

Background:

Asthma hospitalization is an indicator of uncontrolled asthma. With regular visits to a primary care physician and asthma specialist, long-term asthma control medication use, avoidance of environmental triggers, and an Asthma Action Plan, asthma hospitalizations can usually be avoided. Calculating asthma hospitalization rates can provide information on which populations are at highest risk for uncontrolled asthma. In addition, analyzing Intensive Care Unit (ICU) use can be used to help understand which hospitalized asthma patient populations were in severe condition on admission or had become severe during hospitalization.

Methods:

Using the Michigan Inpatient Database (MIDB), collected by the Michigan Health and Hospital Association (MHHA), and yearly bridged-race population estimates provided by the National Vital Statistics System maintained by the Centers for Disease Control and Prevention, age-adjusted asthma hospitalization rates from 2002-2013 were calculated for Michigan across different demographics and counties. In addition, ICU usage statistics were calculated from the 2011-2013 asthma hospitalization records. The MIDB is a voluntary survey system of every hospital discharge from almost all (98%) of Michigan's acute care hospitals and of discharges of Michigan residents from acute care hospitals in contiguous states. In this brief, an asthma hospitalization was defined as a hospitalization for which the principal discharge diagnosis was asthma (ICD-9-CM 493.XX).

Results:

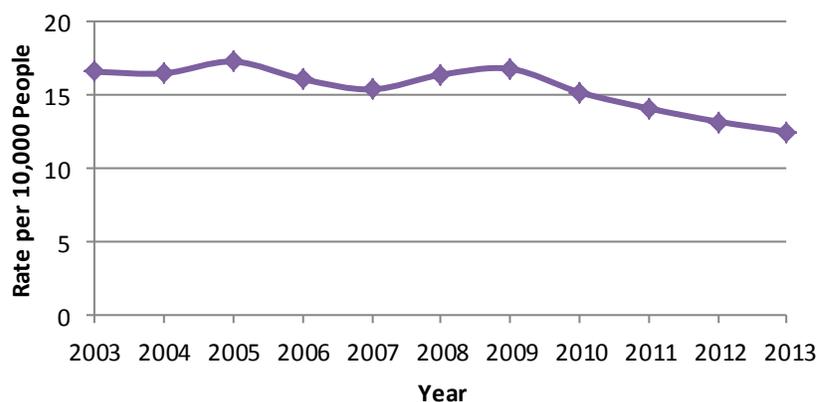
Geography: In 2011 through 2013, the asthma hospitalization rate in Michigan was 13.3 per 10,000 people. The total number of asthma hospitalizations in Michigan from 2011- 2013 was 40,851, for an average of 13,617 per year. Asthma hospitalizations and hospitalization rates have declined 24.7% from 16,572 (16.6 per 10,000 people) in 2003 to 12,837 (12.5 per 10,000 people) in 2013 (**Figure 1**).

Five counties had rates significantly higher than the 2011-2013 state rate: Wayne, Saginaw, Genesee, Monroe, and Ingham (**in descending order; Table 1**).

Table 1. Counties with age-adjusted asthma hospitalization rates significantly higher than the state rate, 2011-2013

County	Rate per 10,000 people (95% CI)
Michigan	13.3 (13.1-13.4)
Wayne	26.4 (26.0-26.9)
Saginaw	24.1 (22.8-25.4)
Genesee	18.2 (17.4-18.9)
Monroe	15.1 (14.0-16.2)
Ingham	15.1 (14.2-16.0)

Figure 1: Michigan Age-Adjusted Asthma Hospitalization Rate by Year , 2003-2013

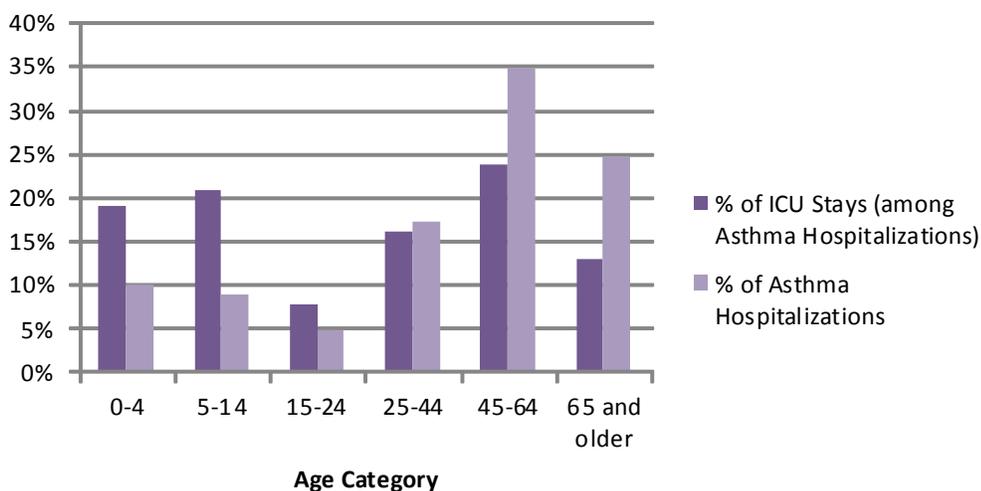


Demographics: Based on the 2011-2013 data, adults had higher rates of asthma hospitalization than children. The rate of hospitalization among adults (18 years and older) was 13.6 per 10,000 people. The rate of hospitalization among children (0-17 years) was 12.3 per 10,000 people. Females had a higher rate of hospitalization than males (16.1 and 10.1 per 10,000 people, respectively). Blacks had a higher rate of asthma hospitalizations than whites (38.2 and 8.9 per 10,000 people, respectively). Racial disparities in asthma hospitalization rates have decreased steadily between blacks and whites from 2004 (48.5 and 10.7 per 10,000 people, respectively), with a difference of 37.8, to 2013 (35.2 and 8.5 per 10,000 people, respectively), with a difference of 26.7.

ICU use: In 2011-2013, 5.8% of asthma hospitalizations included time in the ICU and 74.8% did not; records show 19.4% of hospitalizations did not indicate whether or not the ICU was used. In total, 2,352 out of 40,851 asthma hospitalizations included time in the ICU during the hospitalization in Michigan from 2011-2013.

Out of the 2,353 asthma hospitalizations that were known to require an ICU stay, most were 45 to 64 years old (n=555, 23.6%), followed by 5 to 14 year olds (n=489, 20.8%) and children 4 years or younger (n=446, 19.0%). The 15 to 24 year old group had the smallest number of visits with 182 (7.7%).

Figure 2: Percentage of all Asthma Hospitalizations and ICU Stays by Age Category in Michigan, 2011-2013



When comparing ICU usage with the corresponding asthma hospitalizations, the rates by age group are disproportional. Asthma hospitalizations among ages 4 years or younger, 5 to 14, and 15 to 24 represent a larger proportion of ICU stays than expected as compared with the percentage of asthma hospitalizations among these groups (Figure 2).

Conclusion:

Asthma hospitalization rates have been decreasing over time in Michigan. However, there are disparities in asthma burden geographically and between demographics. Identifying the groups most at-risk for asthma hospitalization can direct intervention efforts. Asthma control can be increased through education, medication use, and regular visits to a physician.

Asthma hospitalizations that require ICU use disproportionately affect children and young adults. Educating patients, parents, teachers, and healthcare workers about managing asthma symptoms and preparing and using an Asthma Action Plan could help asthma patients avoid hospitalization.

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