

# *Louisiana* *Early Event Detection System* **(LEEDS)**



## **Syndromic Surveillance for the State of Louisiana**

Louisiana Office of Public Health  
Infectious Diseases Epidemiology Section

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# LEEDS: Syndromic Surveillance for the State of Louisiana

## Louisiana Office of Public Health, Infectious Diseases Epidemiology Section

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The following information describing Syndromic Surveillance in Louisiana using the *Louisiana Early Event Detection System (LEEDS)* software is designed to provide the reader with an understanding of syndromic surveillance, its use within the Louisiana Office of Public Health infrastructure, and the importance of participation by private health information sources in provision of syndromic surveillance information.

### 1. Definition of Syndromic Surveillance

Syndromic Surveillance is the collection and analysis of pre-diagnostic and non-clinical disease indicators using pre-existing electronic data<sup>1</sup>, with the purpose of:

- rapidly detecting clusters of symptoms and health complaints that might indicate a disease outbreak or other public health threat, and
- monitoring trends in syndromes of public health importance.

Data files are transmitted to the receiving agency at least daily.

Data sources include, but are not limited to:

- Clinical data, such as
  - emergency department and urgent care center patient visits
  - laboratory testing orders
  - 911 calls
  - emergency medical service (EMS) dispatches
- Non-clinical data, such as
  - prescription and over-the-counter drug sales
  - school or workplace absenteeism.

Unlike traditional surveillance, syndromic surveillance does not use actual diagnoses. Instead it uses:

- Symptoms for clinical data
- Presumed symptoms for some non-clinical data
- Status of “present” or “absent” for absenteeism analysis.

### 2. Purpose of Syndromic Surveillance

Unlike traditional surveillance, which relies on reporting of specific illnesses after diagnosis has been determined, Syndromic Surveillance utilizes the detection of well-defined symptoms as an indicator of the possible presence of a public health problem.

Time is paramount in stopping outbreaks from spreading, but confirming a presumptive diagnosis requires time for laboratory tests to be completed. Because Syndromic Surveillance seeks to detect unusual increases in the occurrence of symptoms, it augments traditional surveillance by providing earlier detection and awareness of outbreaks or disease trends of public health significance, natural or man-made. This presumably will allow for a timelier public health response than that afforded by traditional surveillance.<sup>2</sup> In addition, if laboratory testing does not occur, syndromic surveillance can increase the possibility of identifying cases that might go undetected.

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<sup>1</sup> Sosin DA. *Biosecurity and Bioterrorism* 2003; 1(4): 247-53.

<sup>2</sup> Buehler JW, Berkelman RL, Hartley DM, Peters CJ. *Emerg Infect Dis* 2003; 9(10):1197-1204).

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Potential additional purposes<sup>3</sup> for syndromic surveillance include:

- Characterizing outbreaks detected by traditional or syndromic surveillance (often referred to as “situational awareness”), including the
  - magnitude of the unexpected high rates of symptoms or absences
  - geographic location and spread of unexpected high rates
  - temporal duration of unexpected high rates
- Assuring that no outbreak or trend of public health significance has occurred during high-profile events, such as sports or political events
- Improving communication between public health practitioners and healthcare providers, such as infection preventionists (IPs), emergency medicine clinicians, occupational health professionals and school nurses
- Detecting non-infectious disease trends, such as asthmatic exacerbations during summer months
- Detecting seasonal infectious disease trends, such as influenza during winter months. (Although syndromic surveillance has detected influenza season earlier than other surveillance, its role in detection of pandemic influenza remains to be proven.)

In response to growing concerns<sup>3</sup> of an influenza pandemic, public health partners are exploring the novel applications of syndromic surveillance.<sup>4</sup>

### 3. Authority

The Infectious Diseases Epidemiology Section (IDEpi) in the Louisiana Office of Public Health (OPH) has the authority under state law to conduct surveillance and investigations for any disease outbreaks or suspected outbreaks. OPH also has the authority to conduct investigations with the goal of effecting reduction in the incidence and proper control of disease, disorders and disabilities.

### 4. Privacy and Confidentiality

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) protects the privacy of certain individually identifiable health information, called protected health information (PHI). In the interest of public health, the HIPAA Privacy Rule permits PHI to be shared for public health activities conducted by a legally authorized public health authority (45 CFR § 164.512(b)). OPH’s Syndromic Surveillance System does not collect directly identifiable patient information, and will be administered by OPH solely for public health purposes. Data will be transmitted and maintained in secure electronic formats.

### 5. Joint Commission on Accreditation of Healthcare Organizations (JCAHO)

Syndromic surveillance has the potential to aid healthcare entities with the rapid recognition of infectious patients before diagnoses are established, as deemed necessary by the 2006 Joint Commission on Accreditation of Healthcare Organizations (JCAHO) standard of IC.6.10.<sup>5</sup>

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<sup>3</sup> Layton M (for Mostashari F). Overview of Syndromic Surveillance, a Local Perspective. 2005 CSTE Annual Conference, Albuquerque, NM; June 7, 2005.

<sup>4</sup> International Society for Disease Surveillance, 2006 Syndromic Surveillance Conference. Available at: <http://www.syndromic.org/conference/2006/index.htm>. Accessed July 28, 2006.

<sup>5</sup> Joint Commission on Accreditation of Healthcare Organizations, 2006 Hospital Accreditation Standards for Emergency Management Planning, Emergency Management Drills, Infection Control, Disaster Privileges. Available at: [http://www.jointcommission.org/NR/rdonlyres/F42AF828-7248-48C0-B4E6-BA18E719A87C/0/06\\_hap\\_accred\\_std.pdf](http://www.jointcommission.org/NR/rdonlyres/F42AF828-7248-48C0-B4E6-BA18E719A87C/0/06_hap_accred_std.pdf). Accessed July 28, 2006.

## 6. Meaningful Use

Under the Health Information Technology for Economic and Clinical Health (HITECH) Act, the U.S. Department of Health and Human Services (HHS) has established incentive programs for eligible health care professionals and hospitals to receive Medicare and Medicaid incentive payments when they adopt certified Electronic Health Record (EHR) technology and use it to achieve “Meaningful Use” objectives. In an effort to improve health care quality, efficiency, and patient safety, meaningful use of EHR focuses on electronically recording health information in a coded format, using that information to track clinical conditions, communicating that information for care coordination purposes, and initiating the reporting of clinical quality measures and public health information<sup>6</sup>.

Submission of electronic syndromic surveillance data to public health agencies is one of the Meaningful Use objectives in which a hospital can participate. This objective specifies the use of HL7-format files for reporting. Participation in syndromic surveillance helps the hospital gain meaningful use compliance, which qualifies the hospital for incentive payments.

## 7. Syndromic Surveillance in Louisiana

In 2002 the Infectious Diseases Epidemiology Section in Louisiana’s Office of Public Health introduced web-based reporting of nationally-notifiable infectious diseases to Louisiana medical care providers for reporting cases of diagnosed infectious diseases to the state. In 2004 IDEpi expanded its reporting capabilities to enable hospital emergency departments and emergency medical service providers to report individuals who have symptoms that match any of ten bioterrorism-related syndromes.

In recognition of the urgent need for early detection of disease outbreaks and unusual health conditions following Hurricanes Katrina and Rita in August/September of 2005, the Centers for Disease Control and Prevention (CDC) conducted detailed daily abstracts of emergency department records for all persons seen in permanent and temporary medical facilities in the New Orleans area in September 2005, and OPH conducted statewide surveillance of evacuee shelters until all shelter inhabitants were relocated to non-shelter housing.

After CDC discontinued its daily abstracting of New Orleans-area emergency department records in October 2005, OPH began piloting the use of the CDC’s *Early Aberration Reporting System (EARS)*, a syndromic surveillance tool that requires manual processing of data extracted from pre-existing databases to identify and analyze the frequency of occurrence of cases that meet user-defined syndrome definitions.

The success of EARS as a pilot project utilized by hospital emergency departments (EDs) in OPH Regions 1, 3, and 9 led to the creation of the *Louisiana Early Event Detection System (LEEDS)*, which is described below.

## 8. LEEDS (Louisiana Early Event Detection System)

LEEDS is a web-based reporting system that enables automated processing of non-traditional public health data sources, such as hospital ED data, to identify records that are indicative of one or more of the syndromes being tracked by OPH. Participating facilities submit daily files to LEEDS, and summary reports of syndromes can be viewed by authorized users via password-protected web-based accounts. Because access to these accounts is restricted to users in the submitting facility, the privacy and security needs of the submitting facility are met.

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<sup>6</sup> Centers for Medicare & Medicaid Services. CMS Finalizes Definition of Meaningful Use of Certified Electronic Health Records (EHR) Technology. Available at: <http://www.cms.gov/EHRIncentivePrograms/>. Accessed October 5, 2011.

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LEEDS uses an internal ‘Text String Search’ function to examine symptom information, such as ED chief complaint data, and flags records with symptoms indicative of a particular health syndrome. LEEDS then creates tables and graphs that present weekly summaries of counts and percentages of visits attributable to the syndromes being tracked, with the goal of identifying unusual trends in syndrome prevalence. (See Appendix III for a sample LEEDS report.) Syndromes currently tracked by IDEpi include asthma, diarrhea, influenza-like illness (ILI), skin and soft tissue infections (SSTI), and upper and lower respiratory tract infections (URTI, LRTI). (See Appendix II for clinical visit syndrome definitions.)

### **9. Data Collection**

Participating facilities submit daily CSV or HL7-formatted data files to LEEDS using secure file transfer protocol (sFTP), with sFTP providing point-to-point encryption of data delivered via a public network. OPH provides, free of charge, the software and assistance in implementing the transfer of these data. To ensure timeliness, data transfer is automated by the sender. Because the goal of syndromic surveillance is to identify outbreaks in their very early stages, OPH values timeliness of data submission above data quality or ability to obtain additional variables.

The required data format follows PHIN messaging standards. Specific variables used by LEEDS are Facility Name, Patient Identifier (ID), Date of Visit, Time of Visit, Age, Date of Birth, Gender, Patient’s Residence Zip Code, Emergency Department Chief Complaint (text and/or ICD code), Emergency Department Discharge Disposition, and Emergency Department Discharge Diagnosis (see Appendix 1 for file format details). To assure patient confidentiality, OPH does not ask for patient name or address, which easily could be used to identify an individual. However, because of the potential need to investigate an outbreak or cluster detected through LEEDS, OPH requests that participating facilities assign a unique, facility-defined identifier (ID) for each individual for whom a record is submitted. This identifier should be usable by personnel in the submitting facility, such as Infection Preventionists, in investigation of individuals associated with an event with public health significance.

### **10. Follow-up of Aberrations Identified by LEEDS**

In situations where LEEDS identifies a syndrome cluster that might be of public health significance, the State Epidemiologist will authorize further investigation of patients whose ‘Chief Complaint’ data have been flagged as meeting the syndrome definition. OPH staff will contact submitting-facility personnel, provide them with the information originally submitted by the facility, and ask for further information for the flagged cases.

### **11. Viewing LEEDS Reports**

LEEDS reports can be viewed at any time by authorized users via password-protected web-based accounts. Reports present syndrome counts and percentage of total ED visits at statewide, regional, or hospital levels within user-specified time periods. Data are aggregated and reported by week based on CDC’s Morbidity and Mortality Weekly Report’s (MMWR) weekly calendar.

Reports include: 1) a table of counts of weekly ED visits reported, counts of each type of syndrome and percentages of ED visits attributable to each syndrome broken down by each week selected; and 2) graphs for each syndrome representing the percent of total visits indicative of that syndrome. Reports can be exported to an Excel or Adobe PDF file for further use. A sample LEEDS report is found in Appendix III.

**Appendix I**  
**Emergency Department/Urgent Care Center Visit Variables and File Specifications**

File transfer process:

- Files should be generated daily and should contain the previous day's data (12:00 a.m. to 11:59 p.m. of the previous day)
- Files can be in .csv format (comma delimited with CR/LF line termination) or in HL7 format (2.3.1 or 2.5.1), and should adhere to the formats specified in the tables below.
- Files should be generated and delivered to the OPH public internet FTP site via secure FTP (sFTP) by 8:00 a.m. each day.
  - Host, username, and password will be provided.
  - Assistance in creating automatic transfer from your local system is available.
  - Windows-based SFTP client and scheduling software also is available on an as-needed basis.
- File naming convention should be the following:
  - x...xYYYYMMDD.csv or x...xYYYYMMDD.hl7, where 'x...x' is a self determined 5-15 character filename (containing no spaces, periods, etc.) that identifies the facility providing data in the file and YYYYMMDD is the year, month and day that the file was generated
  - e.g. MyHospital20060915.csv or MyHospital20060915.hl7

The following two tables describe the data formats required for CSV or HL7 files submitted by emergency departments or urgent care centers (ED/UCC) participating in LEEDS.

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**CSV Format**

(Does not comply with Meaningful Use file format specifications)

Only the fields specified in this table should be sent in a CSV file.

<b>Order</b>	<b>Fieldname</b>	<b>Data Type</b>	<b>Format</b>	<b>Max Length</b>	<b>Description</b>	<b>Required*/ Requested**</b>
1	Hospital Name	text		30	Text string that Identifies each emergency department in the file. The value should be repeated for every row in the file.	<b>Required</b>
2	Patient ID	text		15	Text string that uniquely identifies record of patient visit to ED/UCC. Any unique record identifier in the facility's local system can be used to populate this field.	<b>Required</b>
3	Triage Date	date	MM-DD-YYYY or MM/DD/YYYY	10	Day of ED/UCC Visit. Data is 2-digit month (01-12), 2-digit day (01-31) and 4- digit year separated by dashes (-) or slashes (/)	<b>Required</b>
4	Triage Time	time	HH:MM	5	Time of ED/UCC Visit. Data is 2-digit hour of day (00-23) and 2-digit minutes of the hour (00-59) in eastern standard time separated by a colon (:).	<b>Required</b>
5	Age	text		8	Age of patient in years. If child is less than one year old, use '0' as the age.	Required if Birth Date is not provided
6	Birth Date	Date	MM-DD-YYYY or MM/DD/YYYY	10	Date of Birth. Data is 2-digit month (01-12), 2-digit day (01-31) and 4- digit year separated by dashes (-) or slashes (/).	Required if Age is not provided
7	Gender	text	'M' or 'F'	8	Gender of patient	Requested
8	Zip Code	text	00000	5	Patient's Residence Zip Code (do not include plus 4).	Requested
9	Chief Complaint	text		100	Patient's chief complaints expressed as text string. Multiple Chief Complaints must be separated by a semicolon.	<b>Required if Chief Complaint Code is not provided</b>
10	Chief Complaint Code	text		100	ICD9 or ICD10 Code for Patient's chief complaint. Codes must be sent without periods. Multiple Codes must be separated by a semicolon.	<b>Required if chief Complaint is not provided</b>
11	Discharge Disposition	text		200	Patient's Discharge Disposition at ER departure; no standard has yet been set	Requested
12	Discharge Diagnosis	text		400	Patient's diagnosis upon discharge. (Multiple diagnoses should be separated by a double pipe ' ')	Strongly Requested
13	Extra Information	text		400	Any additional information included in the submission for this record will be captured in one data field. This data field must be positioned as the last field in the record.	Strongly Requested

\***Required** – these variables must be present for every record

\*\***Requested** – these variables are strongly desired in order to make analysis of data more relevant, but may be omitted when not available. If a given variable is not available, the file should still preserve the overall format using empty delimiters for variables that are not available.

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**HL7 Format**

(Complies with Meaningful Use file format specifications)

(Based on the format specified in the *PHIN Syndromic Surveillance Messaging Guide, October 2011*)

These are the fields that Louisiana is requiring in HL7-formatted files. The Sending Facility is not limited to these fields, i.e., additional fields can be included in the transmitted files.

**\*Each segment must be followed by a carriage return character and a line feed character. This will ensure that each segment of each HL7 message is printed on a new line, allowing DHH to interpret the message.**

Segment	Sequence	Element Name	Maximum Length	Description	Notes	Required/ Requested/ Conditional
MSH	4	Sending Facility	30	Name of Emergency Department where patient was seen		Required
MSH	9	Message Type	7	Identifies Message Type	'ADT A04' only	Required
EVN	7	Event Facility	30	Treating Facility		Required if using HL7 version 2.5.1
PID	3.1	Patient Identifier List: ID Number	15	Unique identifier supplied by the Sending Facility for this Patient		Required
PID	7	Date of Birth	8	Patient's Date of Birth	yyyymmdd	Required
PID	8	Administrative Sex	1	Patient's Gender	M=Male F=Female U=Unknown	Required if Available
PID	11.5	ZIP or Postal Code	5	Patient's Home 5-digit ZIPCODE		Required if Available
PV1	2	Patient Class	1	Identifies Patient type	E=Emergency	Requested
PV1	36	Discharge Disposition	20	Patient's Discharge Disposition at departure	Free Text or UB92 FL22	Required if Available
PV1	44	Admit Date/Time	12	Date and Time of ER visit	yyyymmddhhmm	Required
PV2	3.1	Admit Reason: Identifier	20	ICD-9, ICD-10, ICD-9CM, or SNOMED code describing reason for ED visit		Requested
PV2	3.2	Admit Reason: Text	100	Free text Patient Complaint describing reason for ED visit		Required
PV2	3.3	Admit Reason: Name of Coding System	20	Identifies code system used in PV2-3.1	ICD-9, ICD-10, ICD-9CM, SNOMED	Conditional: Required if PV1-3.1 is populated
OBX-1	5	Age	3	Numeric value of Patient's Age		Required
OBX-1	6	Age Units	10	Unit corresponding to numeric value of patient age	Days, Months, Years	Required
DG1	3.1	Diagnosis Code: Identifier	10	ICD-9, ICD-10, ICD-9CM, or SNOMED code describing reason for ED visit		Requested; If not available, do not delay transmission of record
DG1	3.2	Diagnosis Code: Text	100	Standardized description associated with code in DG1-3.1		Requested; If not available, do not delay transmission of record
DG1	3.3	Diagnosis Code:	10	Identifies code system used	ICD-9, ICD-10,	Conditional:

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		Name of Coding System		in DG1-3.1	ICD-9CM, SNOMED	Required if DG1-3.1 is populated
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**Sample HL7 message for records sent to IDEpi, based on A04 Emergency Department Registration; no Updates**

```
MSH|^~\&|Acme Hospital |||||ADT^A04<cr>
EVN|||||Acme Hospital<cr>
PID|1|20060012168|||20040923|F||^ ^ ^^70001<cr>
PV1|E| |||||01|||20110217144208<cr>
PV2| |913.1^ABRASION FOREARM-INFECT^I9<cr>
OBX|1|NM|216127^AGE TIME PATIENT REPORTED^LN||2|a^YEAR^UCUM
DG1| |913.1^ABRASION FOREARM-INFECT^I9<cr>
```

**Appendix II**  
**Syndrome Definitions for Clinical Visits**

**Asthma** – Any text resembling asthma or wheezing.

**Diarrhea** – Any text resembling diarrhea, bloody diarrhea, loose bowels/stool, gastroenteritis, stomach flu/virus. Attempts are made to exclude chronic conditions (e.g., cancer) and non-infectious acute conditions related to stomach distress (e.g., gi bleeding, appendicitis).

**Influenza-Like Illness (ILI)** – Any text resembling chest cold/congestion/breathing difficulties with fever. Attempts are made to exclude upper respiratory conditions.

**Skin and Soft Tissue Infections (SSTI)** – Any text resembling abscess, cellulitis, and skin infections.

**Lower Respiratory Tract Infections (LRTI)** – Any text resembling chest cold/congestion/tightness, bronchitis, shortness of breath. Attempts are made to exclude chronic conditions related to LRI (e.g., asthma, angina, cancer, gastric problems).

**Upper Respiratory Tract Infections (URTI)** – Any text resembling ear infection, allergy-related eye problems, nasal (not injury or pain), stuffy (not stuffy chest), sneezy, congestion (not chest congestion), runny (not running), sore throat, strep throat, sinus, cold, or upper respiratory.

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**Appendix III**  
**LEEDS Report**

Below is a sample of the LEEDS summary report. The reports can be filtered to present data on a State level, OPH Region level, or Hospital level. The reports contain the following information:

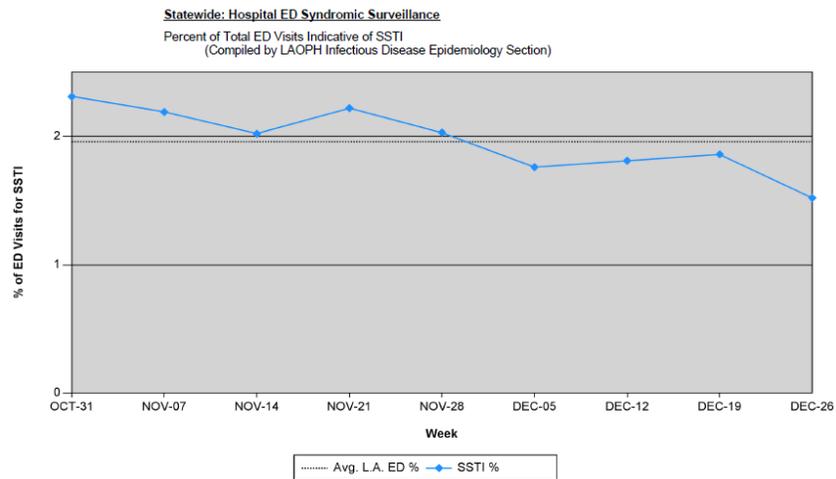
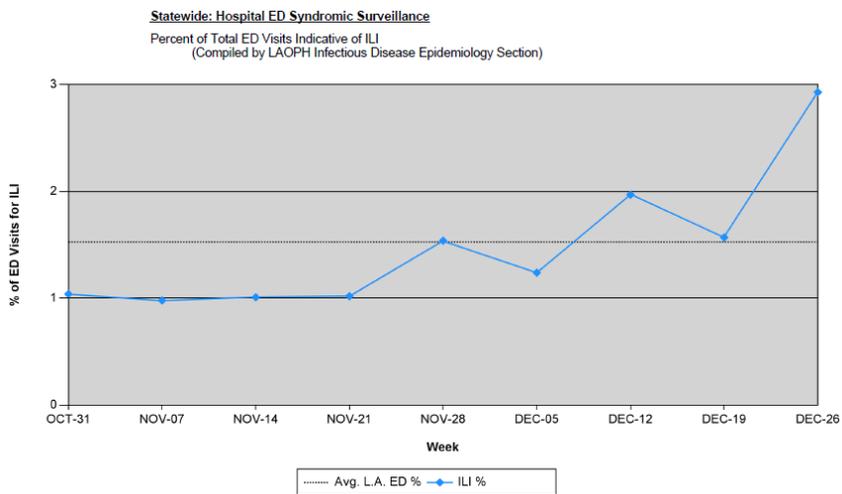
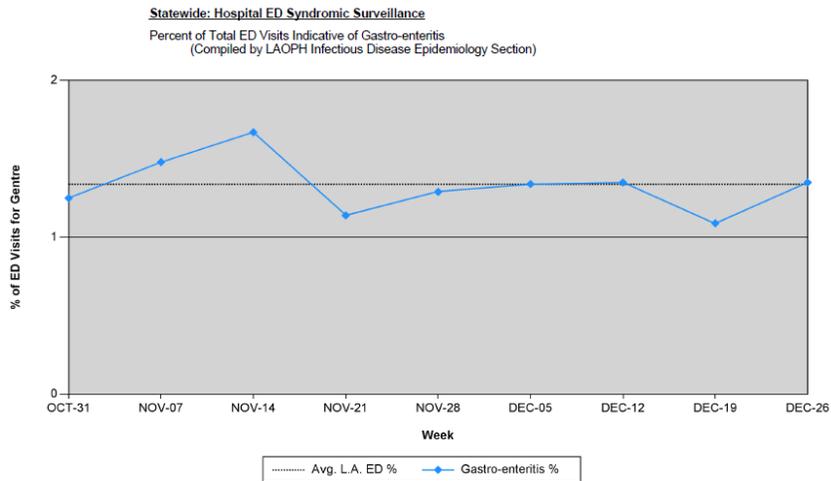
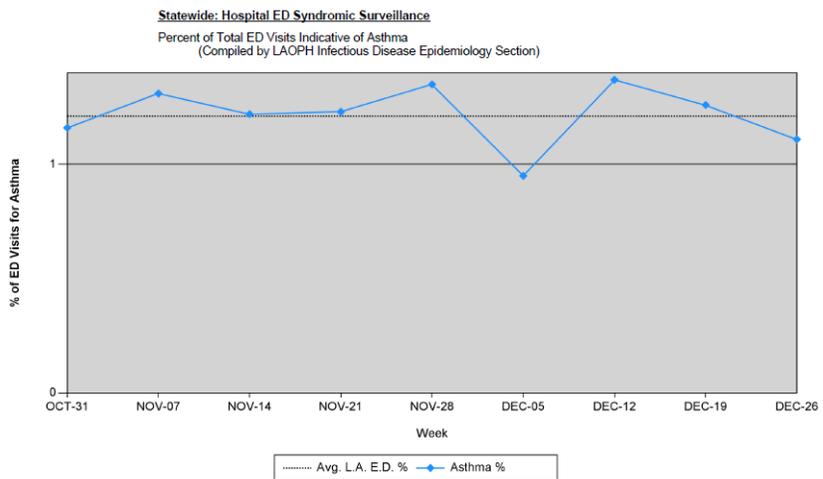
- Counts of the total number of emergency department visits reported through LEEDS
- Counts and percentages of the number of emergency department visits that meet the definitions of each individual syndrome.

LEEDS reports are viewable via web-based password-protected account. Because these accounts are restricted to the submitting facility, the privacy and security needs of the submitting facility are met.

<b>PH-1 Emergency Department Surveillance for Specified Syndromes</b>																10/6/2011 10:21:02 AM
<u>Statewide: Emergency Department Surveillance for Specified Syndromes</u>																
(Compiled by LAOPH Infectious Disease Epidemiology Section)																
				Number of ED Visits Associated with Each Syndrome						Percent of Total ED Visits Associated with Each Syndrome						
MMWR WEEK	Week	Number of Participating Hospitals	Total No. of ED Visits	Asthma	Gastro-Enteritis	Influenza - Like Illness (ILI)	Skin and Soft Tissue Infections (SSTI)	Lower Respiratory Tract Infection (LRTI)	Upper Respiratory Tract Infection (URTI)	Asthma	Gastro-Enteritis	Influenza - Like Illness (ILI)	Skin and Soft Tissue Infections (SSTI)	Lower Respiratory Tract Infection (LRTI)	Upper Respiratory Tract Infection (URTI)	
52	12/28/2010-01/01/2011	7	6363	71	86	187	97	379	559	1.11%	1.35%	2.93%	1.52%	5.95%	8.78%	
51	12/19/2010-12/25/2010	7	6228	79	68	98	116	295	420	1.26%	1.09%	1.57%	1.86%	4.73%	6.74%	
50	12/12/2010-12/18/2010	7	5962	82	81	118	108	291	405	1.37%	1.35%	1.97%	1.81%	4.88%	6.79%	
49	12/05/2010-12/11/2010	7	5876	56	79	73	104	258	355	.95%	1.34%	1.24%	1.76%	4.39%	6.04%	
48	11/28/2010-12/04/2010	7	5318	72	69	82	108	203	304	1.35%	1.29%	1.54%	2.03%	3.81%	5.71%	
47	11/21/2010-11/27/2010	7	5663	70	65	58	126	227	305	1.23%	1.14%	1.02%	2.22%	4%	5.38%	
46	11/14/2010-11/20/2010	7	5737	70	96	58	116	247	309	1.22%	1.67%	1.01%	2.02%	4.3%	5.38%	
45	11/07/2010-11/13/2010	7	5785	76	86	57	127	228	307	1.31%	1.48%	.98%	2.19%	3.94%	5.3%	
44	10/31/2010-11/06/2010	7	5661	66	71	59	131	187	269	1.16%	1.25%	1.04%	2.31%	3.3%	4.75%	
Syndrome Definitions are revised several times a year, based on periodic review of chief complaint data submitted by hospitals.																
MMWR week is a CDC reporting week during which the reported ED visits occurred. For example, the counts reported for MMWR week '04' are a tally of ED visits that occurred in the fourth week of the indicated year.																

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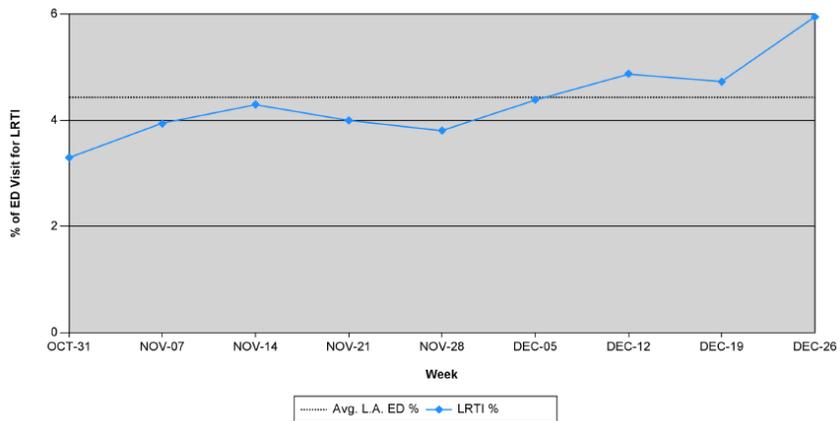


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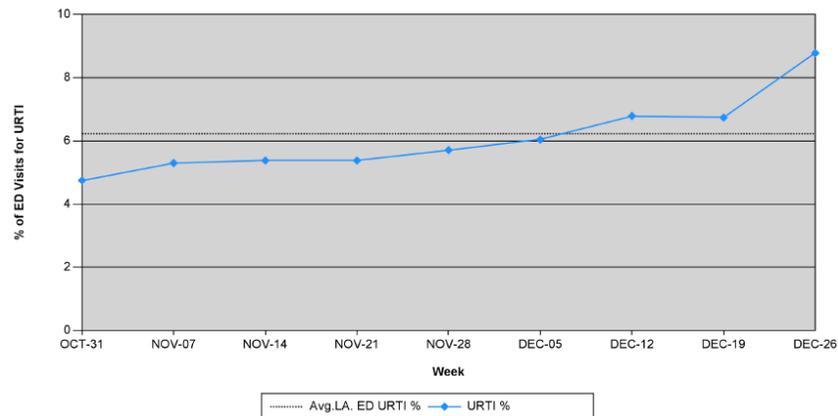
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**Statewide: Hospital ED Syndromic Surveillance**  
 Percent of Total ED Visits Indicative of LRTI  
 (Compiled by LAOPH Infectious Disease Epidemiology Section)



**Statewide: Hospital ED Syndromic Surveillance**  
 Percent of Total ED Visits Indicative of URTI  
 (Compiled by LAOPH Infectious Disease Epidemiology Section)



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**Appendix IV**  
**LEEDS Contacts**

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**Appendix V**  
**Acknowledgements**

The Louisiana Office of Public Health Infectious Diseases Epidemiology Section would like to thank the staff of CDC's Early Aberration Reporting System and the members of the Georgia Division of Public Health Syndromic Surveillance team for their generous assistance in the preparation of this document.