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Syndromic Surveillance Practice in the United States: Findings from a Survey of State, Territorial, and Selected Local Health Departments

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In 2007–2008, the authors surveyed public health officials in 59 state, territorial, and selected large local jurisdictions in the United States regarding conduct and use of syndromic surveillance. Fifty-two (88%) responded, representing areas comprising 94% of the U.S. population. Forty-three (83%) of the respondents reported conducting syndromic surveillance for a median of 3 years (range, 2 months to 13 years). Emergency department visits were the most common data source, used by 84%, followed by outpatient clinic visits (49%), over-the-counter (otc) medication sales (44%), calls to poison control centers (37%), and school absenteeism (35%). Among those who provided data on staffing and contract costs, the median number of staff dedicated to alert assessment was 1.0 (range, 0.05 to 4), to technical system maintenance 0.6 (range, 0 to 3); and, among the two-thirds who reported using external contracts to support system maintenance, median annual contract costs were $95,000 (range, $5,500 to $1 million). Respondents rated syndromic surveillance as most useful for seasonal influenza monitoring, of intermediate usefulness for jurisdiction-wide (eg, city, county, or state) trend monitoring and ad hoc analyses, and least useful for detecting small outbreaks. Nearly all plan to include syndromic surveillance as part of their surveillance strategy in the event of an influenza pandemic. Two-thirds are either "highly" or "somewhat" likely to expand their use of syndromic surveillance within the next 2 years. Respondents from 3 state health departments who reported they did not conduct syndromic surveillance noted that local health departments in their states independently conducted syndromic surveillance. Syndromic surveillance is used widely throughout the United States. Although detection of outbreaks initially motivated investments in syndromic surveillance, other applications, notably influenza surveillance, are emerging as the main utility.

Abbreviations: CDC, Centers for Disease Control and Prevention; ED, emergency department; FTE, full-time equivalent; ISDS, International Society for Disease Surveillance; OTC, over-the-counter.

INTRODUCTION

Since 2001, a growing number of state, territorial, and local health departments in the United States have implemented syndromic surveillance systems aimed at improving their ability to detect epidemics and monitor public health threats as quickly as possible. While some syndromic surveillance systems are based on manual data collection, in general the premium on timeliness has fostered an emphasis

on automation of the full cycle of surveillance. This includes using automated systems to collect data on health-related events that can be gleaned from electronic record systems, to classify events into various syndrome categories, to identify aberrant trends in the incidence of disease syndromes, and to display results using secure Internet-based technologies. Health-related events monitored by syndromic surveillance systems fall into two broad categories: the use of health care services (eg, clinic or emergency department (ED) visits, ambulance services, health hotline calls) or health-related behaviors (eg, purchase of over-the-counter (OTC) medicines, school or work absenteeism) (1). Although concerns about bioterrorism provided much of the impetus and funding for syndromic surveillance, with the absence of bioterrorist attacks since 2001, these systems have been used to detect and monitor disease outbreaks unrelated to intentional acts as well as seasonal illnesses, health consequences of natural or other disasters, and a growing spectrum of noninfectious conditions (2,3).

Despite the investments that have been made in developing syndromic surveillance systems, there is a paucity of information about the status and characteristics of syndromic surveillance practice in the United States. In 2007, the International Society for Disease Surveillance (ISDS), with funding from the Centers for Disease Control and Prevention (CDC), conducted a survey of state, territorial, and selected large city health departments in the United States regarding their experience in conducting syndromic surveillance. This report summarizes the findings from that survey. Data analysis for a second survey, targeted at local heath departments for jurisdictions with >100,000 population, is in progress.

METHODS

In May 2007, ISDS convened a meeting of representatives from the CDC, the Association of State and Territorial Health Officers, the National Association of County and City Health Officials, the Council of State and Territorial Epidemiologists, the ISDS Public Health Practice Committee, and other agencies or organizations with an interest in syndromic surveillance practice (Appendix I) to solicit recommendations for implementing an ongoing registry of syndromic surveillance systems in the United States. The consensus of meeting participants was to conduct a highly focused, two-stage survey of state and then local health departments regarding syndromic surveillance practices. These surveys were viewed as antecedents to potential subsequent development of a future registry of syndromic surveillance systems.

Based on this guidance, we designed a survey instrument (Appendix II) that addressed whether or not health departments conducted syndromic surveillance and, if so, what data sources were used. For those who conducted syndromic surveillance in hospital EDs, additional questions were asked concerning the number of facilities, the average number of visits per week, and the proportion of ED visits in the jurisdiction represented by participating hospitals. Respondents were also queried about the number of staff dedicated to conducting syndromic surveillance, the cost of contracts used to maintain systems, their assessment of the utility of syndromic surveillance, and near-term plans to initiate, expand, or contract syndromic surveillance efforts.

Eligible respondents were the 59 public health jurisdictions funded by the CDC through its Cooperative Agreement for Emergency Preparedness (4), including the 50 states, the District of Columbia, 5 territories, New York City, the City of Chicago, and Los Angeles County. For state respondents, because there may be a spectrum of state and local roles in conducting syndromic surveillance, we limited inclusion to syndromic surveillance systems that involve state health department participation in the system management, including data collection, aggregation, analysis, or dissemination. For localities other than New York City, the City of Chicago, and Los Angeles County, we excluded systems operated independently by local health departments—information on such systems will be reported separately as part of the second-phase survey.

We defined "syndromic surveillance" as systems with all of the following characteristics: 1) surveillance for human health-related events or outcomes, including pre-diagnostic events or diagnoses; 2) surveillance for the purpose of early event detection or situational awareness (ie, monitoring disease trends or other markers of community health in situations where there is a need for prompt information), which implies an emphasis on timeliness approaching to the extent possible "real-time" surveillance; 3) ongoing surveillance as opposed to time-limited, "drop-in" surveillance around specific high-profile events; and 4) surveillance systems not established primarily to support notifiable disease reporting. We excluded from this definition use of data from Veterans Affairs or Department of Defense facilities that are part of the CDC BioSense system and use of data from BioSense "real-time" hospitals that report detailed clinical information directly to the CDC (5). Respondents were asked in a separate question to report whether they used such data from BioSense, and, if so, to briefly describe their use of BioSense data. For health departments that forward data from state-developed syndromic systems to the BioSense program (5), use of data from their systems was not considered as "use of BioSense data."

In August 2007, the Executive Director of CSTE emailed the survey (Appendix II) and cover letter from the ISDS president (Appendix III) to state, District of Columbia, and territorial epidemiologists and deputy epidemiologists, and the ISDS emailed the survey and cover letter to lead epidemiologists in New York City, the City of Chicago, and Los Angeles County. The survey was administered using an Internet-based survey utility (SurveyMonkey®). At least two attempts were made to contact non-respondents, either by email or

telephone, to prompt participation. All responses received through February 26, 2008 are included in this report.

For tabulations based on the population of jurisdictions surveyed, we used mid-year population estimates for 2006 from the U.S. Census Bureau (6), and we classified regions of the country as defined by the Census Bureau (7).

RESULTS

Respondents included 46 of 50 states, 2 of 5 territories, the District of Columbia, and all 3 local jurisdictions directly funded under the CDC Cooperative Agreement for Emergency Preparedness, corresponding to an overall response rate of 52 (88%) of the 59 jurisdictions surveyed. Among states, all in the West and Northeast census regions responded, and 83% and 88% in the Midwest and South regions, respectively, responded (Table 1). Among the 9 largest states, which account for approximately one-half of the U.S. population, 8 (89%) responded. Among the 22 next largest states which, together with the largest states, account for approximately 90% of the U.S. population, all responded, and 16 of 19 (84%) of the remaining smallest states responded. Excluding territories, health departments from areas that responded account for 94% of the U.S. population.

Forty-three (83%) of 52 respondents reported conducting syndromic surveillance for a median of 3.3 years (range, 2 months to 13 years). The proportion of respondents reporting conducting syndromic surveillance ranged from 100% in the Northeast to 69% in the West (Table 2). Conduct of syndromic surveillance was not clearly related to population size and ranged from 75% among respondents (states or 3 local health departments) in the 9 largest states to 100% among the next largest states which, together with the largest states, account for up to one-half the U.S. population (Table 2). Populations covered by health departments that reported conducting syndromic surveillance account for 72% of the U.S. population.

TABLE 1 State health department survey response rates by census region

Region	Number Responded/ Number of States in Region	Percent Responding to Survey
West	13/13	100%
Pacific	5/5	
Mountain	8/8	
Midwest	10/12	83%
West North Central	6/7	
East North Central	4/5	
South	14/16	88%
West South Central	3/4	
East South Central	4/4	
South Atlantic	7/8	
Northeast	9/9	100%
Middle Atlantic	3/3	
New England	6/6	
All States	**46/50**	**92%**

Among the health departments that provided information on staffing allocations, the median number of full-time equivalent (FTE) positions dedicated to technical system maintenance was 0.6 (range, 0 to 3 among 32 respondents) and separately to analysis and alert response was 1.0 (range, 0.05 to 4 among 34 respondents). Among 26 health departments that responded to the question, 18 reported using funds for external contracts to support the maintenance of syndromic surveillance; for these 18 health departments, the median annual expenditure was $95,000 (range, $5,500 to $1,000,000; 25th quartile, $48,500; 75th quartile, $137,500).

Among the 43 health departments conducting syndromic surveillance, ED visits were the most commonly reported information source (84%), followed by outpatient clinic visits (49%), OTC medication sales (44%), calls to poison control centers (37%), and school absenteeism (35%). Other sources, including emergency medical service or 911 calls, and health information exchanges were reported by approximately 20% or fewer respondents (Figure 1). The median number of information sources used by health departments was 3 (range, 1 to 8), and 37 (86%) reported using more than one information source.

Among the 36 health departments conducting syndromic surveillance in EDs, 72% reported reviewing the data from participating hospitals at least daily, 17% several times a week, 6% at least once a week, 3% less than weekly, and 3% on a variable frequency depending on circumstances. Varying numbers of respondents provided information about the characteristics of participating facilities, including the:

- Number of participating facilities (median, 13; range, 1 to 138 [35 respondents])
- Average number of total weekly ED visits at participating facilities (median, 5,000; range, 100 to 80,000 [27 respondents])
- Percentage of EDs in the jurisdiction participating in syndromic surveillance (median, 35%; range, 2% to 100% [27 respondents)]
- Estimated percentage of ED visits in the jurisdiction represented by participating facilities (median, 72%; range, 10% to 100% [25 respondents])

Respondents conducting syndromic surveillance rated its utility for 4 functions. The proportion describing syndromic surveillance as either "highly useful" or "somewhat useful" was 93% for "monitoring influenza," 79% for "larger area trend monitoring (eg, city, county, state)," 70% for "ad hoc analyses," and 40% for "small Outbreak Detection" (eg, events within families, nursing homes, day care centers, hospitals, zip codes) (Table 3). These ratings were similar

TABLE 2 Use of any form of syndromic surveillance, by census region and population size, all survey respondents[a]

	Number of Health Departments Conducting Syndromic Surveillance / Number of Respondents	Percent of Health Departments Conducting Syndromic Surveillance
Region		
West	11/16	69%
Midwest	10/11	91%
South	12/15	80%
Northeast	10/10	100%
Population Size (In Order of Decreasing State Population Size)		
States or 3 local jurisdictions in 9 largest states (approx. 50% of population[b])	6/8	75%
11 next largest states (up to approx. 75% of population[c])	11/11	100%
11 next largest states (up to approx. 90% of population[c])	9/11	82%
Remaining states, District of Columbia, and territories	17/22	77%
Total Respondents	41/46	89%

[a]Includes all survey respondents: states, territories, the District of Columbia, New York City, City of Chicago, and Los Angeles County.

[b]New York City, City of Chicago, and Los Angeles County are counted here, based on the size of their corresponding states.

[c]When combined with larger states.

for areas with ≥4 years of experience conducting syndromic surveillance and with fewer years of such experience. Regarding plans for expanding or reducing the "use of syndromic data sources and methods" in the next 2 years, 43% reported that they were "highly likely to expand use," 31% were "somewhat likely to expand use," 21% were "not sure—could go either way," 5% were "somewhat likely to reduce use," and none were "highly likely to reduce use." Forty of 41 (98%) syndromic surveillance users who responded stated that they plan to use syndromic surveillance to monitor the impact of pandemic influenza.

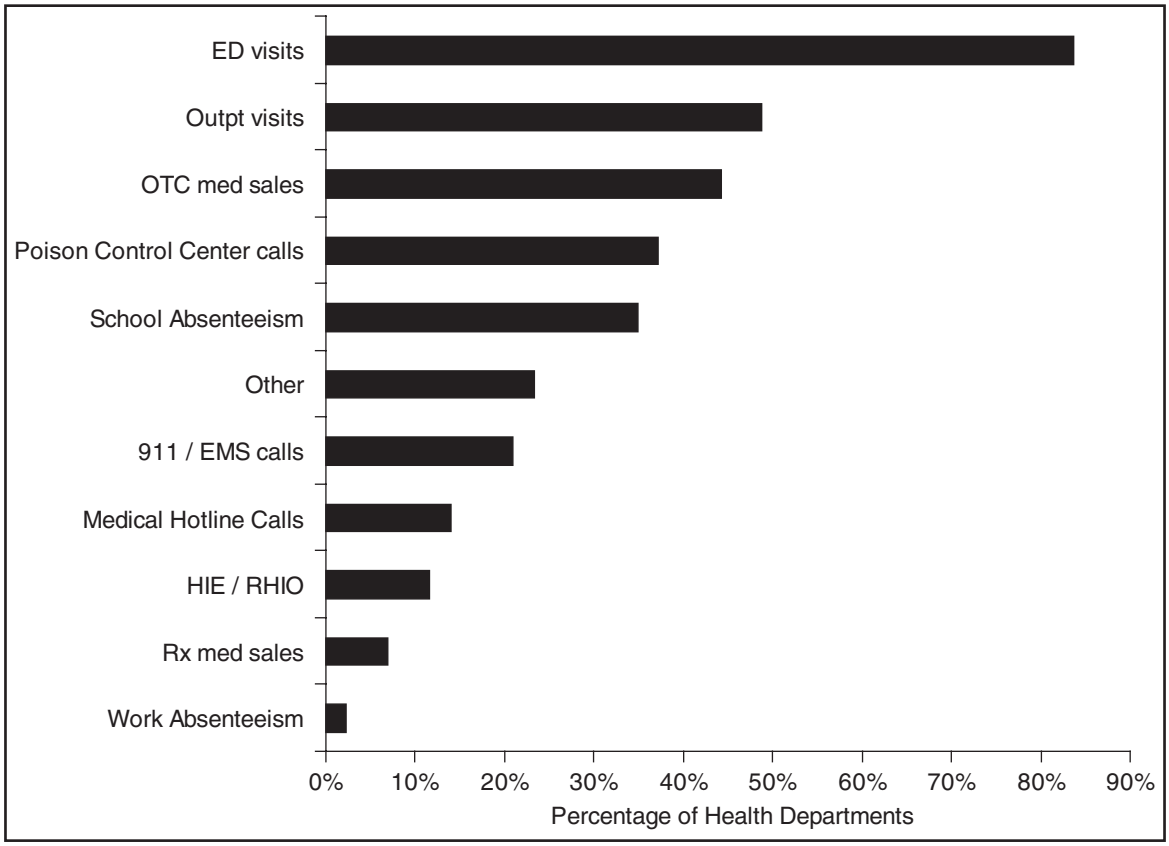
Among the 9 respondents who reported they were not conducting syndromic surveillance, 3 cited a lack of capacity or funding as the reason, 2 stated that they did not believe investments in syndromic surveillance would be worthwhile, 3 state health departments reported that local health departments in their states independently conducted syndromic surveillance without state involvement, and one reported plans to initiate syndromic surveillance.

Separate from conduct of syndromic surveillance systems developed or managed by respondents, 29 (56%) of the 52 respondents reported using data from the CDC BioSense system, including 4 (44%) of 9 health departments that do not conduct syndromic surveillance themselves and 25 (58%) of 43 health departments that do. In response to an open-ended question about their use of BioSense, 5 (17%) of the 29 BioSense users reported reviewing the data or alerts daily; 9 (31%) reported reviewing the system at least weekly or described or implied "regular" use with an unspecified frequency; 10 (34%) described their use as periodic, occasional, or ad hoc; 6 (21%) noted that they use BioSense as a supplement to state or locally-developed systems or as an auxiliary resource; 2 (7%) described their use as an initial effort to gain familiarity with the system; and 1 (3%) reported using BioSense to examine trends in other parts of the country (percentages total to >100% because some respondents described multiple categories of use).

DISCUSSION

The ISDS survey of syndromic surveillance practices by health departments in state, territorial, the District of Columbia, and three large local jurisdictions demonstrates that syndromic surveillance is widely used throughout the United States. While survey responses indicate that use is greatest in the Northeast and lowest in the West, health departments in all regions and in small-, medium- and large-population states are conducting syndromic surveillance. Emergency department visits are by far the most commonly used resource for syndromic surveillance, but information from a mix of other health services is used, including data

FIGURE 1 Information sources for syndromic surveillance, 43 health departments in states, territories, the District of Columbia, New York City, City of Chicago, and Los Angeles County, United States, 2007



Abbreviations: ED, emergency department; EMS, emergency medical services (eg, ambulance dispatch services); Outpt, outpatient; OTC, over-the-counter medications; Rx med, prescription medications; HIE, health information exchange; RHIO, regional health information organization.

from clinic visits, calls to poison control centers, and 911/ emergency medical service calls. Various indicators of the consequences of illness, such as medication purchases or school absenteeism, are also employed.

The impetus and funding for conducting syndromic surveillance increased substantially after 2001, reflecting concerns about the threat of bioterrorism and the public health value of detecting a bioterrorist attack as quickly as possible,

TABLE 3 Reported utility of syndromic surveillance, 43 health departments in states, territories, the District of Columbia, New York City, City of Chicago, and Los Angeles County: United States, 2007

Syndromic Surveillance Application	Highly Useful (%)	Somewhat Useful (%)	Undecided (%)	Not useful (%)	Total[a] (%)
Larger area trend monitoring[b]	47	33	16	5	100
Small outbreak detection[c]	7	33	16	44	100
Monitoring influenza	52	40	7	0	100
Ad hoc analyses	28	42	23	7	100

[a] Values as shown may not add to 100% due to rounding.

[b] Monitoring syndrome trends at the city, county, or state level.

[c] For example, detecting events within families, nursing homes, day care centers, or geographic areas defined by a postal zip code.

especially a large-scale attack with massive exposures (8). In the absence of such events, the utility of syndromic surveillance for its original purpose cannot be evaluated except through simulations, and other uses have emerged and evolved. Given both the impact of influenza on morbidity and the nature of systems commonly used to monitor various facets of seasonal influenza (9), it is not surprising that influenza monitoring was reported as the greatest utility of syndromic surveillance. This is consistent with the findings of others that syndromic surveillance can herald the onset of influenza seasons in advance of virus isolation by public health laboratories (10), provide more timely and geographically detailed information compared to information from networks of sentinel health care practices (11), and provide detailed, age-specific information that can characterize annual variations in the pattern of influenza morbidity (12). By extension, nearly all who conduct syndromic surveillance anticipate that it will be part of their effort to monitor health impacts in the event of an influenza pandemic.

While interest in early outbreak detection motivated the development of syndromic surveillance, experience has been mixed regarding its ability to detect typical community outbreaks due to infectious diseases. Theories, modeling studies, and practice-based experience indicate that situations where syndromic surveillance will or will not provide early recognition of outbreaks reflect differences in the size and epidemiologic attributes of outbreaks, patterns of health care or service use, or the nature of syndromic surveillance sources or methods (13,14). Accordingly, we observed that respondents rated syndromic surveillance as less useful for detection of small outbreaks relative to other uses. Mixed experience with outbreak detection has given way to another role of syndromic surveillance, namely enabling "situational awareness." This is a protean term, borrowed from military and public safety lingo, and has been used to describe the ability to monitor the course of outbreaks regardless of how they are detected, to track and characterize seasonal gastrointestinal or respiratory viral illnesses as they sweep across communities, and to monitor trends for an increasingly diverse spectrum of both infectious and non-infectious conditions. Thus, it is not surprising that respondents noted the utility of syndromic surveillance for population health monitoring at the city- county- or statewide levels, or for ad hoc analyses when situations arise that require assessments of public health impacts.

Investments in syndromic surveillance have sparked controversy (15,16). While the intensity of these debates seems to have diminished as experience with the method has grown, concerns about its utility linger, as is evident from the responses of two health departments that cited such concerns as the reason for not developing syndromic surveillance systems. For those health departments that have taken this step, however, the utility is apparent from the responses of approximately two-thirds who anticipate that expansions in their use of syndromic surveillance are likely within the next 2 years, and very few anticipated scaling back their use of syndromic surveillance. One dimension of the controversy surrounding the value of syndromic surveillance has been the potential costs in public health staff time associated with following up on statistical alerts. The median number of FTEs dedicated to this function and ongoing data analysis was one, indicating that demands on epidemiologists are not burdensome. Similarly, the median number of staff required for system technical maintenance was <1, and, for those that used external contracts to support system maintenance, median annual contract costs were <$100,000, although for both FTE and contract cost estimates there were substantial ranges. These findings are roughly consistent with more detailed assessments of the costs of operating and maintaining syndromic surveillance. In Boston and New York City, two jurisdictions with well-established syndromic surveillance programs, annual operating costs have been estimated to be in the range of $130,000 to $150,000 (10,17,18).

Separate from the use of syndromic surveillance systems managed by the respondent health departments, we inquired about the use of data from the CDC BioSense system, which the CDC describes as a "biosurveillance" system and makes available to health departments for purposes of early event detection and situational awareness (5). Over half of respondents reported using the BioSense system, of whom fewer than one-third reported daily use. Others described a less frequent or unspecified pattern of routine or regular BioSense use, or they reported occasional use of BioSense, including use secondary to their primary dependence on locally developed systems. This pattern is consistent with how several health departments have used BioSense as part of their response to various public health crises (11).

The strengths of our survey include a response rate of nearly 90%, which was undoubtedly enhanced by the official imprint of the Council of State and Territorial Epidemiologists in distributing the survey to members, and the proportion of the U.S. population (>90%) represented by the respondent jurisdictions. Our survey had several limitations, however. Most notably, it was relatively brief, limiting or precluding our ability to describe lessons learned from practice, such as the merits of alternative data sources, software utilities, or statistical aberration detection methods. Variable numbers of respondents provided information about the characteristics of their syndromic surveillance systems, and it is possible that those who provided this information were not representative of all who conduct syndromic surveillance. Descriptions of BioSense use were requested in an open-ended format, and responses such as "periodic" or "occasional" were often not quantified. We queried state health departments about systems they are involved in managing and, to the extent that city or county health departments conduct syndromic surveillance independently (as noted by 3 state respondents), our survey under-estimates the extent of syndromic surveillance practice. Our second-phase survey of

local health departments, conducted in partnership with the National Association of County and City Health Officials, will provide this additional perspective.

As is evident from presentations at the annual ISDS conferences (3), the field of syndromic surveillance is evolving rapidly. This evolution includes an expansion of the practice of syndromic surveillance, its methods, and uses. New terms have entered the public health lexicon, such as "biosurveillance" and "situational awareness." The boundaries between syndromic and more traditional public health surveillance methods are blurring, as methods adopted from syndromic surveillance are being used to improve the timeliness and completeness of notifiable disease reporting, as traditional surveillance methods are increasingly infused with the use of automated tools, as health care systems increasingly adopt electronic medical records, and as health information exchanges provide new opportunities for linking healthcare and public health information systems (19). Distinguishing "syndromic surveillance" or "biosurveillance" from other surveillance approaches may eventually become moot. Regardless, the field of syndromic surveillance has forged a convergence of practitioners and researchers from a mix of disciplines—epidemiology, biostatistics, informatics, health care, disease prevention and control—with a focus on integrating automation and human capacities to improve surveillance for public health threats. A goal of the ISDS is to use these surveys as a platform for building a "community of users" that allows people who share these interests to learn more readily from one another's experience. Lessons learned from these surveys and from the ISDS' ongoing engagement of its members and constituents will inform whether the next step includes the development of a registry of such systems or alternate approaches to improving links within the community of public health surveillance practitioners and developers.

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APPENDIX I

Participants Listed by Institutional Affiliation, International Society for Disease Surveillance Consultation on Syndromic Surveillance Registry Project, May 9, 2007, Atlanta, GA

Association of State and Territorial Health Officials
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- Michelle Podgornik, Epidemiologist

Council of State and Territorial Epidemiologists
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- Julia Gunn, Boston Public Health Commission (ISDS Board Liaison to the ISDS Public Health Practice Committee)
- Marc Paladini, MPH (ISDS Research Director)
- Julie Pavlin, MD, Uniformed Services University of the Health Sciences (ISDS Vice President)
- Amy Sonricker, MPH (ISDS CDC Project Manager)
- Dan Sosin, MD, MPH, Senior Advisor for Science and Public Health Practice, Coordinating Office for Terrorism Preparedness & Emergency Response, Centers for Disease Control & Prevention, (ISDS Board of Directors)
- Alan Siniscalchi, MPH, MS, Connecticut Department of Public Health (Chair, ISDS Public Health Practice Committee)

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United States Department of Health and Human Services, Office of the Inspector General, Office of Evaluation and Inspections, Atlanta, GA
- Mina Zadeh, MPH

APPENDIX II

Survey Form

Introduction

Thank you very much for agreeing to complete the ISDS syndromic surveillance survey. In considering your responses to the questions below, the criteria for systems that we wish to include are:

1. Surveillance for human health-related events or outcomes, including pre-diagnostic events or diagnoses
2. Surveillance for the purpose of early event detection or situational awareness, which implies an emphasis on timeliness approaching to the extent possible "real-time" surveillance
3. Ongoing surveillance as opposed to time-limited "drop-in" surveillance around specific high-profile events
4. Surveillance systems not established primarily to support notifiable disease reporting
5. Systems that involve participation in the system management by the state health department, such as data collection, management, analysis, or dissemination via a state-managed process (This survey is being sent to state and territorial health departments and to those local health departments that are directly funded by CDC under its bioterrorism and emergency preparedness cooperative agreement. In this context, we are using the term "state" to refer to the recipients of this survey.)

If you have any questions about completing this survey, please contact Amy Sonricker, MPH at ISDS via email at asonricker@syndromic.org or by telephone at 617.636.0470.

Respondent Information

Name

Agency or Institution -- What is the jurisdiction that your department covers? (e.g. state, city, county, territory, commonwealth)

Please list the following:

Phone:

Email:

Will you continue as the primary contact person for your agency or institution? Names of primary contacts will be listed as part of the information provided regarding your responses on the "members only channel" of the ISDS Internet site. The ISDS site will include a utility that allows users to send an email message to the primary contacts.

◯ Yes, I will be the primary contact

◯ No, I will not be the primary contact

Optional

If you will NOT be the primary contact, the primary contact will be:

Name:

Phone:

Email:

Alternate Contact Information

Alternate contact person information:

Name:

Phone:

Email:

Syndromic Surveillance Specifics

Do you use any syndromic surveillance systems developed or managed by your health department (see cover email or first page of survey for survey inclusion criteria), such as syndromic surveillance based on emergency department data, outpatient data, over-the-counter medication sales, prescription sales, EMS/911 calls, school or workplace absenteeism, poison control center calls, nurse and other medical hotline calls, or clinical information from health information exchanges?

◯ Yes

◯ No

Does your department use BioSense?

◯ Yes

◯ No

If yes, briefly describe your use of BioSense:

If No

If you do not use any syndromic surveillance systems developed or managed by your health department please provide a brief explanation why. Also, please state if you plan to implement syndromic surveillance in the future.

If Yes

The following questions about your use of specific information sources apply only to syndromic surveillance systems developed or managed by your health department

Does your health department currently monitor syndromic surveillance data from emergency departments?

- ◯ Yes
- ◯ No

ED Data

What is the frequency of examination of Emergency Department (ED) data?

- ◯ Daily or more than once/day
- ◯ Several times a week
- ◯ Weekly
- ◯ Less than once/week
- ◯ Variable frequency on ad hoc basis

Number of facilities that are a part of the system:

Average number of visits per week:

Approximate percentage of ED visits in state included in system:

Percentage of EDs in state included in system:

Outpatient (non-ED) Data

Does your health department currently monitor syndromic surveillance data from outpatient (non-emergency department) sources?

- ◯ Yes
- ◯ No

OTC Data

Does your health department currently monitor syndromic surveillance data from over the counter medication sales?

- ◯ Yes
- ◯ No

Rx Sales

Does your health department currently monitor syndromic surveillance data from prescription pharmacy sales?

◯ Yes
◯ No

EMS/ 911

Does your health department currently monitor syndromic surveillance data from EMS/ 911 calls?

◯ Yes
◯ No

School (elementary, middle, high schools)

Does your health department currently monitor syndromic surveillance data from school absenteeism or school clinic sources?

◯ Yes
◯ No

Work

Does your health department currently monitor syndromic surveillance data from worker absenteeism or workplace clinic or healthcare services?

◯ Yes
◯ No

PCC

Does your health department currently monitor syndromic surveillance data from Poison Control Center sources?

◯ Yes
◯ No

Nurse and Other Sources

Does your health department currently monitor syndromic surveillance data from nurse or other medical hotline calls?

- ◯ Yes
- ◯ No

RHIOS

Does your health department currently monitor syndromic surveillance data from Health Information Exchanges / Regional health Information Organizations (RHIOs)?

- ◯ Yes
- ◯ No

Other

Does your health department currently monitor syndromic surveillance data from any other sources?

- ◯ Yes
- ◯ No

If Yes to 'Other'

Please describe other sources that you use.

Length of Time

How many years have you been monitoring syndromic surveillance? (Monitoring refers to routinely accessing and reviewing data from each source at least weekly)

Utility

How useful do you think syndromic surveillance is for:

	Highly useful	Somewhat useful	Not useful	Undecided
Larger area trend monitoring (e.g. city, county, state)	◯	◯	◯	◯
Small Outbreak Detection (e.g. events within families, nursing homes, day care centers, hospitals, zip codes)	◯	◯	◯	◯
Monitoring Influenza	◯	◯	◯	◯
Ad hoc analyses	◯	◯	◯	◯

Future Syndromic Surveillance

In the next two years, do you think you are likely to expand or reduce your use of syndromic data sources and methods?

- ◯ Highly Likely to expand use
- ◯ Somewhat Likely to expand use
- ◯ Not sure - could go either way
- ◯ Somewhat likely to reduce use
- ◯ Highly Likely to reduce use

Does your jurisdiction plan on using any syndromic surveillance systems to monitor the impact of an influenza pandemic?

- ◯ Yes
- ◯ No

If Yes, which systems will you primarily use?

Continued

What is the approximate yearly cost to operate and monitor the syndromic surveillance systems in use by your jurisdiction? (If the same person does both analysis and system maintenance please put the fraction of time they do each in the answer space)

Number of FTE's needed for technical system maintenance?

Number of FTE's needed for analysis and response?

External contract costs spent to support these systems?

Local

Are you aware of syndromic surveillance systems that are operated independently by local health departments in your state and that are not part of statewide networks noted in your responses above?

◯ Yes

◯ No

Local If Yes

Please list the names and contact information for people in local health departments who manage syndromic surveillance systems.

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Thank you

You've reached the end of our survey. Thank you for participating.

APPENDIX III

Cover Letter that Accompanied Email Distribution of Survey

Dear State or Territorial Epidemiologist:

The International Society for Disease Surveillance (ISDS) has been funded by the Centers for Disease Control and Prevention (CDC) BioSense program, through CDC's cooperative agreement with the National Association of County and City Health Officials (NACCHO), to develop and maintain a registry of syndromic surveillance (or biosurveillance) systems in the United States.

In the development of this project, ISDS adhered to two key principles. The first was to coordinate efforts, where possible, with other agencies and organizations interested in collecting analogous data, including CDC, NACCHO, the Association of State and Territorial Health Officials (ASTHO), and the Council of State and Territorial Epidemiologists (CSTE). The second was to construct the registry in a way that would provide ongoing utility for people and health departments managing syndromic surveillance systems. On May 9, 2007, ISDS held a one-day meeting in Atlanta, Georgia with representatives from local, state and federal public health agencies and associations to develop the project in a manner that fulfilled these principles. During that meeting, the participants articulated and agreed on three project objectives:

1. To foster a community of biosurveillance users by developing and maintaining a registry that describes biosurveillance practice and lessons learned
2. To inform biosurveillance policy development, particularly with respect to the mandate within the Pandemic and All-Hazards Preparedness Act (PAHPA) to enhance biosurveillance and situational awareness capacity based on development of a network of existing systems
3. To foster research, development, and evaluation about biosurveillance practice

This survey represents the first phase of the ISDS registry development, which focuses on describing key characteristics of state-based syndromic surveillance practice. While the scope of the registry may expand in the future, at present, we aim to include public health surveillance systems that involve:

1. Surveillance for human health-related events or outcomes, including pre-diagnostic events or diagnoses
2. Surveillance for the purpose of early event detection or situational awareness, which implies an emphasis on timeliness approaching to the extent possible "real-time" surveillance
3. Ongoing surveillance as opposed to time-limited "drop-in" surveillance around specific high-profile events
4. Surveillance systems not established primarily to support notifiable disease reporting
5. Systems that involve participation in the system management by the state health department, such as data collection, management, analysis, or dissemination via a state-managed process (This survey is being sent to state and territorial health departments and to those local health departments that are directly funded by CDC under its bioterrorism and emergency preparedness cooperative agreement. In this context, we are using the term "state" to refer to the recipients of this survey.)

The terminology for surveillance systems that have these characteristics is evolving, with a shift away from the use of the term "syndromic surveillance" and increasing use of the term "biosurveillance." For the purposes of this registry, ISDS is using the terms interchangeably, setting aside ambiguities about the distinction between these terms, and focusing on describing the attributes of systems to include in the registry.

This survey has been developed with the guidance of an advisory board that includes representatives from CSTE and ASTHO. This survey has the support of ASTHO and has been endorsed by the CSTE Executive Committee. ISDS policy will be to report survey findings in aggregate in a way that would not identify the responses of individual state, territorial, or local health departments. In moving to develop a registry following the completion of the survey, we anticipate allowing health department surveillance system managers or authorized representatives to update descriptions of their systems via a secure, password-protected Internet utility. As part of our effort to promote a community of syndromic surveillance users through the registry, we envision allowing this group of users to access information about syndromic surveillance practices in other jurisdictions. This would allow epidemiologists and others who are responsible for conducting syndromic surveillance to query their colleagues in other locations and learn from their experience. We anticipate that academic members of the ISDS may also be interested in conducting analyses of the survey/registry information, and we would develop data-use agreements that assure adherence to ISDS data security and reporting policies. CSTE, NACCHO and ASTHO are represented on the project's advisory board, and we expect their participation on the board will be ongoing.

If you have any questions about completing this survey, please contact Amy Sonricker, MPH at ISDS via email at asonricker@syndromic.org or by telephone at 617.636.0470.

To complete the survey, please click on the following URL or cut and past this address into your web browser:

[SURVEY URL IS NO LONGER AVAILABLE]

Thank you very much for your interest and participation.

Sincerely,

Farzad Mostashari, MD, MPH
President, ISDS