Characterization of Patients with Clinical Features Consistent with Inhalational Anthrax in an Emergency Department Population

Nicholas D. Soulakis, M.S., Lee H. Harrison, M.D.

Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh

OBJECTIVE

The objective of this work was to elucidate clinical features for distinguishing inhalational anthrax (IA) from ED patients.

BACKGROUND

Maintaining a surveillance system for the continual identification of IA cases in the emergency department requires an understanding of the clinical characteristics of patients meeting a syndromic case definition.

METHODS

A comprehensive review of case reports [1-8] and medical charts was undertaken to identify clinical characteristics of IA. 11 historical cases were compared to 160 patients meeting a syndromic case definition based on acute respiratory failure and the presence of mediastinal widening or lymphadenopathy on a chest radiograph.

RESULTS

The majority of syndromic group patients admitted were due to motor vehicle accident (52%), followed by fall (10%), or other causes (4%). Positive likelihood ratios (PLR) with 95% confidence intervals (CI) were calculated for all clinical features that were reported significantly more often among anthrax patients than syndromic patients. After admissions resulting from trauma were excluded from the analysis, a positive culture for a gram positive rod was the most predictive feature for anthrax cases (PLR 36.0; 95% CI 5.2 to 248.7). Among signs and symptoms, myalgias (PLR 26.2; 95% CI 3.7 to 187.0), fatigue (PLR 8.7; 95% CI 2.8 to 27.4), sweats (PLR 7.6; 95% CI 2.4 to 24.7), nausea (PLR 4.9; 95% CI 2.2 to 10.7), headache (PLR 16.4; 95% CI 2.1 to 125.6), cough (PLR 16.4; 95% CI 2.1 to 125.6), confusion (PLR 16.4; 95% CI 2.1 to 125.6), fever (PLR 16.4; 95% CI 2.1 to 125.6), and chest pain (PLR 16.4; 95% CI 2.1 to 125.6) were found to best discriminate between anthrax and syndromic patients. When radiological findings were examined, consolidation and pleural effusions were both significantly higher among anthrax patients. Consolidation, pleural effusions and the presence of a high hematocrit were all between PLR 1.0 and 2.0. A four step algorithm was devised based on combinations of the most accurate clinical features and the availability of data during the course of typical patient care (**Figure 1**). The ratio (anthrax to syndromic) of highest (11:0), increased (0:5), decreased (0:21) and lowest (0:81) risk categories showed accuracy and very low false positives. 5 patients were "higher risk" after excluding for trauma and two met the syndromic case definition and returned a positive result for a gram positive bacillus from sterile culture. These are reviewed in a case series.

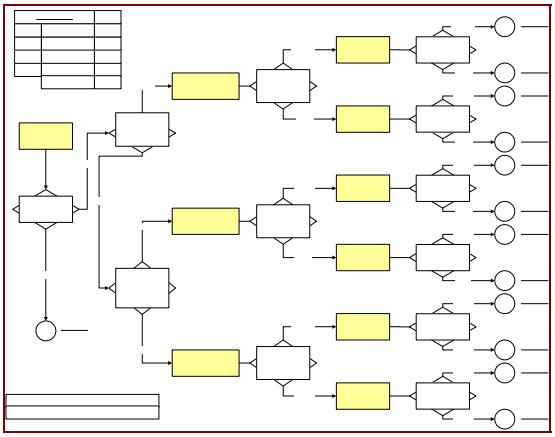

Figure 1 – An algorithm was used to sort patients into risk categories

CONCLUSIONS

Surveillance based on late stage findings of inhalation anthrax can be used by clinicians to identify high risk patient in the Emergency Department using a simple decision tree. This patient-based approach can supplement population-based methods monitoring for early findings.

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Further Information: Nicholas D. Soulakis (ndsst@pitt.edu)