North Carolina Bioterrorism and Emerging Infection Prevention System

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OBJECTIVE

This paper describes the North Carolina Bioterrorism and Emerging Infection Prevention System (NC BEIPS). NC BEIPS is the syndromic surveillance arm of NC PHIN.

BACKGROUND

NC BEIPS is a system designed and developed by the NC Division of Public Health (DPH) for early detection of disease and bioterrorism outbreaks or events. It analyzes emergency department (ED) data on a daily basis from 33 (29%) EDs in North Carolina. With a new mandate requiring the submission of ED data to DPH, NC BEIPS will soon have data from all 114 EDs. NC BEIPS also receives data on a daily basis from the Carolinas Poison Center, the Prehospital Medical Information System and the Piedmont Wildlife Center, although syndromic surveillance output from these data sources is still in testing.

SYSTEM DESCRIPTION

NC BEIPS consists of two reporting mechanisms, the North Carolina Emergency Department Database (NCEDD) Portal and CDC's Early Aberration Reporting System (EARS).[1] Both use role-based access and the user types include DPH epidemiologists, hospital-based public health epidemiologists (PHEs), Public Health Regional Surveillance Team (PHRST) members and local health directors (LHDs)

The NCEDD portal provides reporting on disease and injury conditions and utilizes both diagnostic data and syndrome-based data. The data are transmitted to NC BEIPS on a daily basis using either encrypted FTP, SSL or HTTPS. ED medical record numbers and account numbers are de-identified using a one-way HASH algorithm, based on the SHA-1 standard. The HASH algorithm generates a unique identifier that can be used for data quality purposes such as removing duplicates and performing updates, but cannot be traced back to the original numbers. The SSL-encrypted portal is used primarily for syndromic surveillance and provides access to line-listing reports that analyze initial temperature, chief complaint and triage notes to detect potential gastroenteritis, influenza-like illness, fever/rash illness, respiratory illness, and neurological illness. Users can specify any range of dates for which to include data and can cross-reference the syndromes with final diagnoses. The portal also provides tabular, graphical and map-based output. The dynamic, interactive maps present data by county or zip code layer, and permit users to drill down into the data detail on a selected county or zip (Figure. 1.).

Figure 1: Sample Interactive GIS map by county
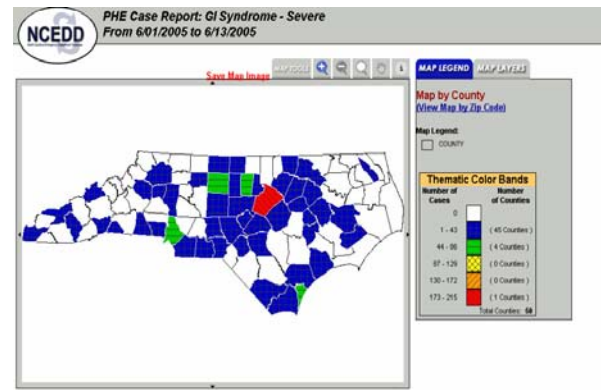
Emergency Medical Text Processor (EMT-P), a natural language processing (NLP) system, is applied to clean ED chief complaint (CC) data daily. Aggregate reports with cleaned CC data are now available, and evaluation of the use of cleaned CC data in the syndromic case reports is underway.

The other primary Web-based tool is EARS 3.0. EARS detects aberrations in the ED data using three different CUSUM-based algorithms and provides tabular, graphical and map-based output. The graphs allow drill down into any red flags that are generated, providing a line listing of all the syndrome visits that contributed to the flag on that particular date.

CONCLUSION

NC BEIPS provides users at the local, regional and state level with syndromic surveillance monitoring capabilities via the Web with tabular, graphical and map-based formats. Analysis of additional data sources for use in NC BEIPS is underway and methods of synthesizing these data sources are being explored. The next version of NC BEIPS will integrate EARS functionality into a single Web-based reporting system.

REFERENCES

[1] Hutwagner L, Thompson W, Seeman GM, Treadwell T. The bioterrorism preparedness and response Early Aberration Reporting System (EARS). J Urban Health. 2003 Jun;80(2 Suppl 1):i89-96.

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