

*Communicable Diseases Protocol*

# Severe Acute Respiratory Syndrome coronavirus (SARS- CoV)

**Public health priority:** Urgent.

PHU response time: Respond to cases immediately on notification. Report details of case to COB on day of notification.

**Case management:** Ensure appropriate infection control measures are being applied and investigate case for exposure and risk factor information. Seek expert advice.

**Contact management:** Identify close contacts and manage according to expert advice.

SARS-CoV is a notifiable infection in NSW under the Public Health Act 2010 and is a listed human disease under the national Biosecurity Act 2015.

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## 1. Summary

No cases of SARS have been reported since the global outbreak in 2003-04. A resurgence of SARS remains a distinct possibility.

### Public health priority

SARS coronavirus is a scheduled disease under NSW Public Health Act 2010 with notification required by doctors, hospitals and laboratories.

### Case management

Isolate suspected cases in a single room with negative pressure air-handling and an en-suite bathroom (if available) and use standard and transmission-based precautions (contact and airborne).

### Contact management

Close contacts of confirmed cases are subject to some work and travel restrictions and should be actively monitored for development of fever and respiratory symptoms in the 10 days following the last contact, while casual contacts are subject to self-monitoring only.

## 2. The disease

### Infectious agents

The SARS coronavirus (SARS-CoV).

### Mode of transmission

SARS is spread mainly through droplet transmission. Transmission through contact with fomites may play a role. Airborne transmission may occur in some settings.

## **Reservoir**

The masked palm civet was the wildlife species most often associated with animal-to-human transmission; however, whether the civet is the natural reservoir or an intermediary species for SARS remains unclear. Research from China suggests that the horseshoe bat is the natural host of SARS-like coronaviruses. [1]

## **Incubation period**

The incubation period for SARS is typically 2-7 days, but can range between 1 and 10 days (longer incubation periods have been postulated).

## **Infectious period**

Cases are most infectious in the second week of illness but can shed virus in stool and respiratory secretions (and may be infectious) for more than 3 weeks.

## **Clinical presentation and outcome**

The illness usually begins with a fever, and is associated with systemic symptoms such as headache, myalgia, and malaise.

After 2 to 7 days, a lower respiratory phase begins and patients may develop a non-productive cough that can progress to shortness of breath. Around 20% of hospitalised cases require mechanical ventilation.

In many patients, the respiratory phase is characterised by early focal interstitial infiltrates on chest x-ray that progress to more generalised patchy interstitial infiltrates or areas of consolidation.

During 2003-04, about 15% of hospitalised cases were fatal. Cases who are elderly, immunocompromised or with co-morbidities have an increased mortality rate.

## **Disease occurrence and public health significance**

SARS was first recognized as a global threat in March 2003 after emerging in southern China. The illness spread to more than two dozen countries in North America, South America, Europe, and Asia. The World Health Organization reported that there were 8096 probable cases of SARS notified, including 774 fatal cases. [2] A total of 1704 SARS cases occurred in healthcare workers.

No case of SARS have been reported anywhere in the world since 2004.

Knowledge about the epidemiology and ecology of SARS coronavirus infection remains limited. Resurgence of SARS remains a distinct possibility.

## **3. Routine prevention activities**

There are no specific prevention activities recommended related to SARS. Travellers should follow routine travel health advice, including avoiding contact with bats and other wild animals, and avoiding live animal markets.

## **4. Surveillance objectives**

- To rapidly identify and isolate cases to prevent outbreaks
- To identify and counsel contacts and ensure that they are isolated rapidly should symptoms occur
- To describe the epidemiology of SARS in NSW.

## **5. Data management**

Confirmed and suspected cases of SARS-CoV infection should be entered onto the NCIMS database within one working day of notification/report.

## 6. Communications

Public health units should immediately notify the Communicable Diseases Branch of suspected cases linked to an Alert Case Cluster, and Confirmed cases and enter onto the NCIMS database within one working day of notification/report.

Confirmed cases of SARS are notified nationally and are also required to be notified under the International Health Regulations (2005). [3]

## 7. Case definition

### Confirmed Case

A confirmed case requires laboratory definitive evidence and clinical evidence.

#### Laboratory definitive evidence:

- Detection of SARS coronavirus (SARS-CoV) by nucleic acid testing using a validated method from at least two different clinical specimens (e.g., nasopharyngeal and stool), OR the same clinical specimen collected on two or more occasions during the course of the illness (e.g. sequential nasopharyngeal aspirates), OR two different assays or repeat PCR using a new RNA extract from the original clinical sample on each occasion of testing
- **or** seroconversion or significant increase in antibody level or fourfold or greater rise in titre to SARS-CoV tested in parallel by enzyme-linked immunosorbent assay or immunofluorescent assay
- **or** isolation of SARS-CoV AND detection of SARS-CoV by nucleic acid testing using a validated method.

#### Clinical evidence

A person with a history of:

- Fever ( $\geq 38^{\circ}\text{C}$ )
- **and** one or more symptoms of lower respiratory tract illness (cough, difficulty breathing),
- **and** radiographic evidence of lung infiltrates consistent with the pathology of pneumonia or acute respiratory distress syndrome (ARDS) OR autopsy findings consistent with the pathology of pneumonia or ARDS.

### Alert case cluster

In the absence of an alternate diagnosis:

- Two or more health care workers in the same health care unit fulfilling the clinical case definition of SARS and with onset of illness in the same 10-day period
- **or** hospital acquired illness in three or more persons (health care workers and/or other hospital staff and/or patients and/or visitors) in the same health care unit fulfilling the clinical case evidence for a confirmed SARS case and with onset of illness in the same 10-day period.

Note:

- Individuals in an Alert Case Cluster are classified as Suspect cases for NCIMS data entry purposes
- The Alert case cluster definition is used during inter-outbreak periods. Alert case clusters should be reported to State and Territory Health Departments, and informally reported to the Australian Government Department of Health.
- The aim of the Alert Case Cluster is to provide early warning of the potential recurrence of SARS (or other important respiratory pathogen) to:
  - rapidly implement appropriate infection control measures

- expedite diagnosis
- activate the public health response.
- Revised case definitions are likely to be issued during SARS outbreaks.

## 8. Laboratory testing

Patients to be considered for SARS-CoV testing are described under the Alert Case Cluster definition (above). Consult with the Communicable Diseases Branch, Health Protection NSW to seek advice on: which NSW laboratories can provide SARS-CoV testing; appropriate specimen type, collection and transport; and also to facilitate contact management if indicated.

Transmission-based contact and airborne precautions must be used when collecting respiratory specimens. These include:

- Contact precautions, including close attention to hand hygiene
- Airborne transmission precautions, including routine use of a P2 mask/respirator, disposable gown, gloves, and eye protection
- Collection in a room with negative pressure air-handling where available.

Routine tests for acute pneumonia/pneumonitis should be performed where indicated, including bacterial cultures, acute and convalescent serology, urinary antigen testing and tests for respiratory viruses, according to local protocols.

Serology, if available, may be useful in cases where SARS-CoV is strongly suspected but non-confirmed with nucleic acid testing (NAT), but requires paired acute and convalescent sera - seek expert clinical microbiology advice. Serology is also useful to estimate secondary infection rates in asymptomatic cases following exposure to SARS-CoV.

## 9. Case management

### Response time

On the same day as notification of an Alert Case Cluster or Confirmed case, begin follow up investigation and notify the Communicable Diseases Branch, Health Protection NSW.

### Response procedure

#### Case investigation

The response to a notification will normally be carried out in collaboration with the clinicians managing the case(s). Public health units should use the MERS-CoV Investigation Form\_ until a SARS-specific case investigation form is available.

Regardless of who does the follow-up, PHU staff should ensure that action has been taken to:

- Confirm the onset date and symptoms of the illness
- Confirm results of relevant pathology tests, or recommend that tests be done
- Seek the treating doctor's permission to contact the case(s) or relevant care-giver
- Determine if the diagnosis has been discussed with the case or relevant care-giver before beginning the interview
- Review case and contact management
- Ensure appropriate infection control guidelines are followed in caring for the case
- Identify the likely source of infection.

If interviews with suspected cases are conducted face-to-face, the person conducting the interview must have a thorough understanding of infection control practices and be competent in using appropriate PPE.

Wherever possible, cases should be managed in hospital. If clinically indicated, cases may be managed at home only if it can be ensured that the case and household contacts are counselled about risk and that appropriate infection control measures are in place.

### **Case treatment**

In the absence of pathogen-specific interventions, patient management largely depends on supportive treatment, and vigilance for and prevention of complications.

### **Education**

Provide [SARS-CoV Factsheets](#) to cases and their close contacts. Ensure that they are aware of the signs and symptoms of SARS-CoV, the requirements of isolation, contact details of the PHU and the infection control practices that can prevent the transmission of SARS-CoV.

### **Isolation and restriction**

Cases must be isolated in an appropriate health facility, unless alternative arrangements are recommended on expert advice. Healthcare workers and others who come into contact with suspected, probable and confirmed cases must be protected according to recommended infection control guidelines. Visitors should be restricted to close family members.

A risk assessment should be undertaken for suspected cases who initially test negative for SARS-CoV. If there is no alternative diagnosis and a high index of suspicion remains that such cases may have SARS-CoV infection, consideration should be given to continued isolation and use of the recommended infection control precautions, pending further testing and re-assessment.

Given the severity of reported infections, the evidence of limited person-to-person transmission, and gaps in knowledge of transmission pathways, the recommendations on isolation and PPE for management of suspected, probable and confirmed cases take a deliberately cautious approach.

Infection control measures should be those applicable to control the transmission of pathogens that can be spread by the airborne route. Until specific infection control guidance is issued, PHUs and clinicians should refer to the measures detailed in the [Interim infection prevention and control advice for acute care hospitals relating to suspected Middle Eastern respiratory syndrome coronavirus \(MERS-CoV\) infections](#).

In summary, transmission-based precautions for suspected, probable and confirmed cases should include:

- Placement of cases in a negative pressure room with an ensuite bathroom, if available, or in a single room from which the air does not circulate to other areas
- Airborne transmission precautions, including routine use of a P2 respirator (or N95 mask), long sleeved disposable gown, gloves, and eye protection when entering a patient care area
- Contact precautions, including close attention to hand hygiene
- If transfer of the confirmed or probable case outside the negative pressure room is necessary, asking the patient to wear a "surgical" face mask while they are being transferred and to follow respiratory hygiene and cough etiquette.

### **Active case finding**

Contacts (see [Section 11. Contact management](#)) should be identified and advised to immediately seek medical advice should they develop symptoms. Contacts or caregivers should be asked to also inform the public health agency if they develop symptoms.

## **10. Environmental evaluation**

Where local transmission of SARS-CoV is thought possible, a thorough review of contributing environmental factors should be done. This should include a review of infection control procedures, and opportunities for exposure to respiratory or faecal contamination.

If a case has had occupational exposure to animals consult with animal health authorities.

## 11. Contact management

As there remain gaps in the understanding of infectivity of SARS-CoV cases and transmission modes the definition of contacts is based on observations of people infected in large outbreaks, particularly the outbreak in South Korea. The definition of contacts and recommended control measures are subject to review as more information on SARS-CoV becomes available.

### Identification of close contacts

All persons categorised as a contact (see definitions of "close contacts" and "casual contacts" following) of probable and confirmed cases should be followed-up and monitored for the development of symptoms for 14 days after the last exposure to the case (i.e. the maximum incubation period).

Close contacts of suspected cases should also be considered for contact management if there is likely to be a delay in confirming or excluding the suspected case, such as delayed testing.

### Close contact definition

A close contact is defined as requiring greater than 15 minutes face-to-face contact with a symptomatic probable or confirmed case in any setting, or the sharing of a closed space with a symptomatic probable or confirmed case for a prolonged period (e.g. more than 2 hours).

Hence, close contacts may include:

- A healthcare worker or family member providing direct patient care to, or who were within close vicinity of an aerosol generating procedure performed on, or a laboratory worker who performed tests on specimens from, a confirmed or probable case, without recommended infection control precautions, including not using full personal protective equipment (PPE)
- or a healthcare worker, patient or visitor who shared the same closed space for a prolonged time
- (e.g. more than 2 hours), and without recommended infection control precautions, including not using full personal protective equipment (PPE).
- or people who resided in the same household or household-like setting (e.g. dormitory room in a boarding school).

Contact tracing by public health units should prioritise identifying close contacts, particularly healthcare workers, and other close contacts who may be at higher risk of severe disease, including the elderly and those with significant co-morbidities.

### Casual Contact definition

Casual contact is defined as any person having less than 15 minutes face-to-face contact with a symptomatic probable or confirmed case in any setting, or sharing a closed space with a symptomatic probable or confirmed case for less than 2 hours. This will include healthcare workers, other patients, or visitors who were in the same closed healthcare space as a case, but for shorter periods than those required for a close contact. Other closed settings might include schools or offices.

Note that healthcare workers and other contacts who have taken recommended infection control precautions, including the use of full PPE, while caring for a symptomatic probable or confirmed SARS-CoV case are not considered to be close contacts. However, these people should be advised to self-monitor and if they develop symptoms consistent with SARS-CoV infection they should isolate themselves and notify their public health unit or staff health unit so they can be tested and managed as a suspected SARS-CoV case (see recommendations below under [Management of symptomatic contacts](#)).

Other casual contacts may include:

- Extended family groups, e.g. in an Aboriginal community.

- Aircraft passengers who were seated in the same row as the case, or in the two rows in front or two rows behind a symptomatic probable or confirmed SARS-CoV case. It is noted that to date no instances of transmission on airlines have been identified. Contact tracing of people who may have had close contact on long bus or train trips should also be attempted where possible, using similar seating/proximity criteria.
- All crew-members on an aircraft who worked in the same cabin area as a symptomatic probable or confirmed case of SARS-CoV. If a crew member is the symptomatic SARS-CoV case, contact tracing efforts should concentrate on passengers seated in the area where the crew member was working during the flight and all of the other members of the crew.

Where resources permit, more active contact tracing may be extended to other persons who have had casual contact (as defined above), particularly in school, office, or other closed settings. In these circumstances, the size of the room/space and degree of separation of the case from others should be considered in identifying contacts.

### **Contact assessment**

All persons identified as having had contact with a symptomatic probable or confirmed case should be assessed to see if they should be classified as a close contact and have demographic and epidemiological data collected. Information on close contacts should be managed according to jurisdictional requirements.

Identification and assessment of the contacts of suspected cases may be deferred pending the results of initial laboratory testing. However, contact tracing should be considered if SARS-CoV infection remains high on the list of differential diagnoses, even if initial laboratory results are negative or are pending.

### **Close Contact testing**

Routine laboratory screening for SARS-CoV infection is not recommended for asymptomatic contacts. One exception is in the setting of a hospital outbreak, where RT-PCR testing of nose/throat swabs of asymptomatic close contacts should be considered, if feasible. RT-PCR-positive asymptomatic close contacts in this setting should be isolated, monitored closely for symptoms and only released from isolation following two negative RT-PCR tests separated by 24 hours.

### **Prophylaxis**

No specific chemoprophylaxis is available for contacts.

### **Education**

Close contacts should be counselled about their risk and the symptoms of SARS-CoV and provided with a SARS-CoV Factsheet. They should be advised to self-isolate if they develop symptoms, and to immediately notify their public health unit and, if appropriate, their facility infection control unit (i.e. for healthcare workers).

### **Quarantine and restriction**

Home quarantine of asymptomatic contacts is not routinely recommended, but people identified as close contacts are advised to monitor their health for 10 days after the last possible contact with a symptomatic probable or confirmed SARS-CoV case.

Public health units should conduct active daily monitoring of close contacts for symptoms for 10 days after the last possible contact with a symptomatic probable or confirmed SARS-CoV case.

Close contacts should be advised to immediately telephone the public health unit to arrange medical attention if they develop symptoms such as fever, respiratory symptoms (including coughing and shortness of breath), headache, muscle pain or diarrhoea.

Less frequent active follow-up together with passive surveillance may be necessary if there are large numbers of close contacts to monitor.

Close contacts should also be advised to not travel internationally for 10 days after the last close contact with a probable or confirmed case of SARS-CoV, and any travel within Australia during this period should be subject to discussion with the public health unit.

Close contacts should be excluded from schools and sensitive occupations or settings such as health care, aged care, or child care during the 10 days after last unprotected contact with a case.

### **Casual contacts**

Casual contacts should monitor their health for 10 days and report any symptoms immediately to the local public health unit. There are no restrictions on movements; however casual contacts should be advised to contact the public health unit if they develop symptoms.

### **Healthcare worker close contacts**

Healthcare worker close contacts (i.e. persons exposed while unprotected, as described in the Contact definition section) should not undertake work in a healthcare setting for 10 days following the last possible contact with the case. Home quarantine is not routinely recommended during this period if these individuals remain asymptomatic, but some restrictions may be recommended based on a risk assessment of the particular circumstances.

Public health units may assist infection control units of health facilities to identify and monitor healthcare worker close contacts.

It is recognised that clinical work restrictions on healthcare worker close contacts may place strain on individuals and on health services. This underlines the importance of ensuring healthcare workers implement appropriate infection control precautions when assessing and managing suspected, probable and confirmed SARS-CoV cases.

### **Management of symptomatic contacts**

If fever, respiratory symptoms or other symptoms consistent with SARS-CoV infection develop within the first 10 days following the last contact, the individual should be immediately isolated and managed as per the current recommendations for suspected SARS-CoV cases, with urgent testing for SARS-CoV infection undertaken in an environment which minimises the exposure of others.

Ill contacts who are being evaluated for SARS-CoV infection can be appropriately isolated and managed at home, unless their condition is severe enough to require hospitalisation.

Symptomatic contacts who test negative for SARS-CoV by PCR will still need to be monitored for 10 days after their last contact with a probable or confirmed SARS-CoV case and may require re-testing.

## **12. Special situations**

### **Outbreaks in healthcare facilities**

If Alert Case Cluster or confirmed SARS case is identified in a healthcare facility, an outbreak management team should be convened, including a senior facility manager, an infection control practitioner and appropriate clinical staff, in consultation with PHU staff. Control measures may include:

- active case finding and treatment
- isolation and/or cohorting
- work restriction for healthcare workers who have had close contact (i.e. unprotected exposure) with a confirmed or probable case
- distribution of factsheets and other information
- epidemiological studies to determine risks for infection.



## **Outbreaks in residential care facilities or other residential institutions (e.g. prisons or boarding schools)**

It is assumed that fellow residents in an institution will be at greater risk of infection if there has been a confirmed case living at the institution while infectious.

If an Alert Case Cluster or confirmed SARS case is identified in a residential care facility or institution, an outbreak management team should be convened, in consultation with PHU staff.

### **13. References**

1. Wendong Li, et al. Bats Are Natural Reservoirs of SARS-Like Coronaviruses. *Science* 28 Oct 2005: Vol. 310, Issue 5748, pp. 676-679. DOI: 10.1126/science.1118391
2. World Health Organization. [Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003](#). Accessed Sept 2016.
3. World Health Organization. [International Health Regulations \(2005\)](#).