enable diagnosis by clinical signs and symptoms alone. Respiratory symptoms often do not develop until 2 to 7 days after onset of systemic symptoms such as fever, headache, myalgias. Respiratory complaints usually include a non-productive cough and dyspnea but not upper respiratory symptoms such as rhinnorhea and sore throat. Almost all patients with laboratory evidence of SARS-CoV infection evaluated thus far developed radiographic evidence of pneumonia, and most (70% -90%) developed lymphopenia. The overall case-fatality rate of approximately 10% can increase to >50% in persons older than age 60.

Transmission
Epidemiologic features of SARS provide keys to its diagnosis and control. The pattern of spread suggests that SARS-CoV is transmitted primarily through droplets and close personal contact. Studies documenting stability of the virus for days in the environment suggest the possibility of fomite transmission. There is also suggestive evidence that, in a few instances, SARS-CoV may have been transmitted by small-particle aerosols. Epidemiologic data suggest that infected persons do not transmit SARS-CoV before the onset of symptoms and that most transmission occurs late in the course of illness when patients are likely to be hospitalized. The lack of transmission before symptom onset and during early illness explains the infrequency of community transmission and the preponderance of hospital-associated transmission. Although evidence indicates that most patients do not transmit SARS-CoV efficiently, documentation of “super-spreaders” and “super-spreading events” shows that, in certain situations, the virus can be transmitted very efficiently.

Control Strategies
The rapidity with which SARS spread globally and the severity of the disease require a rapid and integrated global response to SARS. SARS anywhere in the world can potentially affect all other global regions. In response to the 2003 SARS epidemic, WHO orchestrated a rapid and intense effort to control transmission, which ultimately was effective in stopping all global spread by early July 2003. The classic public health control measures of isolation, contact tracing and monitoring, infection control, and quarantine were an important part of the global control of SARS and will be the key to controlling SARS if it returns.

The Virus and Its Re-emergence
SARS is caused by the newly identified SARS-associated coronavirus (SARS-CoV). As SARS-CoV is distantly related to all previously described coronaviruses, it is likely that the virus or its parent virus has been circulating in some location for a long period. Antibodies to SARS-CoV were not found in human serum samples banked before the SARS outbreak, suggesting that the virus is new to the human population. Evidence suggests that it is a previously unknown coronavirus, probably from an animal host, that somehow acquired the ability to infected humans. No one knows if SARS-CoV will re-emerge, but the most likely potential sources for its reintroduction are: 1) the original animal or a new animal reservoir; 2) undetected transmission in humans; 3) persistent infection in humans; or 4) the laboratory (as occurred recently in Singapore). Since most other respiratory viruses are seasonal with outbreaks in fall, winter, or spring that spontaneously resolve, it is possible that SARS may also be seasonal and spread more efficiently if it recurs during the
respiratory virus season. Recurrence of SARS, or concern about SARS, during respiratory virus season will likely challenge the healthcare and public health communities with large numbers of SARS-like illnesses.

**Laboratory Diagnostics**
Laboratory diagnostics are essential for detecting and documenting a resurgence of SARS, responding to and managing outbreaks of SARS, and addressing concerns about SARS in patients with other respiratory illnesses. Two assays are most often used to diagnose SARS CoV infection: PCR assays for viral RNA and serologic assays for virus-specific antibodies. Both assays can be very specific and sensitive in detecting RNA and antibodies, respectively. However, because of the low titer of virus in clinical specimens from most patients and the time it takes persons to mount an antibody response to infection, neither assay can reliably detect SARS-CoV infection early in illness. Interpretation of these assays needs to account for the possibility of false-negative results, which are frequent occurrences early in infection, and false-positive results, which are especially important concerns for PCR assays.

**Prophylaxis and Treatment**
No vaccines have yet been developed for SARS and no anti-viral treatment has been shown to be effective. CDC, the National Institutes of Health (NIH), the Food and Drug Administration (FDA) and academicians are developing protocols to assess antiviral drugs that show activity in vitro against SARS-CoV. It is not yet clear whether persons who recover from SARS-CoV infection develop long-lasting protective immunity or whether they are susceptible to re-infection and disease, as is the case with other human coronaviruses.
Appendix 2
Terminology and Concepts

Among the public health tools available to respond to infectious respiratory disease outbreaks and interrupt disease transmission are vaccines, prophylactic and therapeutic medications, environmental decontamination, isolation of infectious patients, personal protective measures, and, more rarely, quarantine of persons believed to be exposed to an infectious agent. Because SARS is a newly emerging disease, the understanding of its pathogenesis is limited, and to date no specific pharmaceuticals have been identified as effective treatment or prophylaxis. In addition, there is currently no vaccine that can protect susceptible persons from infection with SARS-CoV. Therefore, the primary tools available to control and prevent disease transmission during a SARS outbreak are case identification and isolation, contact tracing and monitoring, infection control, and community containment measures, including quarantine.

A case of SARS-CoV disease is a person with an illness that is clinically compatible with the features of SARS described previously and with laboratory evidence of SARS-CoV infection.

A contact is a person who has been exposed to a SARS case during the infectious period. A close contact is a person who has cared for or lived with someone with SARS or had direct contact with respiratory secretions of body fluids of a patient with SARS. Examples of close contact include kissing or hugging, sharing eating or drinking utensils, talking to someone within 3 feet, and touching someone directly. Close contact does not include activities such as walking by a person or sitting across a waiting room or office for a brief time.

Contact tracing involves the identification, evaluation, counseling, and monitoring of persons who may have been exposed to a patient with SARS-CoV infection. Contact tracing may result in strict or modified quarantine and regular monitoring for evidence of illness.

Community containment measures refer to the separation of infected or exposed persons from non-infected persons by use of isolation, quarantine, or other restrictions on movement and activities. Isolation and quarantine are common practices in public health, and both aim to control exposure to infected or potentially infected persons. Both may be used voluntarily or compelled by public health authorities and can be applied on an individual or population level.

Isolation refers to the separation of persons with a specific contagious illness from contact with susceptible persons and the restriction of their movement to contain the spread of that illness. Isolation usually occurs in a hospital but can be in a home or dedicated isolation facility. Isolation is used routinely in hospital and healthcare settings to reduce the transmission of infections to uninfected patients.

Quarantine refers to the separation and restriction of movement of well persons who may have been exposed to an infectious agent and may be infected but are not yet ill. Quarantine usually occurs in the home but can be in a dedicated facility or hospital. The term “quarantine” can also be applied to restrictions of movement into or out of buildings, other structures, and public conveyances. States generally have authority to invoke and enforce quarantine within their jurisdictions, although
quarantine laws vary among states. CDC is also empowered to detain, medically examine, or conditionally release persons suspected of carrying certain communicable diseases at points of arrival in and departure from the United States or across state lines.

**Infection control** measures practiced by healthcare personnel in healthcare facilities decrease the risk for transmission and acquisition of infectious agents through proper hand hygiene, scrupulous work practices, and use of personal protective equipment, such as masks, gloves, gowns, and eye protection. The types of infection control measures are based on how an infectious agent is transmitted and include standard, contact, droplet, and airborne precautions (http://www.cdc.gov/ncidod/hip/ISOLAT/Isolat.htm).

**Standard precautions** are work practices required for the basic level of infection control. They center on proper hand hygiene and also include use of protective barriers and appropriate handling of clinical waste.

**Contact precautions** are work practices designed to reduce the risk of transmitting infectious agents by direct or indirect contact with an infectious person. Direct-contact transmission involves a direct body surface-to-body surface contact and physical transfer of infectious agents between an infected person and a susceptible host. Indirect-contact transmission involves contact of a susceptible host with a contaminated intermediate object, such as contaminated instruments or dressings or contaminated hands that are not washed or gloves that are not changed between patients.

**Droplet precautions** are designed to reduce the risk of droplet transmission of infectious agents. Droplet transmission occurs when droplets containing infectious agents generated by an infectious person are propelled a short distance through the air (e.g., by coughing, sneezing, or talking) and deposited on the conjunctivae or mucous membranes of the mouth or nose of a susceptible person.

**Airborne precautions** are designed to reduce the risk of airborne transmission of infectious agents. Airborne transmission occurs by dissemination of nuclei of evaporated droplets that may remain suspended in the air for long periods of time. Microorganisms carried in this way can be dispersed by air currents and may be inhaled by a susceptible host in the same room or over a longer distance from the source patient, depending on environmental factors. An airborne infection isolation room (AIIR) that has negative pressure relative to the surrounding area is required for implementation of airborne precautions.

In this document, healthcare worker and healthcare personnel refer to any employees who have close contact (i.e., within 3 feet) of 1) patients, 2) patient-care areas (e.g., patient rooms, procedure areas), or 3) patient-care items (e.g., linens and other waste).