

GUIDE TO INFECTION CONTROL IN THE HEALTHCARE SETTING

SARS-Associated Coronavirus

Author

Zias A. Memish, MD, FRCPC, FACP

Chapter Editor

Shaheen Mehtar, MBBS, MRCPPath, UK; FRC Path UK; FCPPath (S Africa); MD (London)

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Chapter last updated: February 2018

KEY ISSUES

An outbreak of severe acute respiratory syndrome (SARS) emerged very quickly in the fall of 2002 in Southern China. The etiologic agent was not identified until February 2003 as a novel coronavirus (CoV), which belongs to lineage B of the genus *Betacoronavirus*, especially capable of being transmitted in hospitals. By the time the outbreak was declared over in July 2003, it had infected at least 8500 people in more than 30 countries on 5 continents and claimed the lives of 765 (9%) of them. Most of the reported cases were from Mainland China, but cases were also reported from Hong Kong, Taiwan, Canada, and Singapore. Only assiduous infection control practices were effective for control.

KNOWN FACTS

- SARS emerged in the Southern Chinese Province of Guangdong in November 2002. Subsequently, a global epidemic occurred with a crude mortality worldwide of almost 10% but with considerably higher rates in some locales among patients older than 65 years.
- The etiology of SARS was found to be a novel SARS-CoV that very likely has a natural reservoir in one or more animals indigenous to Southern China; it has been detected in raccoon dogs and Himalayan palm civets and its origin has been traced to the Chinese horseshoe bat (*Rhinolophus sinicus*).
- The incubation period for SARS is 2-10 days.
- Globally, approximately 21% of the infected patients were healthcare workers, but in some affected countries the rates were as high as 50%.
- The SARS virus spreads primarily via large droplets; thus, transmission usually requires close contact. There are cases in which droplet nuclei transmission (airborne) can occur during aerosol generating procedures.

Furthermore, because the virus is shed in the stool for approximately 30 days and can survive in the environment for 1-4 days, it is likely that the environment plays an important role in some cases of transmission.

Lastly, because the virus is found in the bloodstream early, transfusion-related or sharps injury-associated infections remain a theoretic possibility, but have not been documented to date.

- The SARS-CoV virus is infectious and its attack rate is estimated to range from 10%-60%. Importantly, some patients are considered superspreaders with the ability to spread the disease to many patients (usually more than 4), with some reports documenting transmission of the virus to more than 100 contacts.
- Although steroids and ribavirin have been used empirically for therapy, no efficacy data from controlled studies exist to prove that either drug affects outcome favorably.
- Human coronavirus (HCoV 229E) is rapidly inactivated within 1 minute by 2% glutaraldehyde, multiple quaternary ammonium compounds, and multiple phenolics.
- Healthcare workers who failed to use masks properly while managing SARS patients were more likely to become infected than those who used the masks properly.

CONTROVERSIAL ISSUES

- Recognition of the SARS epidemic was important and much credit goes to the late Carlos Urbani, MD, who alerted the world from his hospital in Hanoi. Of interest, the web-based international surveillance system for emerging pathogens—ProMED-mail—had reports of SARS weeks before the World Health Organization (WHO) reported the epidemic.
- There is critical need for all countries to report new epidemics immediately.

- Quarantine, if used, must be employed with care and compassion.
- The WHO showed great leadership by coordinating much of the global response to SARS.
- Because of the fears of healthcare workers, more attention should be paid to psychological support when epidemics affect them and threaten their health and lives.

SUGGESTED PRACTICE

Some of the key points in the management of SARS cases are shown in *Table 55.1*. The wearing of tight-fitting masks, preferably N95 with high filtering ability, is the most essential part of infection control protection of healthcare workers. Handwashing is also very important for infection control. Even if one has used gloves, a healthcare worker should wash hands after removing the gloves. Gowns and eye protection should be used and hair covers and shoe covers used if available. Place the patient in a room with negative air pressure, if available.

Table 55.1 Management of Suspected SARS
Isolate the patient
<ul style="list-style-type: none"> • Place the patient in a private room with negative pressure.
<ul style="list-style-type: none"> • Wear gloves, a gown and masks N95 always.
<ul style="list-style-type: none"> • Just before leaving, remove and leave the gown, mask, and gloves in the room.
<ul style="list-style-type: none"> • Wash hands carefully after removing gloves.
<ul style="list-style-type: none"> • Limit the number of healthcare workers caring for patient.
<ul style="list-style-type: none"> • Limit the number of visitors.
Perform diagnostic studies if possible
<ul style="list-style-type: none"> • To rule out known causes of community-acquired pneumonia and to rule in SARS.

Maintain a clean environment
<ul style="list-style-type: none"> • Use chlorine solutions on bedside counters and on medical equipment that can tolerate the disinfectant, such as IV poles, at least daily.
Supplemental oxygen for hypoxemia
Antibacterial agents for community-acquired pneumonia
Consider a neuraminidase inhibitor for treatment of influenza, if available

Whenever healthcare workers are exposed to initially non-isolated patients, it is ideal if they could be furloughed to their homes alone for 10 days before returning to work in the hospital. This may be very important for limiting transmission of SARS-CoV within the hospital. Ideally, family members should limit their contact at home with the suspected case during the 10 days of furlough

SUGGESTED PRACTICE IN UNDER-RESOURCED SETTINGS:

The practices listed above are equally applicable to under-resourced settings.

SUMMARY

SARS is caused by a novel coronavirus phylogenetically distinct from all previously known human and animal coronaviruses. It emerged in Southern China in November 2002 and caused a large global outbreak. The coronavirus spreads from person to person by droplets and contact, direct or indirect. Although close contact was necessary for transmission most of the time, the possibility exists for coincident transmission via airborne route

and fomites. To contain this virus and other novel coronaviruses, there is no room for error or relaxation of the highest standards of all aspects of infection control.

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