

# Automated Monitoring of Asthma Using the BioSense System

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## OBJECTIVE

To describe the potential utility of BioSense data for surveillance of asthma.

## BACKGROUND

In 2006, approximately 6.8 million children and 16.1 million adults were reported to have asthma in the US [1]. The CDC BioSense System currently receives data from >540 hospital emergency departments (EDs; 522 send patient chief complaints and 182 send physician diagnoses), and captures about 11% of all U.S. ED visits.

## METHODS

We conducted a retrospective analysis of ED visits for asthma final diagnoses (ICD-9: 493.0-493.9) and chief complaints indicators for the 2007 calendar year. Data were summarized by date, demographics, and geographic area. Summarized data was also compared to the latest available (2005) National Hospital Ambulatory Medical Care Survey (NHAMCS) which is currently used by the CDC as one source for national asthma surveillance [2]. A preliminary analysis of BioSense asthma chief complaint data with SatScan was performed as follows: a separate run was performed for each month; the unit of analysis was the facility; a retrospective space-time analysis was done using the Poisson probability model; maximum days per cluster was 1; the adjustment file was used to adjust for differing mean rates of asthma visits among facilities and differing numbers of total visits on individual days within individual facilities.

## RESULTS

Of 13.4 million ED visits in BioSense, 278,070 (2.1%) had either a chief complaint or final diagnosis of asthma; these visits represented 239,315 patients (average 1.2 visits per patient). Forty-six percent of the asthma visits were identified by an asthma chief complaint, 41% by an asthma diagnosis, and 13% had both. The 20-49 year age group comprised 39% of asthma visits. Below age 19, visit rates were higher among males and above age 19, rates were higher for females. Visits among the 0-3 and 50+ age groups were 2.5 times more likely to result in hospitalization compared to visits for the 20-49 age group. Other than asthma, the subsyndromes most frequently associated with an asthma visit were dyspnea (33%) for chief complaints and hypertension (15%) for final diagnoses. ED visits rates with an asthma chief complaint or diagnosis were highest among 4-11 year

olds and showed a seasonal pattern with peak rates in October. (Figure 1).

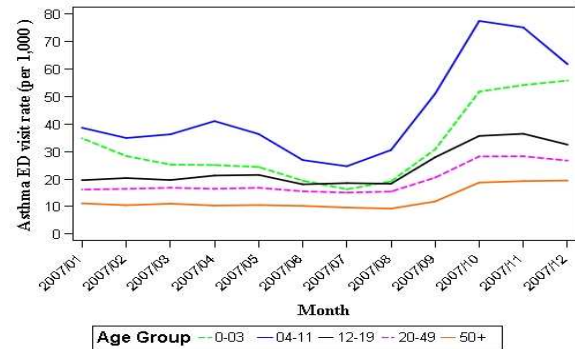


Figure1: Time series of asthma ED visits by age group

This seasonal pattern was comparable to NHAMCS data, which showed rates of 21.6/1000 visits in Oct/Nov and 14.0/1000 for other months combined in 2005 compared to BioSense rates of 32.7/1000 for Oct/Nov and 19.1/1000 for other months combined in 2007. The preliminary SatScan analysis found 25 1-day clusters with  $p=0.0001$ ; the median number of facilities per cluster was 26 (range 4-38); the clusters were centered in 9 states, and 6 involved >1 state; 12 of the 25 clusters occurred during September-October 2007 similar to the seasonal peak described above.

## CONCLUSIONS

Asthma is a common reason for ED visits that can be readily monitored using chief complaints and final diagnoses. Seasonal visit rate increases and 1-day geographic clusters found in BioSense coincide with patterns found in other data sources. These results suggest that BioSense may be an important and timely information source on asthma that could be used to track morbidity and inform public health interventions.

## REFERENCES

[1] Bloom B, Cohen RA. Summary Health Statistics for U.S. Children: National Health Interview Survey, 2006. National Center for Health Statistics. Vital Health Stat 10(234). 2007.

[2] Nawar E, Niska R, Xu J. National Hospital Ambulatory Medical Care Survey: 2005 Emergency Department Summary Division of Health Care Statistics 13(386).