Monitoring Infectious Diseases Using Maine's Syndromic Surveillance System

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BACKGROUND

•Syndromic surveillance may be defined as the collection and analysis of health-related data that precede diagnosis or laboratory confirmation and **signal** with **sufficient probability** (aberration detection) a case or an outbreak to warrant further public health response
•Maine CDC started a syndromic surveillance system in the fall of 2007 with four hospitals
•The syndromic surveillance system is used to monitor syndromes of public health importance
•Maine CDC uses syndromic surveillance to detect health events earlier in the disease continuum, verify outbreaks, detect the beginning of disease seasons, monitor syndrome trends, supplement traditional surveillance, and provide feedback to public health partners.

RATIONALE
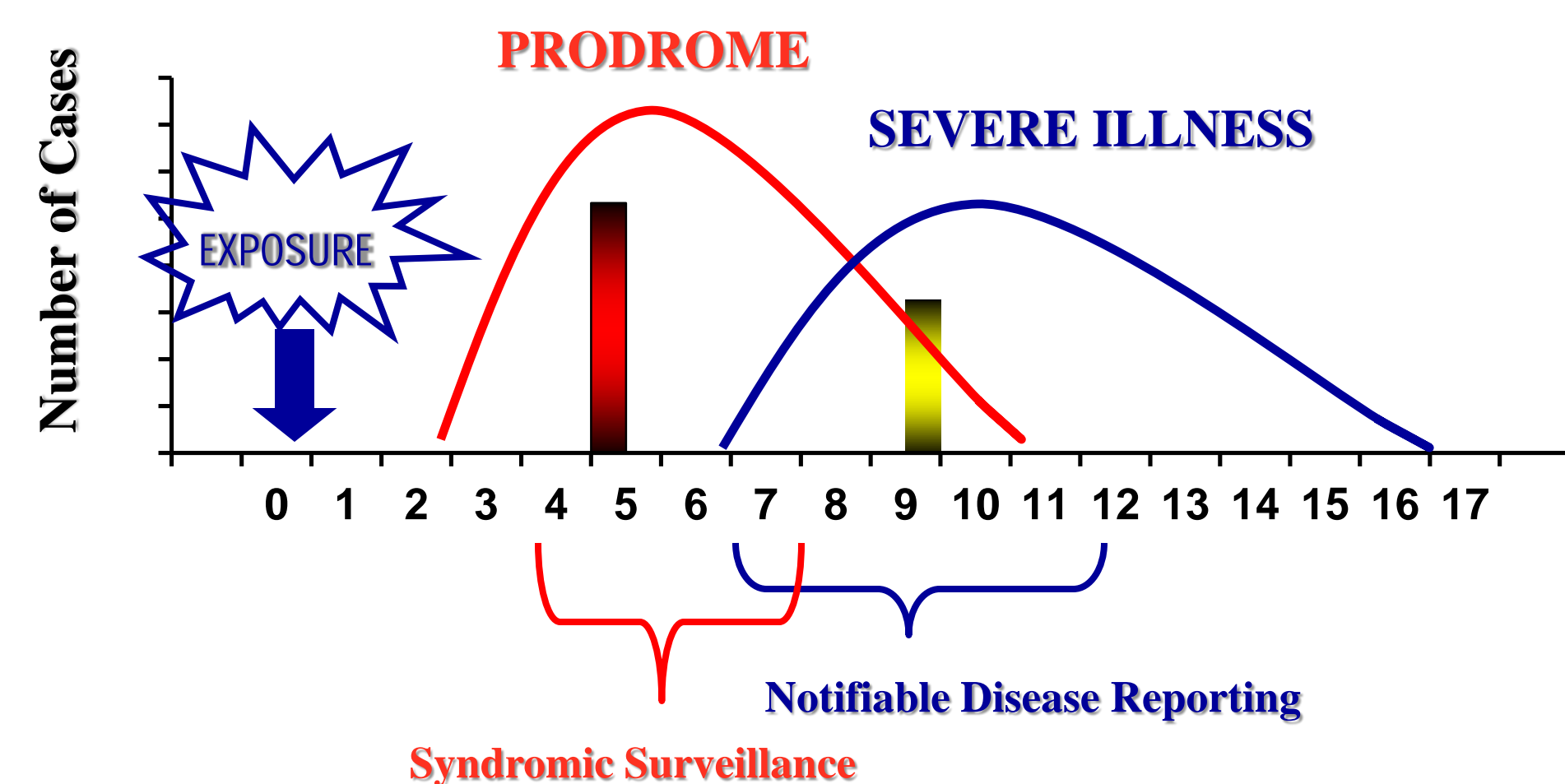
METHODS

•Hospitals with Emergency Departments (ED) are recruited to participate
•A signed Memorandum of Understanding (MOU) to share data is required
•ED data for all visits from 12 AM – 11:59 PM is sent the following morning
•Variables include: hospital name, date of visit, age, gender, town, county, zip code, chief complaint, diagnosis, and disposition
•Maine CDC uses a federal CDC designed product, Early Aberration Reporting System (EARS), to analyze emergency department data
•Chief complaint or similar variable is analyzed for each visit to the emergency department
•ED visits are classified into 14 different syndromes: 9 infectious, 4 environmental and an 'other' category (Table 1)
    •Visits can fall into more than one syndrome
•EARS uses cusum algorithms for aberration detection (C1-MILD, C2-MEDIUM, C3-ULTRA) using counts from previous 10 days to determine expected count (Figure 1)
•Aggregate data for four syndromes (fever, Influenza-like illness (ILI), gastrointestinal (GI) and vomiting) and total number of visits is shared with the Distribute Project each day to contribute to national and regional surveillance efforts

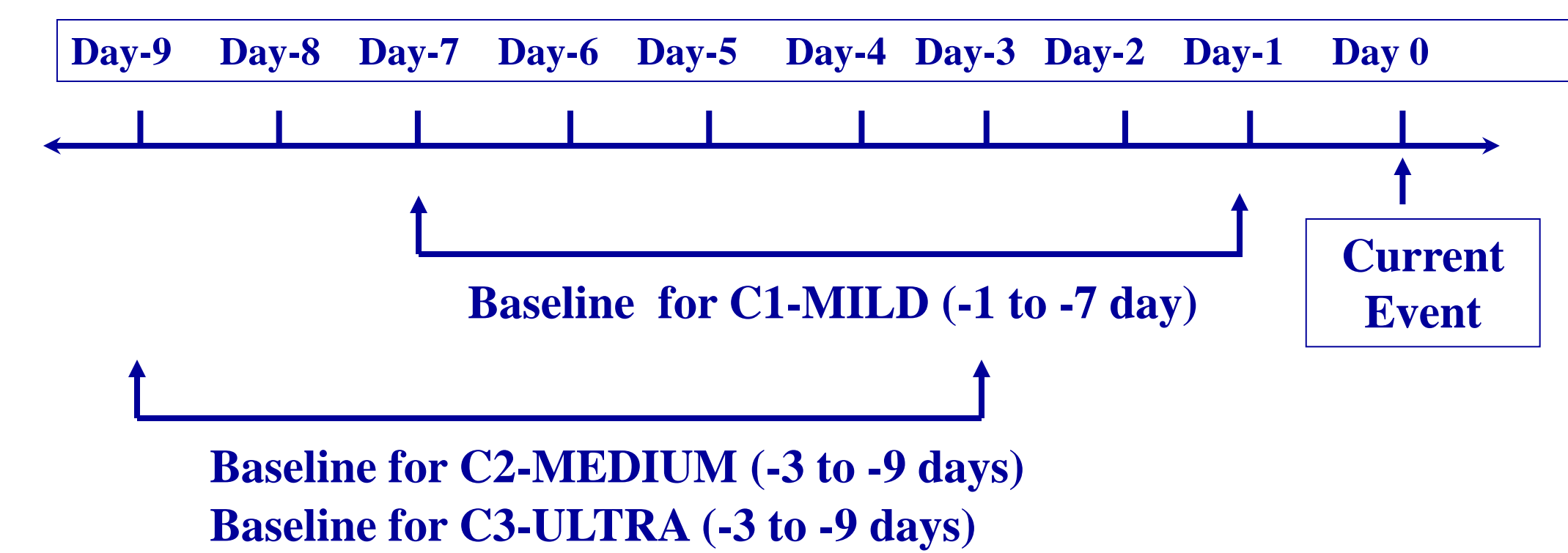## Figure 1. Timeline for Aberration Detection Methods

Table 1. Syndrome Name and Definition Used in Maine's Syndromic Surveillance System

Syndrome name	Definition
Fever	Any mention of fever, excluding chronic conditions
Gastrointestinal (GI)	Any mention of diarrhea, vomiting, nausea, excluding chronic causes, substance abuse and pregnancy
Influenza like Illness (ILI)	Cough + (fever or sore throat) or mention of flu-like symptoms
Neurological	Any mention of neurological symptoms due to infectious causes; excluding chronic conditions, accidents and substance abuse
Rash	Any mention of rash excluding chronic and noninfectious causes
Respiratory	Any mention of respiratory related illness symptoms, excluding chronic conditions
Respiratory test	Any mention of respiratory related illness symptoms, excluding shortness of breath and chronic conditions
Sepsis	Any mention of sepsis
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

•EARS produces a graph of number of visits for each syndrome by hospital and an aggregate state graph (Figure 2 - sepsis syndrome not included)
•Syndromic surveillance graphs provide a general picture of the symptoms seen in the community on that day; not all visits will be classified correctly
•Epidemiologist reviews daily EARS output for any aberrations
•Syndromic data for ILI and fever are included in the weekly influenza report
•Any aberrations considered by an epidemiologist to be significant are investigated

CONCLUSIONS

•The trend graphs produced by syndromic surveillance allows epidemiologists to monitor illness in the community and respond as needed
•Alerts to increases in seasonal diseases allows for early warning and targeted educational messages in a more timely manner
    •Influenza season using ILI syndrome
    •Norovirus season using gastrointestinal syndrome
    •Lyme disease and arboviral disease season using the tick and insect bite syndrome

Next steps:
•Expand syndromic surveillance system to include data from all EDs
•Implement Meaningful Use initiative to accept data from HL7 messages
•Expand database to include all 33 variables from the syndromic surveillance standard recommendations
•Complete an evaluation of the syndromic surveillance system
•Contribute state data for national surveillance purposes through federal CDC's BioSense program
•Begin analysis of federally qualified health center data (FQHC's) and EMS

Figure 2. Examples of EARS Output by Infectious Disease Syndrome
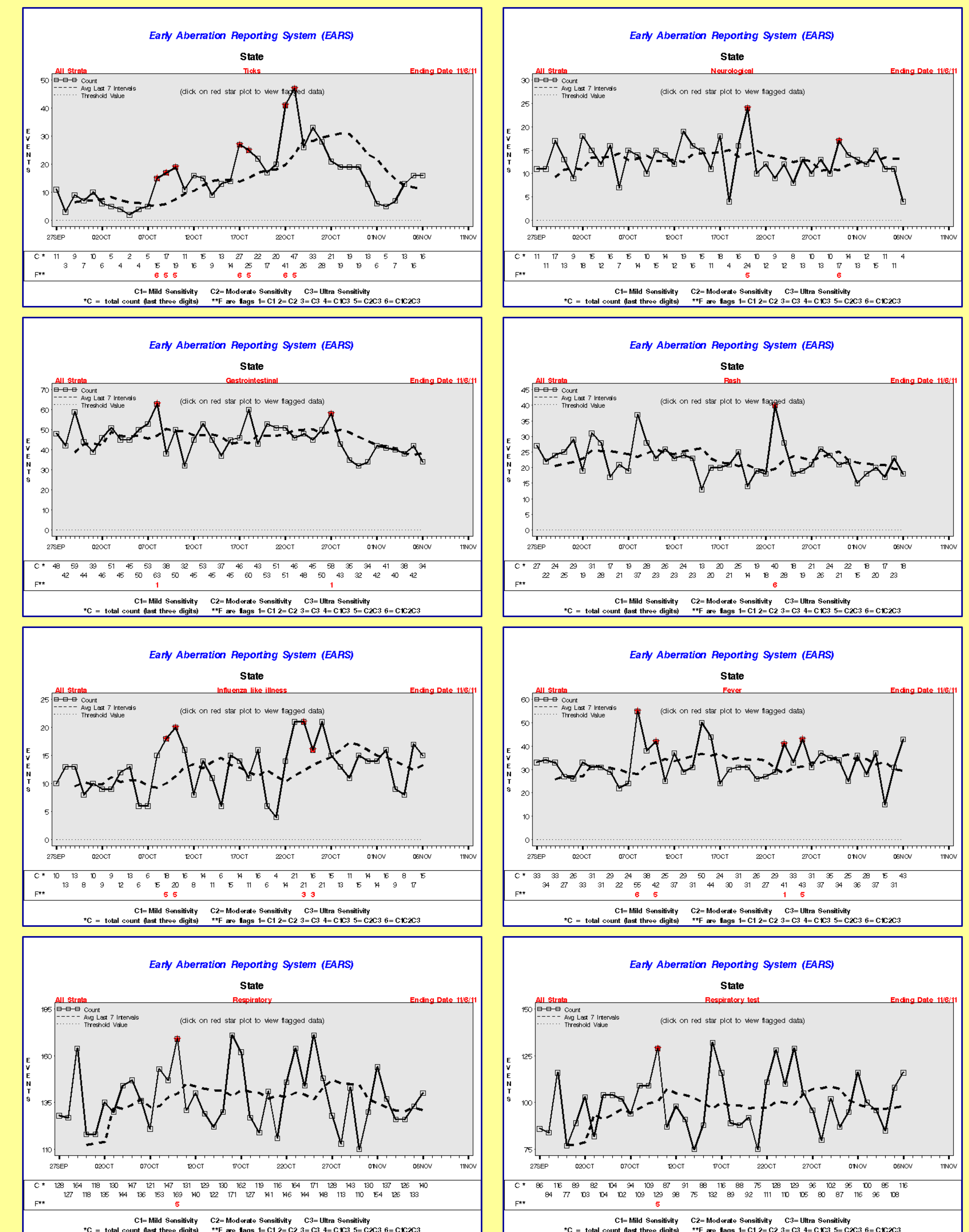
SOURCES

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