



# AARC SARS Guidance Document

**Statement of Intent:** The purpose of this document is to provide guidance to respiratory care staff and managers involved in addressing SARS issues at their facilities and in their practice. The content of this document is based on information found on the web site of the Centers For Disease Control and Prevention (CDC). Because new information about SARS is being published constantly, using the website links in this document will provide the reader access to the latest available information.

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## **Basic Information About SARS**

Source: <http://www.cdc.gov/ncidod/sars/factsheet.htm>

In addition to the following basic information about SARS, frequently asked questions about SARS are found on the CDC website at <http://www.cdc.gov/ncidod/sars/faq.htm>

### **A new disease called SARS**

Severe acute respiratory syndrome (SARS) is a respiratory illness that has recently been reported in Asia, North America, and Europe. This fact sheet provides basic information about the disease and what is being done to combat its spread. To find out more about SARS, go to [www.cdc.gov/ncidod/sars/](http://www.cdc.gov/ncidod/sars/) and [www.who.int/csr/sars/en/](http://www.who.int/csr/sars/en/).

### **Symptoms of SARS**

In general, SARS begins with a fever greater than 100.4°F [ $>38.0^{\circ}\text{C}$ ]. Other symptoms may include headache, an overall feeling of discomfort, and body aches. Some people also experience mild respiratory symptoms. After 2 to 7 days, SARS patients may develop a dry cough and have trouble breathing.

### **How SARS spreads**

The primary way that SARS appears to spread is by close person-to-person contact. Most cases of SARS have involved people who cared for or lived with someone with SARS, or had direct contact with infectious material (for example, respiratory secretions) from a person who has SARS. Potential ways in which SARS can be spread include touching the skin of other people or objects that are contaminated with infectious droplets and then touching your eye(s), nose, or mouth. This can happen when someone who is sick with SARS coughs or sneezes droplets onto themselves, other people, or nearby surfaces. It also is possible that SARS can be spread more broadly through the air or by other ways that are currently not known.

### **Who is at risk for SARS**

Most of the U.S. cases of SARS have occurred among travelers returning to the United States from other parts of the world with SARS. There have been very few cases as a result of spread to close contacts such as family members and health care workers. Currently, there is no evidence that SARS is spreading more widely in the community in the United States.

## **Possible cause of SARS**

Scientists at the CDC and other laboratories have detected a previously unrecognized coronavirus in patients with SARS. The new coronavirus is the leading hypothesis for the cause of SARS.

## **CDC RECOMMENDATIONS FOR HEALTH CARE WORKERS:**

Transmission of SARS to health-care workers appears to have occurred after close contact with sick people before recommended infection control precautions were put into use.

## **Updated Interim Domestic Infection Control Guidance in the Health-Care and Community Setting for Patients with Suspected SARS**

May 1, 2003

Source: <http://www.cdc.gov/ncidod/sars/infectioncontrol.htm>

The CDC is issuing revised interim guidance concerning infection control precautions in the health-care and community settings. To minimize the potential for transmission, these precautions are recommended as feasible given available resources, until the epidemiology of disease transmission is better understood.

**For all contact with suspect SARS patients, careful hand hygiene is urged, including hand washing with soap and water; if hands are not visibly soiled, alcohol-based handrubs may be used as an alternative to hand washing.**

**Access [www.cdc.gov/handhygiene](http://www.cdc.gov/handhygiene) for detailed information on hand hygiene.**

For the *inpatient* setting:

If a suspected SARS patient is admitted to the hospital, infection control personnel should be notified immediately. Infection control measures for inpatients

([www.cdc.gov/ncidod/hip/isolat/isolat.htm](http://www.cdc.gov/ncidod/hip/isolat/isolat.htm)) should include:

Standard precautions (e.g., hand hygiene); in addition to routine standard precautions, health-care personnel should wear eye protection for all patient contact.

Contact precautions (e.g., use of gown and gloves for contact with the patient or their environment)

Airborne precautions (e.g., an isolation room with negative pressure relative to the surrounding area and use of an N-95 filtering disposable respirator for persons entering the room)

If airborne precautions cannot be fully implemented, patients should be placed in a private room, and all persons entering the room should wear N-95 respirators. Where possible, a qualitative fit test should be conducted for N-95 respirators; detailed information on fit testing can be accessed at

<http://www.osha.gov/SLTC/etools/respiratory/oshfiles/fittesting1.html>. (Summarized in Appendix C) If N-95 respirators are not available for health-care personnel, then surgical

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masks should be worn. Regardless of the availability of facilities for airborne precautions, standard and contact precautions should be implemented for all suspected SARS patients.

For the *outpatient* setting:

Persons seeking medical care for an acute respiratory infection should be asked about possible exposure to someone with SARS or recent travel to a area with SARS. If SARS is suspected, provide and place a surgical mask over the patient's nose and mouth. If masking the patient is not feasible, the patient should be asked to cover his/her mouth with a disposable tissue when coughing, talking or sneezing. Separate the patient from others in the reception area as soon as possible, preferably in a private room with negative pressure relative to the surrounding area.

All health-care personnel should wear N-95 respirators while taking care of patients with suspected SARS. In addition, health care personnel should follow standard precautions (e.g., hand hygiene), contact precautions (e.g., use of gown and gloves for contact with the patient or their environment) and wear eye protection for all patient contact.

For more information, see the [triage guidelines](#) in Appendix A.

For *home or residential* setting:

Placing a surgical mask on suspected SARS patients during contact with others at home is recommended. If the patient is unable to wear a surgical mask, it may be prudent for household members to wear surgical masks when in close contact with the patient.

Household members in contact with the patient should be reminded of the need for careful hand hygiene including hand washing with soap and water; if hands are not visibly soiled, alcohol-based handrubs may be used as an alternative to hand washing. For more information, see the [household guidelines](#) in Appendix B.

## **Interim Domestic Guidance for Management of Exposures to Severe Acute Respiratory Syndrome (SARS) for Health-Care Settings**

May 20, 2003

Source: <http://www.cdc.gov/ncidod/sars/exposureguidance.htm>

Given the currently available information on the epidemiology of SARS, the following outlines interim guidance for the management of exposures to SARS in a health-care facility.

### **Surveillance of Health-Care Personnel**

Surveillance of health-care personnel is necessary to ensure that workers who are ill receive appropriate care and are isolated to prevent transmission. Health-care facilities

that care for SARS patients should implement surveillance of health-care workers who have any contact with SARS patients or their environment of care. Recommendations for surveillance include:

- Develop and maintain a listing of all personnel who enter the rooms of SARS patients, or who are involved in the patient's care in other parts of the hospital.
- Instruct personnel who have contact with SARS patients, or their environment of care, to notify occupational health, infection control or their designee if they have unprotected exposure to a SARS patient or if they develop fever or respiratory symptoms.
- Monitor employee absenteeism for increases that may suggest emerging respiratory illness in the workforce. Notify local and state health authorities of clusters or unusual increases in respiratory illness, including atypical pneumonia.

### Management of Asymptomatic, Exposed Health-Care Workers

1. To date, there is no evidence to suggest that SARS is transmitted from asymptomatic individuals. However, according to recent reports, health-care workers who developed SARS may have been a source of transmission within health-care facilities during the early phases of illness when symptoms were mild and not recognized as SARS. To minimize the risk of transmission from unrecognized SARS infections among health-care workers, health-care workers who have **unprotected high-risk exposures** to SARS should be excluded from duty (e.g. administrative leave) for 10 days following the exposure. Unprotected high-risk exposure is defined as presence in the same room as a probable SARS patient during a high-risk aerosol-generating procedure or event and where recommended infection control precautions are either absent or breached. Aerosol-generating procedures or events include aerosolized medication treatments, diagnostic sputum induction, bronchoscopy, endotracheal intubation, airway suctioning, positive pressure ventilation via facemask (e.g., BiPAP, CPAP), during which air may be forced out around the facemask, high frequency oscillatory ventilation (HFOV), and close facial contact during a coughing paroxysm. Health-care workers who are excluded from duty should limit interactions outside the home, and should not go to work, school, church, or other public areas.
2. Health-care workers who have other unprotected exposures to patients with SARS need not be excluded from duty, but should undergo active surveillance for symptoms, including measurement of body temperature at least twice daily for 10 days following the exposure. Prior to reporting for duty each day, the health-care worker should be interviewed regarding respiratory symptoms and have their temperature measured by employee health or other designee.
3. Health-care workers who have cared for, or otherwise been exposed to SARS patients while adhering to recommended infection control precautions, should be instructed to be vigilant for fever and respiratory symptoms, including

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measurement of body temperature at least twice daily for 10 days following the last exposure to a SARS patient. These health-care workers should be contacted by occupational health, infection control or their designee regularly over the 10 day period following exposure to inquire about fever or respiratory symptoms.

### Management of Symptomatic, Exposed Health-Care Workers

1. Any health-care worker who has cared for or been exposed to a SARS patient who develops fever or respiratory symptoms within 10 days following exposure should not report for duty, but should stay home and report symptoms to the appropriate facility point of contact immediately. If the symptoms begin while at work, the health-care worker should be instructed to immediately apply a surgical mask and leave the patient care area. Symptomatic health-care workers should use infection control precautions (see Appendix B) to minimize the potential for transmission and should seek health-care evaluation. **In advance of clinical evaluation, health-care providers should be informed that the individual may have been exposed to SARS so arrangements can be made, as necessary, to prevent transmission to others in the health-care setting.**
2. If symptoms improve or resolve within 72 hours after first symptom onset, the person may be allowed, after consultation with infection control and local public health authorities, to return to duty and infection control precautions can be discontinued.
3. For persons who meet, or progress to meet the case definition for SARS (e.g., develop fever and respiratory symptoms), infection control precautions should be continued until 10 days after the resolution of fever, provided respiratory symptoms are absent or improving.
4. If the illness does not progress to meet the case definition, but the individual has persistent fever or unresolving respiratory symptoms, infection control precautions should be continued for an additional 72 hours, at the end of which time a clinical evaluation should be performed. If the illness progresses to meet the case definition, infection control precautions should be continued as described above. If case definition criteria are not met, infection control precautions can be discontinued after consultation with local public health authorities and the evaluating clinician. Factors that might be considered include the nature of the potential exposure to SARS, the nature of contact with others in the residential or work setting, and evidence for an alternative diagnosis.
5. Persons who meet, or progress to meet the case definition for suspected SARS (e.g., develop fever and respiratory symptoms), or whose illness does not meet the case definition, but who have persistent fever or unresolving respiratory symptoms over the 72 hours following onset of symptoms, should be tested for SARS coronavirus infection. Collection of appropriate specimens for laboratory testing (See Appendix H for collection of respiratory specimens) should be coordinated with and guided by local/state public health authorities and consultation with the CDC

### **Prevention of Unprotected Exposures**

Prevention of unprotected exposures will limit the need for exclusion from duty. Health-care facilities should address the following:

- Review current procedures for early detection and isolation of suspected SARS patients
- Educate all health-care personnel on the signs and symptoms of SARS and recommended infection control practices
- Review use of personal protective equipment with health-care personnel, including physicians, who may care for SARS patients
- Follow current CDC recommendation for aerosol-generating procedures in suspected or probable SARS patients

### **Management of Symptomatic, Exposed Visitors**

Close contacts (e.g., family members) of SARS patients are at risk for infection. Close contacts with either fever or respiratory symptoms should not be allowed to enter the health-care facility as visitors and should be educated about this policy. A system for screening SARS close contacts who are visitors to the facility for fever or respiratory symptoms should be in place. Health-care facilities should educate all visitors about use of infection control precautions when visiting SARS patients and their responsibility for adherence to them. Patient education information is available at:

<http://www.cdc.gov/ncidod/sars/factsheetcc.htm> and are abridged in Appendix I

### **Regarding the Appendices of This Document**

The appendices in this document (many of which have not been referenced to this point) are from the CDC website and provide detailed information about minimizing risks for caregivers of SARS patients. Each contains critical information for respiratory therapists and should be carefully reviewed.

## Appendix A-Updated Interim Domestic Guidelines for Triage and Disposition of Patients Who May Have Severe Acute Respiratory Syndrome (SARS)

April 25, 2003

Source: [http://www.cdc.gov/ncidod/sars/triage\\_interim\\_guidance.htm](http://www.cdc.gov/ncidod/sars/triage_interim_guidance.htm)

To facilitate identification of patients who may have SARS in ambulatory care settings, targeted screening questions concerning fever, respiratory symptoms, close contact with a SARS suspect case patient, and recent travel should be included when patients call for appointments and at triage or as soon as possible after patient arrival. The most recent case definition for SARS should be used as the basis for questions regarding travel history.

- Health-care personnel who are the first points of contact should be trained to perform SARS screening. In the absence of a systematic screening or triage system, providers taking care of patients in ambulatory care settings should perform such screening before performing other history-taking or examinations.
- Because patients with developing SARS may present with either only fever or only respiratory symptoms, infection control precautions should be instituted immediately for patients who have either fever or respiratory symptoms and have had close contact with SARS or who have a history of international travel to an area identified by the case definition. A surgical mask should be placed on such patients early during the triage process until other recommended infection control precautions can be instituted including:
  - Standard precautions (e.g., hand hygiene); in addition to routine standard precautions, health-care personnel should wear eye protection for all patient contact.
  - Contact precautions (e.g., use of gown and gloves for contact with the patient or their environment)
  - Airborne precautions (e.g., an isolation room with negative pressure relative to the surrounding area and use of an N-95 filtering disposable respirator for persons entering the room). Where respirators are not available, healthcare personnel evaluating and caring for suspect SARS patients should wear a surgical mask.

Decisions concerning inpatient hospital admission or discharge of a patient with suspected or developing SARS should generally be based on the patient's health-care needs (e.g., diagnostic, therapeutic, or supportive regimens that necessitate hospitalization).

- Patients should not be hospitalized solely for the purpose of infection control unless they cannot be discharged directly to their home (e.g. travelers, homeless persons) or if infection precautions recommended for the home or residential setting are not feasible in their home environment (e.g. crowded dormitory setting, prisons, jails, detention centers, homeless shelters, or other multi-person single room dwellings).
- Under such circumstances patients should be hospitalized using recommended infection control precautions. Patients may then be discharged as soon as arrangements can be made for discharge directly to a home or residential setting where appropriate infection control precautions can be implemented and maintained.
- Alternatively, the patient could be discharged to a designated residential facility for isolation of convalescing cases where recommended infection control measures can be followed.
- During transport between health-care facility and home or residential setting, patients should wear a surgical mask and limit interactions with others (e.g., avoid public transportation). For emergency medical ground transport of SARS patients, see

## Appendix B-Interim Guidance on Infection Control Precautions for Patients with Suspected Severe Acute Respiratory Syndrome (SARS) and Close Contacts in Households

April 29, 2003

Source: <http://www.cdc.gov/ncidod/sars/ic-closecontacts.htm>

Patients with SARS pose a risk of transmission to close household contacts and health care personnel in close contact. The duration of time before or after onset of symptoms during which a patient with SARS can transmit the disease to others is unknown. The following infection control measures are recommended for patients with suspected SARS in households or residential settings. These recommendations are based on the experience in the United States to date and may be revised as more information becomes available.

1. SARS patients should limit interactions outside the home and should not go to work, school, out-of-home child care, or other public areas until 10 days after the resolution of fever, provided respiratory symptoms are absent or improving. During this time, infection control precautions should be used, as described below, to minimize the potential for transmission.
2. All members of a household with a SARS patient should carefully follow recommendations for hand hygiene (e.g., frequent hand washing or use of alcohol-based hand rubs), particularly after contact with body fluids (e.g., respiratory secretions, urine, or feces). See the "[Guideline for Hand Hygiene in Health-Care Settings](#)" at for more details on hand hygiene.
3. Use of disposable gloves should be considered for any direct contact with body fluids of a SARS patient. **However, gloves are not intended to replace proper hand hygiene.** Immediately after activities involving contact with body fluids, gloves should be removed and discarded and hands should be cleaned. Gloves must never be washed or reused.
4. Each patient with SARS should be advised to cover his or her mouth and nose with a facial tissue when coughing or sneezing. If possible, a SARS patient should wear a surgical mask during close contact with uninfected persons to prevent spread of infectious droplets. When a SARS patient is unable to wear a surgical mask, household members should wear surgical masks when in close contact with the patient.
5. Sharing of eating utensils, towels, and bedding between SARS patients and others should be avoided, although such items can be used by others after routine cleaning (e.g., washing with soap and hot water). Environmental surfaces soiled by body fluids should be cleaned with a household disinfectant according to manufacturer's instructions; gloves should be worn during this activity.
6. Household waste soiled with body fluids of SARS patients, including facial tissues and surgical masks, may be discarded as normal waste.

7. Household members and other close contacts of SARS patients should be actively monitored by the local health department for illness.
8. Household members or other close contacts of SARS patients should be vigilant for the development of fever or respiratory symptoms and, if these develop, should seek healthcare evaluation. **In advance of evaluation, healthcare providers should be informed that the individual is a close contact of a SARS patient so arrangements can be made, as necessary, to prevent transmission to others in the healthcare setting.** Household members or other close contacts with symptoms of SARS should follow the same precautions recommended for SARS patients.
9. At this time, in the absence of fever or respiratory symptoms, household members or other close contacts of SARS patients need not limit their activities outside the home.

## Appendix C-Fit Testing

Source: <http://www.osha.gov/SLTC/etools/respiratory/oshfiles/fittesting1.html>



### Fit Testing

All respirators that rely on a mask-to-face seal need to be annually checked with either qualitative or quantitative methods to determine whether the mask provides an acceptable fit to a wearer. The qualitative fit test procedures rely on a subjective sensation (taste, irritation, smell) of the respirator wearer to a particular test agent while the quantitative use measuring instruments to measure face seal leakage. The relative workplace exposure level determines what constitutes an acceptable fit and which fit test procedure is required. For negative pressure air purifying respirators, users may rely on either a qualitative or a quantitative fit test procedure for exposure levels less than 10 times the occupational exposure limit. Exposure levels greater than 10 times the occupational exposure limit must utilize a quantitative fit test procedure for these respirators. Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode.

Fit Testing – information is found at

[http://www.osha.gov/pls/oshaweb/owalink.query\\_links?src\\_doc\\_type=STANDARDS&src\\_unique\\_file=1910\\_0134&src\\_anchor\\_name=1910.134\(f\)\(2\)](http://www.osha.gov/pls/oshaweb/owalink.query_links?src_doc_type=STANDARDS&src_unique_file=1910_0134&src_anchor_name=1910.134(f)(2))

Fit Testing Procedures (Mandatory) – Information is found at:

[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9780&p\\_text\\_version=FALSE](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9780&p_text_version=FALSE)

## Appendix D-Case Definition for suspected Severe Acute Respiratory Syndrome (SARS)

Source: <http://www.cdc.gov/ncidod/sars/casedefinition.htm>

The case definition for suspected SARS is subject to change, particularly concerning travel history as transmission is reported in other geographic areas; the most current definition can be accessed at the URL listed in the source above.

### Updated Interim U.S. Case Definition of Severe Acute Respiratory Syndrome (SARS)

June 5, 2003

The previous CDC SARS case definition (published May 23, 2003) has been updated as follows:

- In the Epidemiologic Criteria, the last date of illness onset for inclusion as reported case for Singapore is now June 14, 2003.

#### Clinical Criteria

- Asymptomatic or mild respiratory illness
- Moderate respiratory illness
  - Temperature of  $>100.4^{\circ}\text{F}$  ( $>38^{\circ}\text{C}$ )\*, and
  - One or more clinical findings of respiratory illness (e.g., cough, shortness of breath, difficulty breathing, or hypoxia).
- Severe respiratory illness
  - Temperature of  $>100.4^{\circ}\text{F}$  ( $>38^{\circ}\text{C}$ )\*, and
  - One or more clinical findings of respiratory illness (e.g., cough, shortness of breath, difficulty breathing, or hypoxia), and
  - radiographic evidence of pneumonia, or
  - respiratory distress syndrome, or
  - autopsy findings consistent with pneumonia or respiratory distress syndrome without an identifiable cause.

#### Epidemiologic Criteria

- Travel (including transit in an airport) within 10 days of onset of symptoms to an area with current or previously documented or suspected community transmission of SARS (see Table), or
- Close contact<sup>§</sup> within 10 days of onset of symptoms with a person known or suspected to have SARS

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<b>Travel criteria for suspect or probable U.S. cases of SARS</b>		
Area	First date of illness onset for inclusion as reported case†	Last date of illness onset for inclusion as reported case†
China (mainland)	November 1, 2002	Ongoing
Hong Kong	February 1, 2003	Ongoing
Hanoi, Vietnam	February 1, 2003	May 25, 2003
Singapore	February 1, 2003	June 14, 2003
Toronto, Canada	April 23, 2003	Ongoing
Taiwan	May 1, 2003	Ongoing

### Laboratory Criteria

- **Confirmed**
  - Detection of antibody to SARS-CoV in specimens obtained during acute illness or >21 days after illness onset, or
  - Detection of SARS-CoV RNA by RT-PCR confirmed by a second PCR assay, by using a second aliquot of the specimen and a different set of PCR primers, or
  - Isolation of SARS-CoV.
- **Negative**
  - Absence of antibody to SARS-CoV in convalescent serum obtained >21 days after symptom onset.
- **Undetermined**
  - Laboratory testing either not performed or incomplete.

### Case Classification\*\*

- Probable case: meets the clinical criteria for severe respiratory illness of unknown etiology and epidemiologic criteria for exposure; laboratory criteria confirmed, negative, or undetermined.
- Suspect case: meets the clinical criteria for moderate respiratory illness of unknown etiology, and epidemiologic criteria for exposure; laboratory criteria confirmed, negative, or undetermined.

### Exclusion Criteria

A case may be excluded as a suspect or probable SARS case if:

- An alternative diagnosis can fully explain the illness\*\*\*
- The case was reported on the basis of contact with an index case that was subsequently excluded as a case of SARS (e.g., another etiology fully explains the illness) provided other possible epidemiologic exposure criteria are not present

**Also see:**

- [MMWR: Updated Interim Surveillance Case Definition for Severe Acute Respiratory Syndrome \(SARS\)— April 29, 2003](#)

## **Appendix E-Interim Domestic Infection Control Precautions for Aerosol-Generating Procedures on Patients with Severe Acute Respiratory Syndrome (SARS)**

May 20, 2003

Source: <http://www.cdc.gov/ncidod/sars/aerosolinfectioncontrol.htm>

Worldwide, several health-care workers (HCWs) have been reported to develop severe acute respiratory syndrome (SARS) after caring for patients with SARS. Multiple hospitals have reported cases among HCWs who were present during aerosol-generating procedures performed on patients with SARS, suggesting that aerosol-generating procedures may increase the risk of SARS transmission.

Procedures capable of stimulating cough and promoting the generation of aerosols include: administration of aerosolized medication treatment; diagnostic sputum induction; bronchoscopy; airway suctioning; endotracheal intubation; positive pressure ventilation via facemask (e.g., BiPAP, CPAP), during which air may be forced out around the facemask; and high frequency oscillatory ventilation (HFOV). CDC is recommending healthcare facilities to review their strategies to protect HCWs during these procedures, including the use of personal protective equipment and safe work practices, and to alert HCWs performing such procedures that there may be an increased risk for transmission of SARS.

The following recommendations apply to the performance of aerosol-generating procedures in patients with suspect or probable SARS. These recommendations should be considered interim in nature, and may be revised as more information becomes available.

### **Limit opportunities for exposure.**

- Limit the use of aerosol-generating procedures on SARS patients to those that are deemed medically necessary. Use clinically appropriate sedation during intubation and bronchoscopy to minimize resistance and coughing during the procedure.
- Limit the number of HCWs present in the room during an aerosol-generating procedure to those who are essential for patient care and support.
- 

### **Perform aerosol-generating procedures in an airborne isolation environment**

- If the patient is in an airborne isolation room, perform the procedure in that environment.
- If an airborne isolation room is not available, the procedure should be performed in a private room, away from other patients. If possible, steps should be taken to

increase air exchanges, create a negative pressure relative to the adjacent room or hallway, and avoid recirculation of the room air. If recirculation of air from such rooms is unavoidable, the air should be passed through a HEPA filter before recirculation as recommended for *Mycobacterium tuberculosis*. Air cleaning devices such as portable HEPA filtration units may be used to further reduce the concentration of contaminants in the air. Doors should be kept closed except when entering or leaving the room, and entry and exit should be minimized during the procedure.

### **Use of filters on ventilation exhaust valves.**

- Some hospitals caring for SARS patients have used bacterial/viral filters on exhalation valves of mechanical ventilators to prevent contaminated aerosols from entering the environment. Although the effectiveness of this measure in reducing the risk of SARS transmission is unknown, the use of such filters may be prudent during HFOV of patients with SARS.

### **Personal protective equipment.**

Wear personal protective equipment appropriate for standard, contact and airborne precautions with consideration for additional personal protection based on the potential for higher level of contact with respiratory secretions.

The optimal combination of personal protective equipment (PPE) for preventing transmission of SARS during aerosol-generating procedures has not been determined. PPE must cover the arms and torso, and fully protect the eyes, nose and mouth; additional PPE to protect all exposed areas of skin should be considered. The following personal protective equipment is recommended for those present during aerosol-generating procedures on patients with SARS:

- Single isolation gown to protect the body and exposed areas of the arms. A disposable full-body isolation suit may be considered in this setting as it provides greater protection for the neck area; some suits also have an attached hood to cover the hair. Another alternative for providing full head, neck, face and respiratory protection is a disposable surgical hood with an attached face shield in combination with a disposable respirator. It is unknown whether covering exposed areas of skin or hair of the head and neck will further reduce the risk of transmission.
- A single pair of disposable gloves that provide a snug fit over the wrist.
- Eye protection consisting of goggles should be worn to protect the eyes from respiratory splash or spray. Goggles should fit snugly around the eyes.
- A face shield may be worn over goggles to protect exposed areas of the face but should not be used as a primary form of eye protection for these procedures.

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- Respiratory protection for aerosol-generating procedures must ensure that HCWs are protected from exposure to aerosolized infectious droplets through breaches in respirator seal integrity. Healthcare facilities should consider the following options:
  - Disposable particulate respirators (e.g. N-95, N-99, or N-100) are sufficient for routine respiratory protection for airborne precautions and are the minimum level of respiratory protection for HCWs who are performing aerosol-generating procedures. To ensure adequate protection, HCWs must be fit-tested to the respirator model that they will wear (see [TB Respiratory Protection Program In Health Care Facilities: Administrator's Guide](#)), and also know how to check their facepiece seal. A fit-check should be performed each time the respirator is put on, prior to entering the patient room. If disposable respirators cannot be fit-tested to the individual, a higher level of respiratory protection should be used.
  - Healthcare facilities in some SARS affected areas have used higher levels of respiratory protection for persons present during aerosol-generating procedures on SARS patients. Higher levels of respiratory protection include:
    - Powered air purifying respirator (PAPRs) designed with loose-fitting facepieces that form a partial seal with the face;
    - PAPRs with hoods that completely cover the head and neck and may also cover portions of the shoulder and torso;
    - PAPRs with tight-fitting facepieces (both half and full facepiece);
    - Full facepiece elastomeric negative pressure (i.e. non-powered) respirators with N, R, or P100 filters.

At this time there is inadequate information to determine whether these higher levels of respiratory protection will further reduce transmission. Factors that should be considered in choosing respirators in this setting include availability, impact on mobility, comfort, ([TB Respiratory Protection Program In Health Care Facilities: Administrator's Guide](#)), the potential for exposure to higher levels of aerosolized respiratory secretions, and the potential for reusable respirators to serve as fomites for transmission.

All HCWs offered respiratory protection must be included in a respiratory protection program that meets the minimum requirements of the OSHA Respiratory Protection Standard (29CFR1910.134) if within the United States, or other applicable requirements for workplaces outside the U.S.

### Safe work practices

- HCWs must be careful to contain the area of contamination. Aerosol-generating procedures may produce high concentrations of virus in the air and on environmental surfaces. HCWs should avoid touching their face and personal protective equipment on their face with contaminated gloves. They also should avoid contaminating surfaces around the patient and room.
- HCWs should use care when removing personal protective equipment to avoid contaminating skin, clothing, and mucous membranes. Standard procedures for

removal of personal protective equipment that minimize the potential for self-contamination should be developed based on the equipment used, and healthcare workers should be trained in these procedures.

- Hand hygiene should be performed following the removal of PPE and leaving the patient's room.

**Decontaminating, cleaning, and disinfecting personal protective equipment and environmental surfaces**

- A disinfectant should be available for decontaminating reusable personal protective equipment. Clean gloves should be worn when wiping surfaces of equipment to render them safe for handling. Manufacturer's guidelines for cleaning and disinfection of reusable protective equipment should be followed.
- Horizontal surfaces in the environment around the patient should be cleaned and disinfected as soon as possible following an aerosol-generating procedure.

## Appendix F-Interim Recommendations for Cleaning and Disinfection of the SARS Patient Environment

April 28, 2003

Cleaning and disinfection of environmental surfaces are important components of routine infection control in healthcare facilities. Although environmental surfaces (e.g., floors, table tops) are generally not involved in transmission of microorganisms, some surfaces, especially those that are touched frequently (e.g., bed rails, door knobs, lavatory surfaces) may serve as important reservoirs of microbial contamination. When these surfaces are touched the microbial agents can be transferred to nose, mouth, eyes, or other environmental surfaces. The performance of hand hygiene ([www.cdc.gov/handhygiene](http://www.cdc.gov/handhygiene)) and adhering to a regular schedule of cleaning and disinfection will help reduce the microbial burden in the patient's environment. This may be an important adjunct measure for controlling the spread of SARS in healthcare settings. Personnel who are assigned this responsibility should be trained and supervised in cleaning and disinfection methods. In areas with a high volume of SARS patients, consideration may be given to designating specific personnel for this task.

The approach to environmental cleaning and disinfection for SARS will follow the same principles used for controlling the spread of other infections in healthcare settings.

### Personal Protective Equipment

Personnel involved in cleaning and disinfection activities should wear appropriate personal protective equipment. Wear full protective attire as required for contact and airborne precautions (disposable gown, utility gloves, and N95 respirator) plus eye protection (goggles or face shield) (see Interim Domestic Guidance on the Use of Respirators to Prevent Transmission of SARS) as long as the patient is in the room. Once the patient has been transferred or discharged, wear gown and gloves for post-discharge cleaning.

Postpone initiation of cleaning to allow time for the ventilation system to remove any residual airborne viral particles. In most general patient care areas in U.S. healthcare facilities, the heating, ventilation and air-conditioning (HVAC) systems are generally engineered to provide approximately 6 air changes per hour (ACH). (See table of time required for particulate removal relative to ACH in a room in Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Facilities, 1994.)

## Type of Cleaning and Disinfectant Agents

Any EPA-registered\* hospital detergent-disinfectant currently used by healthcare facilities for environmental sanitation may be used. Manufacturer's recommendations for use-dilution (i.e., concentration), contact time and care in handling should be followed.

## Cleaning methods

In-patient rooms housing SARS patients should be cleaned and disinfected daily and at the time of patient transfer or discharge.

- Daily cleaning and disinfection should include horizontal surfaces (e.g., over-bed table, night stand), surfaces that are frequently touched by patients and healthcare personnel (e.g., bed rails, phone), and lavatory facilities. To facilitate daily cleaning, the area around the patient should be kept free of unnecessary equipment and supplies.
- Terminal cleaning and disinfection following transfer or discharge should include the type of surfaces described above plus obviously soiled vertical surfaces, frequently touched surfaces (e.g., light cords and switches, door knobs), and durable patient equipment (e.g., bed, night stand, over-bed table, wheelchair, commode). Curtain dividers also should be changed and laundered as appropriate for the curtain fabric. There is no need to routinely clean and disinfect walls, window drapes, and other vertical surfaces unless visibly soiled; disinfectant fogging for purposes of air disinfection is not recommended.
- Patient care equipment such as mechanical ventilators, pulse oximeters, blood pressure cuff, should be cleaned and disinfected in accordance with current CDC recommendations, manufacturer's instructions and facility procedures for critical, semi-critical and non-critical surfaces. See [www.cdc.gov/ncidod/hip/isolat/isolat.htm](http://www.cdc.gov/ncidod/hip/isolat/isolat.htm) and [www.cdc.gov/ncidod/hip/sterile/sterile.htm](http://www.cdc.gov/ncidod/hip/sterile/sterile.htm).

Cubicles or rooms in out-patient areas where patients with suspected SARS are evaluated should be cleaned and disinfected before another patient is seen or cared for in that environment. Areas that should be specifically targeted for cleaning include the examination table and horizontal surfaces that may have been touched by the patient or healthcare provider.

Solutions used for cleaning and disinfection should be discarded after use. Thoroughly rinse and clean housekeeping equipment after use in a SARS room or area and allow the equipment to dry. Launder reusable mop heads and cleaning cloths according to current practice.

*\* There are no disinfectant products currently registered by the U.S. Environmental Protection Agency (EPA) specifically for the inactivation of the newly identified viruses*

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*associated with SARS. However, related viruses with physical and biochemical properties similar to the possible SARS agents are known to be readily inactivated by EPA-registered chemical germicides that provide low- or intermediate-level disinfection during general use.*

## Appendix G-Interim Domestic Guidance on the Use of Respirators to Prevent Transmission of SARS

May 6, 2003

Source: <http://www.cdc.gov/ncidod/sars/respirators.htm>

Health-care workers caring for patients with Severe Acute Respiratory Syndrome (SARS) are at risk for acquiring SARS. Although the infectivity of SARS is currently uncertain, transmission to health-care workers appears to have occurred after close contact with symptomatic individuals (e.g., persons with fever or respiratory symptoms), particularly before implementation of recommended infection control precautions for SARS (i.e., unprotected exposures). Personal protective equipment appropriate for standard, contact, and airborne precautions (e.g., hand hygiene, gown, gloves, and N95 respirators) in addition to eye protection, have been recommended for health-care workers to prevent transmission of SARS in health-care settings (see the [Infection Control and Exposure Management](#) page).

The transmission of SARS appears to occur predominantly by direct contact with infectious material, including dispersal of large respiratory droplets. However, it is also possible that SARS can be spread through the airborne route. Accordingly, CDC has recommended the use of N95 respirators, consistent with respiratory protection for airborne diseases, such as tuberculosis.

SARS, unlike tuberculosis, also appears to spread by direct contact with respiratory secretions, which makes touching contaminated objects a potential concern. Although reaerosolization of infectious material is unlikely under normal use conditions, infectious material deposited on a respirator may cause it to become a vehicle for direct or indirect transmission. Therefore, additional infection control measures applicable to this specific situation are needed.

This interim guidance provides information on the selection and handling of respirators for SARS and includes guidance for when respirators are either not available or in short supply.

1. A NIOSH-certified, disposable N95 respirator is sufficient for routine airborne isolation precautions. Use of a higher level of respiratory protection may be considered for certain aerosol-generating procedures (see [Infection Control Precautions for Aerosol-Generating Procedures on Patients Who Have SARS](#)).
  - a. Respirators should be used in the context of a complete respiratory protection program in accordance with OSHA regulations. This includes training and fit testing to ensure a proper seal between the respirator's sealing surface and the wearer's face. Detailed information on respirator programs, including fit test procedures can be accessed at [www.osha.gov/SLTC/etools/respiratory](http://www.osha.gov/SLTC/etools/respiratory).

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- b. Once worn in the presence of a SARS patient, the respirator should be considered potentially contaminated with infectious material, and touching the outside of the device should be avoided. Upon leaving the patient's room, the disposable respirator should be removed and discarded, followed by hand hygiene.
2. If a sufficient supply of respirators is not available, healthcare facilities may consider reuse as long as the device has not been obviously soiled or damaged (e.g., creased or torn). Data on reuse of respirators for SARS are not available. Reuse may increase the potential for contamination; however, this risk must be balanced against the need to fully provide respiratory protection for healthcare personnel.

If N95 respirators are reused for contact with SARS patients, implement a procedure for safer reuse to prevent contamination through contact with infectious droplets on the outside of the respirator.

- a. Consider wearing a loose-fitting barrier that does not interfere with fit or seal (e.g., surgical mask, face shield) over the respirator.
  - b. Remove the barrier upon leaving the patient's room and perform hand hygiene. Surgical masks should be discarded; face shields should be cleaned and disinfected.
  - c. Remove the respirator and either hang it in a designated area or place it in a bag. (Consider labeling respirators with a user's name before use to prevent reuse by another individual.)
  - d. Use care when placing a used respirator on the face to ensure proper fit for respiratory protection and to avoid contact with infectious material that may be present on the outside of the mask.
  - e. Perform hand hygiene after replacing the respirator on the face.
3. When elastomeric (rubber) or powered air purifying respirators (PAPRs) are used, their reusable elements should be cleaned and disinfected after use, in accordance with manufacturer's recommendations. When half- or full-facepiece elastomeric negative pressure respirators are used by more than one individual, filters should be replaced between individual users. When PAPRs are used, the filters should be replaced following manufacturer's recommendations. All used filters must be safely discarded.
4. Respiratory protective devices with a filter efficiency of 95% or greater (e.g., N95, N99, N100) may not be available in some settings due to supply shortages or other factors. In this situation, a surgical (procedure) mask should be worn. Surgical masks will provide barrier protection against large droplets that are considered to be the primary route of SARS transmission. However, surgical masks may not adequately protect against aerosol or airborne particles, primarily

because they allow for leakage around the mask and cannot be fit tested. The mask should resist fluid penetration and fit tightly around the mouth and nose when properly applied to the face.

5. Hand hygiene is urged for all contact with suspect SARS patients or objects that may be contaminated with the virus that causes SARS, including hand washing with soap and water; if hands are not visibly soiled, alcohol-based hand rubs may be use as an alternative to hand washing.
6. For additional technical information regarding respirators, see the web site of the [NIOSH National Personal Protective Technology Laboratory](#), or call 1-412-386-4000.

## Appendix H-Guidelines for Collection of Specimens from Potential Cases of SARS

April 23, 2003, 12:30 PM

Source: [http://www.cdc.gov/ncidod/sars/specimen\\_collection\\_sars2.htm](http://www.cdc.gov/ncidod/sars/specimen_collection_sars2.htm)

### **BODY FLUIDS: *Respiratory tract specimens***

Respiratory specimens should be collected as soon as possible in the course of the illness. The likelihood of recovering most viruses diminishes markedly >72 hours after symptom onset. Some respiratory pathogens may be isolated after longer periods.

Three types of specimens may be collected for viral or bacterial isolation and PCR. These include: 1) nasopharyngeal wash/aspirates; 2) nasopharyngeal swabs; or 3) oropharyngeal swabs. Nasopharyngeal aspirates are the specimen of choice for detection of respiratory viruses and are the preferred collection method among children aged <2 years.

#### **A. Upper Respiratory Tract**

1. Collection of nasopharyngeal wash/aspirate

Have the patient sit with the head tilted slightly backward. Instill 1 - 1.5 ml of nonbacteriostatic saline (pH 7.0) into one nostril. Flush a plastic catheter or tubing with 2 - 3 ml of saline. Insert the tubing into the nostril parallel to the palate. Aspirate nasopharyngeal secretions. Repeat this procedure for the other nostril. Collect specimens in sterile vials. Each specimen should be labeled with ID number and the date collected. If shipped domestically, ship with cold packs to keep sample at 4°C. If shipped internationally, ship on dry ice.

2. Collection of nasopharyngeal or oropharyngeal swabs

Use only sterile dacron or rayon swabs with plastic shafts. Do **NOT** use calcium alginate swabs or swabs with wooden sticks, as they may contain substances that inactivate some viruses and inhibit PCR testing.

Nasopharyngeal swabs - Insert swab into nostril parallel to the palate and leave in place for a few seconds to absorb secretions. Swab both nostrils.

Oropharyngeal swabs - Swab both posterior pharynx and tonsillar areas, avoiding the tongue.

Place swabs immediately into sterile vials containing 2 ml of viral transport media. Break applicator sticks off near the tip to permit tightening of the cap. Each specimen should be labeled with ID number and the date collected. If shipped domestically, ship with cold packs to keep sample at 4°C. If shipped internationally, ship on dry ice.

#### **B. Lower Respiratory Tract**

Collection of bronchoalveolar lavage, tracheal aspirate, pleural tap: If these specimens have been obtained, half should be centrifuged and the cell-pellet fixed in formalin.

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Remaining unspun fluid should be placed in sterile vials with external caps and internal O-ring seals. If there are no internal O-ring seals, then cap securely and seal with parafilm. Each specimen should be labeled with ID number and the date the sample was collected. If shipped domestically, ship with cold packs to keep sample at 4°C. If shipped internationally, ship fixed cells at room temperature and unfixed cells frozen.

## Appendix I- Information For Close Contacts Of SARS Patients

May 5, 2003

Source: <http://www.cdc.gov/ncidod/sars/factsheetcc.htm>

### GUIDELINES

#### **If you think you (or someone in your family) might have SARS, you should:**

- Consult a health care provider as soon as possible.
- Cover your mouth and nose with tissue when coughing or sneezing. If you have a surgical mask, wear it during close contact with other people. A mask can reduce the number of droplets coughed into the air.

#### **If you have SARS and are being cared for at home, you should:**

- Follow the instructions given by your health care provider.
- Limit your activities outside the home during this 10-day period. For example, do not go to work, school, or public areas.
- Wash your hands often and well, especially after you have blown your nose.
- Cover your mouth and nose with tissue when you sneeze or cough.
- If possible, wear a surgical mask when around other people in your home. If you can't wear a mask, the members of your household should wear one when they are around you.
- Don't share silverware, towels, or bedding with anyone in your home until these items have been washed with soap and hot water.
- Clean surfaces (counter or tabletops, door knobs, bathroom fixtures, etc.) that have been contaminated by body fluids (sweat, saliva, mucous, or even vomit or urine) from the SARS patient with a household disinfectant used according to the manufacturer's instructions. Wear disposable gloves during all cleaning activities. Throw these out when you are done. Do not reuse them.
- Follow these instructions for 10 days after your fever and respiratory symptoms have gone away.

#### **If you are caring for someone at home who has SARS, you should:**

- Be sure that the person with SARS has seen a health care provider and is following instructions for medication and care.
- Be sure that all members of your household are washing their hands frequently with soap and hot water or using alcohol-based hand wash.
- Wear disposable gloves if you have direct contact with body fluids of a SARS patient. However, the wearing of gloves is not a substitute for good hand hygiene. After contact with body fluids of a SARS patient, remove the gloves, throw them out, and wash your hands. Do not wash or reuse the gloves.
- Encourage the person with SARS to cover their mouth and nose with a tissue when coughing or sneezing. If possible, the person with SARS should wear a

- surgical mask during close contact with other people in the home. If the person with SARS cannot wear a surgical mask, other members of the household should wear one when in the room with that person.
- Do not use silverware, towels, bedding, clothing, or other items that have been used by the person with SARS until these items have been washed with soap and hot water.
  - Clean surfaces (counter or tabletops, door knobs, bathroom fixtures, etc.) that have been contaminated by body fluids (sweat, saliva, mucous, or even vomit or urine) with a household disinfectant used according to the manufacturer's instructions. Wear disposable gloves during all cleaning activities. Throw these out when done. Do not reuse them.
  - Follow these instructions for 10 days after the sick person's fever and respiratory symptoms have gone away.
  - If you develop a fever or respiratory symptoms, contact your health care provider immediately and tell him or her that you have had close contact with a SARS patient.

## **Appendix J-Isolation and Quarantine**

May 6, 2003

Source: <http://www.cdc.gov/ncidod/sars/isolationquarantine.htm>

To contain the spread of a contagious illness, public health authorities rely on many strategies. Two of these strategies are isolation and quarantine. Both are common practices in public health and both aim to control exposure to infected or potentially infected individuals. Both may be undertaken voluntarily or compelled by public health authorities. The two strategies differ in that isolation applies to people who are known to have an illness and quarantine applies to those who have been exposed to an illness but who may or may not become infected.

### **Isolation: For People Who Are Ill**

Isolation of people who have a specific illness separates them from healthy people and restricts their movement to stop the spread of that illness. Isolation allows for the focused delivery of specialized health care to people who are ill, and it protects healthy people from getting sick. People in isolation may be cared for in their homes, in hospitals, or at designated health care facilities. Isolation is a standard procedure used in hospitals today for patients with tuberculosis (TB) and certain other infectious diseases. In most cases, isolation is voluntary; however, many levels of government (federal, state, and local) have basic authority to compel isolation of sick people to protect the public.

### **Quarantine: For People Who Have Been Exposed But Are Not Ill**

Quarantine, in contrast, applies to people who have been exposed and may be infected but are not yet ill. Separating exposed people and restricting their movements is intended to stop the spread of that illness. Quarantine is medically very effective in protecting the public from disease.

States generally have authority to declare and enforce quarantine within their borders. This authority varies widely from state to state, depending on the laws of each state. The Centers for Disease Control and Prevention (CDC), through its Division of Global Migration and Quarantine, also is empowered to detain, medically examine, or conditionally release individuals suspected of carrying certain communicable diseases. This authority derives from section 361 of the Public Health Service Act (42 U.S.C. 264), as amended.

### **SARS and Isolation**

SARS patients in the United States are being isolated until they are no longer infectious. This practice allows patients to receive appropriate care, and it contains the potential spread of the illness. Those who are more severely ill are being cared for in hospitals. Those whose illness is mild are being cared for at home. Individuals being cared for at home have been asked to avoid contact with other people and to remain at home until 10

days after the resolution of fever, provided respiratory symptoms are absent or improving. (For more information on SARS infection control precautions, visit [CDC's SARS Web site](#).)

**SARS and Quarantine**

To date, CDC has recommended isolation of individuals with SARS, but has not compelled quarantine or isolation of these individuals.

For more information, see [Questions and Answers on Executive Order and Interim Final Rule](#).

For more information, visit [CDC's SARS Web site](#), or call the CDC public response hotline at (888) 246-2675 (English), (888) 246-2857 (Español), or (866) 874-2646 (TTY)

## **Appendix K - Updated Interim Guidance: Pre-Hospital Emergency Medical Care and Ground Transport of Suspected Severe Acute Respiratory Syndrome Patients**

April 29, 2003

Source: <http://www.cdc.gov/ncidod/sars/emtguidance.htm>

### **Introduction**

The current outbreak of Severe Acute Respiratory Syndrome (SARS) has included reports of cases in Southeast Asia, Europe, and North America; and has required ground emergency medical services (EMS) to move patients to medical facilities for further assessment and care. This guidance is intended to assist Emergency Medical Services (EMS) providers to manage suspected SARS patients while ensuring the safety of patients and transport personnel. These interim recommendations are based on standard infection control practices and available epidemiologic information regarding the transmission of SARS.

Currently recommended infection control measures for hospitalized patients with SARS include Standard precautions (with eye protection to prevent droplet exposure), plus Contact and Airborne precautions. Respiratory protection using respirators providing at least 95% filtering efficiency (e.g., N-95) with appropriate fit-testing is recommended. The following guidelines are adapted from these recommendations.

### **Emergency medical ground transport of SARS patients, general considerations**

- Suspected SARS patients should be transported using the minimum number of EMS personnel and without non-SARS patients or passengers in the vehicle.
- Receiving facilities must be notified prior to arrival of suspected SARS patients to facilitate preparation of appropriate infection control procedures and facilities.
- Concerns regarding movement of possible SARS patients in the United States should be discussed with appropriate local, state and federal health authorities, including the Centers for Disease Control and Prevention (CDC) (24 hour response number: (770) 488-7100).

### **Infection Control**

#### **General**

- In addition to respiratory droplet and possible airborne spread, SARS may be transmitted if residual infectious particles on environmental surfaces are brought into direct contact with the eyes, nose or mouth, e.g., by unwashed hands. Therefore, [hand hygiene](#) is of primary importance for all personnel working with possible SARS patients.
- Protective equipment should be used throughout transport of a suspected SARS patient.
- Personal activities (including: eating, drinking, application of cosmetics, and handling of contact lenses) should not be performed during patient transport.

### Protective equipment and procedures

- Disposable, non-sterile gloves must be worn for all patient contact.
- Gloves should be removed and discarded in biohazard bags after patient care is completed (e.g., between patients) or when soiled or damaged.
- Hands must be washed or disinfected with a waterless hand sanitizer immediately after removal of gloves.
- Disposable fluid-resistant gowns should be worn for all direct patient care.
- Gowns should be removed and discarded in biohazard bags after patient care is completed or when soiled or damaged.
- Eye-protection must be worn in the patient-care compartment and when working within 6 feet of the patient. Corrective eyeglasses alone are not appropriate protection.
- N-95 (or greater) respirators should be worn by personnel in the patient-care compartment during transport of a suspected SARS patient; personnel wearing respirators should be fit tested.
- The door/window between driver and patient compartments should be closed before a suspected SARS patient is brought onboard. N-95 (or greater) respirators should be worn by the driver if the driver's compartment is open to the patient-care compartment. Drivers that provide direct patient care (including moving patients on stretchers) should wear a disposable gown, eye-protection, and gloves as described above during patient-care activities. Gowns and gloves are not required for personnel whose duties are strictly limited to driving.
- Vehicles that have separate driver and patient compartments and can provide separate ventilation to these areas are preferred for transport of possible SARS patients. If a vehicle without separate compartments and ventilation must be used, the outside air vents in the driver compartment should be open, and the rear exhaust ventilation fans should be turned on at the highest setting during transport of SARS patients to provide relative negative pressure in the patient care compartment.
- Oxygen delivery with non-rebreather facemasks may be used for patient oxygen support during transport.
- The patient may wear a paper surgical mask to reduce droplet production, if tolerated.

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- Positive pressure ventilation should be performed using a resuscitation bag-valve mask, preferably one equipped to provide HEPA or equivalent filtration of expired air.
- Cough-generating procedures should be avoided during pre-hospital care (e.g., nebulizer treatments).

### **Mechanically Ventilated Patients**

- EMS organizations should consult their ventilator equipment manufacturer to confirm appropriate filtration capability and the effect of filtration on positive pressure ventilation.
- Mechanical ventilators for SARS-patient transport should provide HEPA or equivalent filtration of airflow exhaust.

### **Clinical Specimens**

- Standard precautions must be used when collecting and transporting clinical specimens.
- Clinical specimens should be labeled with appropriate patient information and placed in a clean self-sealing bag for storage and transport.

### **Waste disposal**

- Dry solid waste, e.g., used gloves, dressings, etc., should be collected in biohazard bags for disposal as regulated medical waste in accordance with local requirements at the destination hospital.
- Waste that is saturated with blood, body fluids, or excreta should be collected in leak-proof biohazard bags or containers for disposal as regulated medical waste in accordance with local requirements at the destination hospital.
- Sharp items such as used needles or scalpel blades should be collected in puncture resistant sharps containers for disposal as regulated medical waste in accordance with local requirements at the destination hospital.
- Suctioned fluids and secretions should be stored in sealed containers for disposal as regulated medical waste in accordance with local requirements at the destination hospital. Handling that might create splashes or aerosols during transport should be avoided.
- Suction devices should be fitted with in-line HEPA or equivalent filters in accordance with manufacturer's recommendations.

## **Cleaning and Disinfection after transporting a possible SARS patient**

- Compressed air that might re-aerosolize infectious material should not be used for cleaning the vehicle or reusable equipment.
- Non-patient-care areas of the vehicle should be cleaned and maintained according to vehicle manufacturer's recommendations.
- Personnel performing cleaning should wear non-sterile gloves, disposable gowns and eye-protection while cleaning the patient-care compartment.
- Patient-care compartments (including stretchers, railings, medical equipment, control panels, and adjacent flooring, walls and work surfaces likely to be directly contaminated during care) should be cleaned using an EPA-registered hospital disinfectant in accordance with manufacturer's recommendations.
- Spills of body fluids during transport should be cleaned by placing absorbent material over the spill and collecting the used cleaning material in a biohazard bag. The area of the spill should be cleaned using an EPA-registered hospital disinfectant. Cleaning personnel should be notified of the spill location and initial clean-up performed.
- Contaminated reusable patient care equipment should be cleaned and disinfected promptly after use and before returning to service.
- Personnel should wear non-sterile gloves, disposable gowns and face shields while cleaning reusable equipment.
- Reusable equipment should be cleaned and disinfected according to manufacturer's instructions.

## **Follow-up of EMS Personnel who Transport suspected SARS Patients**

- Personnel who have transported a suspected SARS patient and develop symptoms of SARS within the 10 day post-exposure period should be directed to seek medical evaluation and should be reported to the state health department and to the CDC at the number listed above.
- Personnel may continue working during the 10 day post-exposure period if they have no symptoms of fever or respiratory illness.

## **Acknowledgements**

This guidance was prepared in cooperation with and with contributions from:

*National Council of State EMS Training Coordinators*

*Executive Committee of the National Association of State EMS Directors (NASEMSD)*

## Appendix L Interim Guidance: Air Medical Transport for Severe Acute Respiratory Syndrome (SARS) Patients

May 8, 2003

Source: <http://www.cdc.gov/ncidod/sars/airtransport-sarspatients.htm>

### Introduction

The Centers for Disease Control and Prevention (CDC) is tracking reports of outbreaks of a respiratory illness called severe acute respiratory syndrome (SARS). CDC has issued two types of notices to travelers: advisories and alerts. A *travel advisory* recommends that nonessential travel be deferred; a *travel alert* does not advise against travel, but informs travelers of a health concern and provides advice about specific precautions. CDC updates information on its website on the travel status of [areas with SARS](#) as the situation evolves.

This guidance is intended to assist air medical transport (AMT) service providers using specialized aircraft to transport SARS patients while ensuring the safety of patients and transport personnel. It should not be generalized to commercial passenger aircraft. These interim recommendations are based on standard infection control practices, AMT standards, and epidemiologic information from ongoing investigations of SARS, including experience from air transport of patients during this outbreak.

Currently [recommended infection control measures](#) for hospitalized patients with SARS include Standard Precautions (with eye protection to prevent droplet exposure), plus Contact and Airborne Precautions. Respiratory protection using respirators providing at least 95% filtering efficiency (e.g., N-95) with [appropriate fit-testing is recommended](#).

### Air Transport of SARS Patients, General Considerations

- SARS patients should be transported on a dedicated AMT mission minimizing crew size. There should not be any patients or passengers who do not have SARS on board. If a parent is to accompany a sick child, the parent should use protective equipment during transport as described in section IV, below.
- If possible, a single primary-caregiver should be assigned to the SARS patient.
- All SARS patient movement involving U.S. citizens should be coordinated with appropriate state and federal health authorities, including the [Centers for Disease Control and Prevention \(CDC\)](#) (24 hour response number: (770) 488-7100) and the Department of State, before movement begins. International movement of SARS patients might require special approvals by countries that will be over-flown, aircraft-servicing locations, patient rest-stop hospitals, and/or final destinations.

### Airframe Selection and Cabin Airflow

Cabin airflow characteristics may reduce exposure of occupants to airborne infectious particles; however, based on current understanding of how SARS is transmitted, airflow alone does not provide complete protection of personnel when sharing airspace with an infectious SARS patient. N-95 (or better) respirators are recommended for personnel in any part of an aircraft that shares air (directly or through the ventilation system) with the patient-care cabin.

### **Fixed-wing, pressurized aircraft:**

- AMT service providers should consult manufacturer(s) of their aircraft to identify cabin airflow characteristics, including: HEPA filtration and directional airflow capabilities, air outlet location, presence or absence of air mixing between cockpit and patient-care cabin during flight, and the time and aircraft configuration required to perform a post-mission airing-out of the aircraft.
- Aircraft with forward-to-aft cabin airflow and a separate cockpit cabin are preferred for transport of SARS patients. Aft-to-forward cabin airflow may increase the risk of airborne exposure of cabin and flight deck personnel.
- Aircraft ventilation should remain on at all times during transport of SARS patients, including during ground delays. Aircraft that re-circulate cabin and flight-deck air without HEPA filtration should not be selected for SARS patient transport.
- Aircraft that provide space for crew members to perform necessary personal activities (eating, drinking, handling contact lenses, etc.) in an area that does not share air with the patient-care cabin should be selected for flights likely to exceed 4 hours.

### **Rotor-wing, and non-pressurized aircraft:**

- In aircraft with uncontrolled interior airflow such as rotor-wing and small, non-pressurized fixed-wing aircraft, all personnel should wear disposable, N-95 or better respirators during transport of SARS patients.

## **Patient Placement**

The in-flight environment might preclude the creation of a true negative pressure space; however, some aircraft designs permit a downwind zone of relative airflow isolation. The airflow of each aircraft should form the basis for litter and seat assignments. In general:

- SARS patients should be positioned as far downwind with regard to cabin airflow as possible.
- In AMT aircraft with vertical litter tiers and top-to-bottom airflow, SARS litter patients should be placed in the lowest position in the tier.
- Ambulatory SARS patients should be seated next to the cabin sidewall.
- If a non-SARS patient must be transported simultaneously with SARS patient(s), the non-SARS patient must wear an N-95 respirator during transport and should not be positioned downwind from, or within 3 feet of, the SARS patient.
- If several SARS patients are transported, they may be moved as a group (cohorted) in an aircraft that provides appropriate airflow characteristics as described above.

## **Infection Control**

General:

## **AARC SARS Guidance Document**

- Personnel should not wear leather or other “flight” gloves while providing patient care.
- Eating, drinking, application of cosmetics, and handling of contact lenses should not be done in the immediate patient care area.
- Handling or storage of medication or clinical specimens should not be done in areas where food or beverages are stored or prepared.

### **Protective equipment and procedures:**

- Disposable, non-sterile gloves must be worn for all patient contact.
- Gloves should be removed and discarded in designated trash bags after patient care is completed (e.g., between patients) or when soiled or damaged.
- Hands must be washed or disinfected with waterless hand sanitizer immediately after removal of gloves.
- Disposable fluid-resistant gowns should be worn for all patient care activity.
- Gowns should be removed and discarded in designated trash bags after patient care is completed or when soiled or damaged.
- Goggles or face-shields must be worn for all patient care within 6 feet of the patient. Corrective eyeglasses alone are not appropriate protection.
- Disposable, N-95 respirators are approved for in-flight use. Personnel using N-95 respirators should be fit-tested.
- If air is shared between the cockpit/flight deck and the patient-care cabin, cockpit/flight deck crew should wear disposable N-95 respirators.
- For cockpit crews, aircraft aviator tight-fitting face-pieces capable of delivering oxygen that has not mixed with cabin air may be used in lieu of a disposable N-95 respirator.
- Personal activities that require removal of respirators should not be performed in the patient-care cabin.
- Patients should wear a paper surgical mask to reduce droplet production, if tolerated.
- Oxygen delivery with simple and non-rebreather facemasks may be used for patient oxygen support during flight.
- Positive pressure ventilation should be performed using a resuscitation bag-valve mask. If available, units equipped for HEPA or equivalent filtration of expired air should be used.
- Cough-generating procedures should be avoided during transport (e.g., nebulizer treatments).

## **Mechanically Ventilated Patients**

- Mechanical ventilators for SARS patients should provide HEPA or equivalent filtration of airflow exhaust.
- AMT services should consult their ventilator equipment manufacturer to confirm appropriate filtration capability and the effect of filtration on positive pressure ventilation.

## **Clinical Specimens**

- Standard precautions must be used when collecting and transporting clinical specimens.
- Specimens should be stored only in designated coolers or refrigerators.
- Clinical specimens should be labeled with appropriate patient information and placed in a clean self-sealing bag for storage and transport.

## **Waste Disposal**

- Dry solid waste (e.g., used gloves, dressings, etc.), should be collected in biohazard bags for disposal as regulated medical waste in accordance with local requirements at the destination medical facility.
- Waste that is saturated with blood or body fluids should be collected in leak-proof biohazard bags or containers for disposal as regulated medical waste in accordance with local requirements at the destination medical facility.
- Sharp items such as used needles or scalpel blades should be collected in puncture resistant sharps containers for disposal as regulated medical waste in accordance with local requirements at the destination medical facility.
- Suctioned fluids and secretions should be stored in sealed containers for disposal as regulated medical waste in accordance with local requirements at the destination medical facility. Handling that might create splashes or aerosols during flight should be avoided.
- Suction device exhaust should not be vented into the cabin without HEPA or equivalent filtration. Portable suction devices should be fitted with in-line HEPA or equivalent filters. Externally vented suction should not be used during ground operation.
- Excretions (feces, urine) may be carefully poured down the aircraft toilet.

## **Cleaning and Disinfection**

- After transporting a SARS patient, exits and doors should be closed and aircraft air conditioning turned on at maximum capacity for several minutes in accordance with the airing time specified by aircraft-manufacturers to provide at least one complete air-exchange. Non-pressurized aircraft should be aired out with exits and doors open long enough to ensure a complete air-exchange. Blowers and high-powered fans that might re-aerosolize infectious material should not be used for airing out aircraft.
- Cleaning should be postponed until airing out is complete.
- Compressed air that might re-aerosolize infectious material should not be used for cleaning the aircraft.
- Non-patient-care areas of the aircraft should be cleaned and maintained according to manufacturer's recommendations.
- Cleaning personnel should wear non-sterile gloves, disposable gowns and face shields while cleaning patient-care areas.
- Patient-care areas (including stretchers, railings, medical equipment control panels, and adjacent flooring, walls and work surfaces likely to be directly contaminated during care) should be cleaned using an EPA-registered\* hospital disinfectant in accordance with aircraft manufacturer's recommendations.
- Spills of body fluids during transport should be cleaned by placing absorbent material over the spill and collecting the used cleaning material in a biohazard bag. The area of the spill should be cleaned using an EPA-registered hospital disinfectant. Ground service personnel should be notified of the spill location and initial clean-up performed.
- Contaminated web seats or seat cushions should be placed in a biohazard bag and labeled with the location and type of contamination for later disposal or cleaning.
- Contaminated reusable patient care equipment should be placed in biohazard bags and labeled for cleaning and disinfection at the AMT service medical equipment section.
- Personnel should wear non-sterile gloves, disposable gowns and face shields while cleaning reusable equipment.
- Reusable equipment should be cleaned and disinfected according to manufacturer's instructions.

### Logistical Planning and Post-Mission Follow-Up

- Sufficient infection control supplies should be on board to support the expected duration of the mission plus additional time should the aircraft experience maintenance delays or weather diversions.
- Flight planning should identify emergency or unexpected diversion airfields, and coordinate with authorities in advance.
- Upon mission termination, the AMT team should provide the following information to their medical director: mission number/date; address of the team/aircraft basing; duration of patient transport; names, contact information, and crew positions (including estimated duration of direct patient care provided) of mission personnel.
- AMT services should designate individuals responsible for performing post-mission monitoring of mission personnel and reporting results to the AMT service medical director.
- Mission personnel should be monitored (directly or by telephone) at least once daily for 10 days for evidence of fever or respiratory illness that would require [evaluation and follow-up](#).
- *There are no disinfectant products currently registered by the U.S. Environmental Protection Agency (EPA) specifically for the inactivation of the newly identified viruses associated with SARS. However, related viruses with physical and biochemical properties similar to the possible SARS agents are known to be readily inactivated by EPA-registered chemical germicides that provide low- or intermediate-level disinfection during general use.*

### Ground/In-Flight Emergency Procedures

AMT service providers should have a written plan addressing patient handling during in-flight and/or ground emergency situations. Activities such as donning life vests and litter-patient emergency egress may create special exposure risks. Use of N-95 respirators must be weighed against time constraints and on-board emergency conditions (e.g., smoke in the cabin, sudden cabin decompression). Gowns and latex gloves represent a fire/flash hazard and should not be worn during ground or in-flight emergency situations.

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## Appendix M- Treatment

March 25, 2003

Source: <http://www.cdc.gov/ncidod/sars/treatment.htm>

No specific treatment recommendations can be made at this time. Empiric therapy should include coverage for organisms associated with any community-acquired pneumonia of unclear etiology, including agents with activity against both typical and atypical respiratory pathogens (2). Treatment choices may be influenced by severity of the illness. Infectious disease consultation is recommended.

May 20, 2003

Clinicians evaluating suspected cases should use standard precautions (e.g., hand hygiene) together with airborne (e.g., N-95 respirator) and contact (e.g., gowns and gloves) precautions (see the Updated Interim Domestic Infection Control Guidance in the Health Care and Community Setting for Patients with Suspected SARS). Until the mode of transmission has been defined more precisely, eye protection also should be worn for all patient contact. As more clinical and epidemiologic information becomes available, interim recommendations will be updated.

## Appendix N-SARS Training and Reference Materials

Source: <http://www.cdc.gov/ncidod/sars/training.htm>

### Information from the CDC

#### Training

- **May 20 Webcast: Public Health Community Preparedness for SARS** (May 20, 2003)
- **May 8 Webcast: Increasing Clinician Preparedness for SARS** (May 14, 2003)
- **April 4 Webcast: Preventing the Spread of SARS** (Apr 7, 2003)

### MMWR Articles (Morbidity and Mortality Weekly Report)

- **MMWR SARS mGuide Summaries**  
[http://www.cdc.gov/mmwr/mguide\\_sars.html](http://www.cdc.gov/mmwr/mguide_sars.html)

### Emerging Infectious Diseases (EID) Articles


- **Severe Acute Respiratory Syndrome (SARS) in Singapore: Clinical Features of Index Patient and Initial Contacts**



Hsu L-Y, Lee C-C, Green JA, Ang B, Paton NI, Lee L, et al.  
Emerging Infectious Disease [serial online] 2003 Jun;9(6).

- **Control Measures for Severe Acute Respiratory Syndrome (SARS) in Taiwan**

Twu S-J, Chen T-J, Chen C-J, Olsen SJ, Lee L-T, Fisk T, et al.  
Emerging Infectious Disease [serial online] 2003 Jun;9(6).

### Additional Reference Materials

- **Characterization of a Novel Coronavirus Associated with Severe Acute Respiratory Syndrome**  PDF (823 KB/10 pages)  
Science [serial online] 30 Apr 2003;10.1126/science.1085952. [View Abstract](#)

- **The Genome Sequence of the SARS-Associated Coronavirus**  PDF (891 KB/13 pages)  
  
Science [serial online] 30 Apr 2003;10.1126/science.1085953. [View Abstract](#)
- **A Novel Coronavirus Associated with Severe Acute Respiratory Syndrome**  
  
Ksiazek TG, Erdman D, Goldsmith C, Zaki SR, Peret T, Emery S, et al.  
New England Journal of Medicine [serial online] 11 Apr 2003;10.1056/NEJMoa030781.
- **Guideline for Isolation Precautions in Hospitals**  
  
Garner JS & the Hospital Infection Control Practices Advisory Committee.  
American Journal of Infection Control 1996;24:24-52.
- **Practice Guidelines for the Management of Community-Acquired Pneumonia in Adults**  
  
 PDF (287 KB/36 pages)  
  
Bartlett JG, Dowell SF, Mandell LA, File TM, Musher DM, Fine MJ.  
  
Clinical Infectious Disease 2000;31:347–82.

## **Information from the AARC**

### **AARC Web page Links to Information About SARS**

The AARC is keeping a close eye on SARS developments and is committed to keeping its members fully informed as more becomes known about this deadly disease and how it spreads. The AARC maintains a SARS page on its website at <http://www.aarc.org/resources/sars/>

### **AARC SARS Webcast**

#### **SARS: Lessons from the Front Lines**

Learn about SARS from those who have been living it on the front lines in Toronto (Presented June 17, 2003) Available to AARC members only.  
<http://www.aarc.org/education/webcast/archives/>

### **AARC Times Editorial**

#### **SARS: Will It Be Different in the United States?**

by Sam P. Giordano, MBA, RRT, FAARC, AARC Executive Director  
<http://www.aarc.org/resources/sars/giordano.asp>  
Published in *AARC Times* May 2003