

AN EVALUATION OF THE GEORGIA SYNDROMIC SURVEILLANCE PROGRAM

Implementation of a New System



Introduction

In 2005, the Georgia Division of Public Health established a statewide Syndromic Surveillance Program as a result of continued concerns about threats of terrorism, natural disasters, and pandemic influenza. Using clinical, symptom-related data transmitted every 24 hours, the program employed an active surveillance strategy designed to allow for more timely detection of illnesses and outbreaks than more traditional passive surveillance systems.

An evaluation was conducted to determine whether the objectives for the Georgia Syndromic Surveillance Program (GSSP) were being met and to assess the usefulness of the system for timely public health response. This evaluation was based on the CDC Surveillance System Evaluation Framework, with special emphasis on the usefulness, simplicity, acceptability, flexibility, stability, timeliness, and data quality of the program.

Key Findings

- Overall, the program objectives were met
- Voluntary participation increased substantially from 7 health facilities in 2 health districts in 2005 to 39 health facilities in 16 health districts in 2008
- Many uses of the program were identified by stakeholders, including monitoring adverse health events and characterizing potential outbreaks or epidemics
- Stakeholders unanimously viewed syndromic surveillance as having public health importance
- Users at health facilities did not want more training or support for using the system

Conclusions

- The GSSP objectives were met
- The program is very useful, acceptable, and timely
- The simplicity, flexibility, data quality, and stability attributes of the program are good

GSSP Objectives	Met
Collect and process pre-diagnostic clinic data every 24 hours	√
Display analyzed data in SendSS interface	√
Use email to notify system users of aberrations in priority syndrome trends	√
Provide health districts with individual data for facilities in their jurisdiction and aggregate data for facilities in their jurisdiction, other districts, and the state	√
Ensure data providers can access and benefit from their syndromic data	√
Provide regular updates on progress and findings to health districts	√
Continual use of syndromic surveillance data	√
Increase data providers through health district recruiting	√
Utilize data-sharing activity to cultivate and maintain relationships between community health care partners and health districts	√

Attributes	Rating
Usefulness	<i>Very good</i> - Many uses identified
Simplicity	<i>Good</i> - Most users found the program to be straightforward and user friendly
Acceptability	<i>Very good</i> - All respondents viewed syndromic surveillance as having public health importance
Flexibility	<i>Good</i> - Adapts well to new data sources such as school absentee and laboratory data; Opportunities exist for better integration
Data Quality	<i>Good</i> - Automated data management is working well. Low percentages of diagnostic data provided; Automated syndrome mapping using chief complaint data is imprecise
Stability	<i>Good</i> - Fully operational nearly all of the time
Timeliness	<i>Very Good</i> - Most users found the program was timely

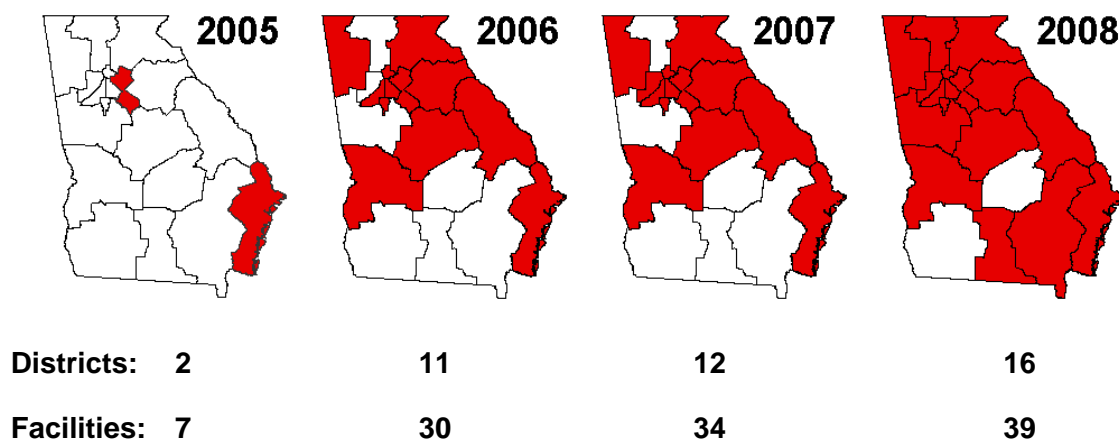
Background

The Georgia Syndromic Surveillance Program (GSSP) was implemented to complement traditional surveillance systems and allow for earlier detection of illness trends and potential outbreaks, both natural and man-made. To detect these types of events, chief complaint data are categorized into syndromes using a text-parsing algorithm and are then analyzed using the Early Aberration Reporting System (EARS) statistical methods.¹ The EARS methods allow for comparison of current case numbers with mean case numbers and standard deviations for the previous seven days. Analyzed syndromic surveillance data can be viewed through the State Electronic Notifiable Disease Surveillance System (SendSS) interface. The SENDSS interface allows syndromic surveillance system users to view event counts, flag summaries, event graphs, line lists, event frequencies, and geospatial distributions.

The stakeholders for the GSSP include the GSSP Team and epidemiologists at the state Division of Public Health, epidemiologists at district public health offices, health professionals at facilities providing syndromic surveillance data, and the Centers for Disease Control and Prevention (CDC). The operating resources for the program include funding from the CDC Preparedness Grant, one full-time Program Coordinator, one part-time (40 percent) Information Technology Developer, and one part-time (5 percent) Medical Epidemiologist.

Prior to implementation of statewide syndromic surveillance, temporary (or drop-in) surveillance was conducted in the coastal region of the state during the G-8 Summit in 2004. In 2005, the Georgia Division of Public Health began a voluntary statewide syndromic surveillance program.² Participation in the GSSP increased substantially between 2005 and 2008 (Figure 1). Beginning in 2007, the GSSP formed new partnerships with a statewide utility provider and a school system to provide absentee data.

Figure 1. Health Districts with Participating Facilities by Year, 2005-2008



Methodology

This evaluation was designed using the CDC Surveillance System Evaluation Framework.^{3,4} The surveillance system attributes examined in this evaluation were usefulness, simplicity, acceptability, flexibility, data quality, stability, and timeliness. Each attribute was rated using a separate set of criteria as described in the CDC Surveillance System Evaluation Framework. Additionally, special consideration was given for attribute characteristics that differ in syndromic surveillance systems compared with more traditional systems. One issue inherent to syndromic surveillance is that timeliness is emphasized at the expense of data quality. Sensitivity and predictive value positive for each syndrome were described in a separate evaluation.⁵

Data collection for the evaluation included reviews of GSSP documentation and an automated data transfer log of health facility data. Interviews were conducted with the GSSP Program Coordinator, Medical Epidemiologist, and Information Technology Developer (Program Team). Additionally, online surveys were administered to epidemiologists at District Public Health Offices (District Users) and Infection Control Practitioners at participating facilities (Facility Users). District and Facility Users were notified of anonymous online surveys in

late January 2009 and were given four weeks to complete the surveys. District Users were directly emailed links to the online surveys, while Facility Users were forwarded an email with a link to their survey by District Users. Response rates for the interviews and online surveys are summarized in Table 1.

Table 1. Interview and Survey Response Rates

Stakeholder Group	Participants	Response Rate
GSSP Team (Program Team)	3/3	100%
District Epidemiologists (District Users)	13/22	59%
Facility Infection Control Practitioners (Facility Users)	12/36	33%

Results*

Usefulness

Uses Identified by the Program Team:

- Influenza Like Illness syndrome data have been used to monitor influenza season (since 2005)
- Clusters of the Gastrointestinal Illness syndrome have resulted in investigation (2007)
- Aberrations in the Bloody Respiratory syndrome led to detection of a cluster of laboratory-confirmed *Streptococcus pneumoniae* infections among a homeless population (2007)
- Injury syndrome data were useful for characterizing impact of Imperial Sugar Refinery explosion on emergency departments in Savannah, GA (2008)

Uses Identified by District Users (Table 2):

- 92% (12) used the system for monitoring adverse health events
- 85% (11) used the system for monitoring disease trends
- 69% (9) used the system to detect trends of potential public health importance
- 92% (11) reported that they identified events of public health importance resulting in contact with a health care partner or infection control professional

Uses Identified by Facility Users (Table 2):

- 50% (6) used the system to detect trends of public health importance
- 50% (5) reported that using the system led to identification of events that prompted implementation of control measures
- 44% (4) reported that using the system led to improved awareness of something they were already responding to

Frequency of Use (Table 2):

- 46% (6) of District Users used the system daily and 23% (3) used the system when they received automated email notifications about flagged data
- 50% (6) of Facility Users used the system when they received automated email notifications about flagged data and 17% (2) used the system when they were personally called or emailed by someone at the District Office

Syndromes² that were viewed and used most frequently (Table 3):

- Automated email alerts are sent to syndromic users when priority syndromes generate three flags in one day or one flag on three consecutive days
- Priority syndromes (i.e., Diarrhea, Fever and Flu, Nausea and Vomit, and BT/ Emerging Infectious Disease) were frequently viewed and used
- Meningitis, Bloody Diarrhea, Influenza Like Illness, Respiratory, and Rash and Fever syndromes were also frequently viewed and used

*Percentages presented in results are based on the number of respondents for each question, and for some questions the number of respondents was less than the number of participants.

Table 2. Uses of the Syndromic Surveillance System, 2009

	<i>District Users</i>		<i>Facility Users</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Uses Identified				
Monitoring adverse health events	12	92	2	17
Monitoring...				
seasonal disease or other health trends	11	85		
seasonal disease trends			3	25
Detection of trends of...				
potential public health importance	9	69		
public health importance			6	50
Characterization of potential outbreaks or epidemics	7	64	NA	NA
Facilitate communication with...				
health care providers	4	31		
health care providers at your facility			1	8
Facilitate communication with...				
other public health professionals	2	23		
the District Public Health Office			3	25
Uses Leading to Public Health Action				
Identification of events of public health importance prompting contact with...				
a healthcare partner or infection control professional	11	92		
an infection control professional or the District Health Office			2	20
Identification of events of public health importance prompting laboratory testing	3	33	NA	NA
Identification of events of public health importance prompting implementation of control measures	1	9	5	50
Improvement of...				
situational awareness of something already being responded to	5	46		
awareness of something already being responded to			4	44
Frequency of Use				
Daily	6	46	0	0
When automated email notifications are received	3	23	6	50
When personally called or emailed by an individual...				
at the State Georgia Division of Public Health Office	2	15		
at the District Public Health Office			2	17
2-4 times per week	2	15	0	0

Table 3. Frequency of Syndrome Viewing¹ and Use², 2009

Syndrome	<i>District Users</i>				Syndrome	<i>Facility Users</i>			
	<i>Viewed</i>		<i>Used</i>			<i>Viewed</i>		<i>Used</i>	
	<i>n=11</i>	<i>n=11</i>	<i>n=12</i>	<i>n=11</i>		<i>n=11</i>	<i>n=11</i>	<i>n=12</i>	<i>n=11</i>
	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>		<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>
Diarrhea	82	82	50	46	Fever and Chest	27	0	8	9
Fever and Flu	82	46	50	46	Pox Rash and Fever	27	9	25	18
Meningitis	73	64	25	36	Very ill	27	9	8	0
Bloody Diarrhea	73	46	25	9	Hepatitis	18	9	0	0
Nausea and Vomit	64	64	42	27	Hemorrhagic	18	9	8	18
Influenza Like Illness	64	36	33	18	Poison	18	9	0	9
BT/Emerging Infectious Disease	55	36	33	36	Mumps	9	0	8	0
Respiratory	55	27	25	18	Sepsis	9	0	0	0
Rash and Fever	55	27	17	36	Injury	9	0	0	0
Bloody Vomit	46	9	8	0	Asthma	0	0	0	0
Bloody Respiratory	36	0	8	18	Drug Alcohol	0	0	0	0
Botulism	27	0	8	9	Heat Exposure	0	0	0	0

¹ District and Facility Users were asked "When using the Georgia Syndromic Surveillance Program user interface in SendSS, which syndromes do you view data for most frequently? (select all that apply)"

² District and Facility Users were asked "Of all the syndromes listed below, select up to five that you find most useful for informing your activities. (select only five)"

Usefulness of Syndromic Surveillance Email Alerts:

- 85% (11) of District Users reported that automated trigger alert emails were useful or very useful
- 100% (11) of District Users reported that they felt they received an appropriate amount of automated trigger alert emails
- 85% (11) of District Users reported that they preferred to be notified of syndromic surveillance flags by email rather than other methods such as phone calls, text messages, or message boxes in the user interface
- One District User wrote:
 - *“If I don’t get a chance to check SS, I know that I will be alerted by email for priority syndromes. I always check email, so I know I won’t miss a priority event.”*

Simplicity

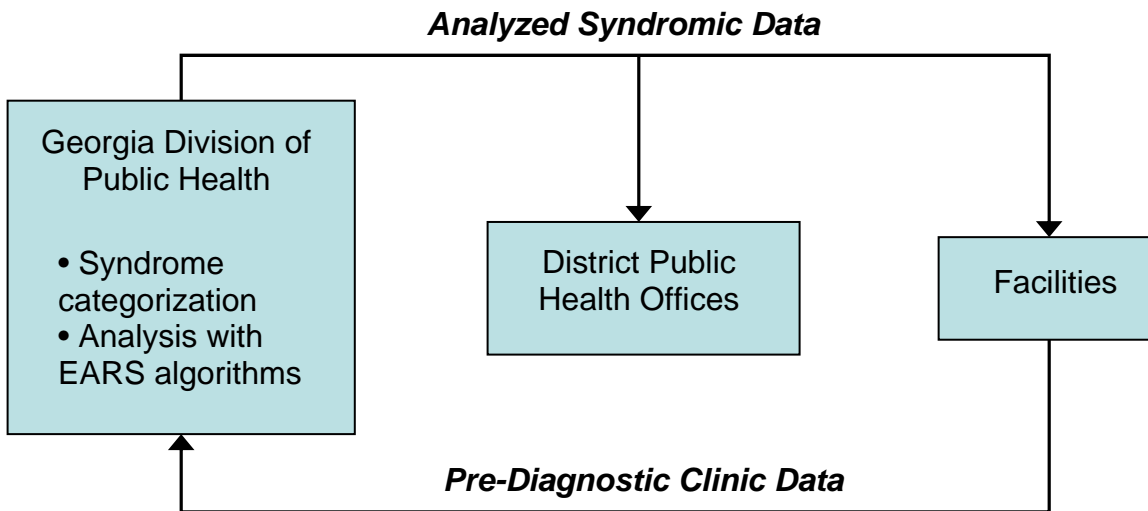
Straightforwardness of Program Structure:

- 73% (8) of District Users reported that the program structure was straightforward or very straightforward
- District User comments:
 - *“I think the only problem is a few times when we did notice an increase in something it was a little difficult to obtain patient information due to it being confusing to the Infection Control Practitioner at the hospitals end.”*
 - *“There are times I can’t figure how something got mapped to the event that it did.”*

User-friendliness of System:

- 85% (11) of District Users reported that the system interface was user-friendly or very user-friendly
- One District User wrote:
 - *“I generally can get the information I need even if I have to click around a little. It is easier now that I use it regularly. Also, I know I can always call [the Program Coordinator] if I need help!”*
- 90% (9) of Facility Users reported that the system interface was user-friendly or very user-friendly

Figure 2. Syndromic Surveillance System Data Flowchart



District Users' Preferences Regarding Orientation and Training:

- 73% (8) said the orientation they received was helpful or very helpful
- 55% (6) said they were receiving adequate training and 18% (2) reported receiving too little training for using the system’s user interface
- 55% (6) reported a preference for in-person training, 36% (4) said they would prefer web-based training, and 27% (3) said they would prefer videoconference-based training; 11 District Users responded to this question and some selected more than one response
- 89% (8) said they would like to learn more about manipulating data in future trainings and 44% (4) said they would like to learn more about using syndromic data

Facility Users' Preferences Regarding Orientation and Training:

- 73% (8) reported not wanting an orientation to the program
- 46% (5) reported that they had received some type of training on using the program
- 40% (4) reported that they would like to receive training on using the system interface

Program Support:

- 91% (10) of District Users reported that they receive adequate support or a lot of support from the Program Team
- 67% (6) of District Users reported that practice exercises would be helpful. Also, 45% (4) reported that updates on District Epidemiologist conference calls would be helpful, 45% (4) said that regular working group meetings would be helpful, and 45% (4) said that intermediate level classes would be helpful
- One District User wrote:
 - *"Set rules on what needs to be done in response to flags and how to minimize unnecessary work."*
- 80% (8) of Facility Users reported that they would not like more support for using the System

Acceptability

Public Health Importance of Syndromic Surveillance:

- 100% (13) of District Users rated the public health importance of syndromic surveillance for Georgia as important or very important
- 100% (11) of District Users rated the public health importance of using syndromic surveillance in their work as important or very important
- 100% (11) of Facility Users rated the public health importance of syndromic surveillance for Georgia as important or very important

Responsiveness of Program to Suggestions:

- 82% (9) of District Users rated the program as responsive or very responsive to suggestions

Perceived Benefits from Using Syndromic Surveillance Interface:

- 50% (5) of Facility Users reported that they have benefitted from using the system user interface

Data Sharing:

- 55% (6) of District Users reported that being able to view line list data for other districts would be helpful or very helpful
- 82% (9) of District Users reported that they would be willing to allow other districts to view line list data for their district
- One District User commented:
 - *"This could be helpful if we had something going on across county lines that could be related or linked in some way."*

Flexibility

Integration with Other Systems:

- SendSS framework
- Biosense, the CDC's nationwide Syndromic Surveillance System
- CDC Flu Branch's sentinel surveillance system; Georgia is one of three states providing data

Opportunities for Better Integration:

- State's Outbreak Management System
- Improved integration at the local level since the program depends on human follow-up

Data Quality

Data Management:

- Automated data transfers work well for 90% (35) of participating facilities
- 2 facilities were sending data manually rather than using automated data transfers
- 2 facilities were transmitting data that were not viewable in the user interface due to the data format
- 2 facilities were unable to participate because their data were not captured electronically
- The process of syndrome mapping is imprecise since free text is used to identify syndromes
 - For example, 'bracing' was misspelled as 'bricing' resulting in the record being misclassified as ricin poisoning

Table 4. Proportion of Data Provided for Required Variables from Syndromic Surveillance Facilities from October 28 to November 27, 2008 (n = 140,656)

Required Variables	n	%
Hospital	140,627	100
Patient ID	140,580	100
Triage Date	140,656	100
Triage Time	140,656	100
Chief Complaint	139,457	99

Table 5. Proportion of Data Provided for Requested Variables from Syndromic Surveillance Facilities from October 28 to November 27, 2008 (n = 140,656)

Requested Variables	n	%
Race	139,598	99
Age	140,655	100
Sex	140,623	100
Zip Code	138,142	98
MD (working) Diagnosis	40,108	29
ICD-9 Code	26,130	19
Acuity or Triage Score	47,770	34
Disposition	98,434	70

Stability

- Since statewide data collection began in 2005, the system was fully operational 95% of the time
- In the previous six months, the system was fully operational 98-99% of the time
- Personnel issues may have affected the stability of the program
 - Departmental budget constraints, staff turnover, and furlough
 - The system was not being used as efficiently and consistently as it could have been
 - Limited in ability to do higher level analyses examining specific syndromes and their definitions

Timeliness

Timeliness of Program in Providing Useful Information:

- 93% (12) of District Users reported that the program was timely or very timely in providing useful information
- 70% (7) of Facility Users reported that the program was timely or very timely in providing useful information

Timeliness of Automated Email Alerts:

- 100% (11) of District Users reported that the automated email alert notifications about flagged data in the system were timely

Recommendations

- Conduct follow-up training and provide continued support for District Users
 - Conduct in-person training, if possible
 - Train on manipulating syndromic surveillance data in interface
 - Train on communicating with current Facility Users and recruiting new data providers
 - Provide practice exercises to help with using the system
 - Provide regular updates on conference calls and consider holding regular working group meetings
- Determine how allowing District Users to view line list data across districts would impact the overall program
- Integrate the GSSP with the State's Outbreak Management System
- Identify strategies to encourage local-level involvement in the program

Strengths and Limitations of Evaluation

- Obtained valuable qualitative information about the GSSP
- Documented the progress of the program since it began in 2005
- Response rates were not optimal
- Low response rates may have influenced results (e.g., non-respondents may be less likely to use GSSP)

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