

### BACKGROUND

- Maine has been conducting syndromic surveillance since 2007 using the Early Aberration Reporting System (EARS)
- Objectives for conducting syndromic surveillance in Maine:
  - Detect health events earlier in the disease continuum
  - Detect beginning of disease seasons
  - Verify outbreaks
  - Monitor trends
  - Supplement traditional surveillance
- No formal evaluation of Maine's syndromic surveillance system has been completed
- This evaluation will:
  - Determine if system objectives are being met
  - Assess the system's usefulness
  - Identify areas for improvement

### METHODS

- Syndromic surveillance system in Maine collects and analyzes emergency department (ED) data from 24 of Maine's 37 EDs and 7 affiliated urgent care clinics
- Previous day's ED visits are classified into syndromes based on chief complaint
- Maine uses 14 syndromes: 9 infectious, 4 environmental and an "other"
- Visits may be classified under multiple syndromes
- EARS uses cusum algorithms for aberration detection, counts from previous 10 days determines expected count (Figure 1)
- This evaluation assesses usefulness of the tick and gastrointestinal syndromes, correctness of syndrome definitions, age and gender disparities, and data completeness
- Used CDC guidelines for evaluating public health surveillance systems and guidelines for evaluating syndromic surveillance systems
- Stakeholder meetings conducted with system users
- Analyzed data from June 21-August 1, 2011
- Will replicate analysis using winter 2012 data
- Manually compared chief complaints with syndrome definition
- Reviewed all syndromes for misclassified events

Figure 1. Timeline for Aberration Detection Methods

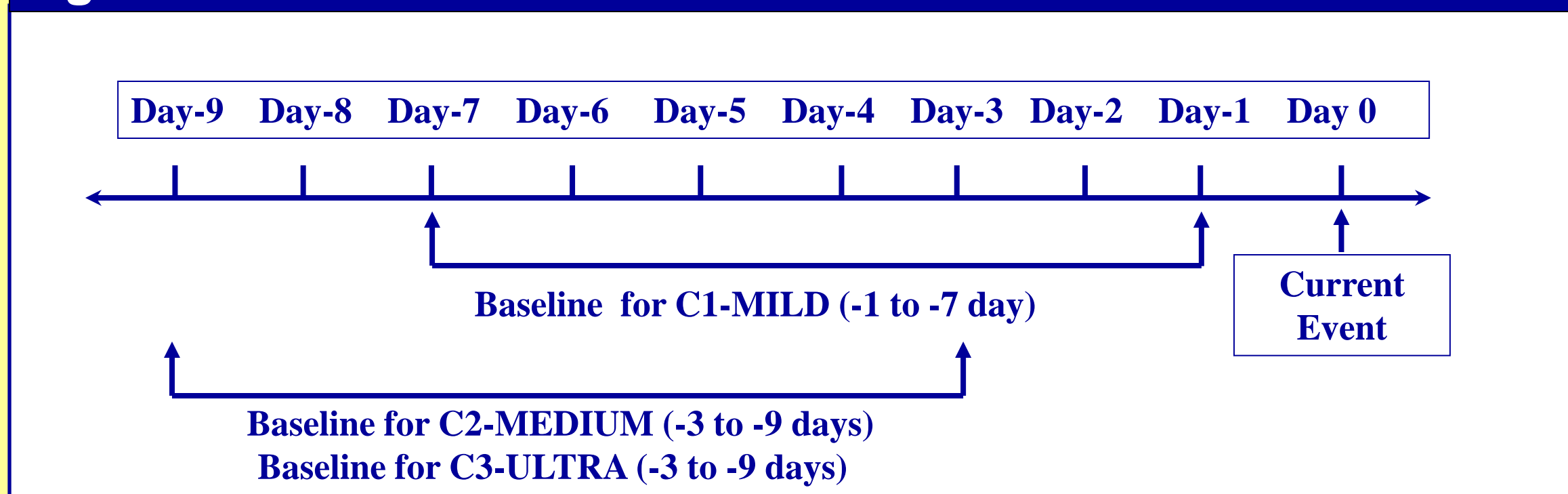


Figure 2. Flow Chart of Maine Syndromic Surveillance System

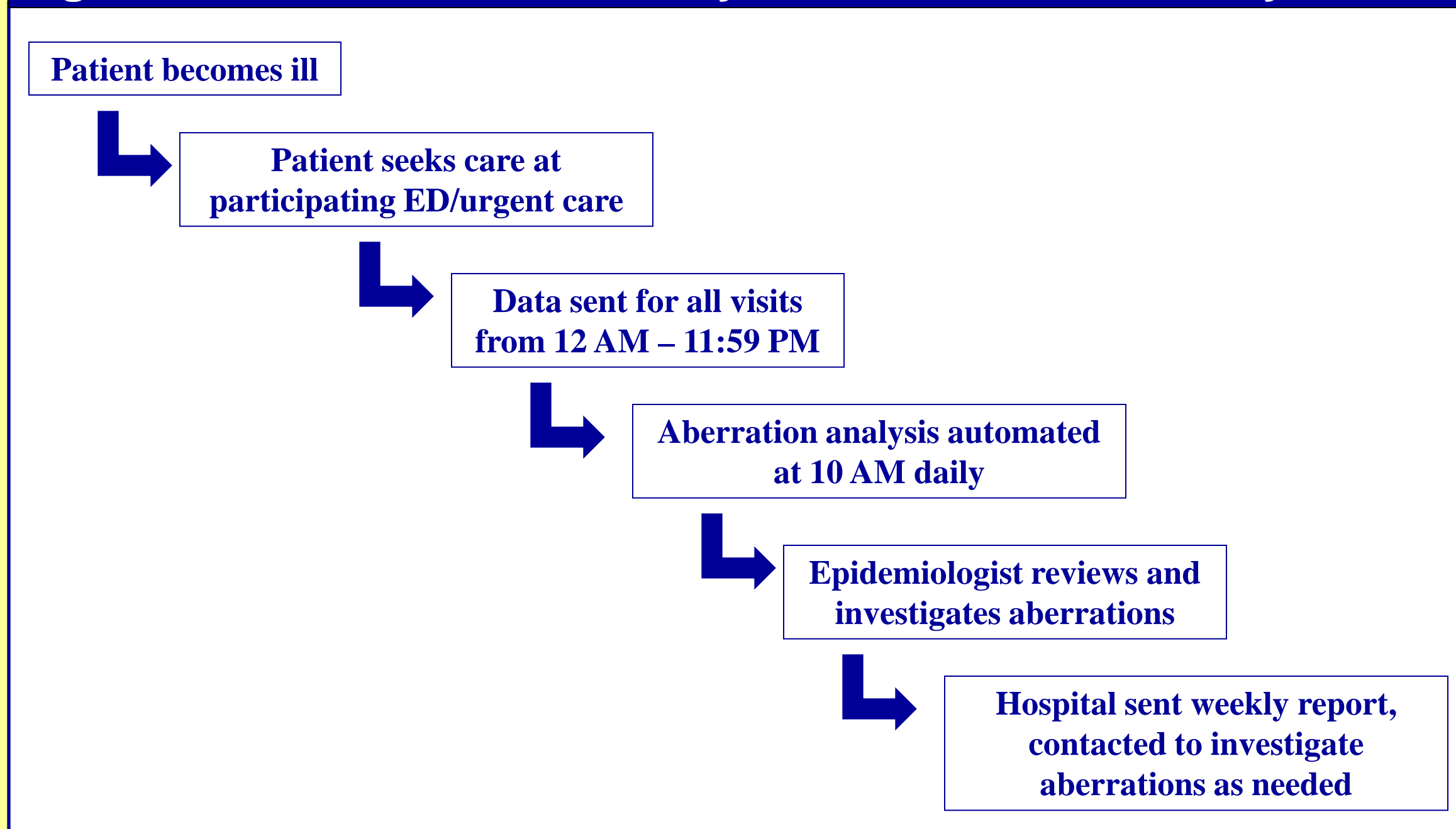


Table 1. Syndrome Definitions in Maine's Syndromic Surveillance System

Syndrome Name	Definition
Gastrointestinal (GI)	Any mention of diarrhea, vomiting, or nausea, excluding chronic causes, substance abuse and pregnancy
Ticks	Any mention of a tick, insect bites, or Lyme disease
Other	A visit for any other reason that is not captured by a specific syndrome

### RESULTS – SYSTEM ATTRIBUTES

- Simplicity:** System mostly automated, including aberration detection, epidemiologist manually sends weekly reports to hospitals (Figure 2)
- Flexibility:** Easy to add/delete syndromes, easy to add/change/delete terms from syndrome definitions, examples:
  - Added heat related syndromes during July 2010 heat wave
  - Added terms to syndromes to exclude vaccination and pregnancy
  - Added misspelling of carbon monoxide to definition to capture missed events
- Representativeness:** Data are ED visits from 24 of Maine's 37 EDs, represents ~75% of Maine's ED visits (Figure 3)
- Timeliness:** Near real-time, receive previous day's ED visits (Figure 2)
- Stability:** System unavailable only when servers are inaccessible

Table 2. Syndrome Descriptive Statistics

Syndrome	N	Gender (%)		Age Group, yrs (%)					
		Male	Female	0-1	2-4	5-17	18-44	45-64	65+
Tick	752	47	53	2	8	13	31	27	19
GI	2,125	35	65	3	3	9	38	23	23

Table 3. Syndrome Data Quality

Variable	Missing Data	
	Tick (N=752)	GI (N=2,125)
Age	0	0
Gender	0	0
County *	425 (56.5%)	1177 (55.4%)
Chief Complaint	0	0
Hospital Disposition Code	179 (23.8%)	371 (17.5%)

\*Missing county comprises of a blank field, "N/A," "unknown," and missing data

Table 4. Syndrome Classification

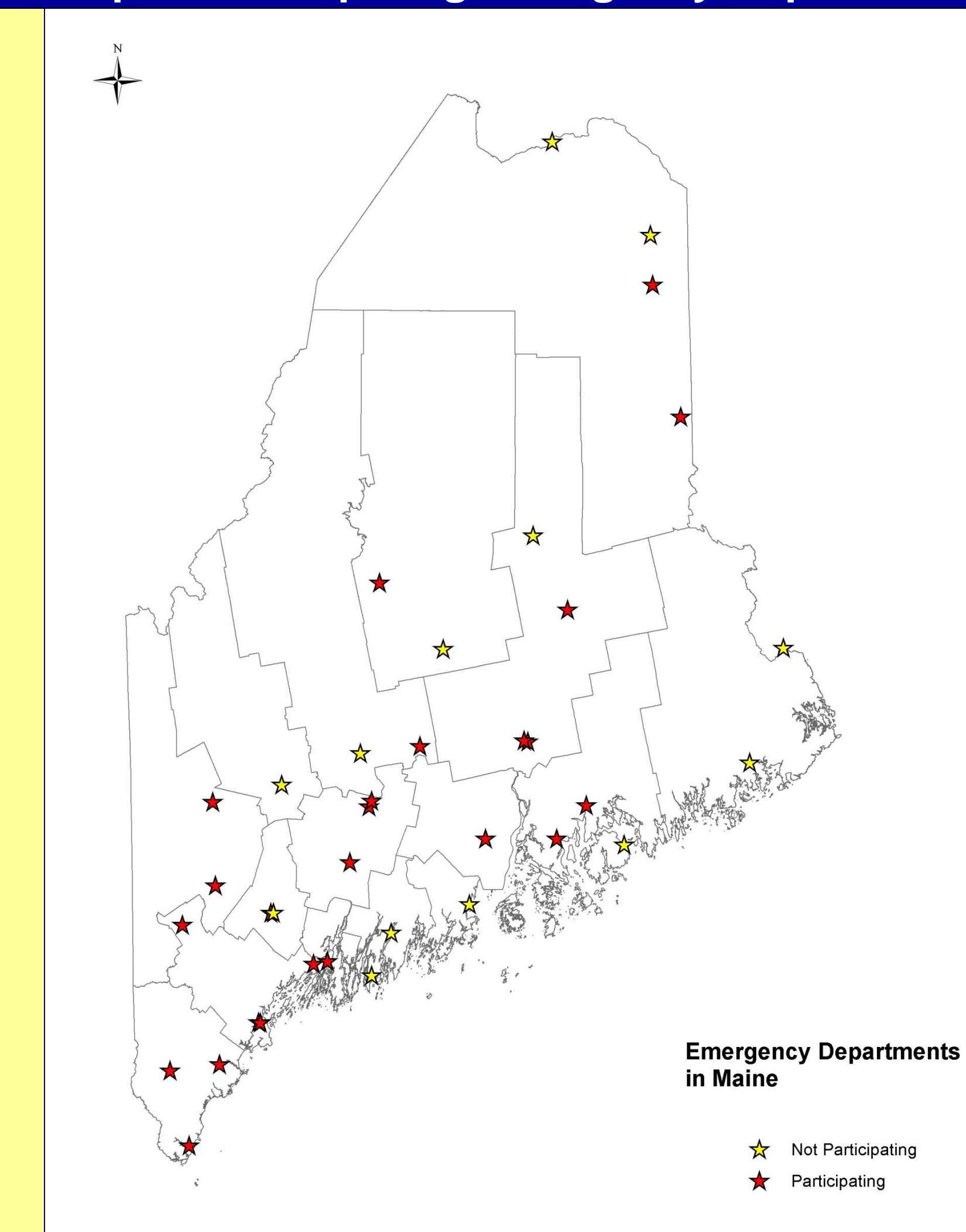
	# Visits in Syndrome	Correctly Identified in Syndrome (true events)	Misclassified Visits *	% of ED Visits Correctly Classified	Misclassified in "Other"	Misclassified in Another Syndrome
Tick	752	751 (99.9%)	128	85.4%	96 (75.0%)	32 (25.0%)
GI	2,125	1,939 (91.3%)	694	73.6%	254 (36.6%)	440 (63.4%)

\*Misclassified visits are true events (tick or GI) incorrectly classified into another syndrome

### Changes to Syndrome Definitions

- Tick syndrome:**
  - Adding 5 terms to tick symptom list corrects 74 / 96 (77.1%)
  - Correcting existing terms with adjacent punctuation fixes 15 / 96 (15.6%)
  - Total corrected: 89 / 96 (92.7%)
- GI syndrome:**
  - Adding 1 term to GI symptom list [emesis] fixes 95 / 694 (13.7%) total misclassified events
  - Correcting existing terms (adjacent punctuation, spacing, string terms) corrects 584 / 694 (84.2%)
  - Total corrected: 679 / 694 (97.8%)

Figure 3. Map of Participating Emergency Departments



### CONCLUSIONS

- Tick misclassifications more likely to go in "Other" syndrome
- GI misclassifications more likely to go in another syndrome
- Misclassifications may be related to how extensive a syndrome definition is and symptom overlap with other chief complaints
- Time intensive procedure to review all chief complaints, especially for syndrome with more extensive definition (GI)

### NEXT STEPS

- Evaluate more syndromes using the summer data file including Influenza-like Illness and heat-related syndromes
- Replicate analysis of Tick and GI syndromes with winter data file for seasonal comparisons
- Evaluate acceptability of syndromic surveillance system with survey of hospital-based system participants
- Increase number of participating hospitals
- Transition to HL7 messaging and extended variables for meaningful use initiative
- Transition to using BioSense 2.0

### SOURCES

Framework for evaluating public health surveillance systems for early detection of outbreaks. (2004, May 7) MMWR: Morbidity and Mortality Weekly Report, 53(RR05);1-11. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5305a1.htm>  
Updated guidelines for evaluating public health surveillance systems. (2001, July 27) MMWR: Morbidity and Mortality Weekly Report, 50(RR13);1-35. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5013a1.htm>

### ACKNOWLEDGMENTS

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