



Severe Acute Respiratory Syndrome (SARS) Investigation Guideline

This guideline simply outlines information about the disease management and investigation of SARS. If you suspect that you are dealing with a SARS situation, immediately contact the local Health Officer, on-call epidemiologist and the Kansas Department of Health and Environment (KDHE) by phone at 1-877-427-7317.

During an outbreak or re-emergence of SARS – additional information may become available. The investigator is urged to review the most up-to-date information on the CDC’s SARS website at www.cdc.gov/sars/guidance/index.html.

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Revision History:

Date	Replaced	Comments
05/2018	06/2012	
06/2012	08/2010	Notification section: added additional information on reporting to CDC. Updated web links. Updated incubation period. Removed references to KS-EDSS (02/2012).

Severe Acute Respiratory Syndrome (SARS) Disease Management and Investigation Guidelines

CASE DEFINITION (CDC 2003)

Clinical Description for Public Health Surveillance:

Early Illness:

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

* A measured documented temperature is expected. Clinical judgment may allow a small proportion of patients without a documented fever to meet this criterion, based on such factors as a patient's self-report of fever, the use of antipyretics, presence of immunocompromising conditions or therapies, lack of access to health care, or inability to obtain a measurement.

Laboratory Criteria:

The following are 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), 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 test validated by CDC and with subsequent confirmation in a reference laboratory

Note: As tests to detect SARS-CoV are being refined and their performance characteristics assessed, criteria for SARS-CoV laboratory diagnosis are changing. Information about the current criteria for laboratory diagnosis is available at <https://www.cdc.gov/sars/lab/index.html>.

Epidemiologic Criteria:

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

Likely exposure:

- Close contact with a person with confirmed SARS-CoV disease, OR
- Close contact with a person with mild-to-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

Possible exposure:

- 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 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.

Note: Information on CDC travel alerts and advisories to determine appropriate dates of possible exposure are available at www.cdc.gov/sars/travel/index.html. Types of locations will vary (e.g., country, airport, city, building, or floor). Transit through a foreign airport meets the epidemiologic criteria for possible exposure in a location for which a CDC travel advisory is in effect.

Case Classification:

Confirmed: clinically compatible illness (i.e., early, mild-to-moderate, or severe) that is laboratory confirmed.

Probable: meets the clinical criteria for severe respiratory illness and the epidemiologic criteria for likely exposure to SARS-CoV.

Suspected – SARS Report Under Investigation (RUI): 4 different levels.

Suspected reports in persons from areas where SARS is not known to be active:

- **SARS RUI-1:** Cases 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

Suspected reports in persons from areas where SARS activity is occurring:

- **SARS RUI-2:** Cases meeting the clinical criteria for mild-to-moderate illness and the epidemiologic criteria for possible exposure
- **SARS RUI-3:** Cases meeting the clinical criteria for severe illness and the epidemiologic criteria for possible exposure
- **SARS RUI-4:** Cases meeting the clinical criteria for early or mild-to-moderate illness and the epidemiologic criteria for likely exposure to SARS-CoV

§§ Consensus guidance is in development on which groups are most likely to be affected first by SARS-CoV if it reemerges. SARS-CoV disease should be considered at a minimum in the differential diagnosis of 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 exposure (e.g., health care worker with direct patient contact and worker in a laboratory that contains live SARS-CoV), OR
- Part of a cluster of cases of atypical pneumonia without an alternative diagnosis.

Exclusion Criteria

A probable or any SARS RUI case may be excluded, if any of the following apply:

- An alternative diagnosis can explain the illness fully**, OR
- Antibody to SARS-CoV is undetectable in a serum specimen obtained >28 days after onset of illness††, OR
- The case was reported on the basis of contact with a person who was excluded subsequently as a case of SARS-CoV disease and the case has no other epidemiologic or laboratory criteria are not present.

** When assigning alternate diagnoses consider 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 with the alternative diagnosis.

†† Current data indicate that >95% of patients with SARS-CoV disease mount an antibody response. However, health officials may choose not to exclude a case on the basis of lack of a serologic response if reasonable concern exists that an antibody response could not be mounted.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

The following situations require a report to the Kansas disease reporting hotline (877-427-7317) within 4 hours:

- Any SARS case.
- Any illness that has NO identifiable cause of clinical or autopsy findings AND meets any of the following criteria:
 - A person with a positive diagnostic test specific for SARS-CoV
 - A person whose healthcare record contains a diagnosis of SARS.
 - A person whose death certificate lists SARS as a cause of death or a significant condition contributing to death.
 - A person requiring hospitalization for radiographically confirmed pneumonia or acute respiratory distress syndrome (i.e., severe illness criteria) AND who either
 - (1) Traveled 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
 - (2) Worked in an occupation associated with a risk for SARS-CoV exposure (e.g., health-care worker with direct patient contact and worker in a laboratory that contains live SARS-CoV), or
 - (3) Part of a cluster (2 or more persons) of atypical pneumonia without an alternative diagnosis
- Any illness that has NO identifiable cause of clinical or autopsy findings AND meets any of the following criteria during periods of known person-to-person SARS-CoV transmission:
 - A person who meets the clinical criteria for mild-to-moderate or severe illness AND who either
 - (1) Traveled to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV within 10 days before onset of symptoms, or
 - (2) Had close contact with a person with mild-to-moderate or severe respiratory illness and 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
 - A person who meets the clinical criteria for early, mild-to-moderate, or severe illness AND who had either
 - (1) Close contact with a person with confirmed SARS-CoV disease, or
 - (2) Close contact with a person with mild-to-moderate or severe respiratory illness and 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

Remember: Information on CDC travel alerts and advisories to determine appropriate dates of possible exposure are available at www.cdc.gov/sars/travel/index.html. Types of locations will vary (e.g., country, airport, city, building, or floor). Transit through a foreign airport meets the epidemiologic criteria for possible exposure in a location for which a CDC travel advisory is in effect.

All confirmed or **suspected** SARS cases shall be reported within **4 hours by phone**:

1. Health care providers and hospitals: report to the local public health jurisdiction or KDHE-BEPHI (see below)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)
4. KDHE-BEPHI will contact the local public health jurisdiction by phone within one hour of receiving any suspected report.

**Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)
Phone: 1-877-427-7317**

Further responsibilities of state and local health departments to the CDC:

*As a nationally notifiable condition, **all SARS cases prior to classification** require a **IMMEDIATELY NOTIFIABLE, URGENT** report to the Center of Disease Control and Prevention (CDC).*

- 1) KDHE epidemiologist will call the CDC EOC at 770-488-7100 within 4 hours of receiving a report of a case.
- 2) **Local public health jurisdiction** will report information requested on the disease reporting forms as soon as possible.
- 3) KDHE-BEPHI will file an electronic case notification to CDC by the next business day.

LABORATORY ANALYSIS:

Notify KDHE Bureau of Epidemiology and Public Health Informatics (BEPHI) immediately at 1-877-427-7317 when SARS is being considered as part of a differential diagnosis of a hospitalized patient with radiographically confirmed pneumonia or acute respiratory disease associated to possible SARS risk factors. KDHE will assist in evaluating cases and contact CDC at 770-488-7100.

Criteria for Testing at KHEL

During periods of absence of person-to-person SARS-CoV transmission, surveillance efforts and laboratory resources are aimed to identify patients who require hospitalization for radiographically confirmed pneumonia or acute respiratory distress syndrome without identifiable etiology AND who have one of the following risk factors in 10 days before illness onset:

- (1) Traveled 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,
- (2) Worked in an occupation associated with a risk for SARS-CoV exposure, or
- (3) Part of a cluster of cases of atypical pneumonia without an alternative diagnosis.

During periods of known SARS-CoV transmission, surveillance efforts will also include the confirmation of SARS in patients with fever or lower respiratory illness* who have one of the following SARS risk factor within 10 days of illness onset:

- (1) Travel to a foreign or domestic location with ongoing transmission of SARS-CoV infection, or
- (2) Close contact with a person with known or suspected SARS-CoV disease

*** The testing of persons who have potentially been exposed to SARS patients and who are well will only occur as part of formal research studies.**

Prioritizing specimens: As demand for confirmatory testing at KHEL increases, specimen testing will be prioritized based on the surveillance objectives in the most current CDC guidance.

Testing Methods

CDC has developed and validated an enzyme immunoassay (EIA) for detection of serum antibody to SARS-CoV and a reverse transcription-polymerase chain reaction (RT-PCR) assay for detection of SARS-CoV RNA. The EIA has been distributed to most state public health laboratories, and the RT-PCR has been distributed to most laboratories in the Laboratory Response Network (LRN).

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. Most patients in the early disease stages 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. The likelihood of detecting infection is increased if multiple specimens (e.g., stool, serum, respiratory tract specimens) are collected at several times during the course of illness.

Other tests for detection of SARS-CoV, include immunofluorescence assay (IFA) for SARS-CoV antibody, SARS-CoV isolation studies, electron microscopic studies, and immunohistologic or in situ hybridization studies on tissue specimens.

- Cell culture, electron microscopy, and histologic studies are less frequently used and less sensitive than RT-PCR.
- Cell culture for SARS-CoV should be done only in a BSL-3 laboratory using BSL-3 procedures.

Detection of SARS-CoV antibody (i.e., EIA, IFA):

- The most reliable indicator of infection.
- Since previous infection is still rare in most populations, seroconversion is not needed to diagnose infection. The presence of SARS-CoV antibody in someone without a previous history of SARS is indicative of recent infection.
- A negative serologic test can rule out SARS-CoV infection if the serum specimen is collected >28 days after onset of illness.
- Patients with a negative antibody test result whose specimens were obtained \leq 28 days before illness onset should have another serum specimen collected >28 days after onset of symptoms.

RT-PCR for SARS-CoV RNA:

- Very sensitive and specific assay when performed appropriately.
- There is concern of false-positives; therefore a second specimen is required to be confirmed positive to decrease the chance of misclassifying a patient due to a false-positive result.
- Can detect SARS-CoV RNA in serum, stool, upper and lower respiratory specimens, various tissues, and occasionally urine specimens.

SARS-CoV test confirmation:

- Positive antibody and RT-PCR test results should be confirmed by repeat testing of the original specimen AND by testing of the same specimen in an independent laboratory using a validated assay.

Laboratory-confirmed specimen vs. laboratory-confirmed SARS-CoV disease:

- Distinction is made for PCR test results because of false-positive concerns.
- For serology, virus isolation, and histopathologic studies, if a specimen is confirmed positive, the patient is also considered to be confirmed positive.
- For PCR, a second specimen is required to be confirmed positive to decrease the chance of misclassifying a patient due to a false-positive result.

In all instances, laboratory results must be considered in the context of clinical and epidemiologic information on the patient.

Specimen Collection and Submission

(There has been no SARS since 2004; CDC website for SARs, including laboratory guidance, is available for historical purposes, but is no longer maintained or updated. The last posted guidance is outlined below, but new guidance may become available soon after SARS is again identified anywhere in the world.)

To submit specimens for testing, healthcare providers should follow these steps:

1. Consult state or local health department to determine if testing is indicated.
2. KDHE will consult with CDC for guidance and proper forms (for example, patient consent forms) for submitting specimens.
3. The recommendation at this time is to collect specimens for testing.
 - If possible, collect multiple specimens from different body sites and at different times during illness.

- Historical guidelines for specimen collection are in Table 1 and 2 below and in CDC Guidance at www.cdc.gov/sars/lab/index.html
4. Packaging and Shipping:
- Submit specimens, with a signed consent form and completed specimen submission form, to the Kansas Health and Environmental Lab (KHEL).
Kansas Department of Health and Environment
Health & Environmental Laboratories
ATTN: Virology Laboratory
6810 SE Dwight St.
Topeka, KS 66620
 - **IMPORTANT:** Refrigerate or freeze tubes after specimens are placed in them. If specimens will be examined within 48 hours after collection, they can be refrigerated. If specimens must be held longer than 48 hours, freeze them as soon as possible after collection. Although storage in an ultra-low freezer (-70°C) is preferable, storage in a home-type freezer (if properly set at -20°C) is acceptable for short periods.
 - Specimens from possible and known SARS cases must be packaged, shipped, and transported according to the current edition of the "International Air Transport Association (IATA) Dangerous Goods Regulations" at <http://www.iata.org/whatwedo/cargo/dgr/Pages/index.aspx> and US DOT 49 CFR Parts 171-180 at www.phmsa.dot.gov/hazmat/regs.
 - Step-by-step instructions on appropriate packaging and labeling are available at www.cdc.gov/sars/lab/specimen.html.
5. Specimens will be tested and reported. CDC guidance on interpreting these test results is provided at www.cdc.gov/sars/lab/testing.html.
- A positive RT-PCR test result for SARS-CoV is presumptive until confirmatory testing by a second reference laboratory is performed.
 - A negative test result for SARS-CoV may not rule out SARS-CoV disease and should not affect patient management or infection control.
6. Provide a patient information sheet/consent for long-term specimen storage to the patient along with the test results. Specimen remainders stored long term may be used for future investigations.
7. If a signed patient consent for long-term storage is obtained, fax it to KDHE-BEPHI at 1-877-427-7318.

Specimen, by source	Fatal	Inpatient	Outpatient¹
Stool (minimum 10 cc specimen)	✓	✓	✓
Blood			
Serum ² (serum separator tube)	✓	✓	✓
Blood (EDTA/purple top tube for plasma)	✓	✓	✓
Upper Respiratory			
Nasopharyngeal wash/aspirate	✓	✓	✓
Nasopharyngeal and oropharyngeal swabs	✓	✓	✓
Lower Respiratory			
Sputum ³		✓	✓
Bronchoalveolar lavage, tracheal aspirate, or pleural fluid tap ⁴	✓	✓	
Tissue			
Fixed tissue from all major organs (e.g. lung, heart, spleen, liver, brain, kidney, adrenals)	✓		
Frozen tissue from lung and upper airway (e.g. trachea, bronchus)	✓		

¹ Outpatient specimens will not be tested during the absence of person-to-person SARS-CoV transmission.

² Collect both acute and convalescent specimens >28 days post onset.

³ A sputum specimen is the preferred respiratory specimen if the patient has a productive cough.

⁴ Consider these specimen types if sputum is not available.

Specimen, by test type	<1 week after symptom onset	1-3 weeks after symptom onset	>3 weeks after symptom onset
RT-PCR¹ for viral RNA detection			
Sputum ²	√ ³	√√	√
Bronchoalveolar lavage, tracheal aspirate, or pleural fluid tap ⁴	√	√√	√
Nasopharyngeal wash/aspirate	√	√√	√
Nasopharyngeal and oropharyngeal swabs	√	√√	√
Serum (serum separator tube)	√√	√	not recommended
Blood (plasma) (EDTA/purple top tube)	√√	√	not recommended
Stool (minimum 10 cc specimen)	√	√√	√√
EIA¹ for antibody detection			
Serum ⁵ (serum separator tube)	√√	√√	√√

¹ Because of the investigational nature of both the SARS RT-PCR and the SARS EIA, it is recommended that the clinician obtain a signed informed consent form from the patient.

² A sputum specimen is preferred if the patient has a productive cough.

³ The more checks, the better the results from a particular specimen at a specific point in the illness.

⁴ Consider these specimen types if sputum is not available.

⁵ Also collect a convalescent specimen >28 days post onset.

EPIDEMIOLOGY

SARS is newly recognized respiratory illness that first appeared in southern China in November 2002. Within 9 months (Nov 02 – July 03) 8,098 cases worldwide were reported from 29 countries; of these, 774 died. All of the cases had a history of travel to countries where SARS was occurring or close contact to a confirmed case. In the United States, only 8 cases had laboratory evidence of infection with SARS-CoV. Since July 2003, when SARS-CoV transmission was declared contained, active global surveillance for SARS-CoV disease has detected no person-to-person transmission of SARS-CoV. No known cases of SARS have been reported anywhere in the world since 2004.

DISEASE OVERVIEW

A. Agent:

SARS-associated coronavirus or SARS-CoV.

B. Clinical Description:

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 typically do not begin 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 rhinorrhea 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.

C. Reservoirs:

Humans are only known reservoir; however, an animal reservoir is suspected.

D. Mode(s) of Transmission:

Usually transmitted from person to person by direct contact, by fomites, and by respiratory droplets. Caring for or living with an infected person, or having direct contact with respiratory secretions, body fluids and excretions of a case of SARS, are high-risk exposures in the absence of appropriate levels of infection control. In one recorded instance, the virus is thought to have been transmitted by some environmental vehicle, possibly aerosolized sewerage or transport of sewerage by mechanical vectors.

E. Incubation Period:

Range 2-10 days, mean 5 days

F. Period of Communicability:

Transmission does not occur before onset of clinical signs and symptoms, and that maximum period of communicability is less than 21 days. Consider case infectious until 10 days after fever resolution, provided respiratory symptoms are absent or improving

G. Susceptibility and Resistance:

Unknown but assumed to be universal

H. Treatment:

Supportive care. Antiviral treatments have not been shown to be effective

INVESTIGATOR RESPONSIBILITIES

With no SARS transmission anywhere in the world, public health agencies ensure:

- 1) Medical providers are aware of resources available on the CDC SARS Clinical Guidance web page (www.cdc.gov/sars/clinical/guidance.html), including:
 - Surveillance guidelines regarding timely recognition, evaluation, and reporting of possible SARS cases and clusters of unexplained pneumonia
 - [Algorithm for evaluation and management of patients requiring hospitalization for radiographically confirmed pneumonia](#), in the absence of person-to-person transmission of SARS-CoV in the world.
- 2) Appropriate infection control practices, including isolation measures, are implemented in facilities evaluating the risk of SARS in a patient.
 - Radiographically confirmed pneumonia (or acute respiratory distress syndrome) of unknown etiology with potential SARS risk factors: place on Droplet Precautions until it is determined the pneumonia is not contagious.
- 3) Immediate notification occurs to KDHE-BEPHI for any hospitalized patient with radiographically confirmed pneumonia associated to possible SARS risks.
- 4) Information is obtained to assess reported pneumonia cases and clusters for the likelihood of SARS-CoV. (The [SARS Screening Form](#) can be used.)
- 5) Records of persons who are hospitalized and at increased risk for SARS-CoV disease are obtained for review to ensure that:
 - Adequate testing is done to rule out other infectious cases of pneumonia
 - SARS-CoV testing is ordered only when appropriate
- 6) KDHE (with assistance, as needed, from CDC) is consulted about cases or clusters of special concern.

Based on the risk assessment and classification of the possible SARS-CoV case, the local health department investigator will work with KDHE to:

- 1) Assist in an epidemiological investigation.
 - Conduct a [contact investigation](#) to identify additional cases or contacts.
 - Conduct a [case investigation](#) to identify potential source of infection.
 - Conduct [outbreak and cluster investigations](#).
 - Conduct [surveillance](#) to identify additional cases and/or clusters.
- 2) Assist in formulating and implementing disease control and prevention activities ([Case Management](#) and [Contact Management](#)):
 - Identify and isolate SARS cases to prevent disease spread.
 - Identify, monitor, and, if needed, issue restrictions on contacts of cases, to prevent secondary cases.
 - Prioritize contact tracing activities based on exposure histories.

The local health department will also be involved in the implementation of additional measures in response to the SARS incident. These activities are covered in the Kansas Biological Incident Annex (BIA) and the local health department standard operating guides (SOGs), including community containment, mass dispensing, and risk communications.

The activities described below only outline the activities of a local investigator and KDHE during the investigation of initial cases of SARS in a community. Refer to the above mentioned resources (i.e., BIA, SOGs) for additional implementation

measures and responsibilities.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Case Investigation

State Health Officer will designate a state incident command system (ICS) position to coordinate the SARS case investigation activities. Coordination will occur with the local authority responsible for surveillance and reporting.

- 1) Laboratory testing will be coordinated, as described in [Laboratory Analysis](#).
- 2) The case's medical provider will be contacted to obtain the following information (including medical records for hospitalized patients).
 - Initial information collected on the [SARS Screening Form](#) will be faxed to 1-877-427-7318.
 - [CDC SARS Domestic Case Reporting Form](#) will be used to record and report information related to the suspected, probable or confirmed SARS-CoV case.
- 3) Safety concerns of field staff: Prior to initiating first face-to-face interview with a case, personnel should be trained and fit-tested in N-95 use to commensurate with the degree of patient contact. Gowns and gloves should be worn when there will be direct contact. PPE should be removed and bagged for disposal and proper hand hygiene performed.
- 4) Interview the case or proxy to identify potential contacts. Use:
 - [Form 2A: Case Travel/Activity Worksheet – Infectious Period](#) 
 - To determine primary residence and sites/locations visited; record household contacts and primary contacts for each site on Form 2B.
 - If travel/transportation use occurred since fever onset – use Form 2C.
 - [Form 2B: Primary Contact/Site Worksheet](#)  – to record listing of primary contact names or sites mentioned in case's daily activities (Form 2A)
 - First, list case's household contacts then list other primary case contacts
 - Use Form 2B to initiate [Form 2D](#)  for each contact.
 - [Form 2C: Contact Transportation Worksheet – Infectious Period](#)  – to record travel and transportation history since onset date of fever
 - If potential contacts are identified based on interviews, contact investigation will occur. (Refer to [Contact Investigation](#) section.)
- 5) Interview the case or proxy, to determine case's source of exposure:
 - [CDC SARS Domestic Case Reporting Form](#) – to record possible exposures to ill individuals and places. Forms below may assist with determining activities and locations on 10 days prior to illness onset
 - [Form 3A: Case Travel/ Activity Worksheet – Exposure](#) : to record case's activities during exposure period to identify possible sources
 - [Form 3B: Contact Listing – Exposure](#) : to record ill contacts and sites
- 6) [Form 3C: Case Transportation Worksheet – Exposure](#) : to record travel history for 10 days before date of onset of fever or symptoms.

Contact Investigation

State Health Officer will designate a state ICS position to coordinate contact investigation activities (i.e. contact tracing, interviewing, arranging for surveillance of contacts.) Coordination will occur with the local authority responsible for contact investigation to accomplish the following.

- 1) Contact tracing teams will be formed consisting of individuals trained in contact tracing, surveillance and follow-up who have field experience. Supervisors are assigned, as needed, if multiple tracing teams are involved.
- 2) Based on case's activities, it may be necessary to interview additional individuals who have knowledge of the case-patient's activities in certain locations (i.e., workplace representative; social contact)
 - Fill out a [Form 2B](#) for each location (i.e. workplace; "hang-out")
- 3) Review of primary contact lists ([Form 2B](#)) to identify close contacts.
 - **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.
 - Close contact includes kissing, embracing, sharing eating or drinking utensils, close (< 3 feet) conversation, physical examination, and other direct physical contact between persons. It does not include walking by a person or sitting across a waiting room or office for a brief time.
- 4) Prioritize contacts based on the risk of possible disease transmission using:
 - Probability of SARS disease in index case (i.e., confirmed and probable of highest priority)
 - Duration and spatial proximity of contacts exposure to a case
 - Type of exposure known to be of higher transmission risk (i.e., patient care, aerosol-generating activity, intimate contact)
- 5) Locate and interview close contacts, starting with those of highest priority
 - Fill out [Form 2D](#) for all close contacts requiring contact tracing.
 - Use a variety of resources to trace contacts (work and school contact numbers, telephone directories, voting lists, neighborhood interview, and site visits). If still unable to find, may need to resort to use of media outlets.
 - When interviewing a contact:
 - Confirm exposure to the SARS case
 - Document presence or absence of fever or lower respiratory symptoms
 - Identify additional contacts
 - Arrange for follow-up as described in [Contact Management](#)
- 6) Contact tracing activities continue throughout an outbreak even if widespread throughout the community, but after a review of available resources state authorities may decide to adopt different levels of contact follow-up and monitoring activities for different categories of contacts.
 - Contact-related activities may be limited to highest priority group(s)
 - Household contacts and exposed health care workers should always be identified and monitored.

Isolation, Work and Daycare Restrictions

K.A.R 28-1-6 for Severe acute respiratory syndrome-associated coronavirus (SARS-CoV):

Control of Cases

- For each person hospitalized with a case, droplet precautions and contact precautions shall be followed for the duration of the acute illness plus 10 days following resolution of fever. Airborne precautions are preferred.
- Each person with a case shall remain in home isolation for the duration of the acute illness plus 10 days following resolution of fever, except when seeking medical care.

- 1) When SARS transmission is detected anywhere in world, decisions on isolation and restrictions will be based on location and extent of community outbreaks.
 - The State Health Officer will evaluate the event with partner organizations and make recommendations on quarantine, shelter-in-place, isolation or other public health measures. A state ICS position will be designated to coordinate activities related to isolation/quarantine.
 - CDC provided “Threshold Determinants for the Use of Community Containment Measures” will be used to make decisions at www.cdc.gov/sars/guidance/D-quarantine/index.html
- 2) SARS isolation measures (overview):
 - Admit SARS patients to a healthcare facility only if clinically indicated or if isolation at home or a community facility cannot be achieved safely
 - Refer to Guidelines for Evaluating Homes and Facilities for Isolation and Quarantine at www.cdc.gov/sars/guidance/D-quarantine/index.html
 - Hospitalization: If SARS is strongly suspected: place the patient on Contact and Airborne Infection Isolation Precautions, in addition to Standard Precautions (See www.cdc.gov/sars/guidance/I-infection/index.html)
 - Home isolation: attempt to relocate household members not providing care or limit their contact with the SARS patient. Those at risk of serious SARS complications should not have any contact with the patient.
 - Isolation duration: the period of infectivity (10 days after the resolution of fever, provided respiratory symptoms are absent or improving).
 - Discontinue based on an alternative diagnosis only after consultation with public health authorities and evaluating clinician when the following are met:
 - Absence of strong epidemiologic link to known SARS-CoV cases
 - Alternative diagnosis confirmed using a test with a high positive-predictive value
 - Clinical manifestations entirely explained by the alternative diagnosis
 - No evidence of clustering of pneumonia cases among close contacts (unless >1 case in cluster is confirmed to same alternative diagnosis)
 - All cases of presumed SARS-CoV disease identified in the surrounding community can be epidemiologically linked to known cases or locations in which transmission is known to have occurred.

- 3) Quarantine of contacts:
 - Not usually necessary in a limited SARS outbreak, but during a large outbreak or in high-risk situation (i.e., transmission from a particular case has been demonstrated) consider the restriction of high-risk contacts
 - Types of quarantine: home, designated facility, and working.
 - A contact's household members do not need to be restricted unless the contact becomes symptomatic
 - Refer to KS Community containment toolbox and the [CDC Supplement D: Community Containment Measures](#) for further descriptions.
 - Refer to managing special situation for exposed healthcare workers.
 - SARS quarantine duration is 10 days from the time of last exposure.

Case Management

- 1) Institute isolation measures as recommended by the State Health Officer and as directed in local/state plans (i.e., BIA, Community Containment SOGs) and CDC SARS guidance [Supplement C: Preparedness and Response in Healthcare Facilities](#) and [Supplement I: Infection Control in Healthcare, Home, and Community Settings](#).
 - Ensure adequate isolation measures are in place.
 - Ensure proper care and resources are available to those in isolation.
- 2) Coordinate activities related to isolation and care.
 - Work with medical providers to track patients in isolation.
 - Notify medical providers of additional suspect cases who may need medical treatment.
- 3) Submit updated information for the [CDC SARS Domestic Case Reporting Form](#), as needed
 - Report on any changes in patient status (i.e., discharge, death).
 - Any information, lab results, or symptoms that would result in a reclassification of the case.

Contact Management

- 1) Institute quarantine measures as recommended by the State Health Officer and as directed in local/state plans (i.e., BIA, Community Containment SOGs).
 - Ensure adequate quarantine measures are in place.
 - Ensure proper care and resources are available to those in quarantine.
- 2) Monitor and evaluate close contacts.
 - Provide [Form 2E: Case Household and Primary Contact Surveillance](#) to each household and other close contact to provide a diary to record information about themselves, daily temperature, and onset of other symptoms.
 - Close contacts should be vigilant for fever (i.e., measure twice daily), respiratory symptoms, and other symptoms of early SARS-CoV disease, such as chills, rigors, myalgia, headache, or diarrhea
 - If symptoms develop, the local health department should be contacted to arrange for immediate medical evaluation and follow-up

- Before visiting any healthcare facility for evaluation, the healthcare provider should be notified in advance about possible exposure to SARS-CoV
- 3) Outcomes of monitoring
- Monitoring can be passive or active based on the situation and available resources.
 - The period of monitoring ends on day 10 after day 0 which is a contact's date of last exposure to an infectious case
 - Any contact that develops symptoms will be evaluated and an appropriate case classification and investigation applied, as needed.
- 1) The household members and close contacts of the symptomatic primary contact will need to be managed appropriately.

Environmental Measures

Although little is known about the extent of environmental contamination in SARS 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 transmission. Environmental cleaning and disinfection for SARS-CoV follows the same principles generally used in healthcare settings.

Medical waste has not been implicated in the transmission of SARS-CoV. Therefore, no special handling procedures are recommended for SARS-CoV-contaminated medical waste.

- 1) Contain and dispose of SARS-CoV-contaminated medical waste in accordance with facility-specific procedures and/or local or state regulations for handling and disposal of medical waste, including used needles and other sharps.
- 2) Discard as routine waste used patient-care supplies that are not likely to be contaminated (e.g., paper wrappers).
- 3) Wear disposable gloves when handling waste. Perform hand hygiene after removal of gloves.

Contact with textiles has not been implicated in the transmission of SARS-CoV. Therefore, no special handling procedures are recommended for linen and laundry that may be contaminated with SARS-CoV.

- 4) Store clean linen outside patient rooms, taking into the room only linen needed for use during the shift.
- 5) Place soiled linen directly into a laundry bag in the patient's room. Contain linen in a manner that prevents the linen bag from opening or bursting during transport and while in the soiled linen holding area
- 6) Wear gloves and gown when directly handling soiled linen and laundry (e.g., bedding, towels, personal clothing) as per Standard and Contact Precautions. Do not shake or otherwise handle soiled linen and laundry in a manner that might aerosolize infectious particles.
- 7) Wear gloves for transporting bagged linen and laundry.
- 8) Perform hand hygiene after removing gloves that have been in contact with soiled linen and laundry.
- 9) Wash and dry linen according to routine standards and procedures.

- Refer to CDC guidance at www.cdc.gov/sars/guidance/I-infection/index.html

Education

Refer to on-line resources and local plans (i.e., risk communication SOG).

- CDC Basic SARS Information: www.cdc.gov/sars/guidance/index.html
- CDC's Guide G – Communication and Education:
www.cdc.gov/sars/guidance/G-education/index.html

MANAGING SPECIAL SITUATIONS

A. Investigation of pneumonia clusters or respiratory outbreaks:

- In outbreaks, cases are clustered in time and place among groups that share a common air space. Notify KDHE immediately, 877-427-7317.
 - Active case finding will be an important part of any investigation.
 - Recommendations will be made based on information collected.
- 1) Start to collect information: Respiratory Outbreak Survey at www.bt.cdc.gov/urdo/pdf/RespiratoryOutbreakSurvey.pdf
 - 2) Compile available data
 - Develop case definition - defining population at risk. Refer to www.bt.cdc.gov/urdo/pdf/CaseDefinitions.pdf)
 - Complete line list. (Refer to www.bt.cdc.gov/urdo/pdf/LineListTemplate.pdf) (modifications may occur based on initial information)
 - Generate an epi-curve. (Refer to www.bt.cdc.gov/urdo/epicurve.asp)
 - Collect and store available clinical and pathologic specimens. (Refer to www.bt.cdc.gov/urdo/specimen.asp)
 - Consider using data collection forms to collect information relevant to identifying etiologies of respiratory outbreaks. (Sample forms at www.bt.cdc.gov/urdo/sampleforms.asp.)
 - List current control measures implemented to date, if any
 - 3) Develop public health response to outbreak. Consider:
 - Number of cases and severity of disease
 - Need and potential for interventions (e.g., cohorting, quarantine, vaccination, use of prophylaxis, elimination of a potential source of disease)
 - Likelihood of natural versus intentional source of infection
 - Level of public health, provider or community concern
 - 4) Recommended reporting and response
 - Notify appropriate local and state public health officials
 - KDHE at 1-877-427-7317
 - Discuss with staff in your program (e.g., laboratory, epidemiology, environmental and veterinary and other personnel as appropriate)
 - Notify CDC about clusters of special concern
 - 5) Consider increased likelihood of SARS-CoV disease;
 - Illness onset dates grouped within a 10-day period.
 - Ill travelers who had contact with healthcare settings or persons hospitalized for unexplained respiratory infection while abroad within 10 days of onset
 - Clusters of pneumonia among any group of persons for whom alternative diagnoses have been reliably excluded or clusters in which one case is linked to travel to a previously affected area or ill healthcare worker.

B. Surveillance of SARS

Along with the [required notification processes](#), additional surveillance activities will be based on the extent of transmission in the world and Kansas, available resources and guidance from CDC ([Supplement B: SARS Surveillance](#)).

C. Surveillance and Monitoring of Healthcare Workers

- 1) Establish a process to identify personnel who enter the rooms or units where SARS patients are provided cared.
- 2) Instruct personnel who have unprotected contact with patients with SARS-CoV disease or who have early symptoms of SARS-CoV disease to immediately notify occupational health, infection control, or a designee.
- 3) Develop a system to identify healthcare personnel who provided care to a patient who was later identified as having SARS-CoV disease.
- 4) Clinical judgment should be used in deciding when a worker has been exposed and needs follow-up monitoring.
 - **An unprotected high-risk exposure** occurs when a healthcare worker is in a room with a SARS patient during an aerosol-generating procedure or event and the recommended infection control precautions are either absent or breached.
 - **Unprotected exposures that are not high risk** occur when a healthcare worker is in a room or patient-care area with a SARS patient (not during a high-risk procedure) and the recommended infection control precautions are either absent or breached.
- 5) **Asymptomatic worker with unprotected high-risk exposures**
 - Excluded from duty (e.g., administrative leave) for 10 days after the date of the last high-risk exposure.
 - Vigilant for the development of fever and/or respiratory symptoms.
 - Actively monitored for the development of fever and/or respiratory symptoms for 10 days after the date of the last high-risk exposure.
 - Activities restricted (e.g., quarantine home/work restrictions) outside the facility based on discussions with the health department, in accordance with the recommendations in [Isolation, Work and Daycare Restrictions](#).
- 6) **Asymptomatic worker with unprotected exposures but not high risk**
 - Need not be excluded from duty.
 - Vigilant for the development of fever and/or respiratory symptoms (i.e., measure and record body temperature twice daily for 10 days following the date of last unprotected exposure, and immediately notify the healthcare facility if symptoms develop.)
 - Actively monitored for the development of fever and lower respiratory symptoms before reporting to duty.
 - Decisions regarding activity restrictions, outside the facility based on discussions with the health department, in accordance with the recommendations in [Isolation, Work and Daycare Restrictions](#).
- 7) **Surveillance of asymptomatic workers who have cared for SARS patient(s) but have no known unprotected exposures**
 - Instruct to be vigilant for the development of fever and/or respiratory symptoms, measure and record body temperature twice daily

throughout the 10-day period following the date of last protected contact with a SARS patient, and immediately notify the healthcare facility if symptoms develop.

- Implement active follow-up surveillance of these workers for 10 days following the last protected exposure.
- Decisions regarding activity restrictions, outside the facility based on discussions with the health department, in accordance with the recommendations in [Isolation, Work and Daycare Restrictions](#).

8) Management of symptomatic healthcare workers

- Immediately contact infection control, occupational health or designee in each facility where s/he works; and
- Report to the predetermined location for clinical evaluation.
- Any healthcare worker who develops symptoms or fever while at work should immediately put on a surgical mask and notify the appropriate facility contact and then report to the designated location for clinical evaluation.

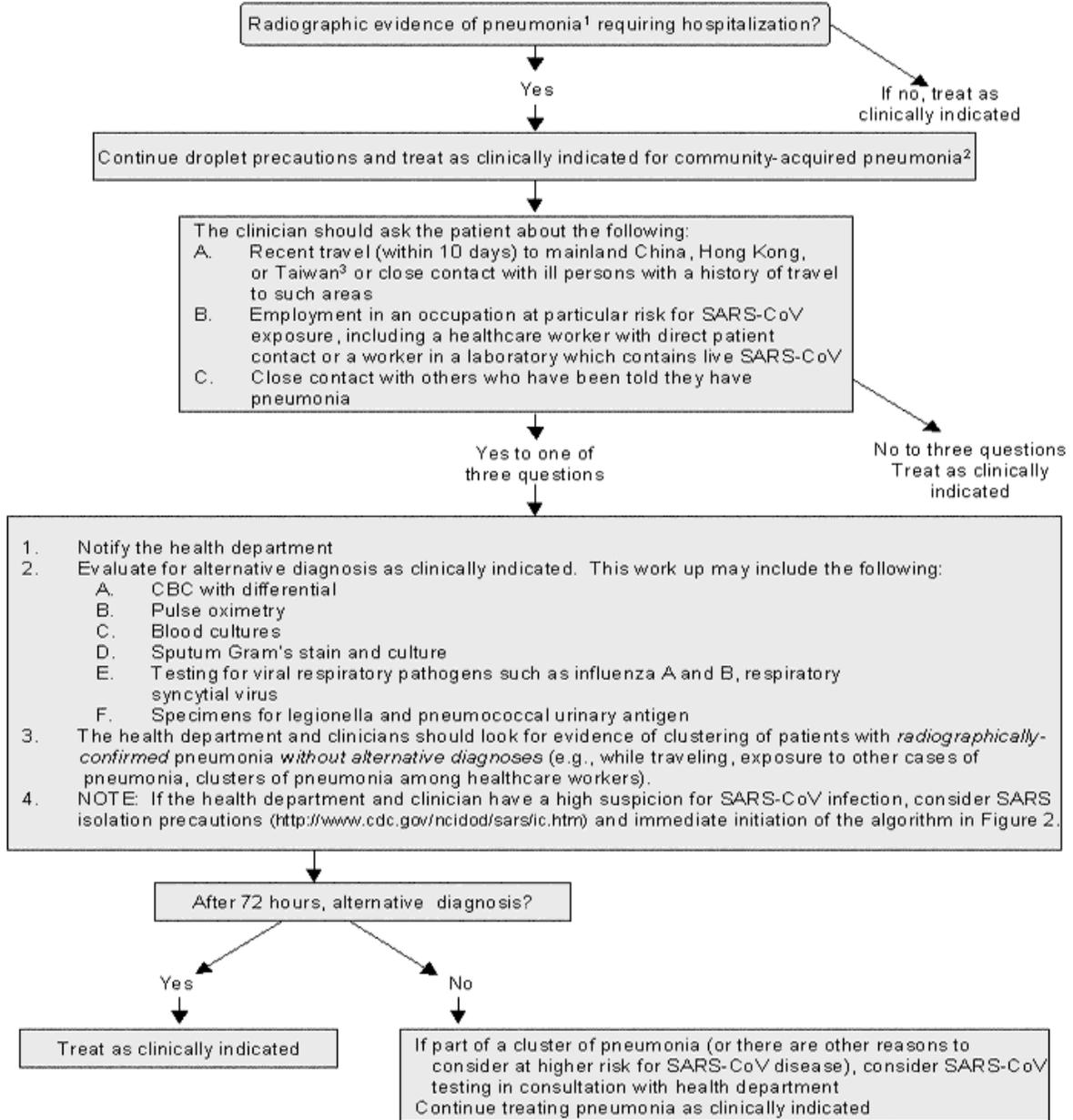
DATA MANAGEMENT AND REPORTING TO THE KDHE

- A. Organize, collect and report data utilizing the appropriate forms.
- B. Report data as directed by the KDHE-BEPHI, include:
- [CDC SARS Domestic Case Reporting Form](#) for all SARS cases (with at least minimal data completed); update as needed
 - EpiTrax case will be created for every form received
 - Form 2B primary contact listing(s)
 - Form 2E for all close contacts or at least the information on disposition and/or diagnosis: update, as needed.

Forms	
Form Number and Name	Purpose
SARS Screening Form – No SARS transmission	To assist with screening of suspect SARS patients when there is no SARS transmission noted anywhere in the world.
CDC SARS Domestic Case Reporting Form	Summarizes clinical and epi information about case patient. Report form for SARS-CoV RUI, probable, and confirmed cases.
Form 2A: Case Travel/Activity Worksheet – Infectious Period	Records case activities during infectious period, to help with identifying exposed contacts.
Form 2B: Primary Contact/Site Worksheet	Lists contacts to case patient and prioritizes by risk.
Form 2C: Case Transportation Worksheet – Infectious Period	Documents case patient travel history and modes of transportation, to identify possible exposed contacts.
Form 2D: Contact Tracing	Documents actions and referrals for clinical evaluation for each identified close contact.
Form 2E: Case Household and Primary Contact Surveillance	Documents surveillance of primary contacts for fever and symptoms.
Form 3A: Case Travel/Activity Worksheet – Exposure Period	Helps identify possible sources of exposure (travel or movement during exposure period)
Form 3B: Case Contact Listing – Exposure Period	List contacts that could have been case's source of exposure.
Form 3C: Case Transportation Worksheet – Exposure Period	Used to record the travel history of the case for up to 10 days before his/her date of onset of symptoms.

Algorithm in Absence of Person-to-Person Transmission

Figure 1. Algorithm for evaluation and management of patients requiring hospitalization for radiographically confirmed pneumonia, in the absence of person-to-person transmission of SARS-CoV in the world



Footnotes to Figure

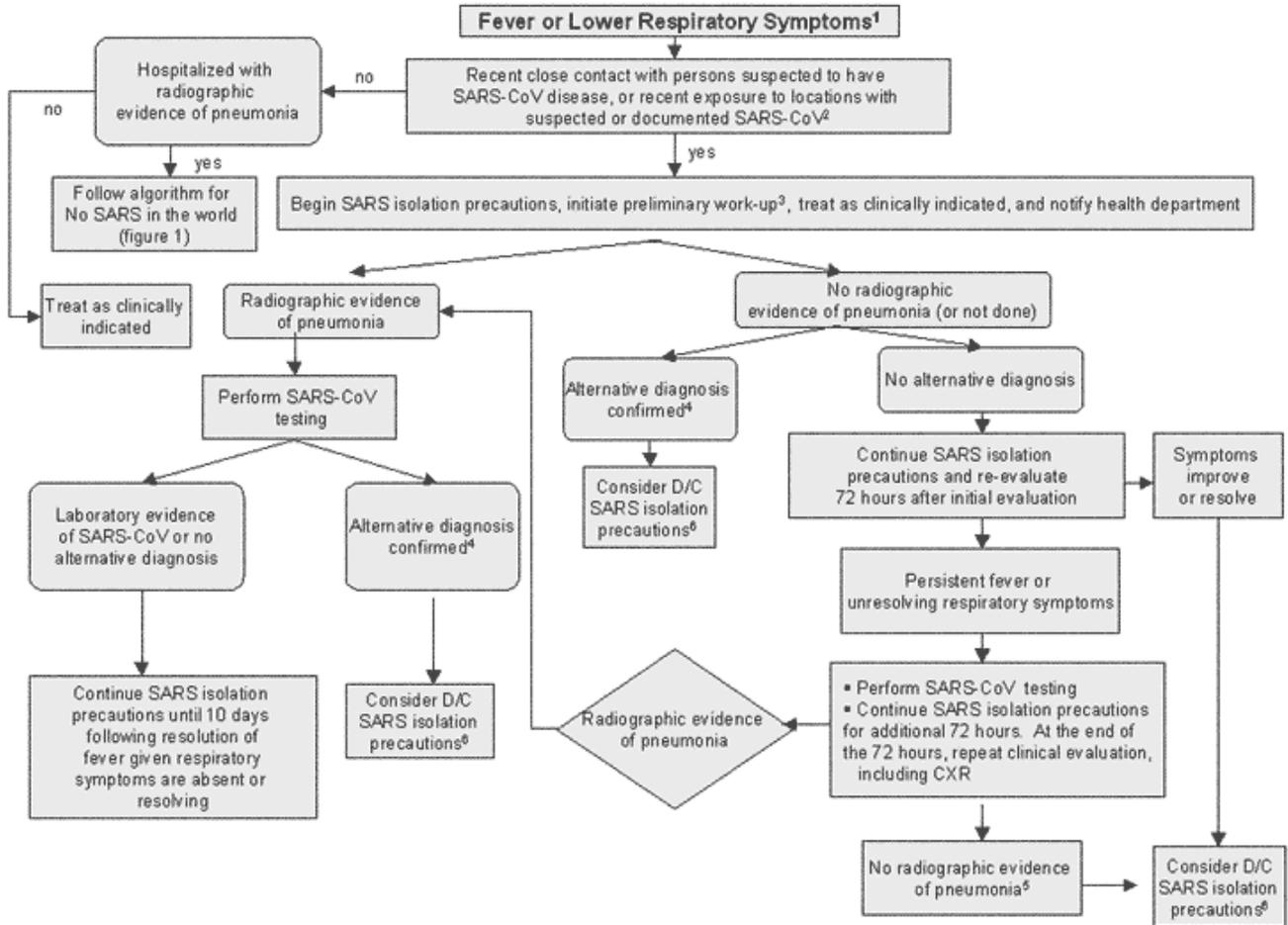
¹ Or acute respiratory distress syndrome (ARDS) of unknown etiology

² Guidance for the management of community-acquired pneumonia is available from the [Infectious Diseases Society of America \(IDSA\)](#).

³ The 2003 SARS-CoV outbreak likely originated in mainland China, and neighboring areas such as Taiwan and Hong Kong are thought to be at higher risk due to the high volume of travelers from mainland China. Although less likely, SARS-CoV may also reappear from other previously affected areas. Therefore, clinicians should obtain a complete travel history and contact the health department if they have concerns about the possibility of SARS-CoV disease in a patient with a history of travel.

Algorithm with Person-to-Person Transmission

Figure 2: Algorithm for management of fever or respiratory symptoms when SARS-CoV person-to-person transmission is occurring in the world



FOOTNOTES FOR FIGURE 2:

¹**Clinical description of SARS-CoV disease and approach to treatment:** Clinical judgment should be used to determine when symptoms trigger initiation of the algorithm in Figure 2. The early symptoms of SARS-CoV disease usually include fever, chills, rigors, myalgia, and headache. In some patients, myalgia and headache may precede the onset of fever by 12-24 hours. Respiratory symptoms often do not appear until 2-7 days after the onset of illness and most often include shortness of breath and/or dry cough. Diarrhea, sore throat, and rhinorrhea may also be early symptoms of SARS-CoV disease.

In the absence of fever, when screening patients for potential SARS-CoV disease, respiratory symptoms that would trigger the clinical algorithm are generally defined as lower respiratory tract symptoms (e.g., cough, shortness of breath, difficulty breathing). However, when screening patients who have a high risk of exposure to SARS-CoV (e.g., persons previously identified through contact tracing or self-identified as close contacts of a laboratory-confirmed case of SARS-CoV disease; persons who are epidemiologically linked to a laboratory-confirmed case of SARS-CoV disease), symptoms that should trigger the clinical algorithm should be expanded to include any of the following: sore throat, rhinorrhea, chills, rigors, myalgia, headache, diarrhea. Although not diagnostic, the following laboratory abnormalities have been seen in some patients with laboratory-confirmed SARS-CoV disease:

- Lymphopenia with normal or low white blood cell count
- Elevated hepatic transaminases

- Elevated creatine phosphokinase
- Elevated lactate dehydrogenase
- Elevated C-reactive protein
- Prolonged activated partial thromboplastin time

As of 1 December 2003, no specific treatment recommendations can be made for management of SARS-CoV disease. Empiric therapy for community-acquired pneumonia should include treatment for organisms associated with any community-acquired pneumonia of unclear etiology, including agents with activity against both typical and atypical respiratory pathogens. Treatment choices may be influenced by both the severity of and the circumstances surrounding the illness. Infectious disease consultation is recommended. The Infectious Diseases Society of America has guidelines for the management of community-acquired pneumonia. [These guidelines can be found at online.](#)

²Exposure history for SARS-CoV, once SARS-CoV transmission is documented in the world: *In settings of no or limited local secondary transmission of SARS-CoV,* patients are considered exposed to SARS if, within 10 days of symptom onset, the patient has:

- Close contact with someone suspected of having SARS-CoV disease, *OR*
- A history of foreign travel (or close contact with an ill person with a history of travel) to a location with documented or suspected SARS-CoV, *OR*
- Exposure to a domestic location with documented or suspected SARS-CoV (including a laboratory that contains live SARS-CoV), or close contact with an ill person with such an exposure history.

In settings with more extensive transmission, all patients with fever or respiratory symptoms should be evaluated for possible SARS-CoV disease, since the ability to determine epidemiologic links will be lost. For up-to-date information on where recent SARS-CoV transmission is suspected or documented, see the [CDC](#) and [WHO](#) websites.

³Clinical work-up: Clinicians should work up patients as clinically indicated. Depending on symptoms and exposure history, initial diagnostic testing for patients with suspected SARS-CoV disease may include:

- Complete blood count (CBC) with differential
- Chest radiograph
- Pulse oximetry
- Blood cultures
- Sputum Gram's stain and culture
- Testing for viral respiratory pathogens, notably influenza A and B and respiratory syncytial virus
- Legionella and pneumococcal urinary antigen testing if radiographic evidence of pneumonia (adults only)

An acute serum sample and other available clinical specimens (respiratory, blood, and stool) should be saved for additional testing until a specific diagnosis is made. SARS-CoV testing may be considered as part of the initial work-up if there is a high level of suspicion for SARS-CoV disease based on exposure history. For additional details on specialized laboratory testing options available through the health department and the Laboratory Response Network (LRN), see [CDC's SARS website.](#)

⁴Alternative diagnosis:

An alternative diagnosis should be based only on laboratory tests with high positive-predictive value (e.g., blood culture, viral culture, Legionella urinary antigen, pleural fluid culture, transthoracic aspirate). In some settings, PCR testing for bacterial and viral pathogens can also be used to help establish alternative diagnoses. The presence of an alternative diagnosis does not necessarily rule out co-infection with SARS-CoV.

⁵Radiographic testing:

Chest CT may show evidence of an infiltrate before a chest radiograph (CXR).

Therefore, a chest CT should be considered in patients with a strong epidemiologic link to a known case of SARS-CoV disease and a negative CXR 6 days after onset of symptoms. Alternatively, the patient should remain in SARS isolation, and the CXR should be repeated on day 9 after symptom onset.

⁶Discontinuation of SARS isolation precautions:

SARS isolation precautions should be discontinued only after consultation with the local public health authorities and the evaluating clinician. Factors that might be considered include the strength of the epidemiologic exposure to SARS-CoV, nature of contact with others in the residential or work setting, strength of evidence for an alternative diagnosis, and evidence for clustering of pneumonia among close contacts. Isolation precautions should be discontinued on the basis of an alternative diagnosis only when the following criteria are met:

- Absence of strong epidemiologic link to known cases of SARS-CoV disease
- Alternative diagnosis confirmed using a test with a high positive-predictive value
- Clinical manifestations entirely explained by the alternative diagnosis
- No evidence of clustering of pneumonia cases among close contacts (unless >1 case in the cluster is confirmed to have the same alternative diagnosis)
- All cases of presumed SARS-CoV disease identified in the surrounding community can be epidemiologically linked to known cases or locations in which transmission is known to have occurred.

ADDITIONAL INFORMATION / REFERENCES

- A. Treatment / Differential Diagnosis:** Red Book: 2015 Report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015.
- B. Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual (CCDM), 20th Edition. Washington, DC, American Public Health Association, 2015.
- C. Case Definitions:** CDC Division of Public Health Surveillance and Informatics, Available at: wwwn.cdc.gov/nndss/
- D. Kansas Regulations/Statutes Related to Infectious Disease:** www.kdheks.gov/epi/regulations.htm
- E. Biological Event:** Kansas Biological Incident Annex at: www.kdheks.gov/cphp/operating_guides.htm
- F. Kansas Community Containment Toolbox:** www.kdheks.gov/cphp/operating_guides.htm
- G. Specific guidance from CDC:** www.cdc.gov/sars/guidance/index.html