BIOMEDICAL INFORMATICS

DETECTING ASTHMA EXACERBATIONS IN A PEDIATRIC EMERGENCY DEPARTMENT

DAVID L SANDERS

Thesis under the direction of Professor Dominik Aronsky

This thesis describes the development and evaluation of a computerized algorithm for detecting patients with acute asthma exacerbations who present to a pediatric emergency department (ED). A rule-based algorithm was designed to collect patient information from the computerized patient record at the time of ED triage. We confirmed the feasibility of this approach through a retrospective analysis. The algorithm was then implemented in the pediatric ED as a real-time asthma detection system. Its performance was evaluated prospectively during a two-month study period on over 3,500 ED patients, of which 342 had an asthma exacerbation. The system was able detect patients presenting with acute asthma with high accuracy. Sensitivity was 71.6%, specificity was 97.8%, positive predictive value was 77.0%, and negative predictive value was 97.1%.

This research could be applied to detect and automatically initiate guidelines for the management of asthma in eligible patients, and could serve as a model for detecting other conditions which are managed by standardized guidelines in the ED.

Approved _____ Date _____