The main finding was that surgery was associated with about a 50% reduction in mortality at 6 months in the subgroup of 109 patients who could be matched by propensity scores to 109 controls. Demonstration of such a substantial benefit, while not surprising, helps to validate the belief that surgery is valuable. Likewise, it was not surprising that benefit was greatest in patients with significant heart failure, a complication long associated with higher mortality in endocarditis.[16]

Thus, the major contribution of this study is not so much its immediate findings, but its implications for future studies. The authors point the way for application of a powerful statistical technique to some previously intractable problems in research on endocarditis. Use of propensity scores to evaluate outcomes among patients in large databases, such as that now being assembled by the International Collaboration on Endocarditis (ICE),[17] should be productive.

In this study, the lack of demonstrated benefit for patients with indications for surgery other than moderate to severe heart failure (eg, septic embolism; refractory infection, including intracardiac abscess; large vegetations) is surprising and provocative. Is it possible that the presumed benefits of surgery are overestimated for patients who do not have significant heart failure? This is one of many pressing questions about surgical management that still require clarification and explanation. Others include: What interval between diagnosis and surgery is associated with the lowest mortality? Is earlier intervention better? If so, how early? How can patients best be selected for this major intervention? Is the presence of a large vegetation per se an adequate indication for surgery? If so, what size is considered large in this context?

A better understanding of how and when to intervene surgically offers the best opportunity to overcome the central challenge in endocarditis management today—how to reduce mortality. The approach described by Vikram and colleagues[13] can help to reach the heart of this matter.

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The SARS Response—Building and Assessing an Evidence-Based Approach to Future Global Microbial Threats

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On February 21, 2003, an ill physician traveling from China's Guangdong Province spent 1 night on the ninth floor of a Hong Kong hotel. During the next 24 hours, this individual would infect more than a dozen other hotel guests and visitors.[1] Within days, these guests would transmit their infections to health care workers and family members in Hong Kong, Vietnam, Singapore, and Canada, providing a vivid illustration of the rapidity and ease with which infectious diseases can spread and marking the start of the global outbreak of severe acute respiratory syndrome (SARS). One of the first persons to recognize the potential gravity of the situation was Carlo Urbani, an infectious disease physician working for the World Health Organization (WHO) in Hanoi. Urbani observed that a patient who had recently arrived from Hong Kong had a highly transmissible form of atypical pneu-

See also pp 3215, 3222, and 3229.

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monia, and he promptly alerted WHO officials. His swift actions to investigate the cause of the illness and implement infection control measures proved effective in helping to limit the spread of the illness in Vietnam, the first affected country to stop its outbreak. Tragically, his heroic actions exposed him to the disease that claimed his life.

On March 12, following notification of simultaneous outbreaks of severe atypical pneumonia in hospitals in Hong Kong, China, and Vietnam, WHO issued a global alert about the new disease, recommending isolation of patients and reporting of all suspected cases to national health authorities.[2] Two days later, officials in Toronto, Ontario, reported 4 cases of the illness, with 2 deaths, in a single extended family, including 1 family member who had recently stayed at the implicated Hong Kong hotel on February 21. By the following day, the number of countries reporting cases had further increased and WHO issued an unprecedented emergency travel advisory.[3] During the next several days, WHO took additional steps to coordinate and strengthen an extraordinary international response to the new illness (by now designated SARS), mobilizing and dispatching teams of experts to assist health officials in affected areas and establishing a collaborative global network of laboratories to identify the cause. These actions facilitated rapid sharing of new information, enabling swift and virtually simultaneous identification of the causative agent as a previously unrecognized coronavirus by 3 of the collaborating laboratories,[4-6] followed soon by sequencing of the complete genome in 2 laboratories.[7,8] As more information became available, WHO developed extensive guidance documents and held frequent global teleconferences involving clinicians, epidemiologists, and laboratory scientists.

Subsequent studies soon focused attention on the likelihood of an animal reservoir for the SARS-associated coronavirus, called SARS-CoV, in southern China,[9,10] although the ultimate source in nature continues to elude researchers. Identifying the reservoir for SARS remains a high priority for prevention efforts and draws clear attention to the need for increased communication and collaboration among the clinical, laboratory, public health, and veterinary communities.

Coincident with the SARS outbreak (and obscured by the surrounding publicity) was the release on March 18 of a new report by the Institute of Medicine.[11] The report, *Microbial Threats to Health: Emergence, Detection, and Response*, serves as a successor to the Institute's 1992 report,[12] which sought to dispel the complacency surrounding the risk of infectious diseases. The new report cites additional health threats, such as the increased frequency of zoonotic diseases and risk of bioterrorism, that have emerged in recent years and describes a host of factors—broadly categorized as genetic and biological; physical environmental; ecological; and social, political, and economic—that can work singly or in concert to produce global microbial threats. Among its recommendations, the report calls for increased global response capacity and strengthened domestic and global disease surveillance to effectively address infectious diseases. Both the timeliness and importance of such measures became strikingly clear as SARS spread rapidly to more than 25 countries, requiring a coordinated global response to contain its spread.

In this issue of THE JOURNAL, 3 articles[13-15] focus on issues that can arise when dealing with an infectious disease for which cause and transmission patterns are unknown and that demands prompt delineation and implementation of containment measures and rapid assessment of potential treatment options. Pang et al[13] describe and assess efforts undertaken to stop the spread of SARS in Beijing, the area most affected by the 2003 outbreak. Despite more than 2500 cases, the city was able to contain its outbreak in a relatively short time. Evaluating the many control measures used, the authors point to the success of a multifaceted approach that included isolation of suspected cases, contact tracing, quarantine of potentially exposed individuals, provision of personal protective equipment and training for health care workers, establishment of fever clinics, and enhanced communication efforts for health care professionals, policymakers, and the public. Important observations include the low risk of transmission to work and school contacts, the low risk of transmission before onset of symptoms, the low yield from screening of travelers at transportation hubs, the lack of transmission to health care workers in the newly constructed SARS hospital, and the decrease observed in the time from illness onset to hospitalization (and isolation) as control measures were implemented—an important metric that should be monitored during future responses.

Loutfy et al[14] provide results from an assessment of outcomes among SARS patients treated with corticosteroids alone or in combination with interferon alfacon-1. The study illustrates the challenges of quickly determining safe and effective treatment options while confronting a frightening and severe new disease. Although the findings in a small number of patients suggest that interferon alfacon-1 may have some benefit, more information from more rigorous investigations is needed. These results highlight the critical need for establishing protocols for randomized controlled trials and for understanding the pathogenesis of SARS before the disease reappears.

Gostin et al[15] discuss the ethical and legal issues resulting from the SARS response in various countries and their implications for controlling future infectious disease outbreaks. Recalling the ethical issues that characterized the early years of AIDS, the authors describe the need to balance the rights of the individual with urgent public safety priorities, citing the importance of the precautionary principle[16] in protecting the public when faced with a new, uncertain health risk and the resulting "tension between the public's health and individual rights to privacy, liberty, and freedom of movement."[15] The authors appropriately em-

phasize issues of equity and justice, the unfortunate stigmatization of affected populations that predictably occurs in outbreaks of new diseases, and the critical importance of transparency in providing the public with new information and the rationale for control strategies in a timely manner. The challenges experienced by those affected firsthand by the control measures used during the SARS epidemic provide much needed insight into these complex issues.[17-19] These issues also highlight the need for clinicians and public health officials to be familiar with local quarantine laws and regulations, as well as the logistical and ethical issues associated with their implementation. Similarly, their observations indicate the need for preparedness planning efforts to involve representatives of the judicial system, who may lack experience in dealing with issues related to control of infectious diseases.

What the future holds for SARS remains to be determined, but heightened vigilance for unexplained and compatible illness, such as unexplained pneumonias in health care workers, is critically important. Whether SARS will be a seasonal illness is not known. Moreover, the significance and implications for recurrence of the 29 nucleotide deletion in human isolates compared with those from exotic animals is uncertain.[9] Potential sources of recurrence include reintroduction from an animal reservoir, occupational infection in a laboratory setting, as recently occurred in Singapore,[20] or spread from a person with persistent infection (although chronic infection has yet to be documented).

The successful control of the 2003 SARS outbreak is a testament to the heroic, collaborative efforts of clinicians, laboratory scientists, and public health officials worldwide, all done in the absence of diagnostic tests, effective therapies, and a vaccine. The response also emphasized the importance as well as the effectiveness of stringent infection control precautions, including respiratory and hand hygiene; patient isolation; appropriate use of personal protective equipment; and implementation of quarantine strategies when faced with a new infectious agent.

As the last decade and, especially, the last year have demonstrated, newly recognized pathogens will continue to emerge, requiring preparedness planning,[21] a vigilant health system, a commitment to timely reporting of disease, and strong interdisciplinary partnerships to contain their spread. It is essential to continue to evaluate and learn from recent experiences. Applying the lessons learned from SARS will serve us well in responding to a recurrence and to future microbial threats, whether naturally occurring (eg, the next influenza pandemic) or the result of a terrorist attack.

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