

# Evolution of a Syndromic Surveillance Case Definition

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## OBJECTIVE

This paper describes the construction of a syndromic surveillance case definition and a test for its ability to capture the appropriate syndromic cases.

## BACKGROUND

In North Carolina, select hospital emergency departments (ED) have been submitting data since 2003 for use in syndromic surveillance. These data are collected, stored, and parsed into syndrome categories by the North Carolina Emergency Department Database (NCEDD). The fever with rash illness (FRI) syndrome is designed to capture smallpox cases. This syndrome was created as a combination of the separate fever and rash syndromes proposed by the consensus recommendations of the CDC's Working Group on Syndrome Groups [1].

## METHODS

Data elements within NCEDD include International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes, chief complaint (CC), initial recorded temperature, and ED nurse triage note (TN). As ICD-9-CM codes are not transmitted to our database in a timely manner, we developed a text based case definition for fever and rash. We originally derived case definition terms from the consensus document text description of smallpox and modified these with input from an ED terminology consultant and epidemiologists using the data daily.

We tested our fever and rash definition utilizing a discharge diagnosis of Chickenpox (CP) as a surrogate for smallpox cases because chickenpox and smallpox both present with fever and diffuse rash [2]. Cases of shingles/herpes zoster were not included.

From the 813,536 ED visits in the database for the calendar year 2004, all visits with the ICD-9-CM code of 052.0-052.9 (CP) and all visits meeting the syndrome definition for FRI were identified. Frequencies of temperatures measuring >38° C and a stated fever were assessed for all of the CP cases. In addition, the availability of data fields for initial documented temperature and TN was assessed. We hypothesized that many CP cases were not detected because the FRI case definition required either a recorded or subjective report of fever in addition to a rash term.

## RESULTS

1961 (.24%) ED visits met the fever and rash case definition. 314 (.04%) visits met the surrogate standard (assigned a CP ICD-9-CM code). 56 visits met both case definitions. Sensitivity and specificity are 17.8% and 99.8%, respectively. Table 1 shows results of the comparison for the 314 CP cases.

Data Fields Available	CP cases meeting FRI Definition (N=56) N (%)	CP cases not meeting FRI Definition (N=258) N (%)
Any Recorded Temp	35 (63%)	46 (18%)
TN	33 (59%)	35 (14%)
Symptoms Present		
Recorded Temp >38	25 (45%)	3 (1%)
Stated Fever	35 (63%)	2 (1%)
Stated Rash	56 (100%)	224 (87%)

Table 1 – Frequency of FRI syndrome conditions met in ED visits diagnosed with CP, 2004

## CONCLUSIONS

Our initial case definition combined fever and rash in an attempt to be more specific. We were concerned that a sensitive case definition would decrease our ability to detect uncommon events using aberration detection software. This analysis shows that by relying on clinical data elements and requiring fever terms in addition to rash, we lost the ability to identify most cases of a common illness (CP) that presents with symptoms similar to smallpox. Using clinical data elements such as initial recorded temperature and triage notes for a more restrictive case definition was not feasible with the current level of data completeness. We next plan to study the usefulness of a rash syndrome without fever terms for our system.

## REFERENCES

- [1] Centers for Disease Control and Prevention (October 23, 2003). Syndrome definitions for diseases associated with critical bioterrorism-associated agents. Available at <http://www.bt.cdc.gov/surveillance/syndromedef/index.asp>. Accessed June 24, 2005.
- [2] Breman, JG, Henderson, DA. Diagnosis and Management of Smallpox. N. Engl J Med. 2002 Apr 25; 346(17): 1300-1308.