CD Summary

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SEVERE ACUTE RESPIRATORY SYNDROME (SARS)

On February 11, the Chinese Ministry of Health notified the World Health Organization (WHO) of an outbreak of 305 cases of "acute respiratory syndrome" of unknown etiology in Guangdong Province, China during November 16, 2002–February 9, 2003; 5 cases were fatal. Cases were reportedly on the decline.[1, 2]

On February 15, a man who had traveled from Guangdong Province to Hong Kong became ill. On February 21, he stayed on the 9th floor of the Metropole Hotel Kowloon in Hong Kong. The following day, he was admitted to a local hospital, and he died on February 23 from what we now know as Severe Acute Respiratory Syndrome ("SARS"). Other guests of this hotel became the sources for subsequent outbreaks—almost exclusively among close personal contacts and healthcare workers—in Hong Kong, Vietnam, Singapore, and Toronto.[3]

On March 12, WHO issued a global alert and began worldwide surveillance for this apparently new illness. The current (working) case definition for this disease is shown in the box below. As this issue of the *CD Summary* goes to press, 2,671 cases of SARS have been reported from 18 countries; 103 (4%) have died.

Oregon healthcare workers are asked to report immediately to the local public health authority any patient with illness meeting either of the definitions shown in the box. To date, two suspect cases have been reported in Oregon; one was treated as an outpatient for upper respiratory infection, and the other turned out to have bacterial pneumonia.

A NEW CORONAVIRUS?

The cause of SARS has not been identified definitively. However, the following suggest that the culprit is a novel coronavirus.

- Investigators in Canada noted cytopathic effect in Vero cell cultures 6 days after inoculation with respiratory specimens from 5 of 9 patients tested. PCR amplification of coronaviral nucleic acid sequences demonstrated a novel coronavirus.[4]
- Another laboratory independently amplified coronaviral sequences directly from bronchoalveolar-lavage fluid from two of the Canadian patients.[4]
- CDC isolated a new coronavirus from clinical specimens of two patients with suspected SARS in Thailand and Hong Kong.[3]
- Indirect fluorescent antibody testing of sera and reverse-transcriptase PCR analysis of clinical specimens from 6 other SARS cases were also positive for the new coronavirus at CDC.[3]
- Nucleic acid sequences of the coronaviruses independently identified by CDC and by investigators in Canada were identical.[4]

Although the weight of evidence suggests an etiologic role for this coronavirus, it must be noted that metapneumovirus (a paramyxovirus) was also identified in several cases.[5, 6] The book is not quite closed on this question.

CLINICAL DESCRIPTION

After an incubation period of about 2–7 (but as long as 10) days, patients typically develop fever, headache, malaise, and myalgias. After 3–7 days, nonproductive cough ensues, sometimes leading to dyspnea and to hypoxemia. Most patients have lymphopenia (<1,500/µl), and many have thrombocytopenia (<150,000/µl), mildly elevated transaminases, or elevated creatine phosphokinase. Chest X-rays initially show unilateral, patchy infiltrates that progress over 1–2 days to bilateral, confluent, interstitial infiltrates, and the adult respiratory distress syndrome may develop. Pleural effusion has been absent.[4, 5, 7]

WORK-UP OF SUSPECTED CASES

During the year 2000, about 460,000 residents of China, Hong Kong, or Vietnam traveled to the United States, and many U.S. residents traveled to these countries and returned. Even if SARS didn't exist, Oregon healthcare workers would see patients coming from these areas with respiratory illness and temperature >38°C. Most illnesses meeting the current, suspect-case definition are therefore *unlikely* to be related to the outbreak.[1]

The first step in a SARS workup should be to make sure that the patient at least meets the definition of a "suspect case." What distinguishes the early cases of SARS from the common colds is the history of travel to an affected region or contact with someone who is already a

SARS CASE DEFINITION

N.B. Case definition is evolving. For up-to-date information see the CDC web site at http://www.cdc.gov/ncidod/sars/

Suspected Case: Respiratory illness of unknown etiology with onset since February 1, 2003, **AND**
Measured temperature >100.5°F (>38° C) **AND**
One or more clinical findings of respiratory illness (e.g. cough, shortness of breath, difficulty breathing, hypoxia, or radiographic findings of either pneumonia or acute respiratory distress syndrome) **AND**
Travel within 10 days of onset of symptoms to mainland China, Hong Kong, Hanoi or Singapore **OR**
Close contact within 10 days of onset of symptoms with either a person with a respiratory illness who traveled to a SARS area or a person known to be a suspect SARS case. **Close contact** is defined as having cared for, having lived with, or having direct contact with respiratory secretions and/or body fluids of a patient known to be suspect SARS case.
Probable Case: Suspect cases with either radiographic evidence of pneumonia or respiratory distress syndrome; or evidence of unexplained respiratory distress syndrome by autopsy.

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known case of SARS.

For patients with illness meeting the suspect-case definition, notify the local public health authority immediately. Order a CXR, pulse oximetry, blood cultures, sputum Gram stain and culture, and tests for viral respiratory pathogens, particularly influenza and respiratory syncytial virus. Make sure that the lab holds on to any remaining clinical specimens until a diagnosis is confirmed.

The following clinical specimens should be sent to the Oregon State Public Health Lab, whence they will be shipped to CDC to be tested for the novel coronavirus.

- Respiratory-tract specimens. Nasopharyngeal washes or aspirates are preferred; CDC will also test nasopharyngeal or oropharyngeal swabs and bronchoalveolar-lavage fluid. Collect specimens as early as possible in the course of illness.
- Blood components. CDC will test leukocytes (collect blood in CPT-citrate [blue-top] tube), serum (acute and convalescent; collect 5–10 ml blood for each); and whole blood (5–10 ml in EDTA [purple-top] tube).
- Urine (50 cc) during acute phase of illness only.
- Stool (10–50 cc).
- Formalin-fixed or paraffin-embedded tissues from any major organ.
- Fresh-frozen lung or upper-airway tissues.

See *http://www.cdc.gov/ncidod/sars/specimens.htm* for more precise descriptions of collection procedures.

TRANSMISSION

Local transmission has not been documented in the U.S. or in most of the other 17 countries reporting cases. Transmission in mainland China, Hong Kong, Taiwan, Vietnam, Singapore, and Canada has, for the most part, occurred within households and healthcare institutions, implying that close contact is required. In animals, however, coronaviruses can be spread by aerosols as well as by the fecal-oral route.[8] The explosion of cases from the hotel in Hong Kong raises the possibility that at least in some instances, close contact may not be required.

INFECTION CONTROL

Much of the burden of this disease has fallen upon healthcare workers, and nosocomial transmission to other patients has also been documented. Prompt identification and isolation of suspect cases are currently the keys to interrupting transmission.

A surgical mask should be placed on patients in whom SARS is suspected, and contact (e.g., gloves, gown, and eye protection) and airborne precautions (e.g., an isolation room with negative pressure relative to the surrounding area and use of an N-95 filtering disposable respirator, or respirators of equivalent filtering efficiency, for persons entering the room) should be applied where feasible. Where respirators are not available (e.g., in outpatient clinics), healthcare personnel evaluating and caring for suspect SARS patients should wear a surgical mask. Additional guidance regarding SARS infection control in the ambulatory care setting is available at *http://www.cdc.gov/ncidod/sars/infectioncontrol.htm.*

CONCLUSIONS

New infections emerge with some regularity (think Legionnaires and Lyme disease, hantavirus pulmonary syndrome, and West Nile encephalitis), so we're no longer surprised when a new condition like SARS comes onto the scene. Our challenge is to be on our toes for this new condition—recognizing its impressive 4% case-fatality rate and potential for spreading, especially within healthcare settings—while maintaining a healthy sense of perspective. Since November, SARS has killed 103 persons worldwide and none in the United States. Recent estimates put the death toll from influenza at 36,000/year in the United States alone.[9] Our citizens may worry about SARS, but they are much more likely to be stricken by more "mundane" diseases.

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