

Obstacles to syndromic surveillance include the need to secure the cooperation of diverse health care systems, the lack of standardization of electronically stored data, the financial costs of data acquisition and manual entry, and the legal issues related to confidentiality. We developed an approach that uses daily imports of ADT (admission, discharge, and transfer) and LIS (laboratory information system) data, in essentially their native format, from a wide variety of system vendors. Data are presented for a university hospital for September 15, 2001 through September 15, 2002. Data were plotted using statistical process control methods ($UCL = 3\sigma$). For the 1-year period under study, there were 73,910 emergency department (ED) visits. ED visits with orders pertaining to the respiratory test (e.g., virus screens) showed discrete episodes exceeding the UCL and corresponded to a cluster of patients who tested positive for influenza. Similarly, a peak in ED visits with stool test orders corresponded to a cluster of patients who tested positive for *Shigella spp.* These results suggest that syndromic measures based on visit and testing data can be done with existing electronic data. Using data from hospitals without requiring data formatting to external standards substantially reduced disincentives to hospital participation. We provided daily feedback to infection control, which gave hospitals a real incentive to participate. Sending notifiable disease (with identifiers) and other data to local or state health departments (without identifiers, but with duplicates removed) would be a simple extension of this approach.

SECTION II: EVENT-BASED SYNDROMIC SURVEILLANCE SYSTEMS

Web-Based Japanese Syndromic Surveillance for FIFA World Cup 2002

S. Suzuki,¹ T. Ohyama,¹ K. Taniguchi,¹ M. Kimura,¹ J. Kobayashi,¹ N. Okabe,¹ T. Sano,² T. Kuwasaki,² and H. Nakatani²

¹National Institute of Infectious Diseases, ²Ministry of Health, Labor, and Welfare

Web-based syndromic surveillance for the 2002 FIFA World Cup was performed successfully with 11 jurisdictions throughout Japan for 2 months. No major outbreaks were detected by syndromic or by strengthened routine surveillance. However, an aseptic meningitis epidemic was first detected as a “neurological syndrome.” Surveillance was conducted with 87 hospitals in Tokyo and the 10 prefectures hosting soccer games. Information was collected and distributed using the Emergency Medical Information System, a preexisting national Web-based system. Hospitals accessed this Web site and submitted the data daily before noon. Reporting criteria were hospital admissions in which infection was either suspected or confirmed. There were five case classifications: (1) cutaneous, mucous membrane, or bleeding disorders; (2) respiratory; (3) gastrointestinal; (4) neurological; and (5) nonspecific syndromes. Each local health authority was responsible for monitoring its own surveillance data and taking action as needed. The National Institute of Infectious Diseases supervised the response of the prefectural health authorities and monitored data for diffuse outbreaks. Feedback information included daily status reports and outbreak information submitted by local and national health authorities. A total of 3,444 cases were reported, and the hospitals sustained a high reporting rate throughout the surveillance period. Web-based syndromic surveillance over a limited period of time appears to be both feasible and effective, even when surveillance sites were over all of Japan. To improve this system, an evaluation, including a questionnaire study, is now ongoing.

A Day at the Races: Communitywide Syndromic Surveillance During the 2002 Kentucky Derby Festival

L. Goss, R. Carrico, C. Hall, and K. Humbaugh

University of Louisville Hospital and Jefferson County Health Department

Data were collected from hospital emergency departments for syndromic surveillance during the 30 days surrounding the Kentucky Derby Festival in Louisville, Kentucky. Two collection methods were employed. One method used personal digital assistants (PDAs) to capture presenting complaint (reason for care) and demographic data from emergency department patients in 6 hospitals. Six other hospitals used preexisting hospital computerized record (CR) systems to extract the same information from hospital records. Reason for care was categorized into one of seven predetermined categories. Data sent by 3 of 6 hospitals in the CR group were not interpretable in near real time and were excluded since no syndromic category assignment could be provided by these hospitals. Data from all 6 PDA group hospitals were usable. Among the 9 remaining hospitals, the mean number participating each day was 6.2 (range 1–9). The syndromic category most often assigned to patient encounters in all hospitals was “other.” When the data were grouped by syndromic category as a percentage of all daily visits, no spikes in any syndromic category were detected throughout the study period. Use of the PDA was accepted as a tool for syndromic data collection by hospitals; however, compliance varied between hospitals using this method. When syndromic category assignment was made by the sending CR hospital, CR data were more complete than PDA data. Participation by all 12 hospitals demonstrated the acceptance of communitywide surveillance and the role of the health department as the data repository.

Syndromic Surveillance Based on the Emergency Department in Korea

J. P. Cho,¹ J. S. Kim,² I. S. Yoo,³ M. Y. Ahn,⁴ S. J. Wang,⁴ T. Hur,⁵ I. C. Park,⁶ and E. K. Jeong⁷

¹Department of Emergency Medicine, Ajou University Hospital, ²Inha University Hospital, ³Chungnam University Hospital, ⁴Hanlim University Hospital, ⁵Chonnam University Hospital, ⁶Yonsei University Hospital, ⁷Department of Communicable Diseases Control, National Institutes of Health, Seoul, Korea

We reviewed a syndromic surveillance system based on the emergency department; the system was developed to detect bioterror attacks early for the safe 2002 Korea-Japan FIFA World Cup Games. We developed protocols of case definition, report form, reporting strategies, method of data analysis, Web-based reporting programs, and so on. Syndromes for surveillance were acute neurologic syndrome, acute skin rash syndrome, acute hemorrhagic syndrome, acute respiratory syndrome, and acute diarrheal syndrome. There were 120 emergency departments from 16 provinces and cities designated to report suspected cases, including a zero report, daily through a Web-based reporting program. If bioterrorism or outbreak was suspected, the provincial epidemiological investigation team conducted an investigation. The average daily report rate was 94.1%. The number of reported cases were as follows: acute neurologic syndrome, 0; acute skin rash syndrome, 18; acute hemorrhagic syndrome, 10; acute respiratory syndrome, 2,520; and acute diarrheal syndrome, 1,414 (cluster, 30; sporadic, 1,384). There was no evidence of bioterrorism throughout the 13 weeks, including the 1-month period of the FIFA World Cup Games, except for several food poisoning outbreaks. There were some limitations in this surveillance system: no previous reference data, inappropriate applications of case definition, variation of reporting rates by hospital, and lack of public health workers and field epidemiologists for investigation. We would like to conduct this syndromic surveillance continuously during ordinary times to focus on the in-

fectious diarrhea and the influenzalike illnesses. During mass gatherings, such as international sports events or political conferences, we should enhance this system.

Planning Syndromic Surveillance for the Athens 2004 Olympic Games: a Pilot Study

Urania Dafni,^{1,3} Kassiani Golfinopoulou,^{1,3} Sotirios Tsiodras,³ and George Saroglou^{2,3}
¹*Biostatistics Laboratory, Department of Public Health,* ²*Department of Internal Medicine, School of Nursing, University of Athens,* ³*Hellenic Center for Infectious Diseases Control, Ministry of Health*

As part of the preparation for the epidemiological surveillance during the 2004 Olympics, a pilot study was conducted during July and August 2002 to assess the feasibility and value of a syndromic surveillance network in the Greek health care system environment. The points of data collection were the emergency departments (EDs) of 14 hospitals in the greater Athens metropolitan area, 3 more cities hosting Olympic games, as well as one major primary health care facility close to Athens and the Olympic athletic facilities. The Hellenic Center for Infectious Disease Control (HCIDC) staff visited participating sites daily to review chief complaints and preliminary diagnoses recorded in ED books and to collect information on a specially designed form for ED encounters representing 1 of 12 public health syndromes of interest. All data from the facilities were faxed to the HCIDC Office of Olympic Games and an analysis report was produced daily. HCIDC staff, in collaboration with infection control nurses, conducted follow-up investigations on a number of cases for verification of condition. The syndromic surveillance network was well accepted in the participating facilities, and expanding it to cover all major public hospitals of the Athens metropolitan area and other cities is deemed feasible. This will require custom-designed procedures for data collection for each health care facility, as well as additional training of ED personnel. The system is currently being evaluated regarding sensitivity and specificity and is expected to be fully operational at least 6 months before the 2004 Olympics.

Syndromic Surveillance: an Applied Tool for Monitoring Health Effects of Colorado Wildfires, Summer 2002

A. J. Davidson, M. W. McClung, and S. V. Cantrill
Denver Public Health and Emergency Department, Denver Health Medical Center, Denver, Colorado

Summer fires near Denver, Colorado, caused significant pollution, but were they associated with appreciable change in health care utilization (HCU)? Would a syndromic surveillance system detect an HCU change during the 26 days until fire containment? HCU for Denver Health (DH), an integrated safety net hospital serving 150,000 citizens, was compared for 2002 ("later") to the preceding 4 years (1998–2001, the "earlier" period). Chief complaint data for patients presenting to the ED and *International Classification of Diseases, 9th Revision (ICD-9)*-coded diagnoses for encounters to 3 urgent/emergent care (UC) and 23 outpatient (OP) facilities were analyzed. Daily visit rates (per 100 visits) for chief complaints (i.e., cough, shortness of breath, and breathing difficulties [RESP] and "asthma") and *ICD-9*-coded asthma visits were calculated and compared using a *t* test and cumulative sums (CUSUM). Mean daily ED visits were 179 versus 168 (earlier vs. later, respectively). ED chief complaint rates were 0.030 versus 0.042 (RESP, $P < .001$) and 0.013 versus 0.010 ("asthma", $P = .13$) for the earlier versus later periods, respectively. Mean daily *ICD-9*-coded visits were 281 versus 283 (UC) and 1,410 versus 1,383 (OP) earlier versus later periods, respectively. Asthma visit rates were 1.31 versus 1.01 (UC, $P = .04$) and 0.57 versus 0.44 (OP, $P = .11$),

earlier versus later, respectively. No significant deviations were observed using CUSUM methods. We found higher ED-based respiratory-related chief complaints rates during a time of intense forest fire activity near Denver. UC visit rates for asthma were decreased compared to the prior period. Public health information alerts may have played a role in decreasing exposure and avoiding increased HCU.

Milwaukee Biosurveillance Project: Real-Time Syndromic Surveillance Using Secure Regional Internet

Seth Foldy,^{1,2} Paul Biedrzycki,¹ Edward Barthell,^{2,3} Nancy Haney-Healey,⁴ Bevan Baker,¹ Donna Howe,¹ Douglas Gieryn,¹ and the Milwaukee Biosurveillance Workgroup
¹City of Milwaukee Health Department, ²Medical College of Wisconsin, ³Infinity Healthcare, ⁴Waukesha County Public Health

Milwaukee, Wisconsin, was visited by 1.2 million people for events, including the All Star baseball game, in July 2002. Eight emergency departments (EDs), four primary/urgent care practices, and one medical examiner reported, using existing personnel, syndromes associated with bioterrorism agents to the Milwaukee Health Department daily for 4 weeks. Clinicians were to complete a brief symptom checklist during each patient encounter. In practice, some EDs screened only selected patients, and many supplemented clinician reports with log reviews. Daily ED syndrome and total visit volume reports were collected and displayed using the EMS system secure Web site. Patient-identifying information was not sent to the Milwaukee Health Department, but was retained at the ED in case needed. Participating EDs were visited by 26,888 patients, and 314 patients were reported to meet syndrome criteria over the 4 weeks. The rate of syndrome cases to total visits ranged from 0.04% to 2.8% across the various EDs; EDs that relied exclusively on physician checklists had lower syndrome-to-visit rates. Mean ED administrator ratings of implementation and reporting ease ranged from neutral to modestly positive. They negatively rated the ease of clinician involvement. Mean clinician ratings of their experience were neutral to modestly negative. Estimated added patient time in ED averaged less than 4 minutes. Estimated total additional staff time per patient approximated 10 minutes. Primary care practices reported a higher syndrome rate (8.8% of 2,442 visits), which included a camp-associated cluster of streptococcal pharyngitis. A Web-mounted "dashboard" facilitated comparison of syndrome rates and other surveillance trends. The Web site facilitated collection, analysis, and display of surveillance information.

SECTION III: DATA TRANSFER AND TRANSFORMATION

The Frontlines of Medicine Project: a Proposal for the Standardized Communication of Emergency Department Data for Public Health Uses Including Syndromic Surveillance for Biological and Chemical Terrorism

Edward N. Barthell,^{1,2} William H. Cordell,³ John C. Moorhead,⁴ Jonathan Handler,⁵ Craig Feied,⁶ Mark S. Smith,⁶ Dennis G. Cochrane,⁷ Christopher W. Felton,¹ Michael A. Collins,¹ Kim R. Pemble,^{1,8} and Brian F. Keaton⁹
¹Infinity HealthCare, Inc., Wisconsin, ²Medical College of Wisconsin, ³Indiana University School of Medicine, ⁴Oregon Health and Sciences University, ⁵Northwestern University, ⁶Washington Hospital Center, Washington, DC, ⁷Morristown Memorial Hospital, New Jersey, ⁸University of Wisconsin–Milwaukee, ⁹Summa Health System, Akron, Ohio