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Lessons from Severe Acute Respiratory Syndrome (SARS): Implications for Infection Control

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Severe acute respiratory syndrome (SARS), the first global epidemic in the 21st century, affected over 8500 people in approximately 30 countries (1–7). With a crude mortality of 9%, its cause was quickly identified as a novel coronavirus that jumped species from animals to man. The SARS coronavirus epidemic, which began in the Fall of 2002, was related to the exotic food industry in southern China, initially involving disproportionate numbers of animal handlers, chefs, and caterers. Subsequently, person-to-person transmission spawned the outbreak. What distinguished this illness clinically was the fact that approximately half of the victims were health care workers (8), infected while caring for recognized or unrecognized patients with SARS. There are many curiosities and uncertainties surrounding the epidemic of SARS with lessons that may be useful to the community of infectious diseases physicians, especially when looking ahead to the next epidemic. Herein we relate our perspectives on useful lessons derived from a review of the SARS epidemic. © 2005 IMSS. Published by Elsevier Inc.

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Recognition of a New Epidemic

A repeated theme in reviewing emergent outbreaks is that it is essential that astute clinicians with sufficient experience will recognize and distinguish something new. It is difficult to comment about clinicians in the early course of SARS in China, because nothing was reported. However, when the epidemic appeared in Vietnam, the team of physicians at the French Hospital of Hanoi led by Dr. Carlo Urbani immediately alerted the world (9). His colleagues in the Doctors without Borders group recognized a defining feature of the cluster of community-acquired pneumonias: 30 of the initial 60 cases involved health care workers. Sadly, within weeks Dr. Urbani and four of his colleagues themselves would die as victims of SARS. It later became apparent that whereas the 9% mortality was somewhat higher than the expected mortality for the usual causes of community-acquired pneumonias (approximately 2–4%), the 50% mortality for patients over age 60 also distinguished this pathogen (10). Diarrhea and dyspnea were common among populations studied with SARS (11), but each was not highly predictive of infection in any single patient with the novel coronavirus. Thus, the high transmissibility to nurses and physicians and the higher than expected mortality were key features strongly suggesting a new pathogen. Furthermore, SARS to many clinicians appeared to have a biphasic course, with cough and fever initially followed in 3–5 days with a normal temperature and increasing hypoxia. The point is that physicians and nurses need to be trained to be alert to the unusual, the unexpected, and the variant clinical presentation. The astute, frontline health care worker is the first defense against spread of an emerging pathogen.

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Early Reporting of an Epidemic

Rapid containment of a serious infectious disease epidemic depends on early notification to the world at large.

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With respect to SARS, much has already been said of the delays caused by Chinese officials in delaying its reporting. Their reluctance and hesitation to notify the World Health Organization (WHO) stands in sharp contrast to the transparency and quick communication from Vietnam (12).

It is assumed that fear of nationally significant, economic downturns was one key factor in the lack of early reporting from China. This is neither new nor unique, and in the future other nations will be similarly concerned about financial losses should they acknowledge an outbreak in their country. Thus, the question is, how can incentives be designed to encourage early and transparent reporting?

We would suggest that the World Bank offer financial support to countries that agree to early reporting with full disclosure about new epidemics. It is likely that the global economy would be better preserved with such a positive financial incentive. Consider the fact that estimates of the cost of SARS ranged from $30 billion to $100 billion (13). A fraction of that cost could have been invested in China late in the Fall of 2002 to help limit the spread of SARS within Guangdong providence, where it originated. At least in retrospect this would seem to indicate a great return on investment.

In addition to the positive incentives, there may indeed need to be some international censure—perhaps from the United Nations—for countries that persist in hiding an epidemic in the face of the proposed World Bank incentives. It probably should not be tied to financial penalties, however, because government officials and not the general citizenry would make the decision to obscure the truth. For example, one could consider the banning of the country from participating in the subsequent Olympics, a situation that would cause national shame for the country's political leadership. Alternatively, the offending country might not be allowed to cast votes in the United Nations for a 1-year period. Of course, there are no guarantees that either the favorable financial incentives or an international rebuke would always lead to early reporting, but the ideas are testable.

Global Surveillance

Even before the notification from Vietnam of SARS, the global web-based surveillance system overseen by the International Society for Infectious Diseases was suggesting a new epidemic. That system, called ProMed, had an unusual query approximately 2 weeks before the WHO notification of 28 February 2003:

> February 10, 2003: This morning I received this e-mail and searched your archives and found nothing. Does anyone know anything about this problem? Have you heard of an epidemic in Guangdong? An acquaintance of mine from a teacher's chat room lives there and reports that the hospitals there have been closed and people are dying. Stephen O. Cummion, MD, PhD, MA. www.promed.org (14).

The question arises that since WHO has no such web-based global surveillance, could ProMed partner—at least informally with WHO—to enhance an early response after the recognition of a new epidemic. The nature of this partnership could be either in the form of a non-financial agreement or a financial agreement with an incentive for the early recognition and reporting of a new epidemic to WHO. There may be complementary, web-based systems worldwide that could be united to work on the issue of global notification.

New Role for WHO

The World Health Organization responded admirably to the SARS epidemic, taking international leadership in addressing questions to the public, coordinating scientific investigations, and quickly reporting all new advances from the laboratory and field epidemiological studies (15). There is no question that WHO emerged as a global leader in epidemic investigation and control, and their suggestions for management and prevention were quickly respected and adopted. They were especially effective in forging important partnerships with national public health authorities such as the Centers for Disease Control and Prevention in Atlanta, GA, as well as with basic scientific laboratories in Asia, Europe and the Americas.

There is, of course, no going back. The international community will anticipate the same commitment, leadership, expertise and favorable outcomes. WHO will surely have to examine its structure, activities and budget as it prepares for the next series of emerging pathogens. Equally important will be the need to reinforce and solidify the scientific relationships it made successfully and consider still new ones. A great deal of thought will have to go into its capacity to respond to future epidemics and to budget for appropriate responses.

The Global Village Concept

Those of us living in developed countries need continually to remind ourselves of the concept of a global village: within 24 h serous microbes infecting a distant population can be carried over oceans directly to our homes. With respect to SARS, the culinary delicacies of southern China—what we call exotic food choices—led initially to infections in animal handlers, chefs, and caterers and subsequently had a huge impact on the lives of people thousands of miles away.

Briefly stated, we need to make concerted efforts to be aware of and remain interested in the afflictions of individuals in remote villages. Global surveillance coupled with a sense of community are the starting points. These concepts