



Conference Session Summaries¹

Healthcare Settings as Amplifiers of Infectious Disease²

Global outbreaks of severe acute respiratory distress syndrome (SARS) in 2003 demonstrated the potential of healthcare facilities to serve as amplifiers of a new communicable disease. However, healthcare settings can also be amplifiers of multidrug-resistant bacteria and bloodborne viruses.

In the public health and healthcare delivery systems, amplifying forces include weaknesses in communication, coordination, early detection and control of emerging diseases, and oversight of healthcare services. Among healthcare personnel, weaknesses include gaps in infection control knowledge and practice.

SARS was spread globally by relatively few people and amplified by super-spreading events that occurred primarily in healthcare settings. Healthcare personnel were disproportionately affected, accounting for up to 57% of cases in some countries. The combination of increasing infectivity in the later stages of SARS, performance of the aerosol-generating procedures (bronchoscopy, intubation), and clustering of SARS patients further enhanced transmission of the SARS-associated coronavirus.

Systems for early detection and isolation of persons with suspected SARS and public quarantine effectively reduced transmission. Conversely, absence of control measures at initial points of patient encounter, particularly in hospital emergency departments, rendered hospitals particularly vulnerable to SARS transmission.

Unsafe injection and blood donation practices have contributed to the global spread of bloodborne viral diseases. Worldwide, unsafe injections alone are estimated to cause 21,000 cases of hepatitis B, 2,000 cases of hepatitis C, and 260 cases of HIV each year. Countries with limited resources are at a disproportionate risk for adverse injection-related outcomes. While lack of sterile supplies is important, unnecessary injections and poor understanding of infection control principles and practices also contribute to the spread of bloodborne viruses. These last two factors are not unique to the developing world. Four recent outbreaks of hepatitis B and C viruses in patients in ambula-

tory care facilities in the United States are a reminder that unsafe injections can occur in any healthcare setting. In these outbreaks, a lack of administrative oversight and poor understanding of infection control practices contributed to the contamination of multidose vials or the reuse of injection equipment and transmission of hepatitis B or hepatitis C virus to numerous patients.

In contrast to SARS and bloodborne viruses, the rise and amplification of multidrug-resistant organisms in healthcare settings have been gradual and subtle. These organisms limit treatment options, increase transmission risks for vulnerable patient populations, increase illness and death, prolong the hospital stay, and add to healthcare costs. The rise of these organisms has been most dramatic in U.S. intensive care units, where 50% of *Staphylococcus aureus* isolates are resistant to methicillin (MRSA) and 25% of enterococcal isolates are resistant to vancomycin. Cases of vancomycin-intermediate *S. aureus* and three recent cases of vancomycin-resistant *S. aureus*, both in outpatient settings, attest to the potential for amplification of these organisms in healthcare settings. Gram-negative organisms resistant to extended-spectrum β -lactamases present similar concerns and have been associated with numerous outbreaks in healthcare facilities.

The problem of multidrug-resistant organisms is multifaceted. While colonized and infected patients constitute the major reservoir for dissemination of these organisms, inappropriate use or overuse of antimicrobial agents contributes to acquiring and expressing resistance genes. Healthcare settings become breeding grounds of additional resistance and distribution centers for amplification of multidrug-resistant organisms to other healthcare settings and the community.

The notion that our healthcare settings contribute to the amplification of infectious disease contradicts our expectations. Usually, healthcare systems work well, and quality healthcare is delivered safely and efficiently. Nonetheless,

¹Authors are the session moderators; first author for each session is the rapporteur. Actual presenters of sessions are listed in footnotes. More session summaries are available at http://www.cdc.gov/ncidod/EID/vol10_no11/iceid.htm.

²Presenters: Mark Loeb, McMaster University; Yvan Hutin, World Health Organization; and Larry Strausbaugh, Portland Veterans Administration Medical Center.

there are gaps in infrastructure, knowledge, and practice that can open the door to disease outbreaks.

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Transformation of the Developing World: Socioeconomic Matrix¹

Economic disparity affects the health of persons around the world, and various societal, environmental, and economic factors influence the emergence of infectious diseases. Similarly, emerging infectious diseases have a social and economic impact, including diminished economic productivity, increased expenditures on public health, deferred external investment and development, and reduced travel and retail sales.

The thriving consumer demand for exotic and rare animals as “tonic” food in China, especially in the southern regions, raises concern for the risk for animal-human cross-infections through contact with live and recently slaughtered animals. The increased demand for civet cat, suspected as the source of severe acute respiratory syndrome, is one such example. The demand for tonic food has risen with improving economic conditions in post-1978 China and is a form of conspicuous consumption that expresses economic and social distinction and prestige. A Chinese medical paradigm based on “humors” inherent in the concept of tonic food, combined with the well-understood cultural symbolism of distinction and prestige associated with conspicuous consumption, has lent weight to the demand for rare and exotic animals perceived to be “pure,” “safe,” and “virile.” Since this rising demand is not likely to be suppressible, regulated production of these animals is needed to make them safe.

Additional contemporary issues in China include the effect of migration and urbanization on the spread of sexually transmitted diseases. The forces driving this effect can be divided into three overlapping categories: the dismantling of the organizational and spatial structures that helped keep order in China's cities during the Maoist era (from 1949 to 1978); a dramatic increase in the overall fluidity of urban societies in China (accompanied by the erosion of traditional moral and behavioral boundaries); and a

new set of cultural values that has encouraged more urban Chinese to think of themselves as actors with individual agency. These overlapping forces, which are geographic, socioeconomic, and cultural, are interwoven with and thoroughly implicated in the emergence of new behavior and lifestyles that have put a growing number of Chinese at risk for infectious diseases.

More broadly, climate can also affect public health and emerging infectious diseases. Factors affecting emergence can also be examined in an eco-epidemiologic framework that can often drive epidemics. Examples include the effects of rains and flooding on vector-borne and diarrheal diseases and the effect of heat and fires on respiratory infections.

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Emerging Issues for the Public Health Laboratory²

U.S. public health laboratories face challenges from within and outside the system, including emergence of new pathogens, introduction of new testing methods, new security requirements, shortages of well-qualified personnel, and collaboration with new partners.

The public health system depends on hospital and commercial laboratories as major sources of reliable epidemiologic information. Thus, the current crisis in these laboratories is of great concern. The pressures come from the need to address emerging infectious diseases, detect antimicrobial resistance, and recognize potential agents of bioterrorism while updating procedures, practices, and facilities to meet new biosafety, biosecurity, confidentiality,

¹Presenters: Christopher Smith, University of New York; Gerry Keusch, National Institutes of Health; Paul Epstein, Harvard University Medical School; and Josephine Smart, University of Calgary.

²Presenters: Roberta Carey, Centers for Disease Control and Prevention; Reynolds Salerno, Sandia National Laboratories; Bruce Budowle, Federal Bureau of Investigation; and Nancy Warren, Pennsylvania Department of Health.