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Syndromic Surveillance

To the Editor: As public health practitioners directly involved in constructing, maintaining, and interpreting syndromic disease surveillance systems, we offer the following comments on the Buehler et al. article, "Syndromic Surveillance and Bioterrorism-related Epidemics" (1). In general, this article was well-crafted. It reviewed the potential for syndromic surveillance to detect various diseases of bioterrorism, specifically an anthrax event based on the inhalational anthrax cases of 2001. However, the reader may conclude that hospital-based syndromic surveillance is potentially ineffective and unproven.

Buehler et al. describe how, within 18 hours, a presumptive diagnosis of anthrax would prompt a full-scale response. We think that functional syndromic surveillance can respond to the rapid onset of hospital-based disease. To isolate and positively identify *Bacillus anthracis* from a blood culture would take ≈48 hours. Syndromic surveillance should detect a large number of cases within 24 hours. A fully functional hospital syndromic surveillance system that uses automated analysis (such as the daily emergency department–based surveillance with SaTScan in New York City) should identify a substantial increase in a relevant syndrome within 12 to 24 hours after data submission (2). A continued daily rise in any disease category would most certainly set off alarms in a syndromic surveillance network. If active statewide laboratory surveillance is included in syndromic surveillance, such as the gram-positive rod surveillance conducted in Connecticut (3), this surveillance should rapidly detect even single cases of anthrax concurrent with the presumptive diagnosis within the hospital.

The authors also state that syndromic surveillance would not detect outbreaks too small to trigger statistical alarms. The combination of active and passive surveillance in the hospital admissions–based syndromic surveillance in Connecticut allows a number of syndromes to be tracked immediately upon notification; these syndromes include pneumonia and acute respiratory disease in healthcare workers admitted to a hospital, all disease clusters, and fever with rash illness. This system is very flexible, and active surveillance of other syndromes can be quickly instituted as required. This active surveillance component has been proven useful. The first 2 of Connecticut's 17 confirmed human cases of West Nile virus during 2002 were discovered in August when a health director, who regularly monitored the syndromic admissions data for the hospital in his municipality, requested immediate West Nile virus testing from the hospital's infection-control department when he received two late summer reports of neurologic illness.

Buehler et al. state that specificity for distinguishing bioterrorism-related epidemics from more ordinary illness may be low because the early symptoms of bioterrorism-related illness overlap with those of many common infections. Illness specificity can be modulated within a syndromic surveillance system by making changes in the definition of the information requested, the method of analysis used, or by incorporating varying amounts of active surveillance into a passive reporting system. In Connecticut, annual rates of hospital admissions for pneumonia and respiratory illness have significantly increased (>3 standard deviations) during winter months. These increases have corresponded temporally with peaks in laboratory-confirmed influenza reports and in our state-based and the national sentinel physician influenzalike illness reports. Similarly, in the military-based syndromic surveillance system, respiratory outbreaks are detected by monitoring routine outpatient visits and pharmacy prescriptions. Absolute numbers of visits, as well as percentage of visits, to primary care clinics for influenzalike illness provide up-to-date information on respiratory disease conditions at military installations in both active-duty personnel and family members.

Connecticut has added additional active surveillance categories to its syndromic surveillance for potential SARS cases by gathering extensive data on all healthcare providers hospitalized with respiratory illness. In the absence of an identified pathogen, the entire United States was conducting syndromic surveillance for SARS during the spring of 2003.

What are existing alternatives to rapid, patient-based reporting through syndromic surveillance for bioterrorism and emerging illness? Will individual physicians (i.e., the "astute clinicians") truly recognize an increase of nonspecific symptoms among their patients in time to warn public health authorities of an impending bioterrorism event? During the past 4 years in the U.S. military population, unless

disease was extremely severe with high rates of hospitalization, virtually no outbreaks of infectious diseases detected by syndromic surveillance were reported to public health officials, even when effective preventive measures existed. Our experience leads us to encourage states and municipalities to develop functional, patient-based syndromic surveillance systems and discover both their limitations and their possibilities.

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[1]The opinions and assertions in this article are the private views of the authors and are not to be construed as official or as necessarily reflecting the views of the Connecticut Department of Public Health, the U.S. Department of Defense, the U.S. Army, or the Walter Reed Army Institute of Research.

In reply: The thoughtful letter of Drs. Dembek, Cochrane, and Pavlin draws attention to several key themes emerging in the ongoing dialogue about the utility and role of syndromic surveillance. First, as illustrated by their work, the growing body of experience in conducting syndromic surveillance should advance this dialogue beyond the hypothetical framework described in our manuscript to a more evidence-based assessment of epidemic detection. Second, in the absence of a bioterrorism-related illness since 2001, the utility of syndromic surveillance for detecting naturally occurring events is coming into greater focus, particularly for detecting the onset of anticipated seasonal upswings in infectious diseases, including West Nile virus disease, gastrointestinal illness, and influenza.

Syndromic surveillance coupled with follow-up investigations can assist clinicians by alerting them to communitywide problems likely to be manifest among their patients. This recognition may occur at the hospital level, as reported by Dembek et al. in the initial recognition of West Nile virus disease in Connecticut in 2002, or at the community level, as illustrated by public health alerts in New York City to notify clinicians about viral gastrointestinal illness (1). Multiple studies have documented that newer syndromic surveillance systems can recognize the onset of the annual influenza season (2), but it is not clear what these systems add to existing syndrome-based systems that track "influenzalike illness" as part of a larger array of influenza-specific surveillance methods. While Dembek et al. note that syndromic surveillance has detected multiple outbreaks that would have been otherwise unrecognized, Sichel et al. observed that syndromic surveillance did not detect outbreaks recognized through more traditional means (1). This discrepancy emphasizes the need to further assess the characteristics of epidemics and surveillance systems that favor detection by using syndromic methods.

We recommend distinguishing between the increasing practice, prompted by concerns about bioterrorism, of syndromic surveillance for epidemic detection and the longstanding and common practice of using syndrome-based case definitions in public health surveillance. Such case definitions have been used in situations in which a wide net is cast to identify potential cases of a particular disease (e.g., acute flaccid paralysis as part of global efforts to eradicate poliomyelitis [3], liver disease associated with a new therapy for latent tuberculosis infection [4], and inhalational anthrax in New Jersey in 2001, after bioterrorism-related cases were clinically detected [5]), when resource and infrastructure constraints do not allow routine use of laboratory-based definitions (e.g., surveillance for sexually transmitted diseases in infrastructure-weak countries [6]), and when surveillance is initiated for a new disease of unknown origin (e.g., toxic shock syndrome [7], AIDS [8], and severe acute respiratory syndrome [SARS] [9]). Although SARS surveillance did not represent syndromic surveillance according to this distinction, relationships between health departments and hospitals, fostered in establishing syndromic surveillance, likely facilitated SARS surveillance.

New guidelines offer an approach for evaluating syndromic surveillance systems, including what is learned from follow-up of statistical alarms and whether syndromic surveillance or other methods lead to the earliest detection of outbreaks (10). These guidelines also provide a framework for modeling exercises to test syndromic surveillance under various bioterrorism scenarios, supplementing experience gained from real-life, but typically less severe, seasonal illness or community epidemics. Eventually, this information should be

useful in developing guidance for health departments seeking to determine whether and how to implement syndromic surveillance.

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Staphylococcus aureus and *Escherichia hermanii* in Diabetes Patient

To the Editor: Polymicrobial invasive infections are infrequent, representing <10% of the invasive infections of known etiology (1). They are often correlated with a predisposing factor: immunodeficiency (e.g., diabetes mellitus, malignancies, extremes of age) or use of a central catheter. *Escherichia hermanii* is an extremely rare etiologic agent for invasive infections; only four cases were published from 1980 to 2002. We report the first case of double invasive infection by *E. hermanii* and *Staphylococcus aureus* and emphasize the importance of screening of all the septic foci for demonstrating a polymicrobial invasive infection.

In August 2000, a 54-year-old comatose man was admitted to our infectious diseases department with a 10-day history of fever. He had a medical history of vertebral arthrosis (lumbar laminectomy in 1989) and insulin-dependent diabetes mellitus. Six weeks before, he had received for 3 days gluteal injections with kebusone (an intramuscular nonsteriodal antiinflammatory drug [NSAID]) for acute lower back pain. Twenty-eight days after the first injection, a gluteal abscess developed, which was surgically drained, without perioperative antimicrobial therapy. Three days later, he became febrile, and pyrexia persisted despite local wound management and treatment with oxacillin, 4 g/day for 3 days; cefuroxime, 3 g/day, and gentamicin, 160 mg/day for another 7 days.

The patient became comatose and was transferred to our department. At that time, the physical examination showed fever (40.2°C), neck stiffness, Brudzinski sign, thoracic dullness, and bilateral crackling rales. The level of C-reactive protein was 123 mg/L. Renal failure was noted with a creatinine blood level of 312 mmol/L and uncontrolled diabetes with fasting glucose of 24.75 mmol/L. Computed tomographic (CT) scan of the brain did not show brain abscesses or tumors. Examination of the cerebrospinal fluid (CSF) indicated a protein level of 2.67 g/L, decreased glucose concentration of 0.55 mmol/L, and a leukocyte count of 2.3 x 10^9/L with 96% neutrophils; no microbial pathogens were demonstrable under direct examination of CSF. Chest x-ray identified bronchopneumonia and bilateral pleural effusion. The pleural fluid analysis revealed a purulent exudate—protein, 4.5 g/L—containing 55% neutrophils. A urine specimen and three blood samples were obtained for cultures over the first 4 hours after admission. A bacterial invasive infection was considered and the antibiotic therapy was started with ceftriaxone, 2 g/day, and rifampin, 1,200 mg/day. Concomitantly, the patient received colloids to reestablish blood volume, intravenous dexamethasone, 6 mg four times daily, to diminish the cerebral edema; and fast-