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Crimean-Congo haemorrhagic fever, hantavirus, and Alkhurma haemorrhagic fever, as emerging infectious diseases

Report by the Secretariat

1. The emergence of new infectious diseases is a consequence of ecological and environmental changes, human demographics and behaviour, increasing international travel, more intensive agricultural practices, changes in technological and industrial practices, microbial adaptation and change, and infrastructural shortcomings for both public health and animal health. In the past 30 years, more than 30 new emerging infectious diseases have been reported globally. New pathogens, particularly viruses, continue to emerge and spread across countries, regions and all continents.

2. Outbreaks of emerging infectious diseases often cause serious problems because of their epidemic potential, the often high case-fatality ratio, difficulties in their treatment and prevention, and often unpredictable societal reactions. Outbreaks tend to emerge at the human–animal interface, in remote rural areas and in vulnerable populations with limited medical services. When emerging pathogens are successfully transmitted between humans, they can be amplified in conditions that favour spread of disease, such as overcrowded areas or hospitals with poor infection control. These outbreaks can then become global through international travel and trade. Lack of timely laboratory diagnosis and functional epidemiological surveillance, poor infection-control practices at health-care facilities, inadequate communication with affected populations and weak vector control-programmes often result in prolonged outbreaks with potential for international spread.

CRIMEAN-CONGO HAEMORRHAGIC FEVER

3. Crimean-Congo haemorrhagic fever virus, a member of the *Nairovirus* genus, is transmitted by ticks and causes serious disease in human beings but is not pathogenic for ruminants, its amplifying host. The virus is transmitted to humans either by tick bites or through contact with viraemic tissues during and immediately after the slaughter of an animal. Outbreaks of human disease can be severe. They constitute a threat to public health services because of the disease's epidemic potential, its high case-fatality ratio (between 10% and 40%), the risk of nosocomial infection and the difficulties in treatment and prevention. Crimean-Congo haemorrhagic fever is endemic throughout Africa, the Balkans, the Middle East and Asia south of latitude 50° north, the geographical limit of the genus *Hyalomma*, the principal tick vector.

4. Following several consultations, including a joint intercountry workshop on prevention and control of Crimean-Congo haemorrhagic fever (Istanbul, Turkey, 6–8 November 2006), WHO and its

partners formulated a general strategy, similar to WHO's global alert and response strategy for emerging zoonotic diseases, for the renewal or intensification of efforts to prevent and control the disease. Five main areas have been identified as priorities for action:

- improving readiness and preparedness for outbreaks of Crimean-Congo haemorrhagic fever with the development of better forecasting models that use remote sensing data and are linked to surveillance activities
- strengthening the outbreak alert system through reinforcement of epidemiological surveillance, including better and more rapid laboratory diagnosis
- supporting development and implementation of a multidisciplinary strategy for outbreak prevention and control that includes elements dealing with vectors (ticks), animal health and human health
- developing a standardized approach to social mobilization for preventing and responding to Crimean-Congo haemorrhagic fever that is based on a strategy of communication for behavioural change and on medical anthropology
- reviewing the current practices for treatment of patients with Crimean-Congo haemorrhagic fever.

HANTAVIRUS

5. Hantaviruses form a genus of viruses that cause a variety of human diseases that range from a relatively mild condition to severe illness depending on the hantavirus. The severe forms of the disease are haemorrhagic fever with renal syndrome and a pulmonary syndrome with a high mortality. Human beings are infected with the viruses through contact with the excreta of infected rodents. Haemorrhagic fever with renal syndrome is endemic in the Asian and European continents; about 150 000 to 200 000 patients are admitted to hospital each year worldwide with haemorrhagic fever with renal syndrome, with most cases occurring in Asia (in particular China and Korea). The case-fatality rate of haemorrhagic fever with renal syndrome varies from <1% to 12% depending on the species of virus. Hantavirus pulmonary syndrome has been reported only in the Americas. Although the number of reported cases of the pulmonary syndrome (about 200 cases a year) is much smaller than that of haemorrhagic fever with renal syndrome, the average case-fatality rate is 40%.

6. The number of reported cases of hantavirus infection is increasing in many countries and new hantavirus strains are being identified worldwide. Climatic and environmental changes may affect the geographical distribution, abundance and dynamics of the rodent carrier, and hence the epidemiology of hantavirus infections.

7. The existing strategy for outbreak control is based on rapid laboratory confirmation of diagnosis, treatment of patients with supportive therapy and ribavirin (except in case of hantavirus pulmonary syndrome for which there is neither antiviral agent nor vaccine) and vaccination of exposed population, as well as reduction of human exposure to infected rodents through social mobilization and rodent control operations.

8. The Secretariat is organizing an international workshop on hantavirus infection to be held in China later in 2010 with the aim of identifying the lessons to be learnt from past outbreaks of disease

due to hantaviruses, understanding better the genesis of outbreaks, and formulating strategies for improved preparedness in order to be able to identify rapidly and control new outbreaks.

9. Over the past few decades, the understanding and recognition of hantaviral infections through the world have greatly improved. With the development of more rapid and sensitive diagnostic tests, and clinicians' greater awareness of the disease, human hantaviral infections will presumably be detected in new areas and new rodent species might be found to carry yet unknown viruses.

10. A more effective treatment for hantaviral infections remains far off. The long-term prognosis of such infections and the pathogenicity of certain virus species remain to be established. Some infections can be prevented by avoidance of contact with rats and their excreta, but the best protection will require a safe and effective multivalent vaccine or a vaccine adapted to local conditions.

ALKHURMA HAEMORRHAGIC FEVER VIRUS

11. Tick-borne flaviviruses causing haemorrhagic fevers in humans have been isolated in the Russian Federation (Omsk haemorrhagic fever virus in Siberia), India (Kyasanur Forest disease virus in Karnataka State) and Saudi Arabia (Alkhurma virus).

12. Alkhurma haemorrhagic fever virus is an emerging pathogen responsible for cases of haemorrhagic fever in the Middle East. The virus was discovered in 1995 in a patient with haemorrhagic manifestations and fever after he slaughtered a sheep that came from the city of Alkhurma in Saudi Arabia. To date, 24 symptomatic cases have been recorded in humans, including six deaths (a case-fatality rate of 25%). All cases were reported from Makkah and Najran provinces, both located on the west coast of Saudi Arabia. Pauci-symptomatic or asymptomatic cases are likely but epidemiological data are currently unavailable.

13. Evidence suggests that the virus infects humans either transcutaneously (by contamination of a skin wound with the blood of an infected vertebrate or through the bite of an infected tick) or orally by drinking unpasteurized contaminated milk. Viral transmission to humans has been associated with butchering of sheep and camels. Genetic studies have determined that Alkhurma haemorrhagic fever virus is a variant genotype of Kyasanur Forest disease virus but, in contrast to that virus, no increase in animal mortality due to the Alkhurma virus has been reported before the detection of human cases of infection and disease.

14. To date, Alkhurma haemorrhagic fever virus has only been isolated from human samples and *Ornithodoros savignyi* ticks.

15. The Secretariat has been evaluating the four most recently reported cases of Alkhurma haemorrhagic fever in Saudi Arabia in December 2009 during the hajj.

16. Because of the considerable livestock trade with neighbouring countries, the spread of Alkhurma haemorrhagic fever virus to other countries cannot be excluded. Given the severity of the disease, the possibility of spread needs to be carefully monitored.

17. Epidemiological, veterinary and entomological aspects and the cycle of transmission are still poorly understood. Further studies are needed to characterize the pathology of the viral infection and its potential risks for public health. In February 2010, a team of experts from the Special Pathogen Branch of the Centers for Disease Control and Prevention (United States of America), the University

of Louisiana (United States of America) and the University of Marseilles (France) visited Saudi Arabia. The team is reviewing the national prevention and control plan that was jointly prepared by the health and agriculture ministries. Human and animal epidemiological studies are planned in order to improve understanding of the ecology and epidemiology of this rare disease and to assess its potential risks for public health.

EMERGING INFECTIOUS DISEASES THREATS

18. The emergence of new infectious diseases is likely to increase in the foreseeable future. They will continue to threaten global public health, and to place sudden intense demands on national and international health systems.

19. Controlling these diseases will require a comprehensive strategy and effective actions, complementary to the International Health Regulations (2005), that would include:

(a) improving knowledge of the nature of these diseases;

(b) gaining a better understanding of the worldwide threat and economic burden of these diseases;

(c) multisectoral and multidisciplinary collaboration;

(d) formulating a global approach for predicting, detecting, preventing, treating and containing the spread of these diseases that takes into consideration ecological pressures, climate change, altered farming and hunting practices, population growth, and related factors;

(e) developing flexible, multivalent diagnostic technologies in order to accelerate the detection of emerging pathogens and to improve the management of outbreaks and the clinical management of patients; and

(f) the strengthening of partnerships and networking at global and regional levels and through intensified collaboration with partners in the animal health sector.

20. Technical consultations could usefully be held at regional and interregional levels in order to formulate a strategy that encompassed different emerging infectious diseases and reflected different country conditions and circumstances.

ACTION BY THE EXECUTIVE BOARD

21. The Executive Board is invited to note the report and provide further strategic guidance.

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