Council of State and Territorial Epidemiologists
Position Statement

03-ID-12

Committee: **Infectious Disease**

Title: **Inclusion of Severe Acute Respiratory Syndrome (SARS) reports under investigation and SARS-associated coronavirus (SARS-CoV) disease in the National Public Health Surveillance System (NPHSS), and revision of the interim US surveillance case definition for SARS.**

Statement of the problem:
The recent emergence of SARS in Asia, its subsequent importation into and spread within North America, its severe clinical manifestations, and its ease of transmission necessitate inclusion of SARS reports under investigation and cases of SARS-CoV as notifiable diseases in the NPHSS. In addition, revision of the interim U.S. case definition for SARS is required to distinguish between syndromes that require aggressive public health action (including diagnostic testing) because they could be SARS-CoV disease and syndromes that are highly likely to be due to SARS-CoV infection, and to specify the laboratory and epidemiologic criteria for diagnosis of SARS-CoV disease.

Statement of the desired action (s) to be taken:
CSTE recommends that:

- A sensitive, non-specific case definition for SARS reports under investigation and a more specific case definition for SARS-CoV disease be added to the list of conditions that are under surveillance as part of the NPHSS.
- The existing interim surveillance case definition for SARS be revised, and cases be reported according to the categories outlined in the revised definitions.
- To the extent possible, these case definitions should be consistent with the published guidelines for uniform criteria for surveillance case definitions in the United States and the case definitions for surveillance of SARS used by the World Health Organization.
- CDC maintain, on the CDC website for purposes of surveillance, information on the current criteria for laboratory diagnosis of SARS-CoV infection and a current list of areas with recent local transmission of SARS.
- CDC should work with states to identify resources needed to support the additional surveillance activities required.

Goals of surveillance:
1) Rapidly identify illness that could be SARS, to screen for SARS-CoV and monitor and contain the potential for transmission; 2) rapidly recognize SARS-CoV disease outbreaks and geographic areas with increased SARS activity; 3) identify areas of possible SARS transmission to implement appropriate infection control practices in health care settings; 4) identify imported cases that may serve as sentinels for SARS-CoV activity in other regions of the world; 5) improve our current understanding of the epidemiology of this emerging disease; 6) assess the national public health impact of SARS-CoV disease and monitor trends; and 7) demonstrate the need for public health intervention programs and federal resources, and provide data to allocate resources.

Methods for surveillance:
Clinician and laboratory reporting. Core surveillance data for cases meeting the SARS-CoV disease case definition will be reported to the Centers for Disease Control and Prevention's (CDC's) National Notifiable Disease Surveillance Systems (NNDSS, a component of the NPHSS), through the National Electronic Telecommunications System for Surveillance (NETSS). Selected additional clinical, epidemiologic, and laboratory data will be collected and linked to the core NNDSS data. All surveillance data from persons meeting the definitions for either SARS reports under investigation or SARS-CoV disease (i.e., core NNDSS and clinical, laboratory, and case investigation data) will be reported to CDC using electronic methods consistent with the NEDSS and PHIX architecture. In particular, CDC will assure that the following actions be implemented:

- Establishment of a dedicated, secure Web-based data entry system for SARS.
- Inclusion of SARS modules in the NEDSS base system, including electronic transmission of laboratory test results.
- Establishment of an XML schema that states can use to transmit information related to SARS cases to CDC, using the CDC secure data network.

States should be offered the options to choose the reporting method that fits their information system best. CDC will work closely with the states to determine the method(s) and frequency of data reporting.

Case definitions: See below.

Period of surveillance: Indefinite.

Background and justification:

SARS is a recently recognized, contagious, febrile lower respiratory illness that is associated with infection by a novel coronavirus, called SARS-CoV. Manifestations are often severe, including death, and severe illnesses often occur in previously healthy persons, including many health care workers. While the illness can be highly contagious, its overall rate of spread is slow enough that it can often be contained with early recognition and aggressive implementation of containment activities. The ongoing pandemic of SARS-CoV disease appears to have originated in China in November 2002, and then spread rapidly globally through air travel. Although sustained local transmission has not occurred in the United States, it has occurred in several countries, most notably Canada, Hong Kong, Taiwan, Singapore, Vietnam, and China. Using a broad screening definition, as of June 4, 2003, a total of 8,402 persons with possible SARS-CoV disease, including 772 deaths, have been reported from 29 countries. In the United States, as of June 4, a total of 373 possible SARS-CoV disease cases have been reported from 41 states and Puerto Rico. Of these, 67 (18%) were classified as "probable" SARS cases and 306 (82%) cases were classified as "suspect" SARS cases, using the interim CDC case definition; no deaths have been reported in the United States. However, evidence of infection with SARS-CoV has been documented in only 8 persons (all probable SARS cases) and has been excluded in 28 of 35 other probable cases in whom testing has been completed and 116 suspect cases. Of these 8 cases, 7 were attributed to exposure during international travel in a country with SARS transmission and one was likely related to household transmission within the United States. Seven of the 8 cases of SARS-CoV disease were identified before early April and the number of new cases meeting the screening definition in the United States has been decreasing in recent weeks. However, vigilance is critical to ensure rapid recognition and appropriate management of persons with SARS-CoV disease so that transmission can be prevented.

Following the initial reports of SARS, a preliminary national surveillance case definition for suspected SARS cases was developed to identify persons with fever (temperature >100.4 F [>38C]), respiratory symptoms, and an epidemiologic link within 10 days of illness onset of either travel to an area with possible transmission of SARS or close contact with a person with SARS. In recognition of the importance of developing a common international system for reporting SARS cases to the World Health Organization, this definition was updated and reporting of cases was expanded to include two categories: suspect and probable (more severe illnesses characterized by the presence of pneumonia or acute respiratory distress syndrome) cases. Later, criteria for defining laboratory infection with SARS-CoV and for excluding new or previously reported suspect or probable cases of SARS for whom an alternative diagnosis could fully explain the patient's illness were added to the definition. Because of the rapid evolution of the SARS pandemic, the improved understanding of the characteristics of SARS-CoV disease, and the recognition that few illnesses meeting the interim case definition are SARS-CoV infection, the current case definition needs revision. Revision is needed to distinguish between common illnesses that may require aggressive public health action (including diagnostic testing) because a small proportion of these could be due to SARS-CoV, and illnesses that are highly likely to be due

to SARS-CoV. Revision is also needed to improve the laboratory and epidemiologic criteria for diagnosis.

In the United States, public health officials at state and territorial health departments and CDC collaborate in determining which diseases should be nationally notifiable. CSTE, in conjunction with CDC, makes recommendations annually for additions and deletions to the list of nationally notifiable diseases. As knowledge increases and diagnostic technology improves, some definitions will change to reflect those trends. Thus, future revisions of surveillance case definitions can be expected. In addition, surveillance case definitions are to be used for identifying and classifying cases, both of which are often done retrospectively, for national reporting purposes. For many conditions of public health importance, action to contain disease should be initiated as soon as a problem is identified; in many circumstances, appropriate public health action should be undertaken even though insufficient information is available to determine whether cases meet the case definition. Thus, surveillance case definitions should not be used as sole criteria for public health action.

Agencies for information:

(1) Mary E. Chamberland, MD, MPH
Deputy Director
Division of Viral and Rickettsial Diseases
National Center for Infectious Disease
Centers for Disease Control and Prevention
1600 Clifton Road, NE
M/S A30
Atlanta, GA 30333
Phone: (404) 639-4350
Email: MChamberland@cdc.gov

(2) George E. Hardy, MD, MPH
Executive Director
Association of State and Territorial Health Officers
1275 K. Street NW, Suite 800
Washington, DC 20005
Phone: (202) 371-9090
Email: Ghardy@astho.org

(3) Rosemary Humes, MS, MT
Director, Infectious Disease Programs
Association of Public Health Laboratories
2025 M Street, NW, #550
Washington, DC 20036-3320
Phone: (202) 822-5227
Email: Sbecker@aphl.org

(4) NIOSH

Agencies for response:

(1) James M. Hughes, MD
Director, National Center for Infectious Disease
Centers for Disease Control and Prevention
1600 Clifton Road, NE
M/S C12
Atlanta, GA 30333
Phone: (404) 639-3401
Email: JHughes@cdc.gov

(2) Sam Groseclose, DVM
Chief, Surveillance Systems Branch
Centers for Disease Control and Prevention
Epidemiology Program Office, MS K-74
1600 Clifton Road, NE
Atlanta, GA 30333
Phone: (770) 488-8359
Email: SGroseclose@cdc.gov

Authors:

(1) Matthew Cartter, MD, MPH
Epidemiology Program Infectious Diseases Division
Connecticut Department of Public Health
410 Capitol Ave. MS 11-EPI
P.O. Box 340308
Hartford, CT 06106
Phone: (860) 509-7994
Email: Matt.cartter@po.state.ct.us

(2) Umesh Parashar, MD, MPH
Medical Epidemiologist
Division of Viral and Rickettsial Diseases
National Center for Infectious Disease
Centers for Disease Control and Prevention
1600 Clifton Road, NE
M/S G04
Atlanta, GA 30333
Phone: (404) 639-3577
Email: UParashar@cdc.gov

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Box. Revised CSTE surveillance case definition for severe acute respiratory syndrome,

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Clinical Criteria

Early illness

- Presence of two or more of the following features: fever (might be subjective), chills, rigors, myalgia, headache, diarrhea, sore throat, rhinorrhea

Mild-to-moderate respiratory illness

- Temperature of >100.4º F (>38º C)*** and**
- One or more clinical findings of lower respiratory illness (e.g., cough, shortness of breath, difficulty breathing)

Severe respiratory illness

- Meets clinical criteria of mild-to-moderate respiratory illness, **and**
- One or more of the following findings:
  - Radiographic evidence of pneumonia, **or**
  - Acute respiratory distress syndrome, **or**
  - Autopsy findings consistent with pneumonia or acute respiratory distress syndrome without an identifiable cause

Epidemiologic Criteria

Possible exposure to SARS-associated coronavirus (SARS-CoV)

One or more of the following exposures in the 10 days before onset of symptoms:

- Travel to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV[†] **or**
- Close contact[§] with a person with mild-to-moderate or severe respiratory illness and with history of travel in the 10 days before onset of symptoms to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV[†]

Likely exposure to SARS-CoV

One or more of the following exposures in the 10 days before onset of symptoms:

- Close contact[§] with a confirmed case of SARS-CoV disease **or**
- Close contact[§] with a person with mild-moderate or severe respiratory illness for whom a chain of transmission can be linked to a confirmed case of SARS-CoV disease in the 10 days before onset of symptoms

Laboratory Criteria

Tests to detect SARS-CoV are being refined, and their performance characteristics assessed; therefore, criteria for laboratory diagnosis of SARS-CoV are changing. The following are the general criteria for laboratory confirmation of SARS-CoV:

- Detection of serum antibody to SARS-CoV by a test validated by CDC (e.g., enzyme immunoassay [EIA]), **or**
- Isolation in cell culture of SARS-CoV from a clinical specimen, **or**
- Detection of SARS-CoV RNA by a reverse-transcription-polymerase chain reaction (RT-PCR) test validated by CDC and with subsequent confirmation in a reference laboratory (e.g., CDC)

Information regarding the current criteria for laboratory diagnosis of SARS-CoV is available at http://www.cdc.gov/ncidod/sars/labdiagnosis.htm.

Exclusion Criteria

A person may be excluded as a SARS report under investigation (SARS RUI), including as a CDC-defined probable SARS-CoV case, if any of the following applies:

- An alternative diagnosis can explain the illness fully**
- Antibody to SARS-CoV is undetectable in a serum specimen obtained >28 days after onset of illness[††]
- The case was reported on the basis of contact with a person who was excluded subsequently as a case of SARS-CoV disease; then the reported case also is excluded, provided other epidemiologic or laboratory criteria are not present

Case Classification

***SARS RUI*:**

Reports in persons from areas where SARS is not known to be active

- SARS RUI-1: Patients with severe illness compatible with SARS in groups likely to be first affected by SARS-CoV[§§] if SARS-CoV is introduced from a person without clear epidemiologic links to known cases of SARS-CoV disease or places with known ongoing transmission of SARS-CoV

Reports in persons from areas where SARS activity is occurring

- SARS RUI-2: Patients who meet the current clinical criteria for mild-to-moderate illness and the epidemiologic criteria for possible exposure (spring 2003 CDC definition for suspect cases[¶¶])
- SARS RUI-3: Patients who meet the current clinical criteria for severe illness and the epidemiologic criteria for possible exposure (spring 2003 CDC definition for probable cases[¶¶])
- SARS RUI-4: Patients who meet the clinical criteria for early or mild-moderate illness and the epidemiologic criteria for likely exposure to SARS-CoV

SARS-CoV disease classification

- Probable case of SARS-CoV disease: in a person who meets the clinical criteria for severe respiratory illness and the epidemiologic criteria for likely exposure to SARS-CoV

- Confirmed case of SARS-CoV disease: in a person who has a clinically compatible illness (i.e., early, mild-to-moderate, or severe) that is laboratory confirmed

*A measured documented temperature of >100.4º F (>38º C) is expected. However, clinical judgment may allow a small proportion of patients without a documented fever to meet this criterion. Factors that might be considered include patient's self-report of fever, use of antipyretics, presence of immunocompromising conditions or therapies, lack of access to health care, or inability to obtain a measured temperature. Initial case classification based on reported information might change, and reclassification might be required.

†Types of locations specified will vary (e.g., country, airport, city, building, floor of building). The last date a location may be a criterion for exposure for illness onset is 10 days (one incubation period) after removal of that location from CDC travel alert status. The patient's travel should have occurred on or before the last date the travel alert was in place. Transit through a foreign airport meets the epidemiologic criteria for possible exposure in a location for which a CDC travel advisory is in effect. Information regarding CDC travel alerts and advisories and assistance in determining appropriate dates are available at http://www.cdc.gov/ncidod/sars/travel.htm.

§Close contact is defined as having cared for or lived with a person with SARS or having a high likelihood of direct contact with respiratory secretions and/or body fluids of a person with SARS (during encounters with the patient or through contact with materials contaminated by the patient) either during the period the person was clinically ill or within 10 days of resolution of symptoms. Examples of close contact include kissing or embracing, sharing eating or drinking utensils, close conversation (<3 feet), physical examination, and any other direct physical contact between persons. Close contact does not include activities such as walking by a person or sitting across a waiting room or office for a brief time.

¶The identification of the etiologic agent of SARS (SARS-CoV) led to the rapid development of EIAs and immunofluorescence assays (IFAs) for serologic diagnosis and RT-PCR assays for detection of SARS-CoV RNA in clinical samples. These assays can be very sensitive and specific for detecting antibody and RNA, respectively, in the later stages of SARS-CoV disease. However, both are less sensitive for detecting infection early in illness. The majority of patients in the early stages of SARS-CoV disease have a low titer of virus in respiratory and other secretions and require time to mount an antibody response. SARS-CoV antibody tests might be positive as early as 8–10 days after onset of illness and often by 14 days after onset of illness, but sometimes not until 28 days after onset of illness. Information regarding the current criteria for laboratory diagnosis of SARS-CoV is available at http://www.cdc.gov/ncidod/sars/labdiagnosis.htm.

**Factors that may be considered in assigning alternate diagnoses include the strength of the epidemiologic exposure criteria for SARS-CoV disease, the specificity of the alternate diagnostic test, and the compatibility of the clinical presentation and course of illness for the alternative diagnosis.

††Current data indicate that >95% of patients with SARS-CoV disease mount an antibody response to SARS-CoV. However, health officials may choose not to exclude a case

based on lack of a serologic response if reasonable concern exists that an antibody response could not be mounted.

[§§]Consensus guidance between CDC and CSTE on which groups are most likely to be first affected by SARS-CoV if it re-emerges is in development. In principle, SARS-CoV disease should be considered at a minimum in the differential diagnosis for persons requiring hospitalization for pneumonia confirmed radiographically or acute respiratory distress syndrome without identifiable etiology and who have one of the following risk factors in the 10 days before the onset of illness:

- Travel to mainland China, Hong Kong, or Taiwan, or close contact with an ill person with a history of recent travel to one of these areas, **or**
- Employment in an occupation associated with a risk for SARS-CoV exposure (e.g., health-care worker with direct patient contact or worker in a laboratory that contains live SARS-CoV), **or**
- Part of a cluster of cases of atypical pneumonia without an alternative diagnosis

Guidelines for the identification, evaluation, and management of these persons are available at http://www.cdc.gov/ncidod/sars/absenceofsars.htm.

[¶¶]During the 2003 SARS epidemic, CDC case definitions were the following:

Suspect case

- Meets the clinical criteria for mild-to-moderate respiratory illness and the epidemiologic criteria for possible exposure to SARS-CoV but does not meet any of the laboratory criteria and exclusion criteria **or**
- Unexplained acute respiratory illness resulting in death in a person on whom an autopsy was not performed and who meets the epidemiologic criteria for possible exposure to SARS-CoV but does not meet any of the laboratory criteria and exclusion criteria

Probable case

- Meets the clinical criteria for severe respiratory illness and the epidemiologic criteria for possible exposure to SARS-CoV but does not meet any of the laboratory criteria and exclusion criteria