

# Severe Acute Respiratory Syndrome-associated Coronavirus (SARS-CoV) disease !

## PROTOCOL CHECKLIST

- Contact provider to verify suspected diagnosis
- Notify Division of Disease Control, Bureau of Epidemiology (DCBE) immediately upon notification of suspected case and for additional assistance in case investigation and management (850-245-4401)
- Notify DOH Bureau of Public Health Laboratories (BPHL) to arrange for confirmatory testing/facilitate further testing at BPHL and CDC.  
**Detection of a suspected case, supported by DOH epidemiologic or medical consultation, is considered a PUBLIC HEALTH EMERGENCY.**
- Enter available information into Merlin upon receipt of initial report
- Review background on disease, case definition, and laboratory testing
- Ensure case is placed in isolation with standard contact and respiratory precautions upon suspected diagnosis and that appropriate respiratory and infection control precautions are implemented
- Interview patient or next of kin
  - Review history for exposure risk in past 10 days
    - Travel to an area where there is documented or suspected SARS-CoV disease
    - Close contact exposure to someone with known or suspected SARS-CoV disease or person with severe respiratory illness for whom a diagnosis is not known
    - Development of fever and respiratory symptoms following exposure
  - Review patient's medical record and or death/autopsy record in case of decedent
    - Evidence of radiographic pneumonia or acute respiratory distress syndrome (ARDS) or autopsy findings of pneumonia
    - Evidence of acute respiratory distress syndrome without an identifiable cause
    - Review to see if patient meets case definition and epidemiologic criteria for case
- If applicable, identify other possible exposed or symptomatic contacts
- Educate contact(s) to monitor for development of fever and respiratory symptoms in the next 10 days, and to seek immediate medical evaluation if symptomatic
- Determine whether symptomatic contact(s) have had clinical laboratory evaluation
- Obtain DOH order for isolation of case(s) and, if needed, for quarantine of close contacts
- Provide education on transmission and prevention
- Address patient's questions or concerns
- Follow-up on special situations such as need for environmental control
- Enter additional data obtained from interview into Merlin

# SARS-CoV

## 1. DISEASE REPORTING

### A. Purpose of reporting and surveillance

1. To rapidly detect SARS-CoV disease so that those who are ill can be isolated promptly, and contacts quarantined.
2. To promptly identify the source of SARS-CoV disease, especially as related to travel to a domestic or foreign location where there may be documented or suspected recent transmission of the disease.

### B. Legal reporting requirements

1. Laboratories and physicians are required to report persons suspected of being infected with SARS-CoV immediately by phone to their local county health department (CHD) upon initial suspicion or laboratory test order.
2. CHDs should immediately notify the Florida Department of Health (DOH) Division of Disease Control's Bureau of Epidemiology (DCBE) at 850-245-4401 for further guidance.
3. Any isolates from patients or suspected patients must be sent to the DOH Bureau of Public Health Laboratories (BPHL), which will forward the specimens to the CDC laboratories for confirmatory testing.

Detection of a suspected case or outbreak of SARS-CoV disease, characterized by fever of 100.4 degrees (F) or higher, one or more symptoms of lower respiratory illness including: cough, shortness of breath (SOB) and difficulty breathing; and radiographic evidence of pneumonia or evidence of acute respiratory distress syndrome (without other explanation) or autopsy finding consistent with pneumonia or ARDS without an identifiable etiology should be considered a **MEDICAL AND PUBLIC HEALTH EMERGENCY**.

### C. County health department investigation responsibilities

1. Work with the DCBE to facilitate the transport of confirmatory laboratory specimens to the BPHL if needed.
2. Work with the DCBE to determine the source of infection.
3. If applicable, identify other persons exposed and recommend vigilant monitoring for development of fever and symptoms for ten days following exposure. Development of symptoms necessitates immediate evaluation by a healthcare provider.
4. Report all confirmed cases to DCBE by phone and enter data into Merlin (SARS-CoV disease CODE 07982). Complete Public Health Services/ CDC International SARS case report form found at:  
[http://www.doh.state.fl.us/Disease\\_ctrl/epi/surv/CaseReportForms/SARS\\_report.pdf](http://www.doh.state.fl.us/Disease_ctrl/epi/surv/CaseReportForms/SARS_report.pdf)

5. Identify patients in need of isolation and assure that necessary steps are taken for them to be isolated.

## 2. THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic agent

Severe acute respiratory syndrome (SARS) is a viral respiratory illness caused by a coronavirus, called SARS-CoV disease-associated coronavirus (SARS-CoV). SARS-CoV disease was first reported in Asia in February 2003. Over the next few months, the outbreak spread to North America, South America, Europe and Asia. The World Health Organization (WHO) received reports of 8098 SARS-CoV disease cases and 774 deaths (case-fatality rate of 9.6%) before the outbreak was contained. In the U.S., 29 people were reported as probable cases, but only eight people had laboratory evidence of SARS-CoV disease and each had traveled to an affected area. All patients subsequently recovered. Since that time, only a small number of cases were reported in China in 2003-2004, and none have been reported through September, 2012.

### B. Description of illness

SARS-CoV disease is a febrile, severe lower respiratory illness. It is typically characterized by a high fever (temperature greater than 100.4°F [ $>38.0^{\circ}\text{C}$ ]), headache, an overall feeling of discomfort, and body aches. Some people have mild respiratory symptoms at onset and 10 - 20% report diarrhea. After two to seven days, SARS-CoV disease patients may develop a dry cough. Most patients develop pneumonia. It is highly communicable through close person-to-person contact.

### C. Reservoir

Epidemiologic evidence suggests the initial human infections came from infected palm civets being served as food in restaurants. Coronaviruses have occasionally been linked to pneumonia in humans, especially people with weakened immune systems. The viruses also can cause severe disease in animals, including cats, dogs, pigs, mice, and birds. The second wave of cases in 2003-2004, however, may have differed from the first one. "Molecular epidemiologic studies showed that the viruses responsible for the 2003-2004 outbreaks were not the same as those isolated during the 2002-2003 outbreaks. These findings indicate independent species-crossing events. They also indicate that a SARS-CoV disease epidemic may recur in the future and that SARS-CoV disease-like coronaviruses that originate from different reservoir host populations may lead to epidemics at different times or in different regions, depending on the distribution of the reservoirs and transmitting hosts." Available at:

<http://www.cdc.gov/ncidod/eid/vol12no12/06-0401.htm>

### D. Modes of transmission

Transmission of SARS-CoV disease is primarily through close person-to-person contact. SARS-CoV disease is thought to be transmitted most readily by respiratory droplets (droplet

spread) produced when an infected person coughs or sneezes. Droplet spread can happen when droplets from the cough or sneeze of an infected person are propelled a short distance (generally up to three feet) through the air and deposited on the mucous membranes of the mouth, nose, or eyes of persons who are nearby. The virus also can spread when a person touches a surface or object contaminated with infectious droplets and then touches his or her mouth, nose, or eye(s). In addition, it is possible that SARS-CoV disease might be spread more broadly through the air (airborne spread) or by other ways that are not now known. During the 2003 SARS-CoV disease outbreak, most persons reported as SARS-CoV disease cases in the United States were exposed through foreign travel to countries with outbreaks of SARS-CoV disease. There was no sustained transmission of SARS in the United States. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5218a2.htm>

#### **E. Incubation period**

The incubation period for SARS-CoV disease is typically two to seven days, although in some cases it may be as long as 10 to 14 days.

#### **F. Period of communicability**

Persons with SARS-CoV disease are most likely to be contagious only when they have symptoms, such as fever or cough. Patients are most contagious during the second week of illness. However, as a precaution against spreading the disease, it is recommended that persons with SARS-CoV disease limit their interactions outside the home (for example, by not going to work or to school) until ten days after their fever has gone away and their respiratory (breathing) symptoms have gotten better.

#### **G. Susceptibility**

Generally, anyone is susceptible, although those who are immune-compromised may be at increased risk. The majority of the cases in the previous global outbreak occurred in adults aged 25 to 70 with few cases in children. Additionally, younger children tended to have milder symptoms and be less infectious to others.

#### **H. Patient Isolation**

As soon as a diagnosis of suspected SARS-CoV disease is made, the patient should be isolated, and county and state health departments should be notified. Confirmatory laboratory work should be initiated, including serum antibody to SARS-CoV and/or isolation of SARS-CoV, and/or detection by RT-PCR ([see laboratory criteria for diagnosis on pg 6-7](#)).

#### **I. Treatment \***

SARS-CoV disease-CoV disease is treated in the same way as any serious community-acquired atypical pneumonia. There is no universal antiviral treatment recommended. Antiviral susceptibility would likely need to be evaluated in the event of another outbreak.

#### **J. SARS-CoV disease in Florida**

There have been no cases of SARS-CoV disease reported in Florida, although several suspected cases related to individuals who traveled to affected countries were investigated during the 2003 outbreak.

### 3. CASE DEFINITION

#### A. Clinical description

##### 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  $>100.4^{\circ}\text{F}$  ( $>38^{\circ}\text{C}$ ), 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.

#### B. Epidemiologic Criteria

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

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

- Travel to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV disease-CoV,  
Or
- Close contact with a person with mild-to-moderate or severe respiratory illness and with history of travel in the ten days before onset of symptoms to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV disease-CoV.

##### Likely exposure to SARS-CoV disease

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

- Close contact with a confirmed case of SARS-CoV disease-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-CoV disease in the ten days before onset of symptoms.

#### C. Laboratory criteria for diagnosis

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 disease-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).

All SARS-CoV testing should be done in the CDC reference lab.

#### D. Exclusion Criteria

A person may be excluded as a SARS report under investigation (SARS RUI), including as a CDC-defined probable SARS-CoV disease 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 more than 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; then the reported case also is excluded, provided other epidemiologic or laboratory criteria are not present.

#### E. Case classification

SARS RUI (Report Under Investigation)

*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*

Confirmed: A 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.

**Probable:** A 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.

#### F. Comment

Information regarding the current criteria for laboratory diagnosis of SARS-CoV is available at: <http://www.cdc.gov/sars/lab/index.html>.

Specimens from all cases must be submitted to the Bureau of Public Health Laboratories for confirmation.

## 4. LABORATORY TESTING

### A. Laboratory diagnosis

Laboratory testing will need to be coordinated with the BPHL and CDC. The DCBE will assist in facilitating in the collection and submission of specimens for testing.

*Since this is an evolving disease, laboratory diagnosis and/or available tests may change in the event of new cases or another outbreak.*

### B. Services available at the BPHL

CDC has developed and validated diagnostic assays for SARS-CoV including an enzyme immunoassay (EIA) ([www.cdc.gov/ncidod/SARS/lab/eia/](http://www.cdc.gov/ncidod/SARS/lab/eia/)) for detection of serum antibodies to SARS-CoV and a reverse transcription-polymerase chain reaction (RT-PCR) assay ([www.cdc.gov/ncidod/SARS/lab/rtpcr/](http://www.cdc.gov/ncidod/SARS/lab/rtpcr/)) for detection of SARS-CoV RNA. Both the EIA and the RT-PCR tests are sensitive and highly specific for diagnosis of SARS-CoV infection. Testing with these assays is now available through BPHL and CDC's Laboratory Response Network (LRN), to which the state BPHL belongs. However, the current recommendation is that testing be conducted at the CDC reference laboratory.

### C. Specimen collection\*

Before collecting and shipping specimens for SARS-CoV testing, consult with the DCBE to determine whether the patient meets the SARS-CoV disease case definition. When possible, collect multiple respiratory specimens for testing. For example, collect specimens from two different sites on the same day (e.g., one nasopharyngeal swab and a stool specimen or another respiratory specimen) or from two different times during the illness.

#### **Specimens for RT-PCR testing\***

During the first week of illness: Nasopharyngeal (NP) swab plus oropharyngeal (OP) swab and a serum or plasma specimen.

After the first week of illness: NP swab plus OP swab and a stool specimen.

#### **Specimens for serologic testing\***

Serum specimens for SARS-CoV antibody testing should be collected when the diagnosis is first suspected and at later times if indicated. An antibody response is occasionally detected

during the first week of illness, likely to be detected by the end of the second week of illness, and sometimes may not be detected until more than 28 days after onset of symptoms.

A **signed consent form** is recommended when collecting specimens for SARS-CoV PCR or antibody testing. Information on the consent process for collection of respiratory specimens, blood or stool for RT-PCR testing is provided at: <http://www.cdc.gov/sars/index.html>. Information on the consent process for the collection of blood/serum for antibody testing is provided at: <http://www.cdc.gov/sars/lab/consent.html>.

All submissions to the BPHL should be accompanied by a Clinical Lab Submission Form: [http://www.doh.state.fl.us/lab/PDF\\_Files/DOH\\_Form\\_DH1847\\_1009\\_v12152010.pdf](http://www.doh.state.fl.us/lab/PDF_Files/DOH_Form_DH1847_1009_v12152010.pdf).

\*Further information about specimen collection is available at: <http://www.cdc.gov/sars/lab/specimen.html>.

## 5. CASE INVESTIGATION

Immediately interview the case, suspect or confirmed, and others who may be able to provide pertinent information. If conducting an in-person interview, personnel should take appropriate respiratory and contact precautions.

### A. Evaluate the diagnosis

Review the clinical presentation, paying special attention to the epidemiologic criteria for exposure as well as the exclusion criteria. Facilitate the transport of specimens to the BPHL for confirmatory testing.

### B. Identify potential sources of infection

Treat any patient with a case of suspected SARS-CoV disease as potentially infectious and isolate immediately. Personnel should take appropriate respiratory and contact precautions when conducting interviews.

Ask about potential sources of transmission in the exposure period, including:

- Travel to foreign or domestic areas where SARS-CoV disease is active and/or is known to be transmitted.
- Close contact with a confirmed case of SARS-CoV disease, or
- Close contact with a person with mild-to-moderate or severe respiratory illness and with history of travel in the ten days before onset of symptoms to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV disease.

### C. Intentional exposure/outbreak, identify potentially exposed persons

Once the likely venue of exposure has been established, determine if there are close contacts that may have been exposed. If so, they should be vigilant in observing for the development of fever or respiratory symptoms in the ten days following exposure. If fever or symptoms occur, they should contact their healthcare provider immediately, and also notify them before arrival to any healthcare facility so appropriate precautions can be taken to



prevent transmission to others. If symptoms developed while at work, school, or other community settings, public health officials should assess the need for education and follow-up of others in the area.

## **6. CONTROLLING FURTHER SPREAD**

### **A. Infection control / case management**

As soon as a diagnosis of suspected SARS-CoV disease is made, the patient should be placed in isolation. Hospitalized patients with SARS-CoV disease should be cared for using standard contact and respiratory precautions.

### **B. Contact management**

Contacts should be evaluated for development of fever and respiratory symptoms to contain development of additional cases. Educate potentially exposed persons who develop symptoms within ten days of exposure to obtain immediate medical evaluation and to minimize contact with other people until evaluated.

### **C. Prophylaxis**

There is neither a vaccine nor effective antiviral chemotherapy available for SARS-CoV disease. Therefore, prophylaxis is not warranted at this time.

### **D. Environmental decontamination**

Preliminary studies in some research laboratories suggest that the virus may survive in the environment for several days. Cleaning and disinfection of environmental surfaces are important components of routine infection control in healthcare facilities. Although little is known about the extent of environmental contamination in SARS-CoV disease patients' rooms, epidemiologic and laboratory evidence suggests that the environment could play a role in transmission. Therefore, cleaning and disinfection are critical to the control of SARS-CoV disease transmission. Environmental cleaning and disinfection for SARS-CoV disease follows the same principles generally used in healthcare settings.

### **E. Community containment measures**

In the event of an outbreak, community containment measures may be followed. Additional information is available at: <http://www.cdc.gov/sars/quarantine/index.html>.

## **7. MANAGING SPECIAL SITUATIONS**

### **A. Response in the event of a domestic or foreign outbreak with significant person-to-person transmission**

In the event of an outbreak with significant person-to-person transmission that can spread SARS-CoV disease in the U.S., public health authorities will evaluate the necessity of implementing quarantine and isolation measures to curtail disease spread.

## 8. ROUTINE PREVENTION

### A. Vaccine recommendations

There is no vaccine to prevent SARS-CoV disease.

### B. Prevention recommendations

Follow any travel precautions/advisories to countries where disease may be active or suspected. Practice good respiratory hygiene and cough etiquette and hand hygiene.

## 9. REFERENCES

- A. Centers for Disease Control and Prevention, <http://www.cdc.gov/sars/index.html> accessed on October 4, 2012.
- B. Review of Bats and SARS. EID, 2006; 12(12):1834-1840.
- C. Outbreak of Severe Acute Respiratory Syndrome-Worldwide, 2003. JAMA. 2003; 289(14):1775-1776.doi:10.1001/jama.289.14.1775.  
<http://jama.jamanetwork.com/article.aspx?articleid=196358%20>