The Severe Acute Respiratory Syndrome Epidemic: Everything You Wanted to Know About SARS but Were Afraid to Ask

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The First Question: Was It Terrorism?

There is no irrefutable evidence that the Severe Acute Respiratory Syndrome (SARS) pandemic of 2003 resulted from deliberate intent. The U.S. public health community strongly believes that bioterrorism was not a factor in the genesis of the epidemic. Several counterterrorism experts have refused, however, to rule out the possibility that the outbreak was consequential to an act of bioterrorism or an on-site accident at a covert Chinese bioweapons development program. The fact is that terrorists—unless operating as part of a militarily styled campaign to create as much internal chaos as possible (e.g., the Palestinian intifada or Al Qaeda’s campaign of attacks in Saudi Arabia)—rarely, if ever, take credit for their actions when they have the option of doing so. This behavior, coupled with even the most sophisticated science laboratory’s inherent inability to ascertain if an outbreak of deadly disease has been deliberately propagated, means such a determination would have to be established chiefly by conjecture and circumstantial inferences. Of course, we should not expect China’s senior leadership and top public health officials, who have already been excoriated by the World Health Organization (WHO) for failing to provide adequate epidemiological data about the SARS epidemic occurring in that country, to be forthcoming if an accident at a state-secret weapons development program were responsible for the incident. Lacking an unambiguous declaratory statement on the part of the perpetrators and in the absence of confirmatory forensic investigation by public health authorities, this question cannot be answered with certainty.

Why would terrorists prefer to act anonymously? One answer is that confusion over “who did it” might allow the perpetrators to escape the fury of their victims, particularly overwhelmingly stronger powers and especially American retaliation. In this regard, it is important to note that American counterterrorism experts spent years blaming Iran and sometimes Syria for a terrorist-caused airplane crash that claimed hundreds of lives, until Libya emerged as the most likely malefactor. Colonel Qaddafi subsequently acknowledged his nation’s role in the air piracy disaster. The United States is becoming more aggressive in hunting down terrorists to enact revenge, which is beginning to be seen as the sole effective deterrent. According to Vice President Dick Cheney,

The only way to deal with this threat [i.e., terrorism] ultimately is to destroy it. There is no treaty that can solve this problem. There is no peace agreement, no policy of containment or deterrence that works to deal with this threat. We have to go find the terrorists.¹

President George W. Bush added, “In the face of terror you have to be strong, not weak. You
can’t talk with them; you can’t negotiate with them. You’ve got to bring them to justice.”

One could be forgiven for thinking there was a relationship between SARS and terrorism, based on the measures taken to contain the disease. During the course of SARS’s fast-spreading phase, many Asian airports began to resemble bioterrorism research laboratories, where nurses in protective “space suit-type” gear assessed all comers—departing as well as arriving—for signs of the disease. Those who showed indications of being ill, acknowledged traveling in infected areas, or answered “yes” when asked if they’d had contact with “suspected” SARS carriers were whisked off to spend the next two weeks in involuntary isolation, “for their own protection,” in the company of others suspected of having SARS. They were sequestered in a confusing warren of closed wards and sometimes intermingled with visibly sick patients, many of whom were dying from SARS, in what fast became ad hoc hospices exclusively set aside for SARS patients. Furthermore, daily press conferences and news briefings held at the WHO in Geneva, the U.S. Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, and affected national health services—where SARS informational, “bulletin board” Web sites were refreshed several times during the workday and statistics-laden interpretations of new case indices were made available for download to media representatives—bore an all but indistinguishable resemblance to the procedures and processes that would have been followed had there been a “real” bioterrorist incident involving a newly emerged, highly contagious, deadly pathogen of unexplained origin.

Dr. Guthrie Birkhead, director of the Center for Community Health at the New York State Department of Health, who has overseen the state’s work on both SARS and smallpox, observed, “It’s uncanny—these [SARS-containment measures] are exactly the kinds of preparations we have been making for the last year and a half on smallpox.”

A final point on the question, “Was it terrorism?” Although the public of any nation attacked by terrorists expects that data obtained from counterterrorism assets and law-enforcement forensic investigations will reveal the identities of the perpetrators, the reality is that many incidents producing casualty tolls similar to those caused by SARS are closed out without being satisfactorily resolved. For example, on April 30, 2003, the office of Russia’s prosecutor general closed its investigation into the bombing of three Moscow apartment buildings that occurred in September 1999, killing 243 people and wounding 1,742. The authorities rounded up and blamed the “usual suspects” (that is, Chechen separatists), without providing any motive for the bombings other than the inference that they were “separatist” acts. It is intriguing that none of the nine men accused was Chechen. Moreover, the prosecutor general’s report acknowledged that “the entire truth might never be known.”

The Second Question: What Is SARS, and Where Did It Come From?

The SARS virus has engendered multiple, substantive strains within several seriously affected nations—not only overburdening public health systems and eroding hospital/medical care staff readiness and resiliency but also causing huge dollar losses stemming from interruptions in business, commerce, trade, travel, and tourism. This pernicious, rapidly spreading viral infection has been responsible for hundreds of deaths and substantial social chaos and political unrest. It is therefore of the utmost urgency that we begin to understand the nature of this illness and develop more effective ways to inhibit its spread.

SARS is an emerging (newly disclosed) infectious disease characterized by symptoms that include myalgia, mild sore throat, dry cough, and a temperature over 38°C. Despite aggressive
treatment with antibiotics and steroids, it often quickly progresses to an atypical pneumonia. The illness is unusual in its high mortality and morbidity rates, which rival those of the 1918 influenza pandemic—the “gold standard” of infectiousness. SARS is transmitted through direct contact, and its medical supervision requires the strictest adherence to infection-control protocols. It is spread by airborne nasopharyngeal discharge. Fecal/oral transmission also occurs; hundreds were infected and several died due to a sewage leak (or the more likely explanation that blamed “splash back,” anal-entry contamination with SARS-infectious material stemming from poorly flushed communal toilets) in the Amoy Gardens, a housing complex in Hong Kong.

SARS has two and sometimes three clinical stages before recovery begins. The first week of the illness is characterized by the presenting symptoms listed above. These symptoms generally improve after the first few days. In the second week of illness, when infectivity is at its height, patients usually experience a recurrence of fever, oxygen desaturation, and diarrhea. On average, the inability of about one-fifth of these patients to breathe automatically progresses to the point at which they need ventilatory support. Consequently, public health authorities and hospital clinicians need to be mindful that SARS patients often present a false recovery during the first week, and that it is dangerous to downgrade the level of prophylaxis, especially quarantine and infection control, in response to significant progress on the patient’s part during the first week of treatment.

The disease’s etiology is not well understood. It is believed to have derived from a spontaneous mutation of a veterinary sickness that previously affected only chickens, turkeys, cattle, and pigs. In this scenario, the disease causing SARS became zoonotic—that is, it crossed the species barrier—and began to infect humans sometime in the fall of 2002. For this to have occurred, both animal and human hosts had to have exchanged DNA. The fact that SARS began in China is not surprising, given the close proximity of farm life, where animals and people are crowded together. Such circumstances are ideal breeding grounds for species-jumping viruses. Yet it was food handlers and chefs, not farmers, who comprised an abnormally large share of the first cohort of SARS victims. This could be significant in explaining SARS’s origin; the slaughter of or intimate contact with freshly killed animals may have been an essential component in creating this zoonose. Supporting this thesis is the custom in China for food handlers and chefs to keep a variety of table-bound animals (chickens, cats, even badgers) in a hodgepodge of cages in jammed stalls situated throughout or close to the restaurant.

The CDC has determined that SARS is caused by a corona virus—so called because viral samples show a crownlike structure under electron microscopy. Corona viruses are notorious for mutating, ultimately making the process of combating this threat significantly more intricate and complicated. In this regard, SARS has the potential to become a hydra—that is, a multifaceted—threat showing a strong tendency to present a changed microbiological structure periodically. For a vaccine to provide effective protection, it must be genetically identical to the disease it seeks to thwart. Because the influenza virus, for example, mutates within the avian (bird and water fowl) reservoir, where it resides when it is not infecting human hosts, new batches of flu vaccine tailored for each specific flu variety must be created during the summer months for next year’s flu season in order to reinoculate the public’s most “at-risk” members each fall. Each year the WHO’s influenza program uses 111 laboratories around the world to scan 200,000 samples from flu victims, looking for candidates for next year’s vaccine.

Corona viruses are not influenza viruses and theoretically should not present this problem. As a hydra, however, SARS could similarly render useless whatever vaccines and efficacious treatments then existed as it metamorphosed de
nouveau into a genetically different molecular structure while being carried inside sick patients’ bodies. Corona virus mutations can be unstable—often producing short-lived, nonviable organisms. With a bit of luck, SARS may follow such a pattern. Indeed, the international medical community seems to have gotten that break in at least one area. The SARS virus appears to be less stable (i.e., more prone to mutations) at room temperature than other corona viruses.

Drs. Earl G. Brown and Jason A. Tetro, epidemiologists from the University of Ottawa, however, believe that SARS is well adapted to the human host and “may not readily mutate to a benign infection because the virus has maintained its consensus genotype.”

In the worst-case scenario, SARS would have a seasonal cycle-like influenza, as discussed above, perhaps scorching the Southern Hemisphere this summer and then reappearing in our part of the world in the fall. Adding to this possibility, corona viruses ominously resemble influenza viruses. Both are zoonoses, each shows instances of dual tropism for respiratory and gastrointestinal tissues, and both possess mechanisms for the generation of extreme genetic vulnerability.

At this juncture, an explanation of zoonotic disease should be helpful in describing the magnitude of the threat that such illnesses pose to humankind. Both HIV-1 and HIV-2—two of the viruses that cause AIDS in humans—made the jump from animals to people more than 60 years ago (HIV-1 in the 1930s, HIV-2 in the 1940s). HIV-2 is the virus responsible for the AIDS epidemic that has now spread around the world. Both forms of HIV are related to simian immunodeficiency virus (SIV), and the primate reservoir of HIV-1 has been identified as the chimpanzee subspecies pan-trogloides troglodytes. AIDS caused by HIV-2 did not reach epidemic proportions in West Africa until the 1960s. It first appeared in Guinea–Bissau, where a sharp increase in new infections coincided with the war of independence between 1963 and 1974. This may have resulted from an increase in sexual activity as well as a heightened use of nonsterile injections during the war. Guinea–Bissau was a Portuguese colony, and the first European cases of HIV-2 were clustered among Portuguese veterans who had served during that war.

The SARS epidemic was initially confused with another zoonotic disease—Avian Influenza H5N1—which caused a devastating epidemic among both humans and poultry in Hong Kong in 1997. The isolation of the highly pathogenic H5N1 influenza virus from poultry raised the specter of a “bird flu” pandemic sweeping one Asian country after another. Because there would not have been time to culture a vaccine to prevent the disease’s spread, the results probably would have been much worse than the way the SARS epidemic unfolded, and the “spread pattern” would probably have been more extensive as the frightened citizenry persistently fled to further distant, uninfected areas, bringing the contagion with them.

SARS derivation as a new corona virus was not confirmed scientifically until May 14, 2003. It was only then that investigators satisfied the scientific guidelines—known as Koch postulates—that establish a pathogen as the cause of a specific disease. Named after 19th-century microbiologist Robert Koch, the identifying “truths” are these.

The agent must be found in all cases of the disease.

It must be isolated from those so infected and cultured in the laboratory.

The cultivated agent must reproduce the disease when introduced in the same or a related species.

The agent must be reisolated from the new host, and a specific immune response must be detected.

One nagging doubt persists, however: Scientists still do not know whether an asymptomatic patient can pass the SARS virus to another person. If true, that would be important,
as those without complaint will not seek medical evaluation and thus could spread the disease unwittingly.

SARS’s genetic sequence is unlike that of any other corona virus. Its many minute differences suggest that it diverged long ago, evolving in some as yet unidentified animal species if it was not created in a biowarfare research laboratory. It does not appear to have previously infected humans, as blood bank analysis reveals the absence of antibodies to the SARS virus in people. Its novelty as a human pathogen suggests that most populations might be immunologically naive to its infection.

Like the variant Creutzfeldt-Jakob (Mad Cow) disease (vCJD) and Acquired Immuno-deficiency Syndrome (AIDS), SARS appeared in the world health arena without warning or precursor. From the first reported cases of a particularly deadly atypical pneumonia in Guangdong (formerly Canton) in southern China in mid-November 2002, SARS rapidly progressed into a major worldwide scourge affecting more than 60 countries. Within three months, SARS had ravaged China, sickening thousands and killing hundreds. Abetted by highly mobile international travelers (many silently infected; others coughing, sneezing, aching, and feverish), SARS cases cropped up in a variety of countries across the globe, posing serious dangers to public safety and health, world commerce, and the national economies of those hardest hit: China, Canada, Singapore, Taiwan, and Vietnam. SARS even rattled the asymptomatic “worried well,” disrupting the normal daily routines of millions of individuals. In myriad restaurants and shops, in China as well as in Chinatowns around the globe, a solitary dry cough or sneeze could empty a crowded room within minutes. This behavior acknowledges a second phenomenon: SARS has universally diminished everyone’s sense of personal security—whether one has served on the front lines of the battle against it as hospital medical staff or rural health care workers, had a family member fall ill, lived in or near an infected area, felt compelled to wear a surgical mask, or merely watched such scenes on television. Media images of these highly visible symbols of individual vulnerability raised personal insecurities that tomorrow’s newspapers would headline the arrival of the fast-spreading, deadly illness in the viewer’s hometown. According to Ding Xue-liang, a Chinese politics expert at the Hong Kong University of Science and Technology, “SARS has been felt everywhere as a personal threat.”

SARS’s effects on domestic public health services in countries that have high patient caseloads—China, in particular—were devastating. Not only were neighborhood hospitals, clinics, and other local medical resources in Beijing, Hong Kong, and Guangzhou severely overloaded to the point at which elective medical and surgical care was postponed for months, but the networked complex of health-care systems in those cities were close to fragmenting under the staggering requirements of caring for extremely contagious, very sick patients. Because gravely ill patients were essentially imprisoned in those hospitals, the question of having adequate resources for treating them assumed crucial importance. Outside China, many victims were routinely offered a choice of quarantine in their homes—monitored by Web cams and electronic bracelets, as happened in Singapore, or subject to random phone calls and home visits or even the posting of a police guard at the front doors of noncompliers’ domiciles, as happened in Ontario, Canada, while two large hospitals remained shuttered because of fears those buildings were irretrievably contaminated with the SARS virus.

Large cohorts of elderly or physically challenged people quarantined at home raised concerns that these groups would languish if relatives and caregivers were prevented from making drop-in, “look-after” visits. Being confined to one’s home was better, however, than internment in medical isolation units in closed hospital wards, where the well slept next to the sick. (Beijing public health authorities routinely
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used that city’s military hospitals primarily for quarantine to protect the public and only coincidently to provide medical treatment for SARS victims).

Many municipalities in China’s hinterlands, particularly Hebei and Shanxi, reached the point at which their beleaguered medical systems could merely offer beds in overcrowded hospital corridors, thronged transit hallways, and hastily converted visitors’ lounges in jam-packed facilities staffed by medical personnel terrified for their own personal safety as they watched their colleagues fall victim to the atypical pneumonia that characterizes the fatal aspect of the disease. In some hospitals, more than 30 percent of medical personnel—the bulk of them nurses—came down with SARS.

Still, quarantine and public health prophylaxis represented the best method to contain outbreaks for which modern medicine lacked diagnostic tests, vaccines, or other effective treatments. With SARS, the world medical community has been forced to function in the premodern, preantibiotics era. A “flying-blind” approach came about because SARS is a diagnosis of exclusion, not an indisputable factual determination. In making this diagnosis, doctors had to rely on a checklist of signs and symptoms, what epidemiologists call a case definition. The absence of full assurance that the presenting illness was actually SARS compounded the difficulties of identifying patients, tracking their movements and contacts, and enforcing quarantine for “suspected” cases; a series of wrong decisions in these instances would either condemn those sick with merely a cold or influenza-A or -B symptoms to face-to-face exposure to SARS sufferers and the certitude of potentially fatal infection or allow the illness to claim further random victims by releasing SARS-infected individuals into the general population.

To the exclusion of everything else, the average citizen’s attention seemed to be riveted on two questions. First, how long would the epidemic continue to claim new victims? Second, when would the fear that by then had permeated the entire society begin to dissipate? On the administrative level, the handling of the SARS epidemic threatened the stability of several nations—China and Canada foremost. In China’s case, a wave of criticism about how the epidemic was managed raised the thorny issue of regime survival. This criticism weakened the grasp of China’s new leadership on the levers of power and strengthened the hand of departing Politburo members, particularly Zu Rongji, whose protégées replaced other Politburo members’ appointees in the Ministry of Health. In ways both similar and different, the Canadian authorities’ handling of the SARS crisis resulted in a firestorm of partisan political recriminations. The real culprit was the patent inadequacy of medical emergency contingency plans that were untested, poorly thought out, and cumbersome to implement rather than deliberate inaction or malfeasance.

What Is SARS Clinically?

This was the definitive report on the clinical aspects of SARS.

Methods:

A prospective study of the clinical, hematological, radiological, and microbiological findings of 75 patients managed with a standardized treatment protocol of the Hospital Authority, Hong Kong Special Administrative Region, using ribavirin and corticosteroid was performed over a 3-week period. The pattern of clinical disease, viral load, the risk factors for a poor clinical outcome, and the usefulness of virological diagnostic methods was presented and analyzed.

Findings:

The fever and pneumonia initially responded to treatment. However, patients developed recurrent fever (85.3 percent) on day 8.9 plus/minus 3.1
(range 4 to 18), watery diarrhea (73.3 percent) on day 7.5 plus/minus 2.3 (range 3 to 15), radiological deterioration (80 percent) on day 7.4 plus/minus 2.2 (range 3 to 13), and respiratory deterioration (45.3 percent) on day 8.6 plus/minus 3 days (range 5 to 19). In 45.3 percent of patients, marked improvement of initial pulmonary lesions was closely associated with appearance of new radiological lesions at other sites. 20 percent progressed to acute respiratory distress syndrome (ARDS) during the third week. Quantitative RT-PCR of nasopharyngeal aspirates in 14 patients (4 had [acute/adult respiratory distress syndrome] ARDS and 10 without ARDS) consistently demonstrated a peak viral load at day 10 and a decrease to admission level at day 15. Age and chronic HBV [hepatitis B virus] infection are independent significant risk factors for progression to ARDS on multivariate analysis. Fecal excretion of corona virus was present and continued through the period of follow-up. Seroconversion and [reverse transcriptase-polymerase chain reaction] RT-PCR of nasopharyngeal aspirates and stool are useful for confirmation of SARS.

Interpretation:

The consistent clinical progression, shifting radiological infiltrates, and an inverted V viral load profile suggested that deterioration during the second week is not related to uncontrolled viral replication but may be related to immunopathological damage. Age and HBV status are risk factors for progression to ARDS.

Subsequent analysis of clinical specimens from 20 patients with initial [nasopharyngeal aspirate] NPART-PCR positive and antibody seroconversion to SARS associated corona virus.9

The Financial Costs: More Than the Regional Economy Can Bear?

SARS’s economic impact has turned out to be far more wide-ranging and costly than initially estimated. The airline travel business was among the hardest hit. Singapore was the first to react by announcing a $130 million economic bailout package for its travel and tourism industry. Most international and domestic carriers reported passenger count declines of more than 50 percent in travel to the affected regions beginning in March 2003. Teleconferencing increasingly substituted for an ever-enlarging number of canceled international business meetings, conferences, and trade shows. New product orders were hit with declines of from 20 to 30 percent. Some businesses—particularly those whose buyers could obtain equivalent supplies, service, and value in other geographic regions—were much more seriously affected. In many ways, the SARS experience has served as a laboratory for calculating the economic effects of potential future bioterrorist incidents. There were, however, marketplace structural restraints such as business good name/good faith considerations that put the brakes on how much product sales diversification, contracting out, and out-migration of service industries could occur. In several SARS-infected countries—Singapore was one—harried CEOs, working to staunch supplier abandonment as well as customer losses by shifting operations elsewhere, worried about retaliation that would occur when the medical emergency ceased and piqued government-imposed sanctions such as higher property tax assessments, penalty fees, or strict auditing of an offender’s prior-year tax returns.
to punish corporations for ostensibly pursuing their own interests and disregarding their “pub-
lic responsibilities” during a grave national crisis.

Once even a single employee of a hotel, res-
taurant, or factory fell ill with SARS, the most pressing question became whether to close down business operations for a brief, siestalike furlough. Such short-interval closings did nothing to check the spread of the epidemic, for the lower baseline of the SARS incubation period is 10 days, necessitating a 20-day shutdown to ensure that the disease did not continue to infect oth-
ers in the already struck facility. Stopping the spread of contagion was not the real goal of such self-serving maneuvers, which were primarily cosmetic, intended to ensure customer confi-
dence and express a collective, nationwide will to “carry on” in the face of terrifying uncertainty over who would fall victim to the epidemic and where the epicenter of the epidemic would next migrate.

In Hong Kong, mainland China, and Singapore, many banks, brokerage houses, insurance companies, and law firms could not suspend operations due to local laws and oversight regu-
lations. This led to a mad scramble to rent out disaster recovery suites meant for natural calami-
ties or terrorist incident-related business contin-
uity interruptions that were fortuitously located outside the perimeters of the “hot zone.” The lucky firms having nearby branches outside the infected area were spared this frenzy. Staff losses began to loom larger in the calculus for deter-
moving how to manage SARS’s impact. Many companies quickly started to segregate their “white-collar” employees based on individual possible exposure to SARS contagion so that a suddenly imposed government health service quarantine would not shut down business. Thus three work sites were established—the company’s usual office, a back-up facility, and workers’ homes. Those known to have been exposed to the SARS virus were told to work at home; the oth-
ers were assigned to the first two venues. Some employers required staff to record their tempera-
tures each morning and evening and to report results to management—an incipient fever suggest-
ing that an infection was brewing. Such a finding resulted in a “work-at-home” reassignment. Following airplane travel, business contin-
uity/survivability protocols, senior managers began to isolate themselves from one another and relied primarily on e-mail and cellphones to com-
municate. Terrorist incident contingency plans were reexamined in light of such experiences and found in need of reconceptualization as well as reprioritization. Before the SARS epidemic, “dis-
saster-recovery” plans were based on the pre-
sumption that if the company’s data-processing software, files, and databases had been backed up at another location and that such a “hot site,” including workload amenities and customer in-
terfaces, was available for a business-location transfer, the business would be adequately pre-
pared for any type of disruption or outage of es-
sential services. In light of the business community’s experience with SARS, that became obviously no longer true. Staff resources sudden-
ly were seen as the company’s most vulnerable asset.

Because the medical nature of SARS is even now not fully understood and the epidemic ap-
pears to have entered a dormant phase rather than having been completely eradicated, it is not possible to factor completely the overall economic costs related to the SARS outbreak, which for awhile brought travel, tourism, and industry in the world’s most populous country to a virtual halt. Not since the wave of currency devaluations and subsequent bank failures of 1998 eroded the 1990s financial gains of Asian Tiger and Tiger Cub economies has the region experienced such fiscal tumult. As a direct result of the SARS epi-
demic, Taiwan, Singapore, and Hong Kong face serious financial problems; Malaysia’s and Thailand’s economies are cooling down; and mainland China’s economic boom, recording its first negative growth quarter in a decade, has experienced a sudden, unexpected chill. Beijing’s economic planners face the prospect of negative national economic indicators for the rest of 2003.
Whatever growth occurs in fiscal year 2004 will offset only this fiscal year’s extensive losses.

In addition to the primary economic dislocation caused by SARS, there were ancillary costs, including sporadic, day-long work stoppages stemming from “precautionary” closings in all manner of small businesses; opportunity losses in foreign business deals; postponed medical treatment for non-SARS health conditions; and the high-level expense of providing intensive care for several weeks or longer for those on respirators, followed by labor-intensive management of their precariously slow recoveries. The high cost of caring for SARS victims and all associated expenses suggest that would-be bioterrorists might not really want what has long been considered their holy grail: that is, a Doomsday virus or bacterial infection that kills all who contract it. Instead, a disease patterned on the SARS model would have significantly greater tactical and strategic impact. Based on the financial cost of the SARS event, a similar epidemic could all but bankrupt a seemingly robust, midsized national economy. In the words of terrorism’s most famous dictum, coined by Brian Michael Jenkins, “Terrorism is theater. Terrorists don’t want a large number dead; they want a few symbolic victims and a great number watching.” SARS fits such a profile: thousands sickened, hundreds dead, and everyone living in fear of who will sneeze or cough next.

In View of the Catastrophic Impact of These Events, It Is Necessary to Ask: How Did All This Come About?

A wide variety of fears, ingrained fealty relationships within the real power in China—the Communist party—and medical miscues led to an initial denial by Chinese public health administrators that an outbreak of a hitherto not encountered contagious disease that results in a significant death rate (at that time, mortality was 2.5 percent) was occurring in Guangdong Province in mid-February 2003, particularly in the cities of Foshan and Zhongshan. These disavowals were transparent fig leaves, for the international medical community was aware, based on reports—known as ProMED Mail issued by the International Society of Infectious Diseases—that patients suffering with an atypical pneumonia had been sporadically appearing at hospitals and clinics in Guangdong since mid-November 2002. Because of administrative dysfunction and consequent delays in gearing up to cope with such an increasing threat, vital time was lost. Poor crisis-management strategies caused pervasive decision-making paralysis throughout China’s public health communities. That would turn out to be a critical fault; immediate action likely would have quelled the burgeoning epidemic.

On the basis of lessons learned through European, Vietnamese, and American SARS containment experiences, strict quarantine and medical staff prophylaxis would have prevented the virus from extending farther into the countryside, where medical care standards and expertise are much lower than in regional centers like Guangzhou. Sharing the details of which treatments worked best and which were unavailing would have saved the lives of many medical staff. As a result of blackout restrictions imposed by the Chinese Ministry of Health on what could be reported about SARS, doctors and nurses throughout the world were kept unaware of the nature of the disease as well as the high contagion factor associated with the illness. The need for stringent prophylaxis was not adequately communicated throughout China’s heartland or within its behemoth hospital system.

This lapse had serious consequences. Pneumonia patients often need lung suctioning and other breathing treatments that cause coughing and create highly hazardous mists containing germs. Some patients vomit during these measures. Without adequate protection, the medical staff performing such procedures is at extreme risk when dealing with nasopharyngeal dis-
charges containing a pathogen as persistent and highly contagious as SARS. In itself, this may substantially account for the high casualty rate among health-care practitioners in Chinese hospitals. On the national level, China’s medical community was thoroughly unprepared for the next eruption of the swiftly escalating outbreak, even though the disease had been raging in Guangdong for four months. Once Beijing’s authorities failed in their attempt to clamp down hard by imposing a draconian quarantine on all reported centers of infection, the hordes fleeing first Guangzhou and Hong Kong and then the capital itself quickly began to spread SARS throughout the surrounding countryside. This resulted in “medical states of emergency” in the provinces of Shanxi, Inner Mongolia, Tianjin, and Hebei, according to Nie Jun, a member of the expert team for SARS, which works under the supervision of the Chinese Health Ministry. Similarly, if doctors in Singapore had known of the highly contagious, pernicious nature of the pneumonia that was hospitalizing dozens of patients in Guangdong daily, they would not have assigned three very sick young women from Hong Kong to ordinary medical/surgical wards. In all, 189 cases and 21 deaths that were a direct result of this medical blunder could likely have been averted had these patients been quarantined instead.

Reminiscent of the manner in which the West Nile virus slowly but relentlessly spread throughout the United States over a period of several years after being introduced by infected birds imported from the Middle East, SARS probably never will be entirely eradicated and will remain a health-care threat for at least this decade as it gradually becomes endemic throughout the world. Both SARS and AIDS pose extremely grievous threats to third-world countries that have poorly trained and equipped medical infrastructures. A potential “spread pattern” in which SARS became endemic in huge swaths of Southeast Asia all the way from the South China Sea to Bangladesh and India’s Northeast Frontier District would be similar to the way the West Nile virus has extended into Western Canada from coastal U.S. cities, “seeded” into mosquito populations that hibernate over the winter months.

Dr. Yeoh Eng-Kiong, Hong Kong’s secretary of health, welfare, and food, has emphasized the long-term nature of the threat presented by SARS’s fast-spreading infection. “We do not anticipate it will ever be eradicated completely because it is a highly infectious virus.” Many experts believe it will be months before an effective vaccine for this new strain of corona virus is available for testing. It could take years before such a vaccine is declared safe for human use. If SARS mutates further, all of these efforts would, of course, be in vain. In the meantime, SARS could reappear in other parts of the world and extend “beyond the reach” of prophylaxis protocols: strict quarantine, vigorous hand washing, and routinized toilet flushing.

A note about the difficulty of producing a SARS vaccine: Scientists have compared samples of the virus from Singapore with genomic sequences of isolates of strains from Canada, Hong Kong, Vietnam, and Guangzhou and Beijing, China. They found a handful of mutations that suggest that the relatively weak immune system response of patients to the disease has so far failed to compel the virus to evolve to new formats to defeat human immune system attacks. In instances in which ill patients’ immune systems are successful in fighting a viral infection, the virus eventually changes its genetic structure. The bad news is that because this is not happening, SARS likely will not reduce its intensity or die out through evolution into weaker strains. The good news is that, under circumstances in which the virus does not repeatedly mutate, effective, long-lasting vaccines can be produced and administered.

To make another parallel comparison with the West Nile virus outbreak, SARS might also cause insidious, long-term health concerns. Most people who become infected with the West Nile virus show no symptoms at all. Of those displaying symptoms, the healthy experience an illness akin to the flu, including fever, headache, and body

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aches. The elderly, the very young, and the immuno-compromised are at risk of the more dangerous complications of encephalitis or meningitis, the swelling of the brain or its lining. Clinical evidence, however, suggests that healthy, middle-aged people will suffer some of the most debilitating and long-term effects of the next outbreak. Patients who have survived the initial onslaught of the disease often have gone on to develop “acute flaccid paralysis,” or a weakening of the limbs, as the virus attacks a vital balance and coordination region of the brain stem. In the case of SARS, many of the recovered—especially those who needed ventilator hookups—remain debilitated for a considerable period after their discharge from the hospital. U.S. public health authorities had consistently downplayed the impact of the West Nile virus on Americans’ health until the lessons learned from other countries’ handling of the SARS epidemic forced them to reevaluate this position and be more forthcoming with case data.

The above account suggests another scenario: SARS may actually be a two-stage disease caused by two separate infections within the SARS virus. Under this supposition, a precursor SARS virus infection would unlock the invoked potential of the SARS virus. According to this thesis, SARS, like AIDS, could lay dormant in a human host for several years before subsequent infection brings about a fatal case of pneumonia.

If SARS were to become endemic throughout parts of the third and fourth worlds, the United States as well as other medically advanced countries would have to be continually vigilant at all border crossing points to prevent new cases from arising in its territory from the free movement of international travelers, commerce, and industry within our open society. Such new cases would serve as the kernels for new outbreaks. Vigilance would involve the mandatory use of both travel history questionnaires and medical examinations to identify febrile signs suggesting the need for quarantine. According to Dr. David L. Heymann, the WHO’s executive director for communicable diseases, “such precautionary measures will be necessary because that is the future of the disease.”

The experience of Vietnam in repressing its SARS epidemic offers hope that other third-world countries can achieve similar results. Such worries might be misplaced. Some argue that SARS presents greater challenges to highly sophisticated, technology-dependent, modern medical care systems than to third-world medicine, for there are many more points where contamination/infection breeches can occur in American-style medicine than in the much less complex, elementary health-care systems of “less developed,” poorer countries. One partial solution for this has been to establish “fever clinics” in parking lot tents or other sequestered areas to keep potentially SARS-infected patients out of hospital emergency tents and thus to maintain SARS-free clinical premises. The concept here is to limit SARS patients to special, dedicated facilities and avoid contaminating the entire hospital-based health-care system. Taiwan, after many horrendous mistakes, has, of necessity led the way in this area. Another technique useful in limiting the spread of SARS inside hospitals is to redesign patient examination and treatment rooms architecturally in order to eliminate corners or protrusions to prevent the collection of viral particles or harmful bacteria.

Why It Will Be Nearly Impossible to Determine the Origin of SARS

What evidence remained of the initial handling of SARS cases in Guangdong, Beijing, and Hong Kong was further distorted under a stringent second-round cover-up. This derived from the senior leadership’s concern that fully informing the public about the true scale and scope of the epidemic would spread panic among the populace and adversely affect trade and tourism as well as threaten public order. More important, such
an admission after earlier denials would be seen as overt, explicit criticism of those authorities who held the affected ministerial portfolios and would subject them, along with all their direct reports, to absolute “loss of face.”

The cover-up went so far as hiding the rapidly incrementing hospital census of critically ill patients by significantly underreporting the numbers infected. Instead of enumerating all cases, reporting was limited to only those whose conditions seemed to be worsening. This excluded “suspected cases” in the universally required count of instances of emerging epidemics that must be reported to WHO authorities. (The WHO, the lead agency in investigating the SARS epidemic, has published daily statistics on the morbidity and mortality rates of the disease since recognizing it as an international health threat on March 15, 2003.)

Moreover, Beijing authorities counted only those admitted to civilian hospitals for the required census enumeration of patients under the reporting requirements mandated by the WHO for “emerging diseases.” Chinese public health officials excluded casualties in military hospitals from such enumeration because those facilities were established to care for People’s Liberation Army (PLA) soldiers, not civilians, and thus were exempt from WHO’s required reporting. This logic ignored the fact that private citizens as well as military personnel were being treated there, and that a false picture of morbidity and mortality rates was being generated. Military casualties from SARS amounted to 8 percent of the patient load at PLA army hospitals.

China’s hospital officials and public health authorities also ignored the presence among the infected of apparent “super spreaders,” who were reported to be infecting casual passersby in seemingly improbable encounters (such as elevator rides) at an alarming rate. At times, such crossed paths leading to sickness and a prolonged, excruciatingly painful death appeared to defy logic. Could sharing tables in airport lounges; breathing recycled air in aircraft cabins on flights of short duration; or attending concerts, movies, or sports arenas at which a single SARS sufferer sneezed or coughed result in deadly infection for dozens of people? Hospitals became more dangerous than military battlefields: Approximately 38 percent of all SARS deaths arose among hospital visitors. Epidemiological studies revealed that in Taiyuan in Shanxi Province, an elderly jewelry merchant returning from a selling trip to Guangzhou infected more than 30 people in his hometown, including his father and mother—both of whom died in a military hospital in Beijing. Another cohort of related cases was traced to a man who claimed the body of a relative who had died in Beijing. A third chain of infections was traced to a dental resident who had a mouth ulcer treated in Beijing, only to discover that he was sick with SARS on his return home. Numerous fatalities ensued in all three instances, a situation worsened by a subsequent string of new cases ushering in the “next round” of serial infection. Medical care practitioners, seeing their colleagues fall ill while treating SARS victims, began to ask whether it was worth tending the sick, when fatalities were highest among medical practitioners who were doing just that. At Hohhot Chest Hospital in Inner Mongolia, the main treatment center for lung diseases, panicked staff refused to report for work after a half-dozen doctors and nurses fell victim to SARS. Serious understaffing resulted, leading to a complete breakdown in the integrity of the region’s medical care system.

Questions of resources and spillover effects began to haunt administrators at already overburdened hospitals. Would there be enough ventilators to sustain the grievously ill, who would begin their recovery only after weeks on those mechanical respirators? If not, who would decide who was to be given the chance to live? Would city residents begin to flee? Could such events lead to widespread economic collapse and social disorder? A moment of administrative panic set in throughout China’s medical community. Blanket denials were made by hospital directors, bureaucrats, and politically conscious local authorities anxious to avoid displeasing regional
officials and eager to prevent a health crisis that might embarrass senior ranks within President Hu Jintao’s newly installed national government. This decision was fatally flawed, and senior tacticians within the Hu government were bitterly criticized for having sacrificed hundreds of lives to ensure a smooth transition of power for the new leaders. An effort to put everything in a “good light” turned into a political humiliation for the very leaders the stratagem was meant to honor. President Hu felt compelled to ask the nation’s forgiveness. Prime Minister Wen Jiabao traveled to Jakarta to apologize to a hastily called meeting of the Association of South East Asian States to convey China’s apology to its neighbors for endangering their safety by failing to take immediate, appropriate action to contain the spread of SARS.

The Political Cost of Minimizing the Dangers of a Potential Epidemic of Unknown Origin: A Lesson for All Governments Tempted to Put a “Good Spin” on a Bad Situation

On April 21, 2003, the Chinese government sacked its health minister, Dr. Zhang, and Meng Xuenong, the mayor of Beijing, for failing to take immediate, appropriate steps to control the SARS epidemic, including issuing falsified reports severely underreporting the number of such patients in Beijing military hospitals as well as failing to open Guangdong’s health care records to international health teams. Deputy Minister of Health Gao Qiang, assuming his former superior’s position, acknowledged that the “Ministry of Health was not adequately prepared to deal with a sudden, new health hazard. Accurate figures have not been reported to high authorities in a timely manner—primarily as a result of incompetence rather than deceit.”

Gao tried to placate the international community’s anger as well as mitigate traditional Chinese distrust of government reassurances in the face of untoward circumstances that frequently drive China’s bureaucrats to sugarcoat bad news or to conceal it altogether. He also attempted to identify the fault as one of mismanagement rather than wrongdoing. The efforts of the dismissed mayor of Beijing and the deposed director of the Ministry of Health toward minimizing the threat presented by the epidemic followed a long-standing tradition within the Chinese Communist party of paying lip service to the party’s doctrine of drawing wisdom from the masses while trying to stifle dissent by antidemocratic “divide and isolate” tactics underpinned by limiting the information available about national, regional, and district crises and catastrophes. In the view of Ding Xue-liang, a Chinese political expert at the Hong Kong University of Science and Technology, “Over the weeks [of the epidemic], as people saw how their government tried to manipulate information, SARS became a serious political problem for the government as well as a medical one.”

In a sign of how seriously the state center was taking the SARS episode once administrative mismanagement and governmental obfuscation had been identified as the principal impediments to the nation’s getting a quick handle on this medical emergency, a new openness emerged, and the need for strong action to quell the epidemic was readily admitted. Education officials initially closed all primary and secondary schools in the capital for two weeks, then extended this “vacation” to a month, sending 1.7 million children home, and announced that college entrance examinations scheduled for the fall would be correspondingly postponed. The latter event will become a prominent reminder of the mishandled emergency situation when, half a year later, it triggers a major dislocation in the schedules of millions of families with children in the affected age groups.
It is important to note that questions and criticisms about the adequacy of the local host nation’s management of the SARS epidemic were not confined to China. Both Canada and the United States came in for their share of criticism—particularly for being slow in providing information on new cases and even less forthcoming with morbidity/mortality statistics. The WHO and other international health authorities scathingly criticized Canadian authorities for concealing new instances of SARS infection in order to get the UN specialized agency to lift its short-lived ban on travel to Toronto. At that time, 23 people had died of SARS in that city, making it the most seriously infected urban center outside of Asia. The WHO’s focus was on preventing the spread of the disease to poorer countries, where lesser prepared health-care systems would rapidly become overwhelmed by the magnitude of the task of fighting the epidemic. The United States was censured for slow reporting, particularly for listing as “not available” all data concerning recovering patients as late as May 2003. “We are not getting good, fast information from Canada,” said a WHO official, speaking on the condition of anonymity. “Many countries are not very good about reporting new cases, even the United States.” The WHO announced in early May 2003 that all affected countries should report not just the number of suspected and confirmed cases but also where those cases were occurring and from whom they had been contracted.

Don’t We Ever Learn?
The Mistakes of China’s Health-Care Leaders Followed a By-Now-Familiar Pattern

The Bush administration’s many acknowledged mistakes in handling the anthrax attacks of 2001, which killed 5 and sickened 13, could have served as a template for promulgating a “what not to do” list for managing a subsequent potential terrorist-caused medical emergency. In the anthrax incidents, the fact that the public health system and the national leadership were caught off guard by a mass mailing of letters and packets containing powdered, weaponized anthrax, coupled with the lack of a rigorously tested emergency-management contingency plan, contributed to a series of grave errors. Like public authorities dealing with SARS in Beijing, the Bush administration suffered a “credibility problem” during the anthrax episode after a serious misjudgment within its scientific advisory unit caused the deaths of two postal workers by falsely assuming that Post Office mail-processing equipment would not disseminate the powdered anthrax held inside sealed letters throughout the confines of the building in which this machinery was housed. This led to the mistaken pronouncement by a panel of government experts that postal workers in mail-sorting stations where traces of anthrax bacteria had been found did not need to take antibiotics prophylactically. That wrong advice caused the consequent fatalities. As a corollary to understanding the magnitude of contamination caused by this anthrax incident, it was only in the second week of May 2003 that the Brentwood Road mail-processing plant was declared successfully decontaminated by chlorine gas purging.

The second major mistake made in the Bush administration’s handling of these anthrax attacks lay in the widely held public impression that Health and Human Services (HHS) scientists were constrained from freely expressing their opinions or offering dissenting interpretations of the meaning of unfolding events—a perception similar to that which caused the downfall of the Chinese minister of health. The Bush administration’s handling of the SARS epidemic (there were 291 SARS cases in 38 states in the United States at the beginning of May 2003) won high marks for its relatively straightforward, value-neutral approach that allowed the U.S. scientific community free reign in publicly discussing the problems that SARS poses.
What Should Have Been Done?
A Short List of Measures
That Worked Effectively to
Contain Outbreaks of SARS

Not all countries found the battle against SARS to be hopeless. American, Canadian, European, Singaporean, and Vietnamese public health authorities were the first among affected countries to establish that SARS cases can be controlled by the following measures:

- prompt identification of persons with SARS, their movements, and contacts;
- effective isolation of SARS patients in hospitals;
- appropriate protection of medical staff treating these patients;
- comprehensive identification and isolation of suspected SARS cases;
- exit screening of international travelers;
- timely and accurate reporting and sharing of information with other authorities or governments or both authorities and governments.

What Is Needed to Improve National Preparedness to Handle Such an Outbreak?

An important lesson has been learned from the several mistakes—particularly those made by public health authorities in China—in handling the SARS epidemic. There is an urgent need for plentiful, rapidly deployable stores of the following:

- biological agent detection devices,
- medical vaccines,
- pretreatments,
- therapeutics and diagnostic equipment,
- individual protective masks and suits,
- collective protection shelters,
- decontamination equipment and systems, and
- comprehensive early warning and epidemiologically useful case incidence reporting systems.

Storm Clouds on the Horizon for U.S. Emergency Management Planners

The recent flap over U.S. bioterrorism preparedness programs for infectious diseases contained in the campaign to vaccinate all first responders and emergency room personnel against smallpox suggests that Washington is going to have a tougher time preparing for a biological-based terrorist incident than had first been thought. Federal health officials acknowledge they have fallen far short of their initial goals for smallpox vaccination. Partisan political critics have accused the Bush administration of withholding financing for emergency services for handling a bioterrorist emergency as well as for failing to set up a system to block the smuggling of biological weapons through the nation’s notoriously porous port system. Howard Dean, former governor of Vermont and a contender for the 2004 Democratic presidential nomination, alleges, “We have a president who talks tough on homeland security but is strangling the cities and towns by not giving them the money to protect themselves.”

The White House is now planning to revise...
inoculation plans to take into account budget pressures as well as people’s reluctance to be vaccinated. The initial target of vaccinating 500,000 health-care workers has been modified in light of the actual count of 33,444 such inoculations as of April 18, 2003—a mere 7 percent of the goal.23 Such “upgraded” plans are “intended to integrate the immunizations into larger efforts to prepare for a possible bioterrorism attack.” In reality, these measures attempt to obscure and thus deflect criticism from a series of procedural and administrative foul-ups in the existing governmental program. The most serious of these errors, which can provide examples for what not to do in future emergencies, was the federal government’s attempt to expand the program too quickly. As part of this somewhat confused rush to get the program implemented, the central bureaucracy distributed conflicting information about who should be vaccinated as well as hastily fabricated and sometimes contradictory educational aids and training materials. The administration’s most egregious mistake was refusing to distribute needles that were potentially safer than those the government provided to give the vaccine. Nurses and other health-care workers therefore were apprehensive about the risk of needle-stick injuries that would expose them to live virus in the vaccine.

This situation has been exacerbated by a demonstrable lack of coordination between the federal bureaucracy and state and local public health authorities. Congress has approved nearly $1 billion to help the individual states deploy their plans. The money will be disbursed after the Department of Homeland Security approves blueprints submitted by individual states. According to this plan, each state must decide which resources it needs to handle a contagious disease outbreak, including how many frontline workers (i.e., first responders) must get the vaccine before such programs can be considered “in place.” The states, collectively, have complained they do not have the financial resources to vaccinate all those who should be protected. The General Accounting Office, an arm of Congress, has found that the Bush administration initially put the cost of administering the vaccine at $13 a person. State and local officials found the actual cost to be $75 to $265 a person. Under this new initiative, funds for vaccinations have been folded into the larger bioterrorism program, which is funded by federal dollars the states are eager to receive. The White House has gambled that the sting has been taken out of various objections raised by several states and that the responsibility for being “fully prepared” rests on the individual shoulders of each governor rather than on the Department of Homeland Security and HHS staff and ultimately on the administration’s back. The difficulty is that the program itself is spluttering, and a surprise bioterrorist event could catch the nation off guard, leaving too little time to complete a hurried, urgent priority vaccination campaign for critical groups such as first responders.

As for SARS, HHS Secretary Tommy G. Thompson has announced a $20 million program to set up an early warning system aimed at stopping the spread of the virus. Thompson believes travel restrictions on infected countries are a significant factor in delimiting the disease. “I would strongly recommend that you do not travel to infected areas such as China, Taiwan, and Hong Kong until the virus is brought under control there, unless it is absolutely necessary.”24 Some Things Have Gone Right for the Bush Administration

By promising to spend $5.6 billion over the next 10 years on purchasing yet-to-be-developed vaccines, antibiotics, and complex treatments for the “biologically wounded,” the Bush administration has radically altered the economics of biodefense. In guaranteeing the government will buy finished products rather than merely fund early research, as it had done in the past, this federal program (known as Project Bioshield) would create a warranted market for bioterror-fighting medicines and machines. Drug compa-
nies will no longer be able to complain that no reliable buyer exists for agents to treat induced illnesses based on genetically engineered mutants of traditional scourges such as anthrax, botulism, plague, and the Ebola virus.

**If It Was Bioterrorism After All, Who Are the Potential Suspects?**

At the beginning of this article, I noted several reasons why “smoking guns” are rarely, if ever, found in the netherworlds of terrorism—particularly in mass-casualty terrorism using exotic weaponry such as contagious disease. Revealing that an epidemiologically significant incident might be the result of bioterrorism without possessing all the facts of that situation could have unacceptable political ramifications as well as prohibitive social costs. The government’s likely inability to identify the responsible actor, state sponsor, or terrorist organization when there are several potential candidates would multiply concerns that the wrong villain will be blamed in the press or by the public. Such an outcome would generate irresistible pressure for inappropriate retaliatory action that could lead to a dangerous escalation in the nation’s weapons of mass destruction (WMD) risk threshold and a consequent increment in its level of defense preparedness.

The possibility of someone else’s deliberate release of biological pathogens at a moment when America was at war to ensure that Saddam Hussein’s Iraq lost its WMD potential undoubtedly would have presented many dilemmas for U.S. security planners. For example, if North Korea—which had just announced its termination of International Atomic Energy Agency onsite monitoring privileges at its Yongbyon nuclear reactor and thus, at least theoretically, could have begun plutonium reprocessing for nuclear weapons use within months—had further ratcheted up its confrontation with Seoul and Washington by explicitly establishing a newly articulated North Korean national policy on Pyongyang’s use of WMDs for “self-defense” in the face of what Kim Jong-il’s regime claimed was a U.S., South Korean, and UN “permanent state of aggression” against his country, Washington would have been obliged to act immediately. A North Korean policy of that kind would have been adopted to deter Washington, in particular, from contemplating a preemptive strike on Yongbyon’s nuclear reactor modeled on the Israeli bombing of Iraq’s unfinished Osirik nuclear complex during the Reagan years or a second WMD eradication campaign similar to “Operation Iraqi Freedom.” Under this presupposed doctrine, any attack on the “hermit kingdom” would be greeted with an equal (if not even more potent) biological, chemical, radiological, or nuclear response than SARS involved. This would have been no idle threat. According to the CIA, North Korea has an estimated 250 tons of chemical and biological weapons in its arsenal. Pyongyang also possesses enough plutonium to fabricate two Hiroshima-sized atomic bombs. What North Korea probably (probably, because no one outside the North Korean leadership knows exactly what the country’s military capabilities are) lacks is the ability to miniaturize such a weapon to fit atop one of its many types of short- and intermediate-range missiles. A bioweapons-based alternative thus would have strong appeal to otherwise cornered despots lacking equivalent “power punching” options.

The Bush administration was eager to let such an implicit challenge pass unheralded. Such a threat, if actually made and publicly disclosed, would have added an overlay of confusion and anxiety at a key psychological moment when Washington was at war with Baghdad over Iraq’s failure to supply documentation to UN weapons inspectors concerning its compliance with long-standing UN resolutions mandating that Saddam Hussein destroy all WMD materials and processing equipment. North Korea’s far more serious breach of WMD nonproliferation accords, coupled
with Pyongyang’s abrogation of onsite monitoring, represented an exponential increase over the threat level presented by Iraq’s manifest noncompliance with UN weapons inspections protocols. A full-blown North Korean WMD incident would have forced the American public to reevaluate the wisdom of a second U.S.–Iraqi war undertaken without solidified domestic support or specific UN reaffirmation when greater nonproliferation dangers clearly lay elsewhere.

Alternatively, SARS might have been Saddam’s final moment of revenge, giving him the last laugh as he spread deadly contagion in far-off places while his armies were being decimated—thus succeeding in imperiling world security while shaking off the label of bioterrorist and denying the U.S.-led “coalition of the willing” their vindication that Iraq had hidden such devices from the UN weapons inspectors, after all. News reports that, on Saddam’s orders, his sons looted the Iraqi national bank of almost $1 billion add credence to the possibility that such large funds could have bankrolled a genetically altered, weaponized biological pathogen scheme.

The American Experience:
So What If It Was Bioterrorism?
The Nation Is at War in Another Theater, and We Must Not Be Distracted

Reaction in the United States to the SARS outbreak in East Asia was muted at first. Then concern that preoccupation with the SARS epidemic might prove counterproductive to the war in Iraq led to an atmosphere in which extraneous issues were seen as possible headline-grabbing, “loose-canon” media distractions. CIA Director George Tenet; FBI Director Robert S. Mueller, III; Attorney General John Ashcroft; Homeland Security Director Tom Ridge; and knowledgeable insiders at the White House refused to comment on the possibility that bioterrorism was involved. A “low horizon” profile was maintained, as HHS was designated the lead agency in preparing the U.S. medical community for a possible epidemic-caused emergency. The secretary of HHS, Tommy G. Thompson, limited his contacts with the White House, having only two publicly acknowledged face-to-face meetings through May 2003 with President George W. Bush since the SARS epidemic became headline news in March.

Many observers believe such a position is both correct and necessary. Incidents that present a grave threat to the security of the nation at times of national crisis—particularly during wartime—require more than responsible handling. Public officials must decide what sensitive information to release based on the prospective psychological impact on a citizenry already concerned over the casualties and conduct of the conflict—in this case, the second Gulf War. In the words of Bruce Hoffman, director of the RAND Corporation’s Washington office and a nationally renowned expert on terrorism and its related concerns: “A prerequisite to ensuring U.S. resources are focused where they can have the most effect is a sober and empirical understanding of the terrorist threat, coupled with comprehensive and coherent strategy.” If that means concealment offers the best prospect of diluting or deterring the threat being presented, then such a policy logically should be implemented immediately. After all, if would-be bioterrorists falter in the final stage of their gambit by failing to garner public recognition for their otherwise well-planned and successfully executed stratagems, such a loss would be their just reward. If no one “feels threatened,” the event might as well have “never happened.”

One Man’s Opinion May Count More Than Others Depending on His Bona Fides

Whatever the reason, by their steadfast denials, an overwhelmingly tight-lipped response from a panoply of involved governmental authori-
ties has discouraged further public discussion of the issue of SARS being a covert bioterrorist incident. Thus to date there is little to support such allegations other than a straightforward assessment by Ken Alibek, which has received limited media attention and less than full-scale investigation. Yet his opinions should not be hastily dismissed. Alibek’s perspective is that of one who has had significant, high-level experience within the labyrinth of bioweapons research and production, making him one of the few public figures both able and prepared to engage in such a discussion or debate. When he was known as Kanatjan Alibekov, he was first deputy chief of Biopreparat, the Soviet Union’s super-secret bioweapons development program. As such, he was an integral part of the Soviet Union’s staggering biological warfare/terrorist offensive capability, which produced rough-cut copies of many of tomorrow’s fearsome “coming plagues,” most of which have become central features of the American intelligence community and the Homeland Security Department’s widely promulgated “what if” portfolios containing nightmare scenarios that graphically depict WMD threats, shaping both bioterrorism gaming models and threat assessments. Alibek, who defected to the United States in 1992, was a principal architect in devising and building Russia’s stockpiles of such bioweapons. As such, he was at least peripherally aware of the details of each one of Biopreparat’s numerous projects in the area of highly infectious droplet/particulate-borne respiratory diseases. He was among the first to make U.S. authorities aware of the Russian germ warfare program’s size, scope, and extensive scientific breakthroughs and medical and pharmaceutical advances that led to spectacular bioweapons development successes—particularly in fabricating genetically altered, antibiotic-resistant strains of infectious droplet-borne disease. Two of these diverse successes were in weaponizing genetically altered versions of

- tularemia, a bacterium that causes a virulent form of pneumonia, and
- glanders, a contagious, chronic, occasionally fatal disease caused by the bacillus Actinobacillus mallei that is marked by a purulent nasal discharge and ulcers in the lungs and respiratory tract and on the skin.

The Soviet Union’s success was not the “weaponization” of such pathogens. That had been accomplished by many of the 17 nations rated “biologically capable” by the CIA. Instead, through genetic manipulation, Russian scientists created a wholly new strain (or type) of the bacterium or virus that would resolutely defy known vaccines and antibiotic treatment regimens. Alibek was not the first defector from the Biopreparat program to inform U.S. intelligence agencies and defense officials of Russia’s sub rosa achievements in bioweapons research in the two decades since Kremlin authorities signed the Biological Weapons Convention in 1972. Vladimir Pasechnik, director of the Institute of Ultra-Pure Preparations in Leningrad, defected to the United Kingdom in 1989. He startled his debriefers by telling them that other Russian scientists, whose work was familiar to him, had succeeded in developing a strain of Yersinia pestis that was immune to any antibiotic treatment known at that time. Because the Russian-made variant of Yersinia pestis (a form of the plague) is spread from one person to another by airborne droplets deriving from coughs and sneezes, an aggressive, drug-resistant strain could sweep through community after community until a nationwide pandemic had been generated. Alibek confirmed this report during his subsequent debriefing and interrogation. In Biohazard, an account of his experiences while working at Biopreparat,27 Alibek discusses in detail the Soviet Union’s efforts during the Brezhnev era, launched by a secret decree signed by Brezhnev himself in 1973, to exploit gene splicing in order to develop genetically altered pathogens resistant to antibiotics and vaccines, which could be turned into pow-
erful weapons under a covert, “state-secret” program codenamed *Enzyme*.

Without incontrovertible proof, Alibek is quite chary of attributing the SARS virus to an act of bioterrorism. He frankly acknowledges this dilemma: “It is a very unusual outbreak. It’s hard to say whether it is deliberate or natural.” In other words, although it is by no means certain that this was bioterrorism, such an explanation is both possible and plausible. Alibek states that China had at least one serious biological weapons accident several years ago in another part of the country, but he is unaware of any bioweapons facility or research center in or near Guangdong Province.

Both mainland China and Taiwan have military units engaged in biological warfare research. Authorities in Beijing remain adamant in denying that such force capabilities are being maintained. The SARS epidemic in Taiwan apparently forced the hand of President Chen-Shui-bian, who, on May 8, 2003, announced that a previously unheard of military unit, the “Military Preventive Medical Research Institute,” would brief the Taiwanese parliament on the nature and extent of Taipei’s strategic resources in combating SARS. This move generated partisan debate, as Ku-Chung-ien, a parliamentarian from the People First party and former naval commander-in-chief, expressed concern that top military secrets could be leaked as a result of the unit’s exposure. The institute, based in the northern town of Tahsi, is one of three military units routinely watched by foreign military satellites.

**Where Would the Genetically Altered Viruses Needed to Induce the Epidemic Have Come From?**

Granted that bioterrorism is a possible explanation for the etiology of SARS, where would terrorists have obtained their starter stocks of the mutated viruses that produce this respiratory disease? Of course, no more than the sheerest type of speculation can answer such a question. Not only that, but there are many plausible answers. The base materials could have derived from several sources:

- a rogue scientist working at a bioweapons laboratory for one of the 17 CIA-listed “biologically capable” nations;
- a secret Iraqi holding of U.S.S.R. bioweapons starter supplies;
- a covert North Korean bioterrorist stratagem;
- a theft from a European or third-world pharmaceutical firm specializing in vaccine production for genetically modified viruses;
- an associate, acquaintance, or lover of someone with access to such materials;
- a dissident scientist from a U.S. BioLab-4 Animal Disease Laboratory (BL-4 facilities, where scientists wear spacesuit-type outfits connected to overhead oxygen lines similar to those seen in the movie *Outbreak*, study primate and other animal infectious diseases, for which no vaccines exist, that could be transmitted to humans);
- an agent of a state sponsor of terrorism;
- leftover stores of biological weapons materials from a discontinued bioweapons program; or
- an undetected “shortage” at any of dozens of pharmaceutical laboratories, medical research centers, universities, or other supply sources.

Much of the knowledge that is required for
composing an adequate answer to this question is classified. What is publicly known, however, suggests that such an explanation of the etiology of SARS is not farfetched. Bioweapons materials are already in the wrong hands. Recently declassified reports reveal that Walter Basson, the father of apartheid-era South Africa’s biological weapon’s program, offered bioweapons materials, including genetically altered hybrids of deadly viruses and bacteria (anthrax, botulism, salmonella, and plague), to FBI agents in July 2002. Although the deal collapsed because of the FBI’s reservations about the $5 million asking price—plus questions about the wisdom of issuing 19 unrestricted immigration permits for Basson, his colleagues, and their family members to come to the United States—the materials were supposed to be turned over to American or South African officials responsible for the nonproliferation of WMDs. That was not done, prompting Milton Leitenberg, an arms control expert and senior research scholar at the University of Maryland’s School of Public Affairs, to observe,

It’s unclear that the government ever wrapped these [the South African] programs up, and they need to wrap them up. The fact that you’ve got a guy with a walking collection of bacteria traveling around the world is just more evidence of that reality.

How Does the SARS Epidemic Compare with Bovine Spongiform Encephalitis (Mad Cow Disease) in Europe and the 1918–1919 (Spanish Flu) Influenza Pandemic?

SARS has a current (as of May 2003) mortality rate of 6.5 percent. This is much higher than that for the influenza pandemic of 1918–1919, which was less than 1 percent. The 1918 influenza epidemic, however, had a horrendous fatal effect. Somewhere between 20 and 40 million people around the world died as a direct result of this flu. This occurred in large part because of the rapid-fire spread of the disease in a world that did not possess modern-day medical technology and antibiotics. Patient vulnerability was increased because the 1918 virus produced inordinately thick, sticky mucous that coated the lungs and quickly killed those whose disease had progressed to this stage.

Unlike other diseases, SARS uniquely increased its lethality as it progressed through the population. When WHO mortality statistics were first published in March 2003, the death rate was 2.5 percent, and the known number of cases were fewer than 250. As the infected population grew to more than 3,000, the death rate more than doubled. That is unusual. One explanation for this apparent aberration is that many of the first cohort of victims were doctors, nurses, and other hospital personnel, who were younger, in better health, and possessed access to superior medical care than the second round of sick patients, who often were their elderly relatives and had compromised health levels due to diabetes, heart disease, high blood pressure, obesity, and other chronic illnesses. Also skewing the statistics were those patients who succumbed after spending several weeks on ventilators—thus making it seem that the disease was getting progressively more deadly. Some doctors infer that this is exactly what happened; others claim that most viruses eventually establish equilibrium between killing a large percentage of the infected and allowing others to survive to pass the virus on to new hosts.

There are disquieting indications that SARS may be even more deadly than has been thought. Until recently, epidemiologists have relied on “case-fatality” rates to understand the percentage of deaths associated with SARS. But these kinds of calculations can underestimate mortality rates in part because they do not take into account patients who remain ill for long periods.
before succumbing to the disease. Under a revised computation adjusting for the aforementioned group, the actual mortality rate for SARS is between 15 and 20 percent. When broken down by age groups, the results are even more disturbing: The elderly are at particular risk, whereas the young appear to be spared the worst ravages of the disease and post significantly lower mortality rates than other age cohorts. Babies, experiencing very few fatalities and much faster recoveries, seem best off.

Using two different methods of calculating the case-fatality rate, researchers found that among those admitted to hospitals, 43.3 percent of patients age 60 and over died, as did 13.2 percent of patients under 60 years of age. Using the second method, epidemiologists discovered that the case-fatality rate was 55 percent for those older than 60 years of age, and 6.8 percent for those younger than 60.

The SARS epidemic has higher morbidity and mortality rates than those associated with vCJD. Confirmed deaths in the United Kingdom (as of April 7, 2003) from vCJD total 127 of 1,682 referrals of definite or probable cases over a 13-year period, beginning in 1990. Considering the publicly perceived magnitude of the “Mad Cow” incident and the enormous financial, social, and economic losses associated with it, SARS’s potential for sowing similar havoc is quite worrying. Table 1 suggests the slow spread of new cases and the fairly steady death rates of confirmed vCJD cases.

As of mid-May 2003, SARS has sickened 7,739 people worldwide and claimed more than 611 lives. Considering that it was identified as a serious health threat in late February 2003, there is significant cause for concern.

Why SARS Is So Deadly

One of the most dangerous features of the SARS epidemic has been its extremely high level of contagion. Another is its relatively long incubation period of a week and a half and the possibility that incubation is even longer, perhaps as much as a fortnight. The WHO recommends quarantine for twice the incubation period for those who have been exposed to the SARS virus. This could mean a monthlong isolation. A third factor making SARS highly lethal is its pattern of clinical progress (as reported by the Combined Hospital Authority of Hong Kong), in which the disease takes a dramatic “turn for the worse” in three of four cases 7 to 10 days after the onset of fever. In 75 percent of patients hospitalized at Princess Margaret Hospital in Hong Kong, the patient’s pneumonia had significantly worsened and spread to both lungs less than a fortnight after becoming ill. One-quarter of SARS patients progress uneventfully until their recoveries are complete. Of concern is the occasional case in which the “turn for the worse” does not occur until as late as the 18th day after infection became apparent. Prince of Wales Hospital in Hong

Table 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Referrals of Suspected vCJD</th>
<th>Confirmed vCJD Deaths</th>
<th>Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>53</td>
<td>—</td>
<td>33</td>
</tr>
<tr>
<td>1991</td>
<td>75</td>
<td>—</td>
<td>36</td>
</tr>
<tr>
<td>1992</td>
<td>96</td>
<td>—</td>
<td>53</td>
</tr>
<tr>
<td>1993</td>
<td>78</td>
<td>—</td>
<td>46</td>
</tr>
<tr>
<td>1994</td>
<td>118</td>
<td>—</td>
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<tr>
<td>1995</td>
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<tr>
<td>2002</td>
<td>158</td>
<td>17</td>
<td>86</td>
</tr>
<tr>
<td>2003</td>
<td>41</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>1682</td>
<td>127</td>
<td>855</td>
</tr>
</tbody>
</table>

Kong reports at least three such cases, including one in which the patient had shown considerable signs of recovery, including the disappearance of fever, before her condition abruptly deteriorated. The delayed onset of the most serious symptoms may be part of the natural course of the disease. Alternatively, it may be an artifact of huge doses of hospital-administered steroids used to repress the patient’s immune system in order to limit inflammation of the lungs.

If this is true, it is even more important to make a swift determination that SARS is the cause of a patient’s early complaints: Reducing the period when those fallen ill can transmit the sickness to others—the interval between the onset of symptoms to the isolating of “suspected cases”—is crucial in controlling the disease.

The CDC has identified SARS as a mutated corona virus. These viruses are known for their ability to survive outside the host’s body for long intervals. Until SARS appeared, however, no corona virus had shown durability after three hours on an inanimate object. Doctors have observed that, unlike other viral diseases, the SARS virus can survive for up to four full days in ph-neutral fluids. Infected patients excrete large amounts of the virus, and poor physical hygiene and less than thorough hand washing can lead to contamination of entire households or the spread of infection through several hospital wards. Tests have shown that the SARS virus can live in a dried format for as long as eight days. Thus the CDC recommends that medical personnel attending SARS patients wear two sets of gloves, two gowns, and full facial shields.

This new finding explains why SARS has a reputation for “irresistibility” wherever it has cropped up, as well as why it has taken such a toll on attending physicians and staff nurses in Guangzhou, Hong Kong, Beijing, and the ravaged hospitals and clinics in the hinterlands of rural China. In this light, it is understandable that fatigued doctors, nurses, and health-care workers became infected as they touched tabletops, pens, blood pressure cuffs, thermometers, and bed rails while wearing only one set of gloves and a single gown and face mask. The 48-hour longevity of the virus allowed even the most prophylaxis observant of health-care workers who had meticulously followed infection control measures in caring for patients to become contaminated when they left rooms and removed their protective clothing. A simple mistake like rubbing an eye without washing the hands or writing an order on a patient’s chart with a contaminated ballpoint pen could result in fatal infection. The assumption made by some Hong Kong health-care officials that sewage leaks (more probably diarrheal discharge in standing water in communal, Asian-style toilets) in the Amoy Gardens apartment complex contributed to the spread of SARS there appears to have been validated, for scientists have found that the SARS virus can survive for four days in watery diarrhea. This is significant and different from the awareness that SARS patients can excrete the SARS virus for up to 30 days after falling ill. The point here is that the SARS virus can remain active in stool samples outside the body—in urine for 24 hours; in feces for two days; and in less acidic, watery diarrhea for four days—the latter effect deriving from a difference in ph levels. SARS has been found to persist on all manner of surfaces, including metal, cotton, plastic, and even skin. The WHO reports that the SARS virus in “sterilized” stool samples can survive for 36 hours on a plaster wall or a Formica surface, for 72 hours on a plastic surface or stainless steel, and for 96 hours on a glass slide. SARS appears abnormally resistant to detergents, which perform poorly when used as a disinfectant against it. There is some good news, however: SARS is particularly sensitive to fluctuations in temperature for a corona virus, and a variety of disinfectants (such as bleach, ethanol, phenol, formaldehyde, and paraformaldehyde) can kill the virus.

A better explanation of corona viruses might lead to a more complete understanding of their possibility for genetic mutation. Corona viruses—like all other RNA viruses—are highly mutable as a consequence of their molecular nature. The replication of genomic RNA is er-
ror-prone and lacks the corrective mechanisms of viruses with DNA genomes. In RNA viruses, the average misincorporation rate during replication is approximately 1 error per 10,000 incorporations. Therefore, every corona virus genome (possessing about 30,000 nucleotides) will contain at least 1 error (mutation). Corona viruses have the potential to vary more than other RNA viruses mainly because the genome of the virus is considerably larger, and high-frequency recombination is a feature of RNA virus biology. Recombination usually is limited to closely related viruses. Detailed phylogenetic analysis will be required to determine whether the SARS virus genome has acquired any genetic information via interaction with known animal corona viruses.

China’s most prestigious genomics institute professed to have discovered that the SARS virus was mutating rapidly when the institute independently sequenced SARS’s genetic blueprint, raising fears about developing a vaccine to combat it. “A few nucleotide differences among individual genomes were detected, and the virus is expected to mutate very fast and easily,” claimed the Beijing Genomics Institute of the Chinese Academy of Sciences in a statement made on the Internet on April 23, 2003. If this is correct, there is a significant chance that SARS is a bioweapon that has gotten loose, as this would represent highly unusual behavior based on a unique, dissident model. Such an orientation in semi-official reports like this might betray the Chinese government’s real thinking about SARS.

A previously mentioned issue needs further discussion and evaluation here: Recovered SARS patients apparently continue to shed virus particles in their stool for possibly as long as three weeks. Such findings have been verified by Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) culture and electron microscopy, a technique that allows for the fast replication of DNA sequences and provides real time, DNA-based detection for biological agents. If such is the case for most—or even some—of the recovered SARS patients, it may represent another route for the transmission of the disease.

How SARS Can Be Stopped

Because we do not have an infallible diagnostic test to identify new SARS cases or a vaccine to inhibit its spread, we must rely on limiting SARS outbreaks by breaking the chains of transmission between infected and healthy persons. In the vast majority of known, documented cases, the virus causing SARS has been spread through proximate, face-to-face contact, when an ill person coughs or sneezes. To interrupt this chain of transmission, scientists must rely on three basic epidemiological strategies:

- case detection,
- patient isolation, and
- contact tracing.

The first infection-control technique, case detection, is as straightforward as it sounds. The most effective approach is to determine as early as possible that the presenting symptoms are those of the SARS virus. Early diagnosis is essential for reducing the number exposed to the disease and is the initial step in breaking the chain of transmission.

The second step, patient isolation, combines the patient care role of medical staff with the restrictive “police power” of public health agencies that assure protection of the community while providing effective treatment of the sick with as much reference to individual rights and personal freedoms as possible. The “common good” must be protected with or without the sick patient’s consent, for only by limiting the number of personal contacts for each diagnosed as well as suspected (i.e., potentially infectious) case will the epidemic eventually be brought under control.

The third component of this epidemiological triad is tracing all contacts the assumed disease-
bearing individual had during his or her incubation period, presuming that hospitalization occurred at the onset of symptoms. These data then are extrapolated by determining the number of days that comprised each of the patient’s contact’s periods of susceptibility. Contract tracing involves a certain amount of detective work, including the identification of all close contacts of each case and then ensuring that those considered “susceptible” receive follow-up care consisting of daily health status checks and probably sequestration at home for the duration of the theoretical incubation period.

The efficacy of these measures is determined by a vital gauge called the effective reproduction number—a calculation determining the average number of new cases generated by a specific existing case. This model is based on the concept of population growth:

- If each SARS-infected patient passes the infection on to more than one person, the epidemic will continue to burgeon.
- If all SARS-infected patients give the infection to only one other person, the epidemic will achieve stasis.
- If SARS-infected patients infect, on average, less than one person, the epidemic will gradually die out.

Studies in Singapore have shown that reducing the “time to isolation” is the most important factor in limiting the spread of the virus. By instituting comprehensive procedures for contact tracing and patient isolation, health authorities reduced this variable from 3 days in the earliest period of the outbreak to 1.4 days by mid-May 2003. This reduced the time in which SARS-infected patients can infect others by half. Of course, a single misdiagnosed case resulting in the admission of a SARS patient to an “ordinary” medical/surgical ward can ignite a new outbreak and potentially infect the hospital’s premises.

There have been examples of already hospitalized patients being rediagnosed as SARS sufferers rather than sick with Influenza-A (in Shenzhen) and Influenza-B (in Singapore). This error suggests that health-care personnel should wear respiratory protection when evaluating all suspected cases of febrile respiratory illness in patients as a routine precaution. It is not known how many others contracted SARS as result of this mistake, but such an error could have induced many further chains of transmission by deferring critical days or weeks of epidemiological “gum-shoeing” to chase down those potentially infected in order to contain the spread of the disease.

How Ready Are We? The Level of New York State’s Preparation

If SARS’s initial appearance had been made in New York State rather than in China’s Guangdong Province, many U.S. public health experts believe the outcome would have been remarkably similar to the overwhelming of healthcare resources that actually occurred. According to Dan Wiener, chairman of emergency medicine at St. Luke’s–Roosevelt Hospital Center in Manhattan, “If we had hundreds of cases of SARS in New York City, we would quickly start outstripping our ability to isolate people.” Given New York City’s primacy in U.S. medicine, the bulk of the preparations being made by New York State to handle a SARS outbreak have centered on raising the preparedness level of upstate medical resources, including some notoriously retrograde county health systems, for such a contingency. Many administrators believe such an outbreak is inevitable, despite the fact that the region has (perhaps) not seen a single case of SARS. Most officials are pessimistic about how the epidemic would be handled. Bruce F. Farber, chief of infectious diseases at North Shore Hospital, confesses,
“I would be dishonest if I said I thought we had the ability to manage a big outbreak right now.”

Central to the plan for strengthening medical care resources outside the New York metropolitan area was the designation earlier this year of eight major medical facilities, including North Shore University Hospital (Long Island), Stony Brook University Hospital, and Westchester Medical Center as regional resource centers. Many New York City hospitals are members of corporate entities that have existing policies on the transfer and treatment of infectious cases throughout their networks, an essential feature of the pairings component underlying Albany’s reorganization of upstate medical facilities. Such interinstitutional compacts governing patient transfers and new admissions are vital for successfully handling an outbreak of highly contagious disease while maintaining the integrity of the region’s health-care providers. In addition, the laboratory at the New York State Health Department’s Wadsworth Center in Albany has been upgraded significantly to begin testing samples taken from patients statewide for the presence of the SARS virus—a task until now performed exclusively by the CDC. Some upstate hospitals have begun physical site renovations, for example, to provide negative pressure examination pods adjacent to the triage area, so that infected patients will not contaminate emergency rooms or the corridors leading to isolation/immersion areas. This would avert the confusion of temporarily designated “off-limits” passageways, hastily implemented protocols for clearing the way for the transport of “suspected” SARS cases, and a mad rush to disinfect potentially contaminated hallways and patient care areas afterward.

The novelty of the plan for establishing regional centers derives from the belief that any facility treating SARS patients inevitably will become irretrievably contaminated with the SARS virus. Based on the decision to sacrifice selected institutions to establish firebreaks on a containment area basis, the SARS-designated hospitals would, upon receipt of their first SARS patients, implement the following preventive measures to limit further exposure of the larger public health system community:

- No admission of new non-SARS patients.
- No discharge of current inpatients.
- No movement of patients or staff across wards.
- No referral of inpatients to other facilities.
- All urgent medical problems of current patients will be handled by the SARS-designated facility.
- Closure of all outpatient services.
- Closing of the SARS facility’s accident and emergency services.

One weakness of this series of planned upgrades is that it would do nothing to address the lack of trained epidemiologists among local health departments to investigate suspected SARS cases once an outbreak has occurred. New York City has five teams of such investigators—who presently have their hands full tracking other contagious diseases, such as meningitis and typhoid. In a full-blown SARS epidemic, these investigators would be overwhelmed by the sheer magnitude of their tasks. In their stead, impromptu squads of volunteers, led by a single trained epidemiologist, would have to go to the hospital, review medical charts/records, determine whether SARS was a probable diagnosis, and interview patients and families. In instances in which the presence of SARS was believed “confirmed,” the epidemiological team would then identify and track down all recent contacts of the ill patient and have those people examined for symptoms of the disease.

Several other vulnerabilities have yet to be resolved. One of these is the lack of experience local law enforcement officers have in imposing crowd control and involuntary confinement mea-
sures in urban and suburban environments. In such circumstances, the battle to establish a cordon while compelling agitated crowds to remain inside the quarantined area undoubtedly will lead to tense confrontations, as fearful residents seek to flee while others frantically search for “lost” children and other temporarily separated family members. The logic that those quarantined must remain inside the cordon to protect the health of others will prove a hard sell when such “self-sacrifice” is seen by those trapped inside the lines as a de facto death sentence. In this regard, it is instructive to note that smallpox scourged America for decades and that the U.S. Immigration Service’s Smallpox Hospital on Roosevelt Island in New York City’s East River (which functioned as a desolate quarantine for would-be immigrants from 1856, when it opened, until 1901, when the city began the house-to-house vaccinations that succeeded in quelling the disease) was really a way to dampen public fears by locking away those who were sick.

A third problem arises: Human nature being what it is, there is a strong probability that in the presence of an unknown, highly contagious, deadly health threat, many hucksters and con artists will attempt to enrich themselves by offering biowarfare protective gear, “magic bullet” pharmaceuticals, herbal remedies, and other spurious cures for the disease. The prevention of such abuses will require policing the Internet to deflate bogus claims that will otherwise be seized upon by a populace desperate to “do something—anything” to mitigate their vulnerability.

The possibility that all epidemic-related health-care systems could be overloaded to the point of dysfunction within weeks of an outbreak’s initial appearance also must be considered. This would occur, for example, if multiple SARS “super-spreader” cases were found to have attended a series of simultaneous mass gatherings at various concert halls, sports stadiums, or racetracks. The capacity of the public health-care system to identify the contacts of unrelated phalanxes of sick patients would immediately overtax the local area’s public health infrastructure because of the tedious, labor-intensive manner of culling such information from hospital records and patient contact interviews as well as the speed with which the illness would spawn new chains of “suspected” cases.

How Prepared Is the United States for a Return of Expatriates Trapped in SARS-Infected Areas?

One area that requires further attention is planning for the possibility that SARS will spread to nations having sizable communities of foreign workers whose presence would immediately be transformed from a needed workforce to a population of no longer wanted host-government-supported dependents who have fallen ill. Saudi Arabia employs more than 6 million foreign migrants—including 30,000 Britons and 35,000 Americans. Foreigners account for 65 percent of workers in Saudi Arabia. Considering the escalating number of bombings terrorists have carried out with conventional weapons to destroy the living quarters and apartment complexes where foreign workers reside, the prospect of a biological-based terror assault should not be ruled out. The British Foreign Office has warned: “There remains a high threat of future large- or small-scale attacks against Western interests in Saudi Arabia. Terrorist attacks could involve the use of chemical or biological materials.” Expert opinion on whether terrorist groups such as Al Qaeda would use biological weapons is divided. Dr. Rohan Gunaratna, author of Inside al-Qaeda: Global Network of Terror, believes the “status quo” will prevail in the long term, a view supported by Ronald Crelinsteble. However, David Capitanchik, at Robert Gordon University in Aberdeen, and most American CIA analysts disagree.
There Have Been Several Food-Borne Poisonings in China Within the Last Two Years

On March 19, 2003, local news media in Liaoling, China, reported an instance of food adulteration. In this case, the poisoning of milk supplies consumed by a few thousand children in the northeastern region of Liaoling Province appeared to result from a deliberate act. Three children died, dozens were left blind, and more than 3,000 were sickened after drinking the locally produced soymilk, which had been recommended by the local education commission for use in all primary and secondary schools in the region. Approximately 250 pupils and their parents were sent to Beijing to seek more effective treatment.

Speaking anonymously, the area’s senior physician told China Daily, “I am afraid someone has intentionally put poison in the milk, as the urinary albumin and phosphate indices are strangely higher than normal figures.” According to local media reports, the children experienced stomach aches, headaches, dizziness, and twitching after consuming a morning snack. The edges of many children’s eyes, noses, and mouths went black and blue. Their symptoms suggest the poison was a toxicant such as nitrate/nitrite, which turns the blood dark and renders it unable to carry oxygen. In severe instances, death occurs due to circulatory collapse.

In April 2003, nearly 400 people fell ill and 60 were hospitalized after they ate bacteria-laden ham at a restaurant in central China’s Henan Province. This was preceded by an incident in September 2002, when 42 people died after a total of 300 were poisoned by breakfast snacks laced with rat poison in the Tangshan Township of the eastern city of Nanjing. A rival snack shop owner was subsequently executed for the crime.

Neighboring Countries Have Experienced Outbreaks of Disease That, Although Not Suspicious in Themselves, Could Suggest a Pattern

Australian public health officials in North Queensland first detected an outbreak of dengue fever in February 2003. Since then, more than 365 people have been diagnosed with this potentially fatal, mosquito-borne disease. Australia was a prominent supporter of President Bush’s Iraqi freedom campaign, and Canberra was one of only a handful of traditional American allies to send troops to fight alongside U.S. soldiers and marines in the Second Gulf War. It is highly intriguing that Australia experienced a similar outbreak of deadly disease caused by a different pathogen (dengue fever) and spread by a different vector (mosquitoes) at the very moment East Asia was hit by the SARS epidemic.

If Not a Smoking Gun, Do We At Least Have a Whiff of Gunpowder?

Given the expectations expressed by CIA Director George J. Tenet that the second U.S. war against Iraq would prompt Baghdad to unleash a terrorist offensive against the United States, the nation should be grateful we have been spared such misfortune. Senior counterterrorism officials still muse that they “can’t believe that they [terrorists] are going to do nothing after Iraq,” and acknowledge being “frankly astonished at how quiet it’s been.” They remain convinced, however, that “somehow, some way the terrorists are going to try to hit us. It’s just a matter of time.” The recent suicide bombings in Saudi Arabia, Morocco, Israel, and other
Middle East nations may be a foretaste of what is to come.

If we reexamine the SARS epidemic in light of these expectations and presume a deliberate rather than a random chance explanation for the etiology of the disease, we can more easily make sense of several contradictions. An examination of the evidence shows the facts of the case. As part of this reevaluation, apparent medical coincidences and viral structure anomalies have been closely scrutinized and inferences correlated with what we now know about the uniqueness of the SARS virus. The following points suggest that we should at least revisit this question, if not revise our understanding of these unique events:

- SARS exhibits several unusual elements rarely, if ever, found in emerging health threats.
- SARS appeared out of the blue.
- SARS spreads with great rapidity.
- The SARS virus is remarkably durable; it can persist on inanimate items for approximately 16 times as long as other known viruses (48 hours as opposed to 4 hours).
- SARS may be unusually persistent inside the patient’s body; recovered patients reputedly continue to shed SARS virus particles in their stool for up to 3 weeks postrecovery.
- SARS is one of the few diseases requiring full protective coverage for health-care workers. In this regard, it is similar to genetically engineered animal and primate diseases studied at U.S. BL-4 animal disease laboratories, such as Long Island’s Plum Island facility.
- A mainland Chinese doctor who insisted he was severely ill with a deadly contagious disease and should be hospitalized in a closed, secured ward with negative internal air pressure brought SARS to Hong Kong. His request was granted. He died within a fortnight, despite an aggressive treatment regimen consisting of high doses of steroids. Was this a sign that a serious bioweapons accident had occurred? Alternatively, at that time did Chinese public health authorities recognize that a biological warfare pathogen had been introduced into China unannounced?
- The CIA rates China as “biologically capable.”
- According to Ken Alibek, China has experienced at least one bioweapons accident in the past. A finding that an accidental introduction of a deadly pathogen had occurred would resolve many otherwise perplexing issues.
- SARS is a substantively mutated corona virus. As such, it could become a hydra, capable of metamorphosing into new molecular combinations that defy existing vaccines and courses of treatment by presenting multifaceted organic structural forms. If this were to happen, SARS would represent an almost ideal bioweapon.
- SARS has had a significant impact on the economy of China. Its potential as a financial weapon is profound.
- SARS has produced a climate of serious embarrassment for the leaders of several nations in which it has erupted. In the case of China’s new
government, it could foster regime change among a newly installed senior leadership. It has already cost the nation’s minister of health and the mayor of Beijing their jobs. The hold on power of the sitting government in Canada is similarly threatened by alleged “mistakes” made in handling of the SARS epidemic there.

- With a 6.5 percent fatality rate, SARS is far removed from a “Doomsday” viral or bacterial illness that would wipe out tens or even hundreds of thousands of victims. We should not presume, however, that terrorists would want to use such a “quantum destruction” bioweapon, unless they are hopelessly cornered and engaged in a final redoubt. If terrorists were to employ a biological agent, they probably would at least start out at a relatively low level and escalate only if their demands were not met. The Al Qaeda groups that attacked the World Trade Center in 1993 might have dreamed of toppling the Twin Towers, but they settled for a traditional truck bombing that caused substantial injuries and some deaths but relatively moderate devastation. The 9/11 attacks represented a calculated, exponentially raised offensive that achieved the goal of leveling the World Trade Center complex—without approximating a “Doomsday” quotient (that is, more than 10,000 fatalities).

- Highly lethal Doomsday weapons (such as a bioweapon based on the Ebola virus) have inherent liabilities. In Ebola’s case, the victims likely would die too quickly to spread the disease far, allowing the epidemic to burn out rather quickly.

- Several plausible candidates, as state sponsors of terrorism, could have executed such a biological terrorist stratagem: North Korea, Iran, and Iraq figure prominently on such a short list.

- China may not have been the intended victim. Instead, the infection might have been started there based on the knowledge that tourists, business executives, and sundry travelers would soon spread the infection across the globe. Thus SARS’s origins in China might have been intended as a “red herring” distraction.

- Genetically altered pathogens periodically have appeared on the black market (i.e., Walter Bassoon’s attempted sale of genetically engineered anthrax, salmonella, botulism, and other “weapons grade” biological agents to the FBI in the summer of 2002).

- There have been several deliberate acts of agroterrorism in which poisoned food was used to harm or kill preselected targets in China within the last 12 months.

- SARS’s genetic sequence is unlike that of any other corona virus. Its many minute differences suggest that it diverged long ago, evolving in some as-yet-unidentified animal species. It does not appear to have previously infected humans, for blood bank analysis reveals the absence of antibodies to the SARS virus in people. Alternatively, these characteristics suggest that SARS
could have been developed in a bioweapons research laboratory.

For these and other reasons, SARS fits the profile of a bioterrorist-weaponized pathogen used with deadly effect against a civilian populace.

Conclusion

The purpose of this article is not to convince readers that SARS is indisputably an act of bioterrorism. Rather, it is intended to stimulate debate on the subject. More important, whether or not SARS is the result of a terrorist stratagem, it is manifestly a wake-up call to America’s public health, intelligence, and counterterrorism communities to get serious about preparing for a deadly pandemic-inducing bioterrorist event before it occurs. The United States has a long way to go in formulating and testing such contingency arrangements, based on recent governmental experiences with administering the smallpox vaccine to American health-care workers. The rural area Chinese experience of entire local health networks undergoing meltdown has shown that the United States is similarly vulnerable to having our interlocking but not well-integrated federal, state, and local (county and municipal) medical systems burst at their weakest seams under the relentless pressure of an unforeseen catastrophe.

There are many other lessons we can learn from the SARS epidemic. According to Jonathan Fielding, director of the Los Angeles County Health Department,

In dealing with SARS, we are back where we were a century ago in treating an emerging disease. We don’t have a diagnostic test, we don’t have a vaccine, and we don’t have a specific treatment. We’re left with “good public health measures” as a bulwark against the spread of this disease.35

Our experiences with West Nile virus, the anthrax attack using the U.S. mail, the Norwalk virus that periodically plagues U.S. cruise ships carrying thousands of vacationers, and the reorganization of our bioterrorism program, however, have brought us to a greater state of readiness to handle such a deliberately provoked medical emergency. Antonio C. Novello, health commissioner of New York State, concurs. “The threat of bioterrorism after September 11 and dealing with the West Nile virus have really strengthened the public health system and helped us prepare for the SARS virus.”36 According to James M. Hughes, a senior official at the CDC, “The investigation of SARS has served as a ‘fire drill’ for coping with bioterrorism.”37

Having noted some of our successes, it would be wrong to leave the impression that, once we have diagnostic tests, vaccines, and treatment regimens for a wide range of emerging diseases, we will be on solid footing to contain and defeat a bioterrorist-caused calamity. U.S. public health laws primarily were written (or at least baseline-defined) during the late nineteenth century and need a vast amount of updating. Lawrence O. Gostin, director of the Center for Law and the Public’s Health, emphasizes, “The need for public health law reform is urgent.” In his view, new provisions should be made for imposed surveillance, vaccination, treatment, isolation, and quarantine that recognize the changes in case law over the last century. Such a perspective is necessary to harmonize the contravening needs for governmental compulsion to protect all of the citizenry with the expansion of individual rights that is a hallmark of civil liberties activism and characterized the thinking of the U.S. Supreme Court for much of the last half of the twentieth century.

Gostin says we must give decisive powers to health authorities, while respecting the Constitution. He is concerned about “the freedom to endanger others” that is embedded in many U.S. laws and in the minds of many American lawmakers. Gostin laments:

American Foreign Policy Interests
If a person had SARS and wanted to go to school or work against public health advice, it seems to me that the need for effective state compulsory power is beyond doubt. But that is not a given in our country, which is now so tied to the rhetoric of human rights. It seems we have lost the tradition of the common good.  

As part of the U.S. government’s efforts to contain SARS as well as future epidemics, the Bush administration has instructed immigration and customs agents at America’s international airports to detain arriving passengers showing symptoms of a proscribed disease. An executive order, signed in April 2003 by President Bush, authorizes the Department of Homeland Security to transport to quarantine all ailing visitors to the United States as determined by federal public health inspectors stationed at major airports (specifically Newark Liberty, Kennedy International, Detroit Metro, O’Hare International, Los Angeles International, and San Francisco International). In the event of an even-more widespread outbreak, in which potentially infected passengers would arrive from all over the globe and not just from East Asia, the presence of U.S. Public Health Service personnel would have to be expanded to all American airports, seaports, and land border stations. Every border crossing and entry point would have to be equipped, staffed, and secured to prevent an epidemic-causing sickness from penetrating the nation’s frontline security against bioterrorism or medical calamity.

Robert C. Bonner, commissioner of customs and border protection at the Department of Homeland Security, says, “We have to get the message out there that travelers who arrive on our shores cannot bring this disease with them. This is a national security issue.” To help accomplish this goal, all major U.S. border crossing points should install infrared electronic temperature-measuring machines (at a cost of $50,000 per thermal scanner). On the basis of lessons learned from the Vietnamese public health service’s successful handling of that nation’s SARS emergency, in which low-technology strategies worked well, smaller border control stations could be adequately protected through the manual use of electronic thermometers to detect visitors running low-grade fevers or presenting high body temperatures.

There are important issues to resolve on the international public health front. According to Stephen O. Cunnion, a former U.S. Navy emerging diseases specialist who first alerted the international medical community to rumors about a possible medical catastrophe brewing in Guangdong Province, “Numbers on health outbreaks are among the most politicized numbers in the world.” He is not surprised that Beijing authorities held back all information, noting, “In China, you can’t even get an accurate count of how many have been killed in an earthquake.”

Just as U.S. authorities must confront dilemmas stemming from civil liberties issues, the international medical community must deal with a host of thorny questions based on diplomatic niceties when investigating outbreaks of emerging epidemics. The World Health Organization relies on the voluntary cooperation of its constituent members. Moreover, because the WHO does not have the funding to hire and deploy its own inspectors, the tasks of international inspections fall to volunteers. The U.S. CDC provides the lion’s share of such “volunteers.” Many foreign countries object to such a heavy U.S. presence, but in constrained circumstances, once a host country has become apprehensive that the outbreak could devastate the nation economically and socially as well as politically by bringing the country’s leaders into disrepute for mismanaging the unfolding epidemic, it usually allows these American-led medical teams relatively free reign. When a life-threatening outbreak occurs, governments that stand the best chance of handling it successfully will be those that can implement plans that have been rigorously tested, refined by several iterations, created on the basis of emergency-management procedures, and reflect reac-
tions to crises. According to Julie L. Gerberding, director of the CDC, “You have to be bold, you have to do it quickly, and you have to do it aggressively. There is not a lot of time for committee meetings. You have to get it done.” In this regard, preparation really helps.

A final point: Neither the United States nor the rest of the world community is out of the woods as far as SARS is concerned. Jong-Wook Lee, the newly elected director of the WHO, believes that “SARS is an alarm signal of the need to strengthen disease surveillance at local, national, and global levels to fight other emerging diseases over the coming years.”

We may yet experience fatalities. The United States has reported 67 SARS cases to the WHO. The Europeans have had 36 cases. Neither has experienced fatalities. HHS Secretary Tommy G. Thompson is concerned about the coming fall and winter months, noting:

I am not confident at all. I do not think SARS is going to go away. Even though it might level off now, it could come back in the fall and then you can, I think, anticipate that you will have deaths on all the continents.

A spread of SARS contagion to Africa, Central or South America, or other poorly prepared, third-world regions might unleash a major medical calamity that could stagger the imagination. We can only pray that whatever SARS’s true origins are, we will meet the full measure of the challenge that SARS and future SARS-like pandemics will present.

About the Author

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Notes

6. Ibid.
7. These findings are reported in the May 12, 2003, online edition of the Proceedings of the National Academy of Sciences of the USA.
9. JSM Peiris, CM Chu, VCC Cheng, KS Chan, IFN Hung, LLM Poon, KI Law, BSF Tang, TYW Hon, CS Chan, KH Chan, JSC Ng, BJ Zheng, WL Ng, RWM Lai, Y Guan, KY Yuen, and members of the HKU/UCH SARS Study Group, “Prospective Study of the Clinical Progression and Viral Load of SARS-Associated Coronavirus Pneumonia in a Community Outbreak.”
12. BBC News online, Friday, May 9, 2003.

18. Ibid.


34. International Society for Infectious Diseases, ProMED Mail Post, “Food Poisoning, Milk, Children—China” (Liaoling).


36. Ibid.


38. Ibid.


42. Ibid.


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