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SEVERE ACUTE RESPIRATORY SYNDROME

Established Infectious Disease Control Measures Helped Contain Spread, But a Large-Scale Resurgence May Pose Challenges

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Highlights

Highlights of GAO-03-1058T, a report to the Permanent Subcommittee on Investigations, Committee on Governmental Affairs, U.S. Senate

Why GAO Did This Study

SARS is a highly contagious respiratory disease that infected more than 8,000 individuals in 29 countries principally throughout Asia, Europe, and North America and led to more than 800 deaths as of July 11, 2003. Due to the speed and volume of international travel and trade, emerging infectious diseases such as SARS are difficult to contain within geographic borders, placing numerous countries and regions at risk with a single outbreak. While SARS did not infect large numbers of individuals in the United States, the possibility that it may reemerge raises concerns about the ability of public health officials and health care workers to prevent the spread of the disease in the United States.

GAO was asked to assist the Subcommittee in identifying ways in which the United States can prepare for the possibility of another SARS outbreak. Specifically, GAO was asked to determine 1) infectious disease control measures practiced within health care and community settings that helped contain the spread of SARS and 2) the initiatives and challenges in preparing for a possible SARS resurgence.

www.gao.gov/cgi-bin/getrpt?GAO-03-1058T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Marjorie E. Kanof at (202) 512-7101.

What GAO Found

Infectious disease experts emphasized that no new infectious disease control measures were introduced to contain SARS in the United States. Instead, strict compliance with and additional vigilance to enforce the use of current measures was sufficient. These measures—case identification and contact tracing, transmission control, and exposure management—are well-established infectious disease control measures that proved effective in both health care and community settings. The combinations of measures that were used depended on either the prevalence of the disease in the community or the number of SARS patients served in a health care facility. For SARS, case identification within health care settings included screening individuals for fever, cough, and recent travel to a country with active cases of SARS. Contact tracing, the identification and tracking of individuals who had close contact with someone who was infected or suspected of being infected, was important for the identification and tracking of individuals at risk for SARS. Transmission control measures for SARS included contact precautions, especially hand washing after contact with someone who was ill, and protection against respiratory spread, including spread by large droplets and by smaller airborne particles. The use of isolation rooms with controlled airflow and the use of respiratory masks by health care workers were key elements of this approach. Exposure management practices—isolation and quarantine—occurred in both health care and home settings. Effective communication among health care professionals and the general public reinforced the need to adhere to infectious disease control measures.

While no one knows whether there will be a resurgence of SARS, federal, state, and local health care officials agree that it is necessary to prepare for the possibility. As part of these preparations, CDC, along with national associations representing state and local health officials, and others, is involved in developing both SARS-specific guidelines for using infectious disease control measures and contingency response plans. In addition, these associations have collaborated with CDC to develop a checklist of preparedness activities for state and local health officials. Such preparation efforts also improve the health care system's capacity to respond to other infectious disease outbreaks, including those precipitated by bioterrorism. However, implementing these plans during a large-scale outbreak may prove difficult due to limitations in both hospital and workforce capacity that could result in overcrowding, as well as potential shortages in health care workers and medical equipment—particularly respirators.

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today as you consider effective infectious disease control measures to help contain the spread of Severe Acute Respiratory Syndrome (SARS) should future outbreaks occur. SARS is a highly contagious respiratory disease that infected more than 8,000 individuals in 29 countries principally throughout Asia, Europe, and North America and led to more than 800 deaths as of July 11, 2003. Due to the speed and volume of international travel and trade, emerging infectious diseases such as SARS are difficult to contain within geographic borders, placing numerous countries and regions at risk with a single outbreak. SARS quickly became a worldwide health problem, prompting the World Health Organization (WHO) to issue a global alert for the first time in more than a decade—an alert that was cancelled on July 5, 2003. Although the outbreak is currently believed to be contained, the fact that SARS is a type of coronavirus—the source of some common colds—leads many to suggest that SARS could be seasonal and as such could recur in the fall and winter months.

Although all the modes of SARS transmission may not have been identified, the disease is most likely spread through person-to-person contact. Experts agree that infected individuals are contagious when symptomatic—a time during which they are more likely to seek medical attention and come into contact with health care workers. One unique characteristic of the SARS outbreak was the high rate of infection among health care workers, who—before the institution of specific protective measures—may have become infected while treating patients with SARS. The SARS outbreak in Asia demonstrated that the disease can also spread rapidly in the community, outside of hospital settings.

While SARS did not infect large numbers of individuals in the United States, the possibility that it may reemerge raises concerns about the ability of public health officials and health care workers to prevent the spread of the disease in the United States. To assist the Subcommittee in identifying ways in which the United States can prepare for the possibility of another SARS outbreak, my remarks today will focus on 1) infectious disease control measures practiced within health care and community settings that helped contain the spread of SARS and 2) the initiatives and challenges in preparing for a possible SARS resurgence.

My testimony today is based on the review of documentation about infection control practices and guidelines, as well as descriptions about the origin of SARS and its spread. In addition, we spoke with leading

national and international disease experts—most of whom were involved in either the investigation of SARS or in the treatment of patients with SARS. Specifically, we spoke with experts in infectious diseases, epidemiology, clinical medicine, and occupational safety from the Centers for Disease Control and Prevention (CDC) and WHO. We also spoke with public health officials of Health Canada and Toronto Public Health because Canada had the highest prevalence of SARS cases in North America. We interviewed state and local public health officials in California and New York—both of which had the greatest number of SARS cases reported in the United States. These officials represented the California Department of Health Services, the New York State Department of Health, and the New York City Department of Health and Mental Hygiene. We also spoke with hospital infectious disease experts in each of these states. In addition, we spoke with national infectious disease experts, hospital epidemiologists, and representatives from the National Association of County and City Health Officials (NACCHO) and the Association of State and Territorial Health Officials (ASTHO). We also used our previous work on the capacity of the public health system to respond to both bioterrorism and emerging infectious diseases.[1] We conducted our work in July 2003 in accordance with generally accepted government auditing standards.

In summary, infectious disease experts emphasized that no new infectious disease control measures were introduced to contain SARS in the United States. Instead, strict compliance with and additional vigilance to enforce the use of current measures was sufficient. These measures—case identification and contact tracing, transmission control, and exposure management—are well-established infectious disease control measures that proved effective in both health care and community settings. The combinations of measures that were used depended on either the prevalence of the disease in the community or the number of SARS patients served in a health care facility. For SARS, case identification within health care settings included screening individuals for fever, cough, and recent travel to a country with active cases of SARS. Contact tracing, the identification and tracking of individuals who had close contact with someone who was infected or suspected of being infected, was important for the identification and tracking of individuals at risk for SARS.

[1]U.S. General Accounting Office, *SARS Outbreak: Improvements to Public Health Capacity Are Needed for Responding to Bioterrorism and Emerging Infectious Diseases*, GAO-03-769T (Washington, D.C.: May 7, 2003).

Transmission control measures for SARS included contact precautions, especially hand washing after contact with someone who was ill, and protection against respiratory spread, including spread by large droplets and by smaller airborne particles. The use of isolation rooms with controlled airflow and the use of respiratory masks by health care workers were key elements of this approach. Exposure management practices—isolation and quarantine—occurred in both health care and home settings. Effective communication among health care professionals and the general public reinforced the need to adhere to infectious disease control measures.

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Background

SARS is an emerging respiratory disease that has been reported principally in Asia, Europe, and North America. SARS is believed to have originated in Guangdong Province, China in mid-November 2002. However, early cases of the disease went unreported, which then delayed identification and treatment of the disease allowing it to spread. On February 11, 2003, WHO received its first official report of an atypical pneumonia outbreak in China. This report stated that 305 individuals were affected by atypical pneumonia and that 5 deaths had been attributed to the disease. SARS was transmitted out of the Guangdong Province on February 21, 2003, by a physician who became infected after treating patients in the province. Subsequently, the physician traveled to a hotel in Hong Kong and began suffering from flu-like symptoms. Days later, other guests and visitors at the hotel contracted SARS. As infected hotel patrons traveled to other countries, such as Vietnam and Singapore, and sought medical attention for their symptoms, they spread the disease throughout each country's

hospitals as well as in some communities. Simultaneously, the disease began spreading around the world along international air travel routes as guests from the hotel flew homeward to Toronto and elsewhere.

Description of Severe Acute Respiratory Syndrome

Scientific evidence indicates that SARS is caused by a previously unrecognized coronavirus.[2] Transmission of SARS appears to result primarily from close person-to-person contact[3] and contact with large respiratory droplets emitted by an infected person who coughs or sneezes. After contact, the incubation period for SARS—the time it takes for symptoms to appear after an individual is infected—is generally within a 10-day period. Clinical evidence to date also suggests that people are most likely to be contagious at the height of their symptoms. However, it is not known how long after symptoms begin that patients with SARS are capable of transmitting the virus to others. There is no evidence that SARS can be transmitted from asymptomatic individuals.

Currently, there is no definitive test to identify SARS during the early phase of the illness, which complicates diagnosing infected individuals. As a result, the early diagnosis of SARS relies more on interpreting individuals' symptoms and identification of travel to locations with SARS transmission. SARS symptoms include fever, chills, headaches, body aches, and respiratory symptoms such as shortness of breath and dry cough—making SARS difficult to distinguish from other respiratory illnesses, such as the flu and pneumonia. The initial symptoms can be quite mild, and gradually increase in severity, often peaking in the second week of illness. In some individuals, the disease might progress to the point where insufficient oxygen is getting to the blood.

CDC has established for health care providers criteria used for the identification of individuals with SARS, called case definitions.[4] In the absence of a definitive diagnostic test for the disease in its early phase,

[2]The coronavirus is one of a group of viruses that are responsible for some but not all common colds. They are so named because their microscopic appearance is that of a virus particle surrounded by a crown.

[3]Close contact is usually defined as having cared for, lived with, or having direct contact with bodily secretions of an infected individual.

[4]See Centers for Disease Control and Prevention, Department of Health and Human Services, *Updated Interim U.S. Case Definition for Severe Acute Respiratory Syndrome (SARS)* (Atlanta, Ga.: July 16, 2003).

reported cases of SARS are classified into two categories based on clinical and epidemiologic criteria—"suspect" and "probable." These case definitions continue to be refined as more is learned about this disease. A "suspect" case of SARS includes the following criteria:

- high fever,
- respiratory illness, and
- recent travel to an area with current or previously documented suspected transmission of SARS,[5] and/or
- close contact within 10 days of the onset of symptoms with a person known or suspected to have SARS.

A "probable" case of SARS includes the following criteria:

- all the criteria for "suspect" cases and
- evidence in the form of chest x-ray findings of pneumonia, acute respiratory distress syndrome (ARDS), or an unexplained respiratory illness resulting in death with autopsy findings of ARDS.

The final determination of whether cases meeting the definitions for "suspect" and "probable" SARS are due to infection with the SARS virus is based on results of testing a blood specimen obtained 28 days after the onset of illness.

Furthermore, there is no specific treatment for SARS. In the absence of a rapid diagnostic test, it can be very difficult to distinguish clinically between individuals with SARS and individuals with atypical pneumonia. Therefore, CDC currently recommends that individuals suspected of having SARS be managed using the same diagnostic and therapeutic strategies that would be used for any patient with serious atypical pneumonia. In mild cases of SARS, management at home may be appropriate, while more severe cases may require treatment, such as intravenous medication and oxygen supplementation, that necessitates hospitalization. In 10 to 20 percent of SARS cases, patients require mechanical ventilation.[6] As of July 11, 2003, the mortality rate for SARS

[5]The last date for illness onset is 10 days (i.e., one incubation period) after removal of a CDC travel alert. To be considered a suspect case, an individual's travel would have occurred on or before the last date the travel alert was in place.

[6]Mechanical ventilation involves artificial ventilation of the lung using means external to the body. A mechanical ventilator is a machine that generates a controlled flow of gas (a mixture of oxygen and air) into a patient's airways.

was approximately 10 percent, but the mortality rates in individuals over 60 years of age approached 50 percent.

As of July 11, 2003, WHO reported that there were an estimated 8,427 "probable" cases from 29 countries, with 813 deaths from SARS. China, Hong Kong, Singapore, Taiwan, and Canada reported the highest number of cases. As of July 15, 2003, the United States identified 211 SARS cases in 39 states (including Puerto Rico), with no related deaths. Of these cases, 175 are classified as "suspect" cases, while 36 are classified as "probable."[7] In the United States, 34 of the 36 "probable" cases contracted SARS through international travel. However, in the other affected countries, SARS spread extensively among health care workers. For example, of the 138 diagnosed cases in Hong Kong as of March 25, 2003, that were not due to travel, 85 (62 percent) occurred among health care workers; among the 144 cases in Canada as of April 10, 2003, 73 (51 percent) were health care workers.

General Infectious Disease Control Measures

In the United States, the Healthcare Infection Control Practices Advisory Committee (HICPAC), a federal advisory committee made up of 14 infection control experts, develops recommendations and guidelines regarding general infectious disease control measures for CDC. Important components of these infectious disease control measures are the following: case identification and contact tracing, transmission control, and exposure management.

Case Identification and Contact Tracing. Case identification and contact tracing are considered by health care providers to be important first steps in the containment of infectious diseases in both the community and health care settings. Case identification is the process of determining whether or not a person meets the specific definitions for a given disease. Generally, health care providers interview patients in order to obtain the history, signs, and symptoms of the patient's complaint and perform a physical examination. Tests, such as blood tests or x-rays, can be performed to provide additional information to help determine the diagnosis. Public awareness of the symptoms of a disease can help case identification to the extent that individuals who believe they exhibit the

[7]Additionally, on July 16, 2003, CDC revised the case definition to exclude individuals with negative test results for SARS coronavirus. This resulted in 207 previously identified SARS cases (169 suspect cases and 38 probable cases) being removed from the count of SARS cases in the United States.

symptoms seek medical attention. Contact tracing involves the identification and tracking of individuals who may have been exposed to a person with a specific disease.

Transmission Control. Transmission control measures decrease the risk for transmission of microorganisms through proper hand hygiene and the use of personal protective equipment, such as masks, gowns, and gloves. These measures also include the decontamination of objects and rooms. The types of transmission control measures used are based on how an illness is transmitted. For example, some categories of transmission are as follows:

- Direct contact: person-to-person contact (e.g., two people shaking hands) and physical transfer of the microorganism between an infected person and an uninfected person.
- Indirect contact: contact with a contaminated object, such as secretions from an infected person on a doorknob or telephone receiver.
- Droplet: eye, nose, or mouth of an uninfected person coming into contact with droplets (larger than 5 micrometers) containing the microorganism from an infected person, for example an infected person sneezing without covering his/her mouth with a tissue.
- Airborne: contact with small droplets (5 micrometers or smaller) or dust particles containing the microorganism, which are suspended in the air.

Exposure Management. Exposure management is the separation of infected individuals from noninfected individuals through isolation or quarantine. Isolation refers to the separation of individuals who have a specific infectious illness from healthy individuals and the restriction of their movement to contain the spread of that illness. Quarantine refers to the separation and restriction of movement of individuals who are not yet ill, but who have been exposed to an infectious agent and are potentially infectious.

The success of these infectious disease control measures—case identification and contact tracing, transmission control, and exposure management—depends, in part, on the frequent and timely exchange of information. Public health officials and health care providers need to be informed about any modifications of existing infectious disease control measures, the geographic progression of an outbreak, and reports of disease occurrence. Likewise, elevating public knowledge about an infectious disease and its symptoms will enable infected individuals to seek medical attention as soon as possible to contain the spread.

Experts Recommend Case Identification and Contact Tracing, Transmission Control, and Exposure Management Measures To Prevent the Spread of SARS

Infectious disease experts emphasized that existing infectious disease control measures played a pivotal role in containing the spread of SARS in both health care and community settings. The combinations of measures that were used depended on either the prevalence of the disease in the community or the number of SARS patients served in a health care facility. No new measures were introduced to contain the SARS outbreak in the United States; instead, experts said strict compliance with and additional vigilance to enforce the use of current measures was sufficient. The successful implementation of all of the infectious disease control measures depended, in part, on effective communication among health care professionals and the general public.

Timely Case Identification and Contact Tracing of SARS Cases Was Critical But Difficult

To prevent the spread of SARS, public health authorities worked to identify every individual who might have been infected with the disease. Rapid identification of these individuals was critical, but the lack of an effective and timely diagnostic test that could be used during the early stages of the disease to identify those who actually had SARS was an obstacle in halting its spread. Experts acknowledged that identification of individuals who might have been infected with the SARS virus was likely to include many people who did not have SARS because the case definition of an individual with SARS is not highly specific and the disease resembles other respiratory illnesses, such as pneumonia and the flu. The long incubation period for SARS provided health care workers the opportunity to identify cases and close contacts of infected individuals before those who actually had the SARS virus could spread the disease to others.

An important part of case identification is screening individuals for symptoms of a disease. CDC recommended that when individuals called for appointments and as soon as possible after the individual arrived in a health care setting, all individuals should be screened with targeted questions concerning SARS-related symptoms, close contact with a SARS suspect case patient, and recent travel. For SARS, public health and hospital officials in California and New York said hospital emergency room or other waiting room staff routinely used questionnaires to screen incoming patients for fever, cough, and travel to a country with active cases of SARS. They said that hospitals' signs in various locations generally used by incoming patients and visitors also included these criteria and asked individuals to identify themselves to hospital staff if they met them. According to these officials, an individual identified as a potential SARS case generally was given a surgical mask and moved into a separate area for further medical evaluation. CDC officials said that these

measures were also important for physicians in private practice. The New York City and California health departments used e-mail health alert notices to inform private physicians, such as family practitioners and pediatricians, about these case identification procedures. These notices directed physicians to information posted on the health departments' Web sites. In addition, officials from these health departments provided information about SARS case identification, among other topics, during local meetings for members of the medical community, including physicians in private practice.

Toronto, which experienced a much greater prevalence of SARS than the United States, used somewhat different case identification practices. At the height of the outbreak in Toronto, everyone entering a hospital was required to answer screening questions and to have their temperature checked before they were allowed to enter. Toronto public health department officials said this heightened screening was useful for case identification and had an added benefit of educating staff and visitors about SARS symptoms. As a further measure, Toronto health officials established SARS assessment clinics, also known as fever clinics; persons suspecting they might have SARS were asked to go to the clinics rather than directly to hospital emergency rooms to avoid infecting other individuals. However, officials acknowledged several limitations to using these assessment clinics. Because there was no follow-up to an initial assessment, some SARS cases that were in the early stages were not identified, but later these individuals went to hospital emergency rooms. Other difficulties included finding physicians to staff the clinics and implementing hospital-level infectious disease control measures at these separate clinics. For example, some clinics were set up in non-hospital locations—one assessment clinic was set up in a tent near a hospital emergency room entrance, while another was situated in a hospital ambulance bay where emergency personnel transfer patients into the hospital.

Contact tracing—the identification and tracking of individuals who had close contact with a "suspect" or "probable" case—is an important component of case identification. Contact tracing to identify individuals at significant risk for SARS required significant local health department resources. In New York City, four teams from the communicable disease bureau, comprised of either a physician or nurse and several field workers, interviewed each suspect or probable case in order to identify contacts. They then called each contact to advise them of their exposure and provided information on monitoring for symptoms of SARS and receiving treatment if necessary. The calls were also to ensure that the contacts

were following infection control measures in the home. Each contact received routine calls during a 10-day period—an average of four calls each from a team member. A New York City health department official characterized the process of contact tracing as labor and time intensive. Standardized forms and electronic contact and case databases helped the teams manage contact tracing. Additionally, routine weekly meetings with other health department divisions ensured that if assistance was needed from these departments, they would be up-to-date. Furthermore, New York City developed procedure manuals that would allow staff from other departments to be trained quickly if needed to assist members of the communicable disease bureau. The health department official emphasized that the electronic database created to log information about SARS contacts was an important tool to facilitate contact tracing. Toronto officials agreed that daily contact tracing required a large amount of resources. Adding to Toronto's difficulties, its health department did not have an electronic case or contact database, but had to rely on separate paper files for each individual.

Multiple Transmission Control Measures Used to Contain Spread

Experts recommended a combination of transmission control measures because not all modes of SARS transmission are known. The primary mode of transmission is direct person-to-person contact, although contact with body fluids and contaminated objects, and possibly airborne spread, may play a role. Therefore, multiple infection control practices that are used for each type of transmission are included in SARS infection control guidelines. Some combination of practices was recommended for both health care settings and in the community, with more intensive infection control procedures recommended for health care settings. According to several experts, the simple "things your mother taught you," such as washing your hands and covering your mouth and nose with a tissue when sneezing or coughing were effective in reducing the spread of SARS.

CDC prepared SARS guidelines for transmission control measures for both inpatient (such as hospitals) and outpatient (such as physician offices) health care settings.[8] These recommendations combined what the CDC calls "standard" hospital transmission control measures with transmission

[8]See Centers for Disease Control and Prevention, Department and Health and Human Services, *Updated Interim Domestic Infection Control Guidance in the Health-Care and Community Setting for Patients with Suspected SARS* (Atlanta, Ga.: May 1, 2003).

control measures specific to contact and airborne transmission. For the inpatient setting, the guidelines included:

- Routine standard precautions, including hand washing. In addition to standard precautions, CDC recommended eye protection—such as goggles or a face shield.
- Contact precautions, such as the use of a gown and gloves for encounters with the patient or his/her environment.
- Airborne precautions, such as an isolation room with negative pressure relative to the surrounding area,[9] and the use of an N-95 filtering disposable respirator for persons entering the room. The CDC guidelines suggested that if an isolation room was not available, patients should be placed in a private room, and all persons entering the room should wear N-95 respirators (or respirators offering comparable protection) to protect the wearer from particles expelled by a sick person, such as in coughing or sneezing. CDC recommended that, where possible, a test to ensure that the N-95 respirators fit properly should be conducted. If N-95 respirators were not available for health care personnel, then surgical masks should be worn. Generally, the material of N-95 respirators is designed to filter smaller particles than a surgical mask, and they also are designed to seal more tightly to the face.

The health department and hospital officials we spoke with said they generally adopted these CDC guidelines for transmission control in inpatient settings. Officials said one of the most effective practices to contain SARS was frequent hand washing with soap and water. CDC guidelines also allow the use of waterless alcohol-based hand rubs after coming in contact with "suspect" or "probable" SARS patients or their environments. Additionally, a hospital and a health department official said careful cleaning of SARS patient rooms was an important hygiene measure.

Inpatient facilities in the United States generally saw few SARS patients. In New York and California, the hospital officials stated that because of the small number of cases that were seen in each hospital, usually only one or two at a time, the hospitals were able to manage SARS patients in available isolation rooms. Because of the greater prevalence of SARS in Toronto, all 22 acute care hospitals were directed to have a SARS unit with negative pressure to the rest of the hospital, individual rooms, and specific staff

[9]Negative pressure rooms generally are private rooms in which air flow is from the hallway into the room, and then outdoors.

who only cared for SARS patients. Toronto health department officials later were able to designate four hospitals as SARS hospitals and direct all SARS patients to these four facilities.

The use of face masks or N-95 respirators was highly recommended by experts as an effective means of transmission control for SARS in inpatient settings. In one study of health care workers who had extensive contact with SARS patients in five Hong Kong hospitals, researchers found that no health care worker who consistently used either type of face covering became infected.[10] Experts also noted that the use of N-95 respirators and isolation rooms was especially important for high-risk medical procedures, such as intubation, where a patient's secretions are likely to be transformed into a fine spray and spread for a longer distance than large droplets.[11] Officials cautioned, however, that there can be difficulties in the use of N-95 respirators. One public health official said that compliance may be limited in hospitals in several ways—either staff has never been properly fitted for the respirators, or some staff who were fitted many years ago should have a more recent fitting. In Canada, Ontario's health ministry directed health care workers in the province (which includes Toronto) to employ an additional level of protective equipment when conducting high-risk medical procedures that was not recommended in the United States. For example, health care workers used a protective system that included a hood, a full-face respirator, and a complete body covering such as long-sleeved floor-length gowns and gloves.

The CDC guidelines for outpatient settings included the same standard and contact precautions outlined for inpatient settings. Reflecting the different types of facilities likely available in a physician office compared to a hospital, for example, outpatient guidelines did not advocate the use of specialized isolation rooms. Instead, for outpatient settings, the guidelines advised health care personnel to separate the potential SARS patient from others in a reception area as soon as possible, preferably in a private room with negative pressure relative to the surrounding area. At the same time, the guidelines said that a surgical mask should be placed

[10]See W.H. Seto, et.al., *Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS)*, The Lancet (Vol. 361, May 3, 2003), pp. 1519-20.

[11]Generally, intubation is the introduction of a tube into an individual's airway to facilitate breathing.

over the patient's nose and mouth—if this was not feasible, the patient should be asked to cover his or her mouth with a disposable tissue when coughing, talking, or sneezing.

Transmission control guidelines for community settings incorporated many of the same types of measures for containing the spread of SARS as recommended for health care settings.[12] CDC published SARS transmission control guidelines for two community settings—the workplace and households. The workplace guidelines recommended frequent hand washing with soap and water or waterless alcohol-based hand rubs. Along with handwashing, guidelines for household transmission control included the following:

- Infection control precautions should be continued for SARS patients for 10 days after respiratory symptoms and fever are gone. SARS patients should limit interactions outside the home and should not go to work, school, out-of-home day care, or other public areas during the 10-day period.
- During this 10-day period, each patient with SARS should cover his or her mouth and nose with a tissue before sneezing or coughing. If possible, a person recovering from SARS should wear a surgical mask during close contact with uninfected persons. If the patient is unable to wear a surgical mask, other people in the home should wear one when in close contact with the patient.
- Disposable gloves should be considered for any contact with body fluids from a SARS patient. Immediately after activities involving contact with body fluids, gloves should be removed and discarded, and hands should be washed. Gloves should not be washed or reused, and were not intended to replace proper hand hygiene.
- SARS patients should avoid sharing eating utensils, towels, and bedding with other members of the household, although these items could be used by others after routine cleaning, such as washing or laundering with soap and hot water.
- Frequent use should be made of common household cleaners for disinfecting toilets, sinks, and other surfaces touched by patients with SARS.

[12]See Centers for Disease Control and Prevention, Department of Health and Human Services, *Interim Guidance on Infection Control Precautions for Patients with Suspected Severe Acute Respiratory Syndrome (SARS) and Close Contacts in Households* (Atlanta, Ga.: Apr. 29, 2003).

Exposure Management Used to Prevent SARS Spread

Exposure management methods such as isolation and quarantine are important infectious disease control measures. These measures were particularly effective for SARS because of its long incubation period during which infected individuals could be isolated before they become contagious. In fact, experts stated that isolation of infected individuals and quarantine measures used for exposed individuals were critical for the containment of SARS.

Isolation of SARS infected individuals occurred in both health care and home settings. In Toronto, patients were typically isolated in the hospital—even in cases where individuals were not ill enough to need hospitalization. During the height of Toronto's outbreak, all 22 acute care hospitals were directed to have separate SARS units. On the other hand, in the United States, individuals were hospitalized only if they needed intensive medical treatment. According to an infectious disease expert who consulted with the CDC, this practice was prompted by concerns that grouping SARS cases together, such as in a hospital ward, could increase the likelihood of spread to both health care workers and other hospital patients.

For home isolation in New York City, each patient and contact was given detailed information that included instructions on what to do if ill, reminders of the importance of calling ahead before going to a physician's office or other health care settings, and information on how to travel to a health care setting without coming in contact with others. These instructions also included guidelines for transmission control measures to be used in the home. For all probable cases, the New York City health department conducted a home assessment to ensure that a SARS patient could be adequately isolated at home, which included the need for such things as adequate ventilation and bathrooms that would not be shared by noninfected individuals.

Quarantine of exposed individuals was based on different parameters, depending on the number of "suspect" or "probable" SARS cases in the community. CDC officials said the agency's guidance reflected the fact that there was little or no transmission of SARS in the United States, and therefore quarantine was less warranted because there were so few cases in a community. CDC's guidance advised individuals who were exposed but not symptomatic to monitor themselves for symptoms—such as fever, a cough, and difficulty breathing, and further advised home isolation and medical evaluation if symptoms began. CDC officials also advised transfer to a hospital only if the illness became severe.

In contrast, Toronto, which experienced a high level of person-to-person transmission, used a more conservative quarantine standard. Individuals who did not have symptoms but had been in contact with SARS infected individuals were ordered to stay in their homes and avoid public gatherings for 10 days. Thousands people were asked to undergo quarantine in their homes in the Toronto area. During the outbreak, exposed Toronto health care workers were restricted to "work quarantine"—they were only allowed to travel to and from work alone in their vehicles, but they were not allowed to have visitors or visit public places. Quarantine efforts in Toronto again required a high level of resources. Daily phone calls required 60 staff per 1,000 people who were quarantined in the Toronto area; these staff worked 7 days a week to follow up with twice-daily calls to each individual.

Success in Implementing Infectious Disease Control Measures Depended on Rapid and Frequent Communication

According to health officials, rapid and frequent communications of crucial information about SARS—such as the level of outbreak worldwide and recommended infectious disease control measures—were vital components of the efforts to contain the spread of SARS. Since March 2003, health organizations have shared extensive SARS-related information and guidelines with health care workers. For example, WHO scheduled numerous press briefings that updated the health community about the status of international SARS containment and prevention efforts. WHO, with CDC support, sponsored a videoconference broadcast globally to discuss the latest findings of the outbreak and prevention of transmission in health care settings (which was also available for computer download). CDC activated its Emergency Operations Center and devoted over 800 medical experts and support personnel worldwide to provide round-the-clock coordination and response to the SARS outbreak. CDC also had regular conference calls and information-sharing sessions with various medical professional associations and state and local health departments and laboratories.

At the state level, the California health department utilized the California Health Alert Network to send e-mails with SARS information (often based on CDC information) to all local health departments and many hospitals and physicians. The New York City health department hosted a symposium specifically for health care workers, to share the latest available SARS information. Hospital officials we spoke with also offered training seminars for their health care personnel on the signs and symptoms of SARS, recommended screening questions, and appropriate infectious disease control measures. Furthermore, hospitals kept their

patients informed about SARS via posters and flyers throughout their facilities, especially in emergency room waiting areas.

Health organizations maintained open and frequent communications in the community setting to facilitate the containment of SARS. For example, in a 2-week period early in the SARS outbreak, CDC conducted nine telephone press conferences with the media to keep the public informed about the latest SARS information, including numbers of "suspect" and "probable" SARS cases, laboratory and surveillance findings, travel advisories, and CDC's efforts nationally and worldwide. CDC also distributed more than two million health alert notices to travelers entering the United States from China, Hong Kong, Singapore, Taiwan, Vietnam, or Toronto. These cards, printed in eight languages, asked individuals to monitor their health for at least 10 days and to contact their health care provider if they exhibited SARS symptoms. A state and a local health official also stressed the importance of informing and educating the general public in workplaces and schools on the signs and symptoms of SARS, an effort which was intended to foster self-identification, minimize panic, and assuage fears of being infected.

Public health officials also concurred that collaboration between federal, state, and local health agencies as well as the medical community was crucial in containing the spread of SARS. Through the collaboration of all the appropriate players, coordination of prevention activities could be maintained, roles could be identified and assigned, available resources could be shared, and subsequent evaluations could be conducted. For instance, the Toronto health department maintained active communications with its local, provincial, and national governments in regard to isolation and quarantine practices, travel jurisdictions, and other SARS-related matters. The health department published directives for all Toronto area health care providers, outlining their SARS-related roles and responsibilities. The health department also maintained ongoing contact with identified liaisons at Toronto hospitals where SARS patients were hospitalized. Furthermore, the city of Toronto activated its local emergency operations center, which brought together emergency medical services, police, and community neighborhood planners to work together to contain SARS. Throughout Toronto's efforts, numerous briefings and teleconferences were organized to keep all players abreast about the latest SARS information in the community.

Federal, State, and Local Health Officials Are Preparing for a Possible SARS Resurgence, But Implementing Plans May Pose Challenges if the Resurgence Is Large-Scale

While no one knows whether there will be a resurgence of SARS, federal, state, and local health care officials we interviewed agree that it is necessary to prepare for the possibility. As part of these preparations, CDC, along with national associations that represent state and local health officials, and others, is involved in developing SARS-specific guidelines for using infectious disease control measures and contingency response plans. In addition, these associations have collaborated with CDC to develop a checklist of preparedness activities for state and local health officials. Such preparation efforts also improve the health care system's capacity to respond to other infectious disease outbreaks, including those precipitated by bioterrorism. However, implementing these plans may prove difficult due to limitations in both hospital and workforce capacity. A large-scale SARS outbreak could create overcrowding, as well as shortages in medical equipment (including N-95 respirators) and in health care personnel, who are at higher risk for infection due to their more frequent exposure to a contaminated environment.

Federal, State, and Local Health Officials Are Preparing for the Possibility of Future Outbreaks

At the federal level, CDC has begun contingency planning for a SARS outbreak, having convened a task force of infection control experts who are responsible for developing SARS-specific guidelines and recommendations, which address various infection control measures. The task force plans to publish its guidelines and recommendations by September 2003. CDC is collaborating with several professional associations, such as the Council of State and Territorial Epidemiologists, ASTHO, and NACCHO, to develop these response plans that vary according to the prevalence of the disease and the type of setting (i.e., health care or community) in which control measures need to be implemented.

At the state and local levels, health departments are also in the process of developing contingency response plans for SARS. To facilitate this, ASTHO and NACCHO, in collaboration with CDC, published a checklist for state and local health officials to use in the event of a SARS resurgence. The SARS preparations have been modeled after a checklist designed for pandemic influenza. The checklist encompasses a broad spectrum of preparedness activities, such as legal issues related to isolation and quarantine, strategies for communicating information to health care providers, and suggestions for ensuring other community partners such as law enforcement and school officials are prepared (see app. I for a copy of the checklist).

In specific local preparedness efforts, California and New York, which had the highest number of SARS cases in the United States, are also preparing for a large-scale SARS outbreak. For example, California health department officials said they were developing a plan for surge capacity by considering staff rotations or details of health department specialists to maintain a high level of response during a potential SARS outbreak.[13] Similarly, officials with the New York City health department said they had created a formal procedure manual, which outlines the roles of reallocated staff from various teams in the department, to help contain a large-scale SARS outbreak.

Limitations in Hospital and Workforce Capacity Make Implementing Infectious Disease Control Measures Difficult in the Event of a Large-Scale SARS Outbreak

While hospital officials we spoke with stated that they are taking steps to ensure that they have the necessary preparations to address a large-scale SARS outbreak, hospitals may still be limited in their capacity to respond. Because of the inability to precisely determine if someone has SARS, many people may be treated who do not have the virus. In the event of a large-scale outbreak, this imprecision may result in severe overcrowding in health care settings—especially if a SARS resurgence occurs during a peak season for another respiratory disease like influenza. This could strain the available capacity of hospitals. For example, public health officials with whom we spoke said that in the event of a large-scale SARS outbreak, entire hospital wards (along with their staff) may need to be used as separate SARS isolation facilities. Moreover, certain hospitals within a community might need to be designated as SARS hospitals.

We recently reported that most hospitals lack the capacity to respond to large-scale infectious disease outbreaks.[14] Most emergency departments have experienced some degree of crowding and therefore, in some cases, may not be able to handle a large influx of patients during a potential outbreak of SARS or another infectious disease. Few hospitals have adequate staff, medical resources, and equipment, such as N-95 respirators, needed to care for the potentially large numbers of patients

[13]Surge capacity is the ability of the health care system to handle a large number of patients.

[14]U.S. General Accounting Office, *SARS Outbreak: Improvements to Public Health Capacity Are Needed for Responding to Bioterrorism and Emerging Infectious Diseases*, GAO-03-769T (Washington D.C.: May 7, 2003).

that may seek treatment.[15] We reported that in the seven cities we visited, hospital, state, and local officials indicated that hospitals needed additional equipment and capital improvements—including medical stockpiles, personal protective equipment, quarantine and isolation facilities, and air handling and filtering equipment—to enhance preparedness. According to our survey of over 2,000 hospitals,[16] the availability of medical equipment varied greatly among hospitals, and few hospitals reported having the equipment and supplies needed to handle a large-scale infectious disease outbreak. Half the hospitals we surveyed had, for every 100 staffed beds, fewer than 6 ventilators, 3 or fewer personal protective equipment suits, and fewer than 4 isolation beds.

Workforce capacity issues may also hinder implementation of infectious disease control measures. Health officials noted that there is a lack of qualified and trained personnel, including epidemiologists, who would be needed in the event of a SARS resurgence. This shortage could grow worse if, in the event of a severe outbreak, existing health care workers became infected as a result of their more frequent exposure to a contaminated environment or became exhausted working longer hours. Workforce shortages could be further exacerbated because of the need to conduct contact tracing. According to WHO officials, an individual infected with SARS came into contact with, on average, 30 to 40 people in Asian countries—all of whom had to be contacted and informed of their possible exposure. In contrast, New York City health department officials said that infected individuals came into contact with 4 people on average.

In addition, the monitoring of individuals placed under isolation and quarantine may strain resources if widespread isolations and quarantines are needed. For example, follow-up with isolated or quarantined individuals requires significant resources. Officials of the New York City

[15]Shortages in N-95 respirators occurred during the SARS outbreak because of the high demand. CDC officials said that shortages in the United States may have been due to high demand in other countries, particularly when WHO recommended that health care workers in all affected countries use N-95 respirators.

[16]Between May and September 2002, we surveyed over 2,000 short-term, nonfederal general medical and surgical hospitals with emergency departments located in metropolitan statistical areas. (See U.S. General Accounting Office, *Hospital Emergency Departments: Crowded Conditions Vary among Hospitals and Communities*, GAO-03-460 (Washington, D.C.: Mar. 14, 2003) for information on the survey universe and development of the survey.) For the part of the survey that specifically addressed hospital preparedness for mass casualty incidents, we obtained responses from 1,482 hospitals, a response rate of about 73 percent.

Department of Health and Mental Hygiene said that they made home visits to SARS cases when officials became concerned that these individuals were not following infection control measures or were not remaining in their homes. Similarly, Canadian public health officials said that they, and in some cases Canadian police, made home visits to check compliance with quarantine orders. These officials also described the difficulty in providing necessary resources (food, medicines, masks, and thermometers) to individuals under isolation or quarantine. In Canada, police and the Red Cross had to help deliver food to those under isolation or quarantine.

Concluding Observations

The global spread of SARS was contained through an unprecedented level of international scientific collaboration and the use of well-established infection control measures that have been used effectively in the past to control diseases. Although questions remain about SARS, especially about the ways it can be transmitted, many lessons were learned that could be helpful to the United States in the event of a resurgence. Lessons to carry forward are the importance of early identification of infected individuals and their contacts, the effectiveness of safety precautions to control transmission and ensure the protection of health care workers, and the need to use, in some cases, isolation and quarantine. Swift and unfettered communication among heath care workers, public health officials, government agencies, as well as the public provided the essential backbone to support ongoing efforts to contain the disease.

Although SARS is currently believed to be contained, now is the time to prepare for the possibility of a future outbreak. Some preparations are already underway and encompass, in large part, approaches similar to those for pandemic influenza and are also part of general bioterrorism preparedness. Worldwide disease surveillance would facilitate prompt identification of a resurgence of SARS, allowing rapid implementation of infectious disease control measures that would reduce both the spread of SARS and the risk of a large outbreak. Should a large-scale outbreak occur in the near term, limitations in the capacity of our nation's health system to undertake effective and rapid implementation of infectious disease control measures could prove problematic. A major SARS outbreak would necessitate rapid escalation of infectious disease control resources including health care workers, emergency room and hospital capacity, and the requisite control and support equipment.

Mr. Chairman, this completes my prepared statement. I would be happy to respond to any questions you or other Members of the Subcommittee may have at this time.

Contact and Staff Acknowledgments

For more information regarding this testimony, please contact Marjorie Kanof at (202) 512-7101. Bonnie Anderson, Karen Doran, John Oh, Danielle Organek, and Krister Friday also made key contributions to this statement.

Appendix I: SARS Preparedness Checklist

ASTHO
ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICIALS

NACCHO NATIONAL ASSOCIATION OF COUNTY & CITY HEALTH OFFICIALS

STATE AND LOCAL HEALTH OFFICIAL EPIDEMIC SARS CHECKLIST

Are You and Your Jurisdiction Ready for Epidemic Severe Acute Respiratory Syndrome (SARS)?

This checklist, developed in collaboration with the Centers for Disease Control and Prevention, has been modeled on a previous Association of State and Territorial Health Officials (ASTHO) checklist for pandemic influenza preparedness (*Preparedness Planning for State Health Officials: Nature's Terrorist Attack - Pandemic Influenza* is available at www.astho.org/pubs/PandemicInfluenza.pdf). Preparations made to respond to other public health emergencies, including bioterror events, will generally be applicable to epidemic SARS planning.

The items on this checklist are intended for use by health officers at all levels – state, regional, district and local. The division of responsibilities between state and local levels varies among states, and often within states, according to the size of the population served by local health agencies. The items on this checklist should be interpreted in the context of the responsibilities of your public health agency and the division of responsibilities within your community, regardless of level of government. For some local public health agencies, for example, the capabilities needed for certain items may be available from a state health department, but are not present locally.

Every locality should plan for the possibility of a local public health crisis such as widespread SARS, in which help from other public health agencies is not available because they are facing similar crises. At the same time, there are advantages to coordinating response plans on a regional and statewide basis, partly so that isolation and quarantine procedures are applied uniformly and equitably.

SARS would be considered to be widespread in the United States if and when cases occur throughout the nation, in multiple locations, in persons without known epidemiologic links to places with community transmission of SARS or to known SARS cases. Local, district, and state public health agencies should be prepared to address all of the following items when the disease is present elsewhere in the world and to implement those preparations when widespread disease occurs in the United States.

LEGAL AND POLICY ISSUES

- ❑ 1. My jurisdiction has a draft or formally adopted epidemic SARS plan.
- ❑ 2. Agreements have been obtained with my state's health care insurers, Medicaid program, and healthcare product and service providers for cooperation with public health recommendations during an epidemic.
- ❑ 3. I have reviewed with legal counsel my jurisdiction's laws and procedures on quarantine, isolation, closing premises and suspending public meetings and know how to implement them to help control an epidemic.
- ❑ 4. I am familiar with my state's medical volunteer licensure, liability, and compensation laws for in-state, out-of-state, returning retired, and non-medical volunteers.
- ❑ 5. I know whether my state allows hospitals and other licensed healthcare institutions to use temporary facilities for provision of medical care in the event of a public health emergency.
- ❑ 6. My jurisdiction's epidemic plan addresses Worker's Compensation and Unemployment Compensation issues related to health care and other workers missing work because of isolation or quarantine.

Version 1.0—June 3, 2003

Source: National Association of County and City Health Officials.

❑ 7. I have identified any deficiencies in my jurisdiction's laws and procedures on quarantine, isolation and related capacities and initiated steps to have those deficiencies corrected.

❑ 8. I know what provisions are in place, if any, for compensation of persons with economic or health injury resulting from needed SARS control measures and for limitation of liability of health care providers and agencies.

AUTHORITY

❑ 9. My state has an executive SARS epidemic planning committee that oversees the planning process, in cooperation with local health agencies.

❑ 10. My state has identified the authority responsible for declaration of a public health emergency and for officially activating our plan during a SARS epidemic.

❑ 11. My jurisdiction has identified key stakeholders responsible for development and implementation of specific components of the SARS epidemic plan, including enforcement of isolation, quarantine, and closure and decontamination of premises.

❑ 12. My jurisdiction's elected officials, appointed officials, and other agency heads know their respective responsibilities in the event of an epidemic.

❑ 13. My jurisdiction has a command system in place (e.g., the Incident Command System) to govern roles and responsibilities during a multi-agency, multi-jurisdictional event.

❑ 14. I am familiar with the controlling authority over intrastate and interstate modes of transportation, should these need to be curtailed during an epidemic (e.g., airplanes, trains, ships, highways).

❑ 15. My staff has relationships with health authorities of adjoining counties or states and with federal agencies to ensure effective communication during a public health emergency.

❑ 16. My jurisdiction has identified an overall authority in charge of coordinating different medical personnel groups during an epidemic.

❑ 17. I know personally the key individuals from the state and local authorities who will assist in maintaining public order and enforcing control measures, if needed, during an epidemic.

❑ 18. I am familiar with the procedure for enlisting the National Guard's assistance during a public health emergency.

SURGE CAPACITY

❑ 19. I know how to access current recommendations on treatment of cases and prevention of transmission in the hospital, long-term care and home care settings.

❑ 20. My jurisdiction's emergency response planning has involved health care product and service providers to determine how to best prevent and control disease spread and manage the health care of the population during an epidemic.

❑ 21. I am familiar with the required protocol for securing needed emergency healthcare services and supplies during a public health emergency.

Source: National Association of County and City Health Officials.

❑ 22. My jurisdiction has identified ways to augment medical, nursing, and other health care staffing to maintain appropriate standards of care during an epidemic.

❑ 23. My jurisdiction has identified ways to augment public health laboratory, epidemiology and disease control staffing to meet emergency needs and in the event public health workers are affected by an epidemic.

❑ 24. My jurisdiction has a process to recruit and train medical volunteers for provision of care and vaccine administration during a public health emergency.

❑ 25. My jurisdiction has identified alternate facilities where overflow cases from hospitals and well persons needing quarantine away from home can be cared for and has developed processes with Emergency Medical Services to assess, communicate, and direct patients to available beds.

❑ 26. My jurisdiction has identified facilities for outpatient and inpatient care of children with SARS and their families.

❑ 27. My jurisdiction's epidemic plan addresses the mechanics of how isolation and quarantine will be carried out, such as providing support services for people who are isolated or quarantined to their homes or temporary infirmary facilities and protection for workers providing these services.

❑ 28. My jurisdiction has a plan for ensuring that appropriate personal protective equipment, including N-95 or higher level respirators, is made available for persons whose job requires exposure to people with SARS, and that needed training and fit-testing are provided.

❑ 29. My jurisdiction has a plan for dealing with mass mortality, including transportation and burial of bodies.

❑ 30. My jurisdiction has a plan for providing mental health services to mitigate the impact of a SARS epidemic.

COMMUNICATIONS AND EDUCATION

❑ 31. I have conveyed the importance of epidemic preparedness, and its overlap with bioterrorism preparedness, to my jurisdiction's chief executive and to other state and local law and policy makers.

❑ 32. I know personally the key individuals from public health agencies, the medical community, and the political community with whom I will need to communicate during an epidemic.

❑ 33. My jurisdiction has begun educating the public on epidemic SARS to instill acceptance of the epidemic response (including quarantine and isolation) and to optimize public assistance during an epidemic.

❑ 34. My jurisdiction has opened a regular channel of communication and begun educating health care providers (including first responders) and their organizations and unions on epidemic SARS (including diagnosis, treatment, and management of cases and contacts to prevent transmission).

❑ 35. My jurisdiction has opened a regular channel of communication and begun educating chief executive officers of health care organizations on epidemic SARS (including management of patients in health care settings, health care worker protection, physical facility needs, voluntary or forced furloughs of exposed workers, etc.).

❑ 36. My jurisdiction has established a multi-component communications network and plan for sharing of timely and accurate information among public health and other officials, medical providers, first responders, the media and the general public.

Source: National Association of County and City Health Officials.

❑ 37. My jurisdiction has begun identifying and planning to produce and provide education and information materials for media, providers, the public, and occupational groups whose duties may expose them to SARS, in appropriate languages and in forms suitable for limited literacy populations.

❑ 38. Whoever is selected as the primary public spokesperson for my jurisdiction during an epidemic is ready to clearly and consistently answer the following types of questions:

- ❑ How is the SARS-associated coronavirus (SARS-CoV) transmitted?
- ❑ How long are people infectious after they have SARS?
- ❑ What is isolation? What is quarantine?
- ❑ What is the justification for isolation of cases and quarantine of contacts?
- ❑ What is the legal authority for isolation of cases and quarantine of contacts?
- ❑ What is the difference between a probable and a suspected SARS case?
- ❑ Who should be tested for the SARS-associated coronavirus?
- ❑ What can members of the public do to protect themselves?
- ❑ In the event a vaccine or antiviral treatment become available, what specific priority groups might be vaccinated or treated first?

❑ 39. My jurisdiction has identified the most effective media to get messages out to the public during an epidemic (e.g., TV, radio, print media, internet, Web sites, hotlines).

❑ 40. My jurisdiction has planned how to coordinate state, local, and federal public messages and ensure they are consistent and timely.

LABORATORY AND SURVEILLANCE

❑ 41. In the event of a SARS epidemic, I will have available daily counts of key community health indicators, such as numbers of emergency department visits, hospital admissions, deaths, available hospital beds and staff, facility closings, numbers of contacts being traced and numbers under quarantine.

❑ 42. The public health laboratory that serves my jurisdiction can test for the SARS-associated coronavirus by serology and/or PCR.

❑ 43. My state has identified those labs that can test for the SARS-associated coronavirus.

❑ 44. The public health laboratory that serves my jurisdiction has linked to clinical laboratories and provided training on the use of SARS tests, biosafety, specimen collection, packing and shipping, and rule-out testing.

❑ 45. Public health laboratories in my state have computerized record-keeping to help with data transmission, tracking, reporting of results to patients and facilities, and analysis during an epidemic.

❑ 46. My jurisdiction has determined how to assess and document the spread and impact of disease throughout the population, including special populations at risk (such as health care workers and first responders), during a SARS epidemic, including enhancements to routine surveillance.

❑ 47. My jurisdiction has computerized record-keeping for cases, suspected cases, contacts, and persons under public health isolation or quarantine orders to help with data transmission, tracking and analysis during an epidemic.

Source: National Association of County and City Health Officials.

❑ 48. My jurisdiction's epidemiology staff, in cooperation with other public health agencies, has the capacity to investigate clusters of SARS cases, to determine how disease is being transmitted, to trace and monitor contacts, to implement and monitor quarantine measures, and to determine whether control measures are working.

❑ 49. My jurisdiction has plans for educating health care providers about recognition and reporting of SARS, about the current case definition, and about sources of current information on all aspects of SARS.

PREPAREDNESS IN OTHER AGENCIES

❑ 50. The emergency response system is ready to deal with epidemic SARS as called for in an all-hazards or epidemic plan.

❑ 51. My jurisdiction has carried out a community-wide epidemic SARS table-top or field exercise, to train on and evaluate its epidemic plan.

❑ 52. Community partners such as hospitals, EMS services, law enforcement agencies, health care practitioners, environmental hygiene/remediation services, news media, schools, and colleges know what part they are expected to play during an epidemic and are prepared to do so.

❑ 53. The law enforcement and court system in this jurisdiction are prepared to enforce isolation and quarantine orders and to promptly adjudicate appeals to public health orders, as provided by statute.

Information about SARS is available from the Centers for Disease Control and Prevention at

www.cdc.gov/ncidod/sars/

Worldwide information about SARS is available from the World Health Organization at

www.who.int/csr/sars/en/

Source: National Association of County and City Health Officials.

VACCINATION / ANTIVIRALS

At present (May, 2003), there is neither a vaccine nor effective antiviral chemotherapy available for SARS. The items below will become relevant when one or both of these become available.

- ❑ V1. My jurisdiction has identified the method(s) of epidemic vaccine and antiviral delivery (i.e., public sector, private sector, or a combination of these two) that will be most efficient for the jurisdiction, and developed and tested methods for mass administration.
- ❑ V2. I know whether my state statutes provide for providing or requiring vaccination or treatment during an infectious disease emergency, and know how to implement them in my jurisdiction to help control an epidemic.
- ❑ V3. My jurisdiction has the infrastructure in place to vaccinate or treat at-risk and hard-to-reach populations during a SARS epidemic.
- ❑ V4. My jurisdiction's epidemic plan outlines a process for identifying essential workers (those people whose jobs/skills are critical for maintenance of public safety and an efficient epidemic response) and "highest risk" groups who will need to receive priority vaccination and/or antiviral prophylaxis.
- ❑ V5. My jurisdiction has developed a documentation process for administered epidemic vaccine and antiviral doses, with recall capacity if more than one dose is required to induce immunity.
- ❑ V6. My jurisdiction has determined how adverse vaccine or medication side effects will be documented, in cooperation with local health agencies, during a mass or targeted vaccination or prophylactic treatment campaign.
- ❑ V7. My jurisdiction has compiled a list of health care workers and institutions that will assist in mass vaccination or prophylactic treatment during an epidemic or other public health emergency.
- ❑ V8. My jurisdiction has identified ways to secure and protect a limited supply of essential medicines, supplies, equipment and vaccines.
- ❑ V9. My jurisdiction has developed and tested, through a simulated exercise, a plan for mass or targeted immunization, prophylactic treatment, and clinical care including: accepting delivery of large quantities of vaccine, drugs, supplies or equipment (e.g., as part of the Strategic National Stockpile); storing and handling vaccine, drugs, supplies or equipment; setting up and staffing clinics; administering vaccine or antiviral drugs; and educating the public, media, and medical providers.

Source: National Association of County and City Health Officials.

Related GAO Products

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