



Healthcare Worker Exposures to Suspect SARS Cases: Prevention and Surveillance Toolkit

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I. BACKGROUND

An outbreak of an unexplained illness called Severe Acute Respiratory Syndrome (SARS) is occurring globally. In the United States, over 100 suspected cases of SARS from a majority of states have been reported to the Centers for Diseases Control and Prevention (CDC) (<http://www.cdc.gov/od/oc/media/sars.htm>). The etiologic agent of SARS has not been confirmed, but the role of a previously unknown coronavirus is under consideration.

The modes of transmission of SARS are not understood. Early reports have suggested that the agent responsible for SARS can be transmitted during close contact between patients and healthcare workers (HCWs). The Centers for Disease Control and Prevention (CDC) has issued interim recommendations that personal protective equipment appropriate for standard, contact, and airborne precautions (e.g., hand hygiene, gown, gloves, and N95 respirator), in addition to eye protection, be used while caring for SARS suspect case patients (<http://www.cdc.gov/ncidod/sars/infectioncontrol.htm>).

It has been recommended that HCWs who have had unprotected exposure to a SARS suspect case patient and who develop fever or respiratory symptoms be excluded from duty (<http://www.cdc.gov/ncidod/sars/exposureguidance.htm>). Furthermore, both active and passive surveillance have been recommended in the management of exposures to SARS in a healthcare facility so as to detect symptomatic HCWs before secondary transmission can occur.

This toolkit was designed to be used by hospital infection control practitioners, as well as state and local health departments, to implement both proper infection control and systematic surveillance in healthcare facilities where healthcare workers have been exposed to suspected SARS patients. Additionally, this surveillance system will provide valuable information about the epidemiology of SARS transmission to HCWs.

II. OBJECTIVES

- 1) Assist in the management of HCW exposures to SARS to reduce the risk of transmission
- 2) Estimate the risk of infection among HCWs according to level of exposure
- 3) Identify risk factors for SARS infection in HCWs
- 4) Identify extent of sub clinical illness due to SARS in HCWs

III. INVESTIGATION SITES

A. Prospective investigations: States with a SARS suspect case patient who, although not yet tested for coronavirus, has:

1. A strong travel history to an area with community transmission or an epidemiologic link to another SARS suspect case patient,
2. Chest X-ray evidence of pneumonia, AND
3. Is either currently hospitalized or has been recently evaluated in an ambulatory setting.

B. Retrospective investigations: States with hospitalized SARS suspect case patients that have evidence of coronavirus on laboratory testing.

IV. INVESTIGATION TEAM

- Infection Control Personnel and Hospital Epidemiologists of involved healthcare facilities
- State Health Departments Epidemiologists and Infection Control Personnel
- CDC, SARS Clinical and Infection Control Team: L. Clifford McDonald, Matthew Kuehnert, and Benjamin Park

V. DEFINITIONS

Recommended isolation precautions: Standard, airborne, and contact precautions are recommended as outlined in the Updated Interim Domestic Infection Control Guidance in the Health Care and Community Setting for Patients with Suspected SARS <http://www.cdc.gov/ncidod/sars/infectioncontrol.htm> and defined by the Hospital Infection Control Practices Advisory Committee (HICPAC) Guideline for Isolation Precautions in Hospitals <http://www.cdc.gov/ncidod/hip/ISOLAT/Isolat.htm>. Measures include placing the patient in a negative pressure room and the use of personal protective equipment including N95 (or higher) respiratory protection, glove, gown, and eye protection whenever the HCW enters the patient's room.

Exposure: Any time a HCW enters the *immediate care area* of a SARS suspect case patient.

Unprotected exposure: Exposure to a SARS suspect case patient either before institution of all recommended isolation precautions or, following institution, the HCW is known or suspected of being non-compliant with recommended isolation precautions.

Immediate care area: The space dedicated to the care of the suspected SARS patient, for example a private or semi-private room. In the outpatient setting, the space would be defined as an examination room in a clinic or office. For open wards such as certain emergency departments or some intensive care units (ICUs) in which more than two patients are cared for in a common ward, the patient care area is limited to the *10-foot radius around the patient*. In a common outpatient waiting or check-in area, the immediate area is limited to the 10-foot radius surrounding the patient. During the time hospitalized patients are transported outside of their rooms, the immediate patient care area is limited to the 10-foot radius surrounding the patient.

Contiguous airspace: The areas surrounding a patient defined by the free flow of air throughout a room; the area outside of a room is included if the door to that room is usually open. Examples include a private or semi-private room, waiting room, "open" ward, and an open bay emergency room (i.e. where nothing

more than curtains separate patients). The hallway outside a functioning negative pressure room with doors appropriately closed before and after access is NOT considered a contiguous airspace. The hallway outside a regular private or semi-private hospital room, or examination room, may be considered a contiguous airspace if the door is commonly left open.

Facility encounter: The encounter between the index SARS patient and the healthcare facility included the duration of an outpatient ambulatory care visit or an entire inpatient admission and should generally include the entire period during which HCWs *could* have had contact with the patient (i.e. including the time the patient spends in a waiting area or registration).

Direct contact: Direct contact is defined as the HCW having physical contact (protected or unprotected) with any part of the skin or clothes of the individual in question. By definition, this must occur in the immediate care area of the patient.

Indirect contact: Contact with an inanimate object that may have already come in contact with the patient. Contact with an inanimate object that has not yet come in contact with the patient is not considered “indirect contact.”

Healthcare Worker (HCW): Any employee or contractor of a healthcare facility including physicians, nurses, students, respiratory therapists, phlebotomists, laboratory staff, as well as transport, food service, housekeeping, volunteers, and maintenance personnel.

Active Surveillance Period: The period of active surveillance for a given HCW, defined as beginning the first day of exposure to a suspect SARS patient, and ending 10 days after the last exposure to the suspect patient.

Passive Surveillance Period: The period of passive surveillance for a facility, defined as beginning the first day the suspect SARS patient enters the facility, and ending 10 days after the suspect patient leaves the facility.

VI. DESCRIPTION- PROSPECTIVE INVESTIGATIONS

A. Overview

An overall strategy for HCW surveillance in facilities with a SARS suspect case patient is demonstrated in Figure 2 below. Initial steps should consist of institution of proper infection control guidelines, followed by education of HCWs. Exposed HCWs should then be identified for inclusion into active surveillance; HCWs who were not exposed should be included in passive surveillance. A standard operating procedure (SOP) is provided for infection control practitioners or other investigators in Appendix 1. The SOP should be used *in conjunction* with this protocol.

B. Settings and Initial Isolation Precautions

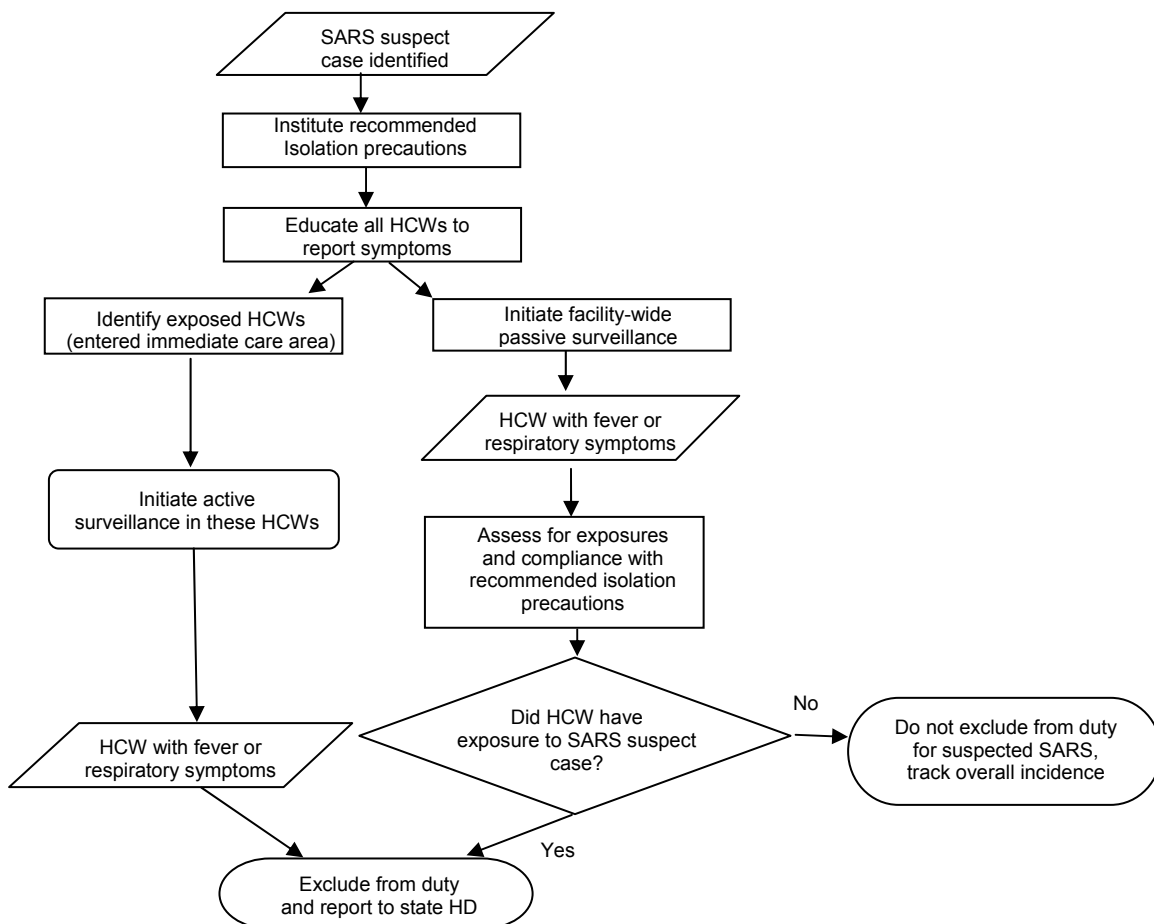
Settings where a SARS suspect case patient may expose HCWs include emergency departments, and outpatient clinics or offices. It has been recommended that patients be screened for SARS early in the triage process (http://www.cdc.gov/ncidod/sars/triage_interim_guidance.htm) so that recommended isolation precautions can be instituted immediately. As shown in Figure 2, once a SARS suspect case

patient is identified, the infection control practitioner (ICP) should immediately institute recommended isolation precautions (see “Recommended isolation precautions” in Definitions section).

C. Education

Once a SARS patient has been identified and recommended isolation precautions instituted, all HCWs in the facility should be educated regarding the symptoms of SARS to watch for. To assist in this educational process, an **information card** (see Appendix 2) is included in this toolkit for printing and dissemination.

Figure 2. HCW Surveillance Strategy in Facilities with a SARS Suspect Case



D. Identification of HCWs for Active and Passive Surveillance

The investigator next should identify those HCWs who entered, or who will enter, the *immediate care area* of the suspected SARS patient. All HCWs who enter the immediate care have had *exposure* to the suspected SARS patient, and should be enrolled in Active Surveillance (see section E). All other HCWs should be enrolled in Passive Surveillance.

1. Identifying HCWs who have already been exposed. There are two suggested methods for identifying these HCWs, which may be used in combination with each other. In the first method, the investigator

reviews the medical chart, nursing schedules, phlebotomy schedules, and other labor records to identify those that were in the area and may have been exposed in the immediate care area. In the second method, the investigator distributes a card with contact information (see Appendix 3) to HCWs who may have been exposed. HCWs who respond to the contact number on the card should be quickly screened to evaluate if they entered the immediate care area of the patient.

2. Identifying HCWs who will be exposed. If the suspect patient is still at the facility, HCWs will continue to be exposed to the suspect SARS patient. One suggested method to track subsequent HCW exposures is to consider keeping a list outside the patient's immediate care area and asking all HCWs who enter the area to record their name. A suggested format for such a list is included in Appendix 4.

E. Conducting Active and Passive Surveillance

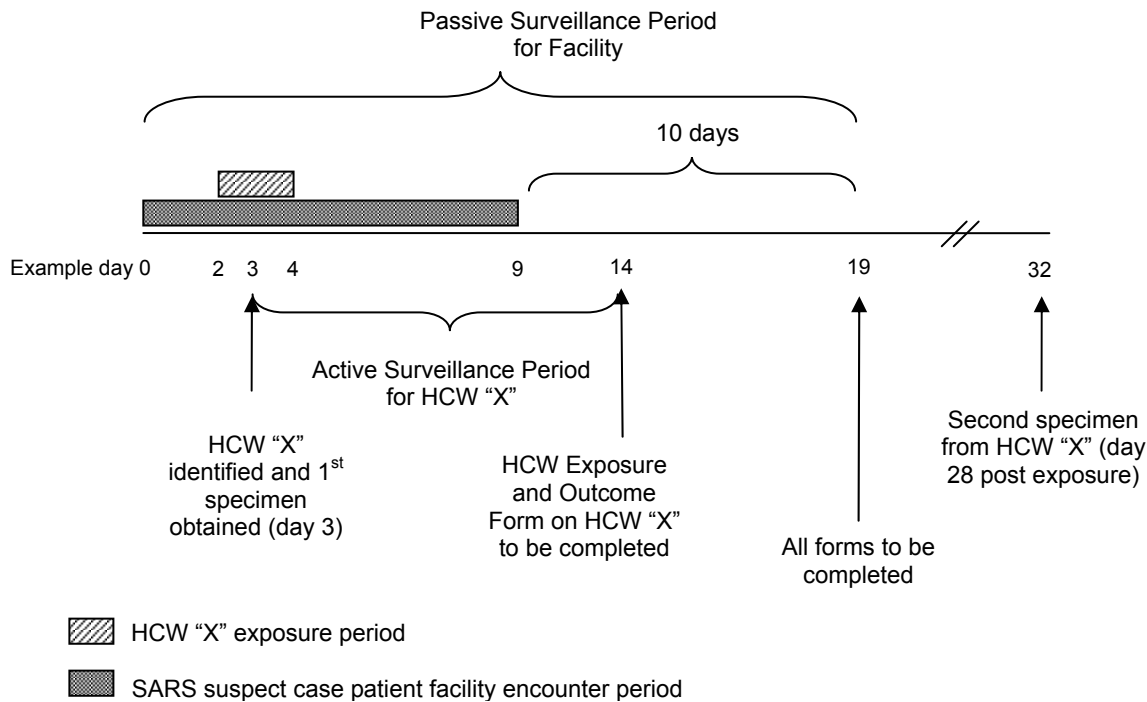
1. Overview and time course

Active surveillance should be conducted on all HCWs who were entered the immediate care area of the SARS suspect patient at any time. Passive surveillance should be conducted on all other HCWs in the facility. An example of the time course for the surveillance activities is shown below.

In the example shown below in Figure 3, a SARS suspect case patient begins the Facility Encounter on day 0. HCW "X" is exposed to the suspect patient beginning on day 2. HCW "X" is identified on day 3 as having been exposed, at which time the 1st specimen is collected and sent to CDC. HCW "X" exposure to the suspect patient ends on day 4. On day 9, the patient is discharged from the hospital.

Active surveillance on exposed HCWs continues until 10 days after the exposure ended, in this case on day 14. At the end of the Active Surveillance Period, the **HCW Exposure and Outcome Form** should be completed. Passive surveillance for the facility continues until 10 days after the suspect patient's facility encounter ends, in this case on day 19. At this time (or soon thereafter) all **HCW Exposure and Outcome Forms**, and the **Facility and HCW Exposure and Outcome Form** should be completed and sent to the state HD and CDC. Twenty-eight days after HCW "X" exposure ended a final specimen from HCW "X" is to be collected, in this case on day 32.

Figure 3. Timeline of surveillance and specimen collection with example days.



2. Active Surveillance

All HCWs who entered the immediate care area of the SARS suspect patient at any time should be identified and enrolled into active surveillance, as described above. If this number is sufficiently large such that complete sampling is impossible or extremely difficult, the investigator should contact the state HD for further guidance. Potential solutions to this could be to sample HCWs randomly in an unbiased fashion, or to provide outside assistance with data collection.

If a HCW did not enter the immediate care area, but specifically requests to be enrolled, that HCW can be enrolled and included in the active surveillance group. HCWs who were never in a contiguous airspace with the index case patient should generally not be enrolled in active surveillance.

Enrollment into active surveillance should consist of obtaining informed consent from the HCW, and collection of the first specimen set. Thereafter, HCWs should be contacted regularly until 10 days following the end of the exposure. Soon after the exposure ends, the investigator should complete all but the Outcome section of the **HCW Exposure and Outcome Form**. If fever or respiratory symptoms develop during this period, the HCW should be immediately excluded from duty (<http://www.cdc.gov/ncidod/sars/exposureguidance.htm>) and reported to the state HD as a potential SARS suspect case. At the end of the 10-day incubation period the **HCW Exposure and Outcome Form** should be completed.

3. Passive Surveillance

Passive surveillance should be conducted by regular (e.g. daily or every other day) review of occupational health and sick-leave records for all HCWs in the facility and continued from the time the SARS suspect case patient is first recognized until 10-days after the end of the facility encounter.

Any HCW who develops fever or respiratory symptoms during this period should be assessed to determine whether they entered the immediate care area of the SARS suspect case patient or were not completely compliant with personal protective equipment guidelines. If the HCW had such an exposure, informed consent should be obtained, the **HCW Exposure and Outcome Form** completed, and a specimen collected (thereby entering the HCW into Active Surveillance).

Additionally, if exposure to a close contact of the SARS patient who may have been ill (e.g. patient's family member or other visitor) occurred, the HCW should be entered into Active Surveillance.

Furthermore, any HCW who develops fever or respiratory symptoms during the 10-day period following unprotected exposure to a SARS suspect case patient, or following exposure to a close contact of the patient, should be excluded from duty (<http://www.cdc.gov/ncidod/sars/exposureguidance.htm>) and reported to the state HD.

Generally a symptomatic HCW who did not enter the immediate care area of a suspect SARS patient should not be enrolled or excluded from work unless there is a clustering of symptomatic HCWs with this exposure level and/or there is a high attack rate of symptom development in the active surveillance group. It is recommended that the State Health Department and the CDC be immediately contacted if such a scenario occurs.

The **Facility Encounter Form**, as well as all HCW Exposure and Outcome Forms, should be completed when the Passive Surveillance Period ends, or 10 days after the patient leaves the facility.

F. Specimen Collection

Serum is the only specimen requested from HCWs unless they develop symptoms of fever or respiratory symptoms suggestive of SARS. If this occurs, the state HD should be notified immediately, and specimens should be collected as appropriate for any other SARS suspect case patient (i.e. serum, nasopharyngeal swab, oropharyngeal swab, stool sample).

The first serum sample is to be collected from each HCW enrolled in active surveillance on the date that they are enrolled. The second and final serum sample should be collected from the HCW at least 28 days following the end of their exposure.

Instructions for specimen collection, labeling, storage, and shipment are included in Appendix 5.

G. Informed Consent

Participation in the investigation is strictly voluntary. HCWs from whom specimens will be collected will be asked to sign the consent to participate in investigation, and specimens will be collected and stored for possible future testing (Appendix 6). Participants will be also notified that they may be contacted in future, to participate in further studies. Participants will be provided with a copy of the signed consent form and the investigator coordinator will keep another copy.

H. Data Management and Analysis

Each participant should be assigned identifiers indicating the Hospital Investigation #, ID number of the index SARS case in the CDC database, and individual Hospital HCW#. More information on these numbers are in the line by line instructions. The investigation database will be developed by CDC and demographic, clinical, epidemiologic, and laboratory data for participating healthcare facilities will be entered. The identifier for the index SARS case will allow retrieval of index case data already reported to CDC.

VII. DESCRIPTION- RETROSPECTIVE INVESTIGATIONS

A. Education

If the toolkit is applied retrospectively, education should still be undertaken up until 10 days after the end of the facility encounter with the SARS suspect case patient; after this period any infected HCWs would be likely to have already manifest symptoms and education less likely to prevent secondary transmission.

B. Identification of exposed HCWs

The investigator should next identify those HCWs who were exposed to the suspect patient, in other words, those HCWs who entered the immediate care area of the patient at any time. These HCWs should be consented, have a **HCW Exposure and Outcome Form** completed, and specimens obtained (see below).

For retrospective investigations, often the investigator will already be aware of many of the HCWs who have been previously exposed. There are a few suggested methods to identify other HCWs who may not be known. These methods, described in detail in Section VII, Part D, can be implemented separately or together for more active case-finding.

C. Active and Passive Surveillance

If the HCWs are identified for active surveillance over 10 days after the end of their exposure, no regular follow-up for symptom development is required. Instead a **HCW Exposure and Outcome Form** should be completed at the time they are identified and the outcome section completed at the same time as the exposure section.

If the passive surveillance period is completely past, available employee health logs should still be reviewed and previously sick HCWs contacted to determine whether the HCW had fever or respiratory symptoms during this period and, if so, whether they entered the immediate care area of the index case. If a symptomatic HCW is identified retrospectively to have had such an exposure, the HCW should be consented, a **HCW Exposure and Outcome Form** completed, and one specimen collected at least 28 days after exposure.

A **Facility Encounter Form** should be filled out for each facility.

D. Informed Consent

Participation in the investigation is voluntary. All participants should sign informed consent. Please see above section and Appendix 6.

E. Specimen Collection

If the toolkit is applied retrospectively and HCWs are enrolled after 21 days following exposure, only one serum sample should be obtained >28 days following exposure. If enrollment occurs ≤ 21 days following exposure two successive samples should be obtained, the first on the day of enrollment and the second after 28 days following exposure.

Instructions for specimen collection, labeling, storage, and shipment are included in Appendix 5.