

Wendy W. Chapman PhD, Michael M. Wagner MD PhD, Oleg Ivanov MD MPH,
Robert Olszewski PhD, John N. Dowling MD
University of Pittsburgh

Motivation

Syndromic Surveillance

- Diseases initially present as syndromes
- Increase in expected syndromic presentation for a given population could indicate outbreak

Free-text Chief Complaints

- One of earliest pieces of clinical data available
- Generated by most hospitals/urgent care facilities
- Short phrases easier to classify into syndromes

Phase I Evaluation: Feature Detection

Goal: Classify free-text chief complaint strings into syndromes

“Bad cough and fever” = Respiratory

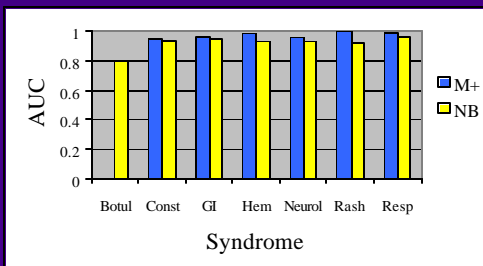
Two Text Processing Syndromic Classifiers

- Natural language processor (M+)
- Naïve Bayesian text classifier (NB)

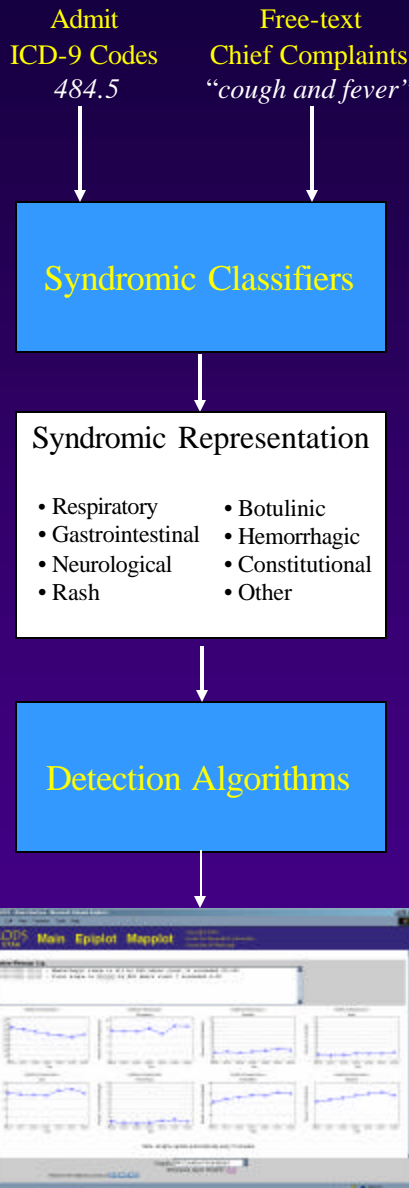
Methods

- **Task:** classify chief complaints into one of 8 syndromic representations
- **Gold standard:** physician classifications
- **Outcome measure:** area under the ROC curve (AUC)

Results



* There were no Botulinic test cases for M+



Alarms

Phase II Evaluation: Case Detection

Goal: Identify patients who present to the emergency room with a syndrome of interest

Study 1: identify patients with acute, infectious gastrointestinal (GI) disorder

Two Sources of Input Data

- ICD-9 admit codes
 - expert-compiled list of ICD-9 acute GI classifier codes
- Free-text triage chief complaints
 - classified into syndromes by NB classifier

Methods

- **Task:** Compare predictive performance of the two sources of input data at identifying patients with acute, infectious GI disorder
- **Test Set:** 1,425 randomly selected patients admitted to the emergency department at UPMC Presbyterian in 2000
- **Gold Standard:** Majority vote of three physicians reading the patients' emergency department dictations
- **Outcome Measures:** Sensitivity, Specificity, PPV, NPV

Results

| | ICD-9 | Chief Complaint |
|--------------------|-------|-----------------|
| Sensitivity | 0.32 | 0.50 |
| Specificity | 0.99 | 0.92 |
| PPV | 0.37 | 0.09 |
| NPV | 0.99 | 0.99 |
| AUC | N/A | 0.75 |

Phase III Evaluation: Outbreak Detection

Goal: Identify retrospective and prospective outbreaks using free-text triage chief complaints

Work in progress