WORLD HEALTH ORGANIZATION

FIFTY-SIXTH WORLD HEALTH ASSEMBLY A56/48
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Revision of the International Health Regulations

Severe acute respiratory syndrome (SARS)

Report by the Secretariat

CHRONOLOGY AND EPIDEMIOLOGY

1. Severe acute respiratory syndrome (SARS) is a new infectious disease in human beings, first recognized in late February 2003, when cases of atypical pneumonia of unknown cause began appearing among staff at a hospital in Hanoi (Viet Nam). Within two weeks, WHO was informed of similar outbreaks in various hospitals in Hong Kong Special Administrative Region (China), Singapore and Toronto (Canada).

2. Subsequent investigations traced the source cases in all these outbreaks to contact in a hotel in Hong Kong with a visiting physician from Guangdong Province, China. He had treated patients with atypical pneumonia before travelling to Hong Kong and was symptomatic upon arrival. On 11 February, WHO had been informed by the Chinese Ministry of Health of an outbreak of acute respiratory syndrome involving 305 cases with five deaths in Guangdong Province. On 14 February, WHO was informed that the disease was clinically consistent with atypical pneumonia, that cases had been detected as far back as 16 November 2002, and that the outbreak was coming under control.

3. Both WHO's Global Outbreak Alert and Response Network and Global Influenza Network were on high alert after reports from Hong Kong, on 19 and 20 February, confirming two cases (one fatal) of infection with avian influenza virus A, subtype H5N1.

4. When cases of atypical pneumonia began to appear among hospital staff, WHO initially feared a new strain of influenza virus, and activated its influenza pandemic preparedness plan. However, when laboratories in the influenza network detected no influenza virus strain or other known cause of pneumonia in samples taken from patients in the Viet Nam and Hong Kong outbreaks, WHO staff then began to suspect a new pathogen as the cause.

5. By 11 March, at least 20 hospital staff in Hanoi and 23 in Hong Kong were showing symptoms of a severe respiratory disease of undetermined cause. On 12 March, WHO had sufficient information to issue a global alert about cases of atypical pneumonia apparently confined to the health care setting. As a general precaution against further nosocomial transmission, WHO recommended that patients with similar symptoms should be isolated and managed according to strict procedures of infection control. WHO further recommended reporting of cases to national health authorities.

6. By 15 March, WHO had received reports of more than 150 cases of a new disease, which it then named severe acute respiratory syndrome. Epidemiological analysis indicated that the new disease was spreading along the routes of international air travel. WHO issued emergency travel recommendations on 15 March to alert health authorities, physicians and the travelling public to what was now perceived to be a worldwide threat to health.

7. The travel recommendations marked a turning point in the early course of the SARS outbreak. Areas with cases detected before the recommendations were issued, namely Viet Nam, Hong Kong, Singapore and Toronto, experienced the largest and most severe outbreaks, all characterized by chains of secondary transmission outside the health care setting. After the recommendations had been issued, all countries with imported cases, with the exception of provinces in China, were able, through prompt detection of cases and isolation of patients, either to prevent further transmission or to keep the number of additional cases very low.

8. In late March, Chinese authorities issued updated data on cases and deaths for the previously reported outbreak of atypical pneumonia in Guangdong Province. WHO staff, in consultation with Chinese health officials, concluded that the cases of atypical pneumonia previously reported were cases of SARS. Daily electronic reporting of cases and deaths, by province, began in China the following month.

9. Near the end of March, WHO recommended screening measures at airports for passengers departing from areas with recent local transmission, and issued advice to airlines on steps to take should a suspect case be detected in flight. Twice in April and once so far in May, to prevent further international spread, WHO issued recommendations that travellers should consider postponing all but essential travel to designated areas determined to carry an elevated risk of acquiring SARS outside confined settings such as the health care environment.

10. During the last week of April, the outbreaks in Viet Nam, Hong Kong, Singapore and Toronto showed signs of peaking. On 28 April, Viet Nam became the first country to stop local transmission of SARS. However, new probable cases, including cases in hospital staff, additional deaths, and cases imported to new areas continued to be reported from several countries. By the end of the first week in May, 30 countries on six continents reported a cumulative total of more than 7000 probable cases of SARS with more than 500 deaths. Of these countries, 23 had only a single or a few imported cases with either no or very limited further spread. Most worrisome were outbreaks in Beijing, with around 100 new cases a day being reported, and other parts of mainland China, and a rapidly growing outbreak in Taiwan, China, including cases in hospital staff.

PUBLIC HEALTH IMPLICATIONS

11. SARS, the first severe infectious disease to emerge in the twenty-first century, has taken advantage of opportunities for rapid international spread made possible by the unprecedented volume and speed of air travel. SARS has also shown how, in a closely interconnected and interdependent world, a new and poorly understood infectious disease can adversely affect economic growth, trade, tourism, business and industrial performance, and social stability as well as public health.

12. SARS has several features that make it a special threat to international public health. There is no vaccine or treatment, forcing health authorities to resort to control tools dating back to the earliest days of empirical microbiology: isolation, infection control and contact tracing. The virus has been identified as a previously unknown member of the *Coronaviridae* family; some coronaviruses undergo

frequent mutations, raising questions about the future evolution of these outbreaks and prospects for vaccine development. Epidemiology and pathogenesis are poorly understood. Evidence is mounting that certain source patients make a special contribution to the rapid spread of infection. The maximum incubation period, currently estimated to be 10 days, allows spread along international air-travel routes during the incubation period, placing any country with an international airport at risk of imported cases. WHO's most recent analysis estimates overall case fatality in the range of 14% to 15%. In persons over the age of 65, the case fatality ratio can exceed 50%.

13. SARS imposes an especially heavy burden on hospitals and health services; it continues to show a disturbing concentration in previously healthy hospital staff, a human resource vital for disease control. Isolation and management according to strict measures of infection control are recommended for all patients. A significant proportion of patients who do not recover spontaneously requires intensive care. All available diagnostic tools have important limitations. Diagnosis continues to rely on clinical examination, supported by case definitions that include travel history. The initial symptoms are non-specific and common, further complicating differential diagnosis and adding to the burden on health services. In some countries, detection of other important diseases has lapsed due to the concentration of health care resources on SARS.

14. This new disease has created an immediate and urgent need for rapid high-level research, in several precise areas, to provide the scientific basis for recommended measures to reduce further spread, assist case detection and reporting, improve patient survival, and halt nosocomial transmission.

WHO RESPONSES

15. In mid-March, WHO used the model of its electronically connected Influenza Network and the Global Outbreak Alert and Response Network to create three "virtual" SARS-dedicated networks of virologists, clinicians, and epidemiologists to ensure a continuous research effort equal to the magnitude of the SARS emergency. Progress has been rapid. One month after the establishment of a network of 11 leading laboratories, participating scientists collectively announced conclusive identification of the SARS virus. Complete sequencing of its RNA followed shortly. Daily teleconferences of epidemiologists have refined the case definitions, confirmed modes of transmission, tracked exported cases, and greatly increased knowledge about which control measures work best in different country settings. WHO has also sent teams of epidemiologists to investigate environmental sources of infection and confer with authorities about the conditions in which the initial cases of SARS may have emerged. Participants in the clinical network have described the clinical course of SARS, compared experiences with different treatments, formulated guidelines for isolation and infection control, and explored possible reasons for the spontaneous recovery of many patients and the rapid deterioration of others, and for the very small number of paediatric cases. Despite this progress, many questions remain.

16. Efforts to develop robust and reliable diagnostic tests have proved more problematic than expected. To support Member States, WHO, in collaboration with industry and members of the SARS laboratory network, has made standardized reagents available on request to improve the reliability and support the quality assurance of diagnostic tests. Sequences of primers for a polymerase chain reaction diagnostic test have been published on the WHO web site.[1]

[1] http://www.who.int

17. SARS has been a demanding test of the effectiveness of WHO and its partners in the Global Outbreak Alert and Response Network. WHO teams continue to provide operational support and specialized expertise in countries on request, and additional requests for assistance continue to be received, causing a strain on the staff resources of both WHO and its international partners. Advice is available on the WHO web site, ranging from forms for collecting and reporting data, through guidelines for clinical management and infection control in hospitals, to advice on the use and interpretation of diagnostic tests. Daily updates on the outbreak and its risks are posted on the WHO web site.

18. The outcome of the current revision process of the International Health Regulations will provide a stronger legal framework for global surveillance and reporting of infectious diseases and a mechanism by which measures to prevent international spread can be enforced. The SARS outbreak provides firm evidence of the need for such regulations and their operational arm (the Global Outbreak Alert and Response Network), and demonstrates specific areas in which revision and updating are urgently needed.

LESSONS LEARNED

19. Lessons learned so far are useful in assessing global capacity to respond to other infectious disease threats, including the next influenza pandemic and the potential use of agents for terrorist purposes. In particular, prompt and open reporting of cases is vital. In conditions that favour rapid international spread of an infectious disease agent, failure adequately to detect, report and manage cases in any country can jeopardize containment efforts globally. When there is reason to be concerned about the effectiveness of containment measures in an individual country, the defence of global health security may require on-the-spot studies by a WHO team, with the cooperation of the government concerned, to assess the severity of the threat to neighbouring countries and international health, and to assist the government in organizing appropriate control measures.

20. Inadequate surge capacity in health care facilities is another important problem that would also arise during a rapidly evolving public health emergency. The shortage of expert staff to coordinate national and global responses in such an event is another problem demanding attention.

21. The urgency of SARS challenged WHO to set in motion high-level scientific and medical collaboration. The success of the three networks described in paragraph 15 is an encouraging sign of the willingness of the scientific community to collaborate, rather than compete, in combating a shared threat of as yet unknown dimensions. Experience has also shown the ability of global alerts, widely supported by a responsible press and amplified by electronic communications, to improve global vigilance and awareness at all levels.

22. Monitoring the evolution of SARS has been hindered by the weak capability of many national surveillance systems to provide detailed information daily. Data on age, sex, date of onset of illness, symptoms and signs, and radiological findings, results of laboratory tests, details of treatment, and outcome are needed to further understanding of SARS or any other rapidly evolving infectious disease threat. When surveillance in individual countries is strengthened along these lines, it generates the knowledge needed to support sound control measures and thus enhances prospects for global containment. Another surveillance problem is that some Member States have experienced difficulties in obtaining information from states, provinces, or territories, creating an obstacle to rapid communications between national authorities and WHO.

23. Immediate political commitment at the highest level can be decisive. Viet Nam demonstrated how a developing country, affected by an especially severe outbreak, can contain a disease when reporting is prompt and open and when WHO assistance is quickly requested and fully supported. The rapid detection and reporting of the first cases in several developing countries are indicative of the high level of global awareness and the vigilance of health systems. Also encouraging is the speed with which developing and developed countries alike have readied their health services with preparedness plans and launched SARS campaigns, often with WHO support, to guard against imported cases. However, disease surveillance and outbreak response capabilities need strengthening in almost all countries.

24. Another lesson relates to the importance of international collaboration and strong global leadership. Although exceptional in many ways, SARS is only one of around 50 internationally important outbreaks to which WHO and its partners respond annually. The considerable medical, scientific, political, and public attention focused on SARS is helping the world to understand the severity of the infectious disease threat, the importance of international solidarity in the face of this threat, and the vital role of prompt and transparent reporting in the interest of protecting the citizens of all countries.

25. WHO is continuing its aggressive containment activities aimed at preventing SARS from becoming widely established. If, nevertheless, the disease does become endemic, WHO and its international partners will need to be prepared for a long and difficult fight. In this case, existing mechanisms developed for other public health emergencies could serve as models for expediting the development of SARS therapies and vaccines and ensuring equitable access in all at-risk countries. Ways would also need to be found to ensure that efforts made and resources invested to combat SARS also work to strengthen global defence against the infectious disease threat in all its dimensions.

ACTION BY THE HEALTH ASSEMBLY

26. The Health Assembly is invited to consider the following draft resolution:

The Fifty-sixth World Health Assembly,

Having considered the report on the emergence of severe acute respiratory syndrome (SARS) and the international response;[1]

Recalling resolutions WHA48.13 on new, emerging, and re-emerging infectious diseases,