Syndromic Surveillance in Texas: a Brief Overview of Current Activities

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Introduction

Biosurveillance is:

"…a process that detects disease in people, plants, or animals. It detects and characterizes outbreaks of disease. It monitors the environment for bacteria, viruses, and other biological agents that cause disease. The biosurveillance process systematically collects and analyzes data for the purpose of detecting cases of disease, outbreaks of disease, and environmental conditions that predispose to disease [1]."

It is an important tool for the early identification of disease outbreaks. The Texas Association of Local Health Officials (TALHO) is building a networked, state-of-the-art, biosurveillance system that is capable of serving public health agencies and other stakeholders across Texas. TALHO's system copies limited patient medical data from hospital management systems to their database, where the data is analyzed for statistical anomalies that can reveal health threats or outbreaks. Both health providers and public health agencies can obtain alerts and reports when the system detects significant statistical anomalies.

Background

The International Society for Disease Surveillance (ISDS) defines syndromic surveillance as:

"…the ongoing, systematic collection, analysis, and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for the prevention and control of diseases, injuries, or other health problems[2]."

Syndromic surveillance is a component of biosurveillance and uses pre-diagnostic data and statistical algorithms to detect epidemics earlier than traditional surveillance; is useful for monitoring the effectiveness of public health response; characterizes affected populations; and identifies outbreaks not fitting certain diagnostic categories[3]. Syndromic surveillance systems can use various types of information to identify disease clusters: chief complaint data; ICD-9 codes (standard numerical codes within the public domain for International Statistical Classification of Diseases and related health problems); over-the-counter medication sales reports; nurse hotline, 911, and poison center calls; school/work absenteeism rates; emergency department, private physician, and military clinic visit information; requests for laboratory work; ambulance usage; veterinary clinic information; and public information about local endemic disease, sales promotions, and weather events[4]. Texas public health departments and other entities (e.g., military installations and some hospitals) use the Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE)[5], Real-time Outbreak and Disease Surveillance (RODS)[6], RedBat[7], Syndrome Reporting Information System (SYRIS)[8], Argus-1[9], and BioSense[10] syndromic surveillance systems to obtain and analyze such information. These systems vary in their approach to data collection. Some of them (e.g., ESSENCE, RODS, RedBat, and BioSense) are typically set up in ways that let providers share data in automated batch or real-time feeds while others (e.g., SYRIS and Argus-1) require providers to share data using more manual processes.

Uses and Limitations of Syndromic Surveillance

The best syndromic surveillance systems are real-time, operate without secondary data entry, include advanced analytical tools, aggregate data from multiple systems across geo-political boundaries, and include an automated alerting process[2]. When health data shows a variance from baseline levels that is statistically significant, this signal may indicate possible outbreaks where public health and/or provider investigation and response are warranted. Early detection of outbreaks allows for public health investigation and response capabilities to be mobilized before disease confirmation[11]. Syndromic surveillance: (1) uses pre-existing data and does not require substantial resources to collect data; (2) focuses on detecting temporal and spatial clustering of illnesses; (3) provides possible earlier detection of and more rapid response to bioterrorist events; (4) allows for rapid recognition of at-risk populations and better targeting of control activities; and (5) increases knowledge regarding naturally-occurring infectious disease[12]. Syndromic surveillance can also determine the size, spread, and rate of infection of an outbreak after detection; this capability is important for calibrating public health response in ways appropriate to the nature and anticipated epidemiological cycle of outbreaks[13].

Conversely, downsides of syndromic surveillance are that it: (1) can be labor-intensive and expensive to maintain; (2) may not detect bioterrorist events early, thereby delaying rapid response; and (3) does not programmatically distinguish natural from man-made outbreaks[12]. Opinions remain mixed about the value of syndromic surveillance systems to support the work of public health departments, particularly in light of the practical limitations many public health agencies face as they cope with budget deficits, hiring freezes, staff reductions, elimination of unfilled positions, low salary levels, and, in some cases, low worker morale. Often, public health departments cannot afford to hire or permanently retain surveillance experts who may be needed to support key aspects of the work involved in recruiting and retaining providers to share health data and maintain adequate performance of the surveillance system[12]. Currently, there is no legislation in Texas requiring healthcare providers to share health data in the absence of a public health emergency and, thus, it can be difficult to engage providers in health information exchange voluntarily. The recruiting of provider participation is a local public health agency activity and the strength of any surveillance system at the local level depends on the breadth and quality of the data collected in that region. TALHO's success in establishing and growing a state biosurveillance network depends, not only on the quality of its technical infrastructure, but also on its ability to encourage and assist local public health agencies in all aspects of their work to gather and analyze data. TALHO works with organizations such as the Texas Organization of Rural and Community Hospitals (TORCH) to build relationships with hospitals to better accommodate data-sharing and syndromic surveillance.

Current Biosurveillance Activities in Texas

There is not yet a statewide biosurveillance system in Texas, but TALHO's network is growing and support for the concept of conducting such surveillance is gaining momentum. During 2001-2002, TALHO was involved with the first evaluations and pilot implementations of syndromic surveillance in Texas[13]. Since then, TALHO has spearheaded the expansion of existing and the addition of new ESSENCE and RODS syndromic surveillance systems in Texas. The automated system TALHO currently uses collects, stores, and analyzes surveillance data sent electronically from 52 Texas hospital emergency departments. TALHO's system can support statewide surveillance and effectively leverages the strengths of both ESSENCE and RODS, which, when used together, provide a strong combination of analysis, alerting, and mapping functions.

Table 1 displays the number and types of syndromic surveillance systems utilized by each Health Service Region (HSR) in Texas. All HSRs use a varying amalgam of mail, phone, fax, e-mail, batch or real-time electronic transmission, and the web-based National Electronic Disease Surveillance System (NEDSS) to communicate outbreak information to county health departments, local health care providers, and larger databases, such as those managed by TALHO and the CDC[14].

Table 1: The number and type of syndromic surveillance systems utilized by each Texas Health Service Region [15]

Regional Totals	REDBAT	RODS	ESSENCE	SYRIS	Argus 1	BioSense
HSR 1	1	1	0	4	0	0
HSR 2/3	1	7	7	0	0	2
HSR 4/5N	0	1	1	0	0	0
HSR 6/5S	1	9	0	0	0	0
HSR 7	0	3	2	0	0	2
HSR 8	2	0	0	0	0	0
HSR 9/10	2	2	0	0	0	1
HSR 11	0	0	0	0	1	1
State Totals	7	23	10	4	1	6

As shown in Table 1, certain HSRs (HSR 4/5N, 8, and 11) conduct little syndromic surveillance. This is problematic because these areas (Tyler, San Antonio, and Harlingen, TX) may have delayed response to potential outbreaks.

Table 2 provides current and projected numbers of Texas emergency departments reporting information to TALHO's surveillance network.

Table 2: Current and projected numbers of Texas emergency department members of TALHO's surveillance network by Health Service Region [16, 17]

Regional Totals	Current	Future
HSR 1	0	0
HSR 2/3	10	0
HSR 4/5N	2	10-15
HSR 6/5S	16	39
HSR 7	11	17
HSR 8	8	2
HSR 9/10	1	7
HSR 11	4	21

HSR 1 predominantly uses the health practitioner-driven SYRIS disease surveillance system (see Table 1) and has not yet adopted automated syndromic surveillance systems, such as ESSENCE or RODS[18]. Disease surveillance, although an important tool for monitoring specific pathogens and reportable diseases, is insufficient for the early outbreak detection of non-reportable diseases[19]. SYRIS system data are inconsistent with the nature of data collected by other syndromic surveillance systems and therefore currently remains isolated from, rather than integrated into, TALHO's growing statewide biosurveillance system. HSR 1 is a rural area where reliance on astute physician reporting of disease is perhaps sufficient for their needs. However, the inclusion of automated methods to capture non-determinant data (e.g., absenteeism rates and over-the-counter medication sales) would allow for more complete surveillance of the region and, potentially, inclusion of HSR 1 data in TALHO's network[20].

The Tarrant County Advanced Practice Center (APC), not TALHO, currently manages the surveillance information from approximately 50 hospitals in HSR 2/3. The APC has a strong partnership with TALHO and is considered a national leader in public health informatics and biosurveillance, and is working on initiatives to move beyond syndromic surveillance to biosurveillance and health situational awareness. Among these initiatives is a project to partner with a leading Fort Worth

hospital to implement automated analysis of microbiology laboratory data. Interested parties may find the Tarrant County APC's online biosurveillance resource compendium helpful in learning more about biosurveillance issues ranging from the strategic to the technical and tactical. It is available at http://www.naccho.org/toolbox/tool.cfm?id=1484. TALHO currently receives surveillance data from HSR 2/3 as part of a statewide feed. HSR 4/5N is projected to have two health care systems come online with TALHO, one of which comprises at least 13 hospitals[21].

Since June 18, 2009, TALHO has begun the process of installing virtual private networks in Region 11 emergency departments to link the region to TALHO's surveillance database[21]. As Table 2 indicates, TALHO plans to have most Texas HSRs eventually utilizing syndromic surveillance and sending data to TALHO's database for analysis and reporting.

Conclusion

Biosurveillance is an important tool for the early identification of disease clusters in Texas. It can allow for rapid public health response to outbreaks and quick characterization of affected populations and their needs. Many Texas health departments and hospitals currently use a number of surveillance systems – ESSENCE and RODS being the most common – to collect patient medical data and send it for analysis and interpretation to TALHO's surveillance system. Many hospital emergency departments are linked to TALHO already, and more are scheduled for connection in the near future. With TALHO's leadership and contributions from many of TALHO's partners in the provider and public health communities, Texas is making rapid progress in the development of a widespread, networked, biosurveillance monitoring system that can be used to safeguard the public's health through the early detection and mitigation of disease outbreaks.

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