Electronic Communication and the Future of International Public Health Surveillance

Recent developments in electronic communication have enhanced national public health surveillance systems and facilitated progress in establishing surveillance that crosses national boundaries. The international foodborne outbreak of *Shigella sonnei* described by Frost and colleagues was first reported through Salmnet (1), a laboratory-based surveillance system designed to include an on-line network database. Salmnet was established in 1994 to improve the prevention and control of human salmonellosis and other foodborne infections in the countries of the European Union and the European Cooperation in Science and Technology.

Epidemiologists who have national surveillance responsibilities and heads of reference laboratories in 13 countries currently collaborate in the Salmnet project under the joint leadership of the Directors of the Laboratory of Enteric Pathogens and the Communicable Disease Surveillance Centre (CDSC) at the Public Health Laboratory Service campus at Colindale, London. During the course of two workshops, the collaborators agreed to a) develop and apply standardized phage typing for the most common salmonella serotypes within Europe, b) introduce an international quality assurance scheme for laboratory performance of *Salmonella* phage typing, c) establish a core set of data on each laboratory-confirmed and typed human salmonella isolate for rapid transfer into a shared nonaggregated dataset, and d) develop statistical analysis programs to facilitate the early recognition of international outbreaks. The collaborators also agreed to rapidly report any clusters detected and to exchange information concerning other infections, including those caused by *Shigella*, *Listeria*, and vero-cytotoxin-producing strains of *Escherichia coli*.

Currently six countries share data through the Internet, while the other seven countries rely on faxing material or sending diskettes through the mail. All collaborating countries plan to join the on-line network by the end of 1995. The opportunities offered by electronic communication have encouraged a remarkable degree of international cooperation in surveillance, as is evident in the far reaching objectives agreed upon for Salmnet.

The Salmnet collaboration was already in place when the *S. sonnei* outbreak in Sweden was reported to Colindale. CDSC responded by sending an electronic message throughout England and Wales by Epinet, an electronic system for the rapid transfer of vital public health information developed by the CDSC Welsh Unit in Cardiff (2). The message was sent to consultants in communicable disease control in each district health authority, to the 53 public health laboratories, and to other agencies in England and Wales involved in infectious disease control. Further information from Norway, Scotland, and Sweden reinforced and stimulated the ongoing investigation in England and Wales. Since its inception, Salmnet has also contributed information with potential international implications concerning several *Salmonella* serotypes (3,4).

The signing of the Treaty of Maastricht (1992) was an important milestone for international cooperation in public health surveillance. The treaty established a basis for European Community action in the field of public health and enjoined cooperation between member states, third countries, and international public health organizations to protect human health. Sufficient evidence has accrued on the added value of international surveillance of infectious diseases, and it is generally accepted that the potential for major public health hazards is amplified as a consequence of the increasing volume of international travel and the global extension of food distribution networks (5). Surveillance systems such as Salmnet and the European Surveillance of Travel-Associated Legionnaires' Disease (6) will pave the way for international surveillance by providing a communications network that will facilitate the rapid collection and analysis of data using standard case definitions, transmission of information for the prevention of communicable diseases, and the promotion of effective public health practice.

Parallel electronic surveillance systems in the United States offer equal opportunity for international collaboration. For example, since 1985, data on notifiable diseases have been transmitted electronically each week to the Centers for Disease Control and Prevention (CDC) from state health departments by the National Electronic Telecommunications System for Surveillance (NETSS) (7). NETSS was developed by CDC and the Council of State and Territorial Epidemiologists for electronically collecting, transmitting, analyzing, and publishing weekly reports of notifiable diseases and injuries from 50 states, New York City, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands (8). The operation of NETSS is based on agreements on reporting conditions, standard case definitions, and protocols for formatting and transmitting data, rather than prescribed software or systems.

A second CDC electronic reporting system, the Public Health Laboratory Information System (PHLIS), is used by public health department laboratories in all states, New York City, the District of Columbia, and Guam to report laboratory isolate-based surveillance data to CDC. The PC-based system was developed jointly by the National Center for

Infectious Diseases, CDC, and the Association of State and Territorial Public Health Laboratory Directors to maintain a fast and direct link between public health laboratories in the United States and CDC. PHLIS is used to gather, analyze and transmit data (e.g., laboratory testing results, epidemiologic information, findings from special studies and surveys) among multiple sources of public health laboratory information (e.g., hospitals, laboratories, or public health departments), and it provides an automated program in its longitudinal databases to detect outbreaks (9).

European and U.S. surveillance databases and information systems should be linked to share public health information of international concern. To that end, CDSC and CDC are developing a cooperative communications information system that will use the Internet to mirror vital public health documents (e.g., CDSC's *Communicable Disease Report* [*CDR*], CDC's *Morbidity and Mortality Weekly Report* [*MMWR*], and selected surveillance data sets). This network is the beginning of a larger international network that will share data, exchange information, and improve public health. This larger network could link such systems as Salmnet, NETSS, and PHLIS to create a virtual on-line library of international surveillance data and information for public health.

With the diffusion of technology, internationally networked electronic public health surveillance systems are gaining in importance. Their existence clearly facilitates the rapid collection, analysis, and dissemination of vital public health information and promotes the establishment of effective international public health policies.

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