Taiwan SARS Experience and the Challenge for Future Outbreak of H5N1 Influenza

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Abstract

Taiwan suffered severely from the outbreak of severe acute respiratory syndrome (SARS) in 2003. The lack of experience, poor coordination of commanding system, inadequate scientific capability, poor infection control together account for the final outcome of SARS 2003. The lessons learned from SARS, however, drive Taiwan to prepare for the coming outbreak of H5N1 pandemic influenza and other emerging infectious diseases. Several control measures were activated in the post-SARS period including central command and governance structure re-organization, improved scientific capability and laboratory diagnostics, surveillance and real-time reporting, law revision and enforcement. Furthermore, the government implemented a policy to self-manufacture anti-virals and vaccine for influenza and H5N1. The above measures proved to be effective for the control of dengue infection, seasonal influenza, and enteroviruses in the post-SARS period. The measure most worthwhile to share with the world is the stockpile of 2.3 million pills of of

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anti-virals-Tamiflu on February 2004. The control policy of ILI illness by antivirals proves to be effective in institutional outbreaks of seasonal influenza. This strategy can be applied to the control of H5N1 pandemic flu. Taiwan paid the painful price for SARS and we should benefit from the lessons in the coming outbreak of H5N1 influenza.

The Lessons We Learned from SARS

(A) Lack of experiences and support from WHO at the intial phase (before May 2003)

The SARS epidemic in Taiwan was marked by three distinct phases: the initial importation phase (before April 20, 2003), the second phase of explosive nosocomial outbreaks (April 21 to May 20, 2003), and the final containment phase (May 21 to July 5, 2003). The first imported SARS patient was a businessman who returned to Taiwan from China on February 25, 2003. The initial importation phase was controlled with success. All the SARS cases at this phase were from Guandong, Beijing, and Fu-Chien of China. However, the success of this phase drove the government to propose a propaganda of " 3 zero—no case mortality, no second transmission, and no exportation "to mark the merit of SARS control and to facilitate the campaign to world health organization (WHO) in late May. The second important lesson for Taiwan is the total lack of experience and communication with WHO before April 2003 which led to the delay to revise the WHO criteria of SARS, and even worse, the WHO criteria was used as a golden standard to exclude the index case even in the presence of repeated laboratory confirmation of SARS-CoV. Therefore, real time alert, and access to scientific information from WHO and other international reference centers are of critical importance to implement appropriate control measures at the initial phase.

(B) Delayed reporting, inappropriate control measures, and poor public communication

In contrast to the success of the initial importation phase, the second phase of serial nosocomial outbreaks represented the startling and painful memory of SARS in Taiwan, when a large-scale nosocomial infection, 30 probable and 50 suspected SARS cases, were recognized in Taipei Municipal Hospital on April 21, 2003. The administrators in the hospitals were usually reluctant to accept the occurrence of SARS at the early stage and therefore slowed down their appropriate response, only until the outside authority got intervention. Understanding the attitude of the administrators drove the government to fine or punish the hospital administrators and, unexpectedly, this new policy led further to an outbursting of case reporting of SARS suspects from the hospitals which subsequently shutdown the laboratory and control system on early May. Furthermore, the poor communication among news medium and shortage of mask dampened the public throughout the island. The improvement of public communication through regular television release of the real time status of SARS control and government policy starting from May 20 was effective to calm down the public panic.

(C) Science contributes to control measures and wins the final battle

The dispatch of WHO officiers to Taiwan on 4 May and the clarification of the incubation and transmission pattern of SARS on 6 May through the WHO telecommunication represent two major breakthrough in the control of SARS in Taiwan. Starting from 15 May, fever was recognized as an important indicator for SARS transmission (“No fever, no transmission”) and appropriate fever triage was implemented in each clinic and hospital throughout the island. A nation-wide fever screen was even implemented under the strong recommendation of the Nobel Prize Laureate, Dr. Yen-Tzer Lee. The successful application of fever triage, patients isolation, and trafficking measures then brought the SARS under control.

(D) Border control and quarantine measure: Should we do it again in influenza pandemic ?

During the late SARS phase, infrared body temperature screening device that can accurately measure body temperature when inbound and outbound travellers walk through at their usual pace was established at the two international airports in Taiwan. During the SARS outbreak, passengers with fevers were prohibited from boarding the aeroplane. A hospital near each airport was designated to house, diagnose, and treat any passengers found with fever at the airport. This level B measure totally quarantined around 60,000 passengers. Together with the level A quarantine (close contacts in health care units or households) of 80,000 persons, the government paid a high price cost. Even worse, the human right become an critical issue. Since influenza transmission may be different from SARS-CoV, quanrantine measure will be futile to restrict the transmission. The infrared temperature screening system implemented during this period, however, played an important role to detect imported dengue, malaria, and shigella at the airports.

The Post-SARS Preparedness and Policy

(A) Strengthening the scientific capability

Twelve virology reference laboratories have been established throughout the island to keep a rapid and smooth chain of flow of clinical specimens from fever patients to the CDC central laboratory and reference laboratories beginning on August 19, 2003. 50 patients each week were selected from fever clinics to be tested for a variety of respiratory pathogens, including the SARS coronavirus, influenza, dengue, and the Japanese encephalitis virus with the rapid antigen test. Currently, this laboratory surveillance system was kept for the monitoring of reporting communicable diseases, syndromic reporting, and influenza and enteroviruses.

Considering the importance of scientific capability in the identification of new pathogens in the outbreak of re-emerging infectious diseases, the government provided Taiwan CDC a total of 47 new positions for recruiting physicians and scientists to strengthen the scientific capability of case investigation and pathogen identification.

(B) Strengthening alert, reporting, and the surveillance system

In general, fever patients are evaluated in designated fever clinics where laboratory specimens are collected and aetiological agents are identified with rapid tests as described above. The reporting of SARS patients was added to the preexisting web-based reporting system along with all other reportable infectious diseases, and can be accessed by all regional hospitals and medical centres. In addition, a special telephone line has been installed for reporting any unusual infectious diseases, imported or otherwise, or in any unusual clusters by the general public or any practising physicians. Several pre-existing surveillance systems are undergoing evaluation and revision, including emergency room-based syndromic surveillance that would allow analysis for targeted signs and symptoms related to infectious diseases—eg, fever, cough, respiratory distress, etc.

(C) Revision of Law for Infectious Disease Control and Establishment of the Infection Control Hospital and Commanding System

The SARS epidemic reactivated disease-control measures, such as the commanding and governance structure, the legal base for quarantine of contacts and compulsory isolation of SARS patients. The public-health code was revised in March 2003 to place the implementation and enforcement of these control measures on a legal ground. Further revision of the public-health code has been undertaken to accommodate the complex issues concerning the protection of rights and freedom of individuals in the context of the overall well-being of the public. Considering the poor coordination of commanding structure, national and regional structures of commanding system, combined with the infection control hospitals in each district, constitute a national network for the commanding structure. Now, the coordination and function improve significantly in the post-SARS period.

(D) Biosafety issues

In August and December 2003, two SARS cases were reported in Singapore and Taiwan in two research virologists working on the SARS coronavirus. The Taiwan CDC invited international and local experts to evaluate and discuss biosafety issues regarding practice, training, and regulation. National policy on monitoring and regulation of biosafety, as well as biosafety level III and IV practice standards is being formalised. A third incident of laboratory-acquired SARS cases that initiated transmission occurred in Beijing, and further stressed the importance of providing guidelines for biosafety standards and maintaining public-health vigilance.

(E) Stockpile of anti-virals to control the institutional outbreaks of influenza

The overlapping of the symptoms/signs between SARS and influenza in the winter season constituted a big challenge for the control of the resurging SARS. In the belief that the far majority of ILI in the winter season will actually represent influenza, Taiwan CDC formulated a flow chart for the proper management of febrile patients in the winter season 2003/2004. Those febrile patients will be regarded as influenza and treated as this under appropriate isolation measure unless laboratory proved the case as SARS. Considering the frequency of clustering outbreak of ILI in the institutions which may raise un-necessary panic in the public, the government decided to stockpile anti-virals (oseltamivir-Tamiflu) for a total of 2.3 millions pills. In the winter of 2003–2004, the Taiwan CDC for the first time distributed an antiviral drug through public-health channels to health-care facilities for aggressive prophylactic therapy. Young children, elderly patients, and patients with a high risk for severe influenza infection should be evaluated early if a fever develops, and given antiviral drugs early when deemed necessary, especially the clustering in the institutions. The goal is to reduce the demand for isolation hospital wards if a SARS resurgence occurs. In addition, all influenza A viruses isolated from potential SARS patients are sent to the Taiwan CDC for subtyping. In winter 2003/2004, a total of 68 institutional outbreak occurred and rapid tests for influenza A and B were performed. After sampling, anti-virals were immediately given to the patients and their close contacts. A total of 12,000 dosages were given. Twenty three percentages of the specimens were reported to be positive for influenza. None of them tested showed positivity for SARS-CoV. Interestingly, follow-up studies revealed a successful control of all the ILI outbreak and transmission was arrested in all 68 institutions. As control, the ILI outbreak in 2 prisons from which no anti-virals were given due to delayed reporting had successive transmission of ILI in their residents. Therefore, the application of anti-virals to the early outbreak if ILI in the institutions appears to be of great success. This measure can be considered to be applied to the influenza pandemic.

Looking to the future: Anti-virals and Vaccine development

The public-health system in Taiwan, as well as in many other countries, has geared up to minimise the adverse health impact of a possible influenza pandemic. It should be reiterated that prevention measures will have to be adjusted to account for the similarities and differences between SARS and influenza. Both SARS and pandemic influenza are likely to be zoonotic in nature, and establishing the capability for early detection in initial human cases is the key to preventing large-scale human transmission. While both diseases carry a considerable surge potential in terms of the number of patients and health-care workers potentially affected, antiviral drugs that can be used for prophylaxis are available to fight influenza. However, the demand for the antiviral may be high and will require countries to stock adequate supplies in advance. If transmission begins in human beings at any focal point, the speed at which influenza spreads will depend on how early it is detected, and how fast the international community can mobilise and deliver assistance, including providing antiviral drugs for prophylactic use. For H5N1, vaccine is of paramount importance. The government makes the decision to self manufacture the flu vaccine through a BOO policy. Therefore, in addition to a national preparedness plan, Taiwan scientists and government officials are also actively seeking international collaborations with neighbouring countries in Asia. With the unexpected emergence of the H5N1 avian influenza in people during the winter of 2004, the preparedness plan in Taiwan for SARS has produced the additional benefit of consolidating the preparedness plans for possible influenza pandemics. Through the already existing viral laboratory network, methods for detecting H5 influenza serotype among patients were quickly established in all the reference laboratories, and have become one of the routine diagnostic items for severe respiratory infection. The intensified efforts to identify aetiological agents for respiratory diseases have put these laboratories in a well-prepared state to detect the avian influenza virus when it occurs in human beings. In fact, early detection of any avian influenza virus in human beings is believed to be the key to influenza pandemic prevention and has been the main focus of concern for clinical laboratories in Taiwan.

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