Estimating Wisconsin Asthma Prevalence
Using Clinical Electronic Health Records and Public Health Data

Carrie Tomasallo, PhD, MPH, Wisconsin Division of Public Health;
Theresa Guilbert, MD, MS, University of Wisconsin, Department of Pediatrics;
Lawrence P. Hanrahan, PhD, MS, Wisconsin Division of Public Health;
Bill Buckingham, PhD, University of Wisconsin, Applied Population Laboratory

Context: Asthma is chronic disease affecting over 500,000 children and adults in Wisconsin. Behavioral Risk Factor Surveillance System (BRFSS) data are used to provide annual statewide asthma prevalence estimates; however, these data consist of small samples, self-reported health outcomes, and are subject to non-response.

Objective: The goal of this research was to determine whether electronic health record (EHR) data could improve our estimate of asthma prevalence over telephone survey data. Specifically, we sought to determine: (1) how asthma prevalence based on the University of Wisconsin Department of Family Medicine (DFM) clinic data compared to Wisconsin BRFSS estimates; and (2) areas and populations of asthma disparity in Wisconsin using DFM clinic data.

Design: Cross sectional analysis

Setting: Collaboration with the University of Wisconsin DFM, Pediatrics, and Applied Population Laboratory (APL) have allowed us to identify a patient population with asthma at a census block group level using electronic health records (EHR).

Patients: Between 2007 and 2009, approximately 192,000 patients, including 18,000 asthmatics, seen in DFM clinics were identified using EHR (compared to 23,000 persons/1,850 asthmatics interviewed over three years from BRFSS).

Outcome Measures: Frequency tables and multivariate logistic regression models were developed for children and adults using WI BRFSS and UW DFM clinic data. Adjusted odds ratios (OR) from each model were assessed for comparability. GIS and spatial analyses were used to map areas of asthma disparity.

Results: Adjusted ORs for asthma were similar in magnitude and direction for all covariates including gender, age and race, when comparing BRFSS and DFM clinic models. While the BRFSS estimates were often not significant due to wide confidence intervals associated with small sample size, the DFM clinic data had greater statistical power to detect associations, especially in the pediatric population. In both BRFSS and DFM clinic models, adult asthma prevalence was twice as high among African Americans, compared to Caucasians, after adjusting for gender and age (p<0.05). GIS analyses identified asthma patients at the census block group in the Madison, WI area, making it possible to identify neighborhoods with the highest asthma prevalence.

Conclusions: EHRs provide exciting opportunities in asthma surveillance, including small area estimation of asthma prevalence by linking to databases on community-level demographic and socioeconomic factors, behaviors and geographic characteristics. This could further highlight areas of asthma disparity, allow discovery of novel risk factors, and improve targeting of education and healthcare interventions.