OHIO HOSPITAL DISCHARGES REPORT | 2004–2009

ASTHMA

Ohio Department of Health

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INTRODUCTION

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Asthma is a major public health concern in the United States. Increasing asthma prevalence, especially among children, is another cause for concern. It is estimated that more than one in seven children in Ohio are reported to have asthma (Ohio Family Health Survey, 2008) and close one in ten of adults (Centers for Disease Control, 2010).

According to the National Asthma Education and Prevention Program, asthma is considered to be an ambulatory care-sensitive condition, because with regular, effective outpatient care, the vast majority of hospitalizations due to asthma are preventable (National Heart, Lung and Blood Institute, 2007).

The burden of asthma can be estimated through a number of asthma-related events. Inpatient hospital discharge rates and emergency visit rates are important proxies for burden. It is important to note that asthma hospital discharge rates measure a severe outcome of the disease and can be used to help identify persons with asthma that are at higher risk of morbidity and mortality due to poor asthma control.

Each visit to the hospital represents a treatment failure–an asthma case out of control. In Ohio in 2009, there were 17.0 hospital discharges for patients with a primary diagnosis of asthma per 10,000 residents. Close to 20,000 discharges occurred in Ohio in 2009.

Tracking rates of hospital discharge can aid in identifying groups or areas with inadequate access to basic medical care. Hospitalizations represent asthma events that might have been prevented with proper management. Asthma inpatient hospital discharge data also give us important information about the cost of asthma in Ohio. With the Ohio Hospital Association (OHA) Statewide Clinical-Financial Data Base, we can identify:

- numbers and rates of hospital discharges
- hospital discharge rates by age, sex or county
- annual trends for asthma hospital discharges
- average length of stay for asthma
- charges associated with asthma hospitalization

These pieces of information tell us how asthma is affecting a person and their community. Asthma affects people with human, social and financial costs. Asthma surveillance can help quantify these costs in order to provide information about where to target interventions and resources.

What is considered a hospitalization for asthma?

The Council of State and Territorial Epidemiologists (CSTE) and the Centers for Disease Control and Prevention developed a standardized case classification for asthma to identify probable and possible asthma cases in hospital discharge data.

Confirmed Case: There is no confirmed case classification for hospital discharge data.

Probable Case: Hospital records listing the ICD-9-CM Code 493.0–493.9X as the primary discharge diagnosis.

Possible Case: Hospital records listing the ICD-9-CM Code 493.0–493.9X as the secondary discharge diagnosis.

For further information on ICD-9 Codes, see Description of Data, pages 45–46. Unless otherwise specified, this report will use the probable case definition of asthma with hospital discharges that have a primary diagnosis of asthma.

What are the limitations of this data set?

Asthma hospital discharge data are collected by the Ohio Hospital Association (OHA), a private organization that has agreed to share the data with Ohio Department of Health. The data are given by the hospitals to OHA Statewide Clinical-Financial Data Base on a voluntary basis.

Currently, all hospitals in Ohio contribute data to the OHA Statewide Clinical-Financial Data Base. It should be noted that these data are collected for billing and other administrative purposes, rather than surveillance purposes. As a result, some of the variables that would be of interest for surveillance, such as race, education level or income, are not collected.

There are some limitations to the OHA Statewide Clinical-Financial Data Base. Unique identifiers are not assigned, so there is no way of identifying multiple hospital discharges for individuals. However, the count and rate of total hospital discharges is a good representation of the asthma burden experienced by a community.

Even with all hospitals reporting, the OHA Statewide Clinical-Financial Data Base may not be a complete census of hospital discharges for Ohio residents. While efforts are employed to capture visits for asthma in other states, Ohio residents visiting other states are not reported in the data set.

For statistical stability, some counties with only a few cases, are calculated for multiple years.

It is also important to note that charges are not necessarily reflective of reimbursement received by any given hospital.

What are the numbers and rates for asthma inpatient hospital discharges in Ohio?

In 2009, there were 105,840 hospital discharges of Ohio residents with any mention of asthma in their diagnosis. Of these discharges, 19,578 had asthma listed as the primary diagnosis. Figure 1 shows the trend of these data from 2004-2009. As indicated in Figure 2, during 2009, for hospital discharges with asthma as the primary diagnosis, the rate was 17.0 per 10,000 residents.

For primary diagnosis of asthma inpatient hospital discharges, there was a 15.6 percent increase from 2004-2009 from 14.7 to 17.0 per 10,000 residents. Inpatient hospital discharges that had any mention of asthma increased 14.2 percent from 2004-2009, from 80.3 to 91.7 per 10,000 residents.

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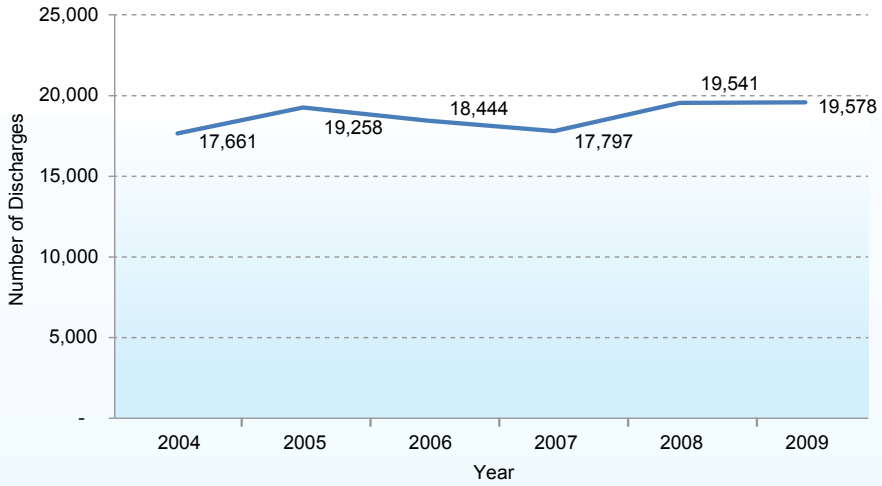
In 2009, there were 19,578 hospital discharges with a primary diagnosis of asthma, up 10.8 percent from 17,661 in 2004.

FIGURE 1

Number of Inpatient Hospital Discharges for Patients with a Primary Diagnosis of Asthma, by Year, Ohio, 2004-2009

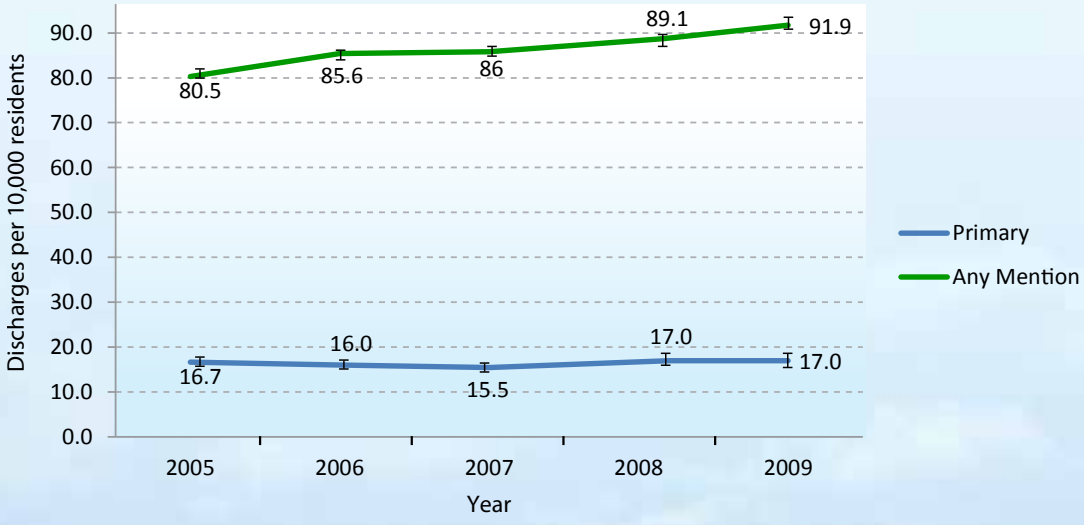


Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

There was 14.1 percent increase in hospital discharge rates for patients with any mention of asthma diagnosis from 2005 through 2009, a statistically significant difference. There is no significant difference in hospital discharges for patients with a primary diagnosis of asthma from 2005-2009.

FIGURE 2

Inpatient Hospital Discharge Rates for Patients with a Primary Diagnosis of Asthma and for Patients with Any Mention of Asthma by Year, Ohio 2005-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

How Does Ohio Compare with the **Healthy People 2010** Goals?

Healthy People 2010 is a set of health objectives developed by an alliance of more than 350 national membership organizations and 250 state health, mental health, substance abuse and environmental agencies. Healthy People 2010 goals are used by states, communities, professional organizations and others to develop programs to improve health. There are two overarching goals in Healthy People 2010: increase quality and years of healthy life and eliminate health disparities.

Objective 24-2 in Healthy People 2010 is to reduce hospitalizations for asthma.

The Healthy People 2010 goals for asthma hospitalization are:

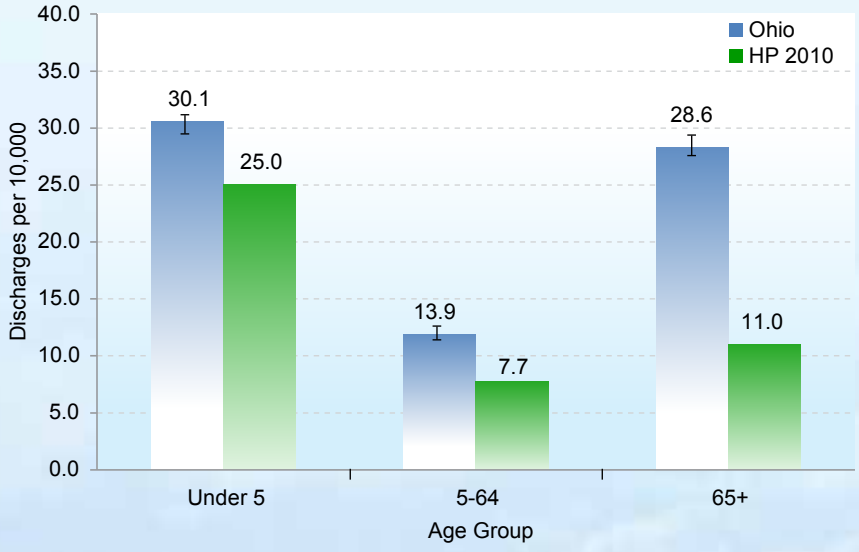
- **25/10,000 in children under age 5 years**
- **7.7/10,000 in children and adults age 5 to 64 years**
- **11/10,000 in adults aged 65 years and older**

As shown in Figure 3, Ohio exceeded all three of these targets by at least 39.2 percent in 2009. For adults 65 and older, the target is exceeded by 150 percent. The inpatient hospital discharge rates for patients with a primary diagnosis of asthma are 34.8 per 10,000 residents for children under 5; 12.6 per 10,000 residents for adults and children aged 5 to 64; and 27.5 per 10,000 residents for adults 65 and older.

Ohio hospital discharge rates for a primary diagnosis of asthma exceed the Healthy People 2010 targets for all age groups by large margins. For adults over age 65, the Healthy People 2010 benchmark is exceeded by 150 percent.

FIGURE 3

Inpatient Hospital Discharge Rates for Patients with a Primary Diagnosis of Asthma, Ohio, 2009, Compared to Healthy People 2010



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

What Are The Demographic Trends For Asthma Hospital Discharges?

Ohio Hospital Association Discharge Data are stratified by sex, age, and county. As seen in Figure 4, close to twice as many females than males were discharged from the hospital for a primary diagnosis of asthma in 2009 (6,908 males and 12,670 females). These figures are consistent with the difference in current adult asthma prevalence rates, where women (11.7 percent) have a significantly higher asthma prevalence than men (7.9 percent) for current asthma (Behavioral Risk Factor Surveillance System, 2009).

Figure 5 shows that females also had nearly twice the rate of hospital discharge as males for a primary diagnosis of asthma in 2009 (females at 21.4, and males at 12.3 per 10,000 residents).

For possible cases of asthma, with any mention of asthma in the hospital discharge, rates increased for males and females at approximately the same rate, 14.4 percent and 14.2 percent, respectively. Similar to other statistics, Figure 6 shows that the inpatient hospital discharge rate for inpatient stays with any mention of asthma in the diagnosis is more than twice as high for females than for males in 2009 (126.5 per 10,000 residents for females and 55.7 per 10,000 residents for males).

The age group with the highest number of inpatient hospital discharges with a primary diagnosis of asthma was for residents aged 35–64 (8,533 discharges) in 2009, shown in Figure 7. In 2009, the fewest number of discharges with a primary diagnosis of asthma were for children aged 5 to 14 (2,053).

Of all discharges with a primary diagnosis of asthma in 2009, 21.8 percent were for children under the age of 14 and younger. About one-fourth (23.4 percent) of patients with primary diagnosis of asthma were 65 years old and over.

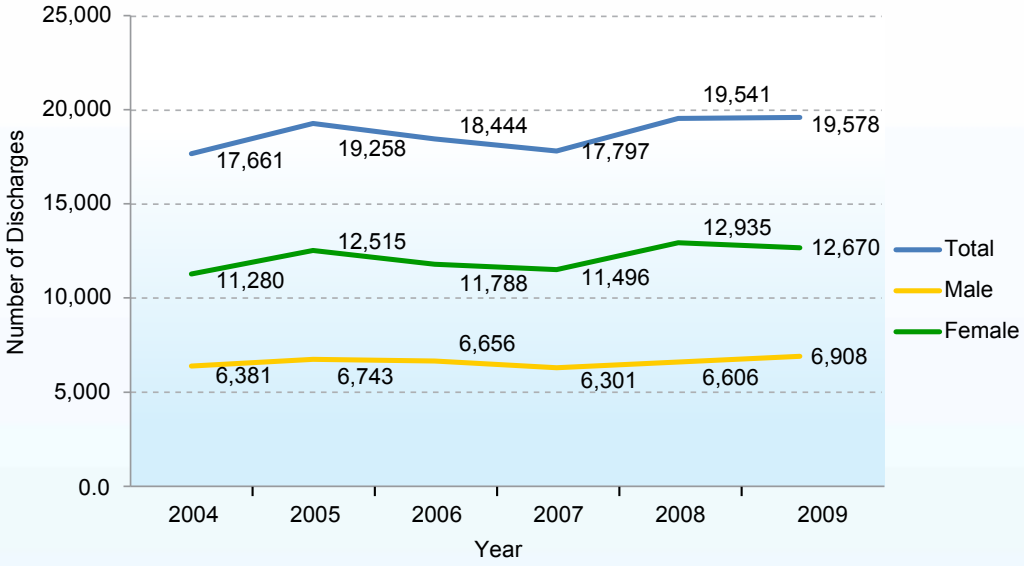
The highest hospital discharges rates for primary diagnosis of asthma are for children under age 5 (30.0 per 10,000 residents), slightly higher than the next nearest age group in 2009. However, Figure 8 shows in this age group there has been a significant decline from a high of 35.5 per 10,000 in 2006 to 2009. Rates of hospital discharges with a primary diagnosis of asthma are rising the fastest for adults aged 65 and older, from 26.0 per 10,000 residents in 2004 to 29.3 per 10,000 residents in 2009, a significant difference since 2006. Rates remain low for children and young adults aged 15-34 years compared with Healthy People 2010 targets.

Hospital discharge rates for primary diagnosis of asthma were calculated for all Ohio counties for the years 2007-2009. County rates significantly higher than the state average rate of 16.2 hospital discharges per 10,000 residents were concentrated in the urban areas (with the exception of Columbus), along Lake Erie and in Northeast Appalachian counties, shown in Figure 9. Cuyahoga is notably higher than other counties, at 28.7 hospital discharges per 10,000 residents. Monroe County is the lowest, at 3.9 discharges per 10,000 residents. Rates of hospital discharges for males were concentrated in Northeast Ohio. Females had higher rates of hospital discharge in Appalachian counties (Figure 9).

There were nearly twice as many inpatient hospital discharges for patients with a primary diagnosis of asthma for females than for males in 2009.

FIGURE 4

Number of Inpatient Hospital Discharges for Patients with a Primary Diagnosis of Asthma, by Sex and Year, Ohio, 2004-2009

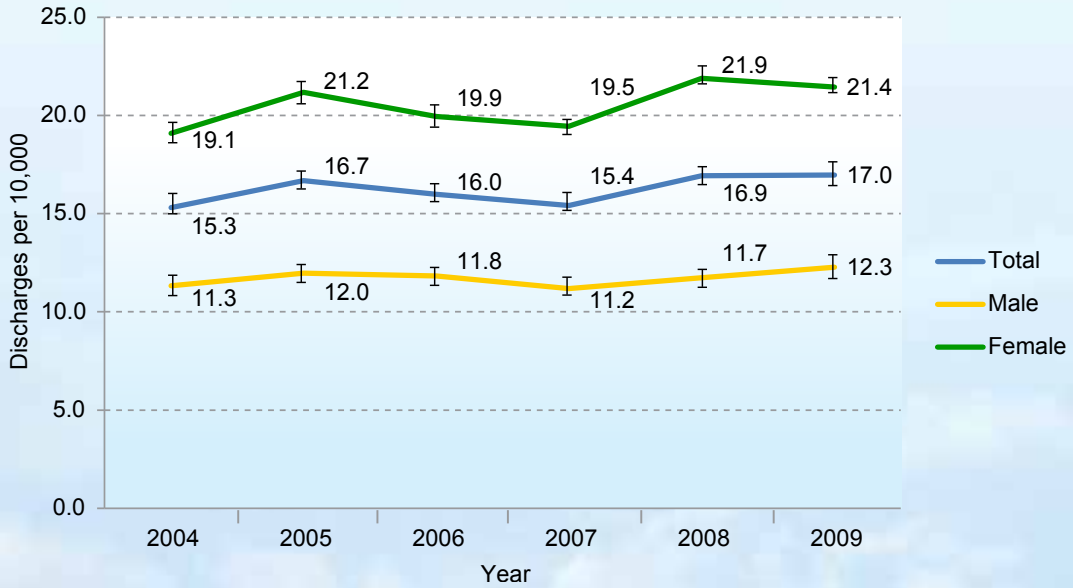


Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

Hospital discharge rates for patients with a primary diagnosis of asthma remain almost twice as high for females than for males from 2004-2009, statistically different in all years.

FIGURE 5

Inpatient Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma by Sex and Year, 2004-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

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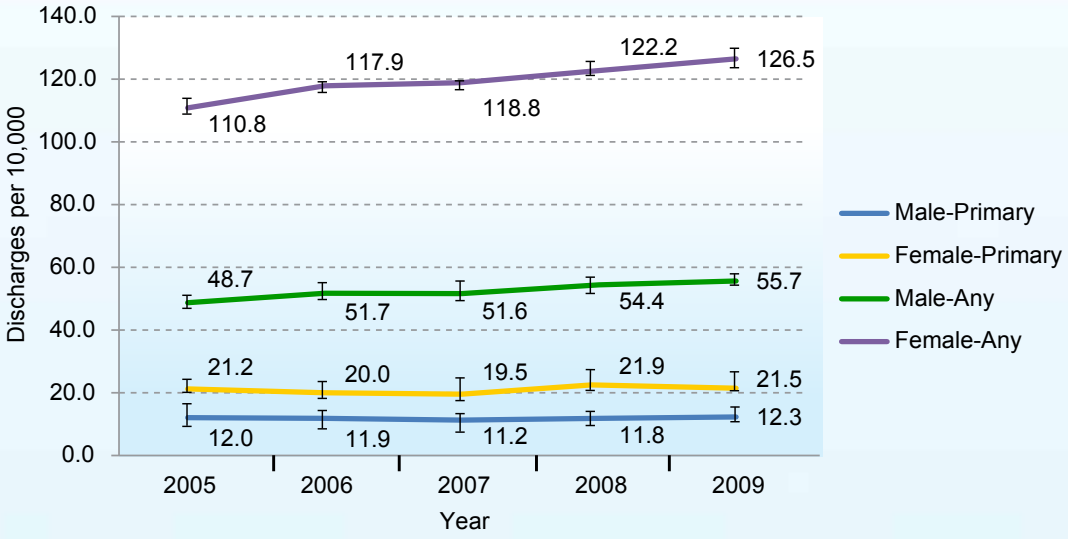
For possible cases of asthma, with any mention of asthma in the diagnosis at hospital discharge, the rate of discharges increased for males and females at approximately the same rate, 14.4 percent and 14.2 percent, respectively. Discharge rates for patients with a primary diagnosis of asthma remained fairly consistent for both sexes from 2005-2009. Discharge rates were significantly higher in all years for females who were discharged from an inpatient hospital visit with any mention of asthma.

FIGURE 6

Inpatient Hospital Discharge Rates for Patients with a Primary Diagnosis of Asthma or Any Mention of Asthma, by Sex and Year, Ohio, 2005-2009

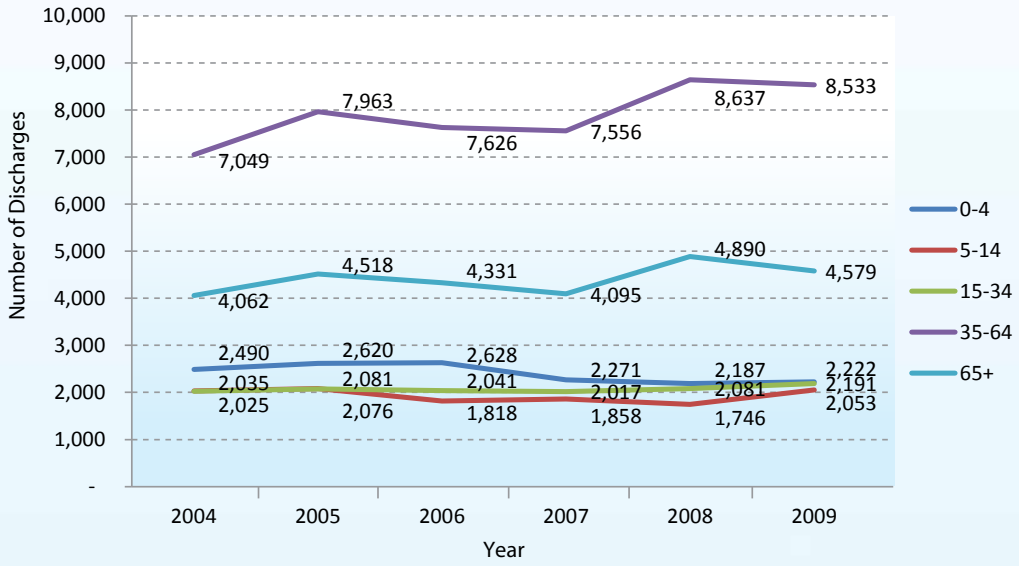


Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

Of all discharges with a primary diagnosis of asthma in 2009, 21.8 percent were for children aged 14 years and younger. About one-fourth (23.4 percent) of patients with primary diagnosis of asthma were 35 through 64. People in age groups 0-4 years, 5-14 years and 15-34 years are significantly less likely to be hospitalized for asthma than people aged 35- 64 years.

FIGURE 7

Inpatient Hospital Discharge for Patients with a Primary Diagnosis of Asthma or Any Mention of Asthma, by Sex and Year, Ohio, 2005-2009

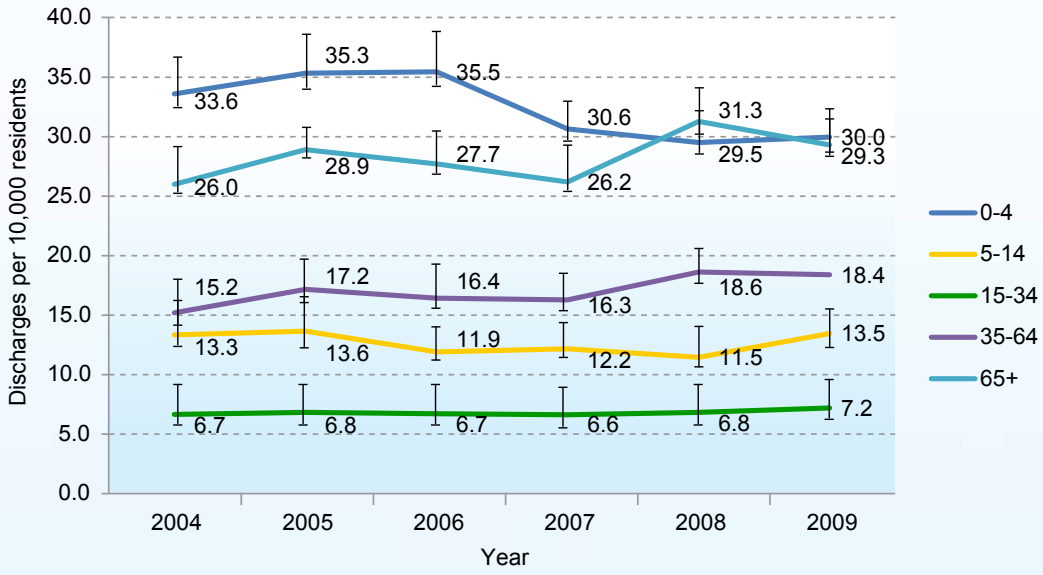


Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

The highest rates for hospital discharges with a primary diagnosis of asthma are for children under age 5 years of age (30.0 per 10,000 residents). Rates remain lower for children and young adults aged 15- 34 years than for the other age groups.

FIGURE 8

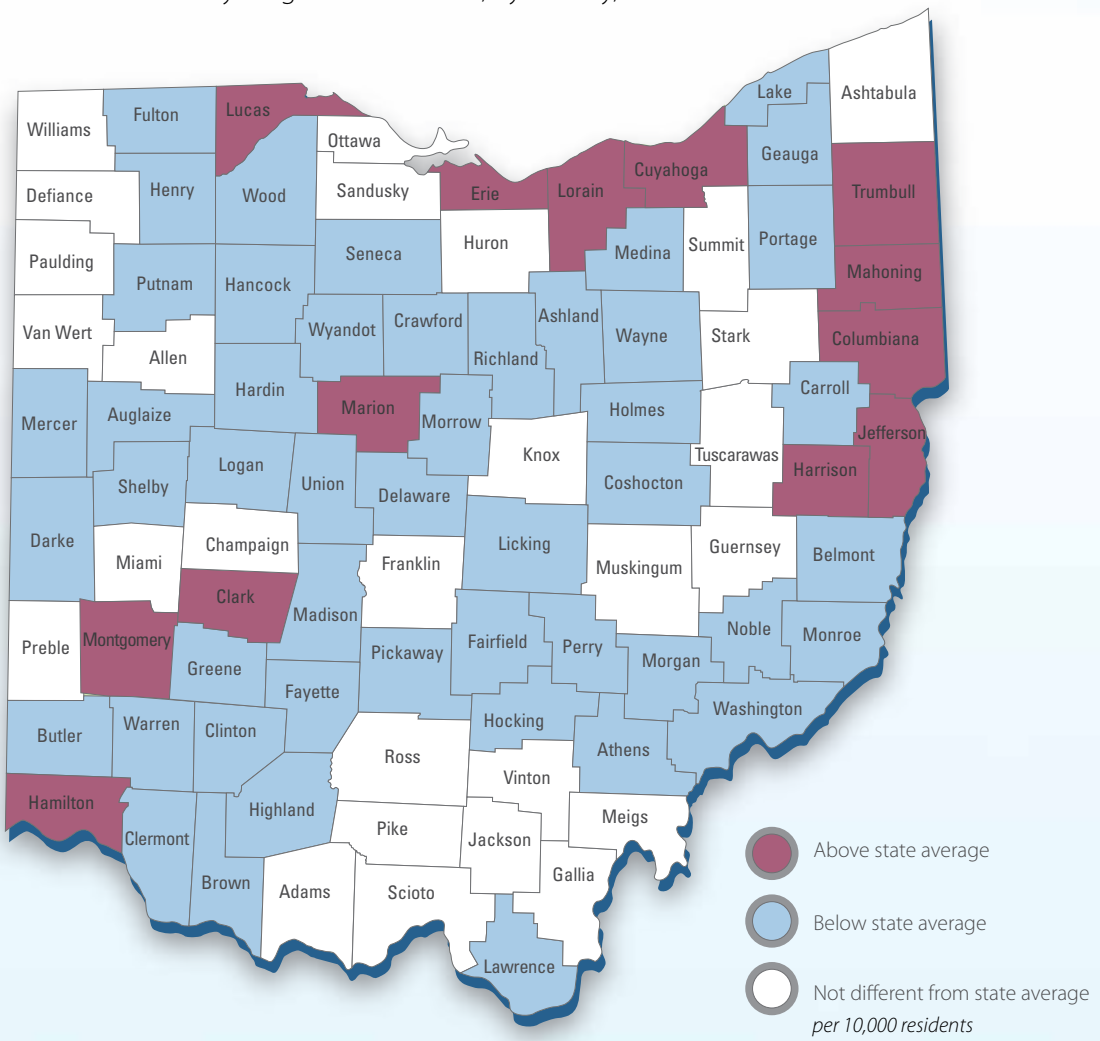
Inpatient Hospital Discharge Rates for Patients with a Primary Diagnosis of Asthma by Age Group and Year, Ohio 2004-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

Comparision of Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by County, Ohio 2007-2009

FIGURE 9



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

County rates significantly higher than the state average rate were concentrated in the urban areas, along Lake Erie and in Northeast Appalachian counties. Cuyahoga is notably higher than other counties; Monroe County is the lowest, at 3.9 discharges per 10,000 residents. Individual county rates can be found in Table 8.

How Long do People Stay in the Hospital for Asthma?

The average length of stay in the hospital for patients with a primary diagnosis of asthma is fairly consistent, from 3.4 days in 2004 to 3.5 days in 2009, as shown in Figure 10. Females had an average length of stay of 3.8 days, and males had an average of 3.0 days in 2009, a significant difference between sexes in all years.

In 2009, 24.5 percent of patients with a primary diagnosis of asthma had stays that were less than two days. Figure 11 shows that the two youngest age groups (children under 5 and children aged 5 through 14) had the shortest average length of stay, at 2 and 2.2 days respectively. The longest average stays were for adults age 65 and over. The length of stay for this age category dropped dramatically between 2007 and 2008, from 4.7 days to 3.8 days.

For every age group, females have a longer length of stay than males.

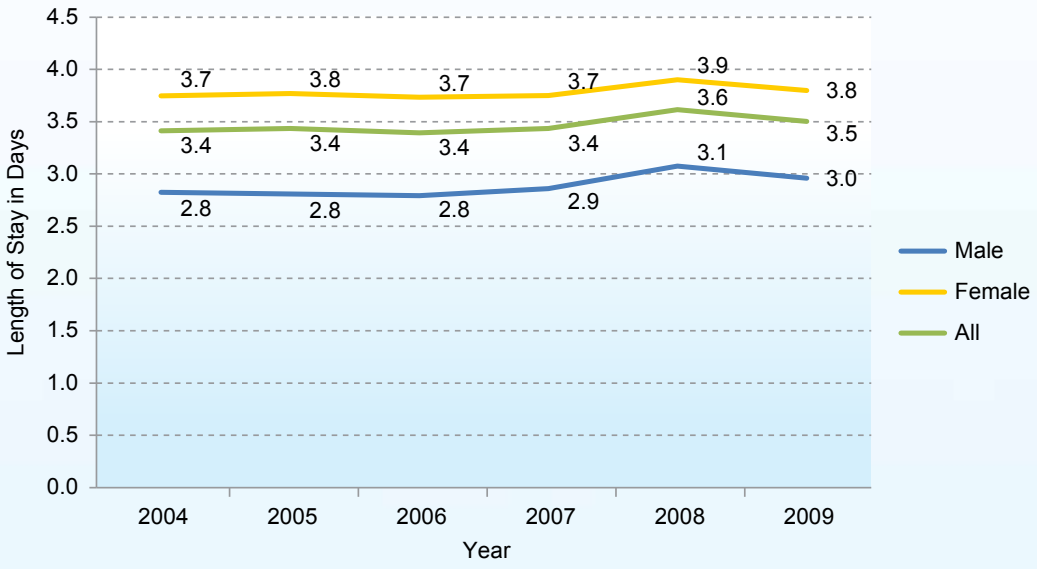
During 2007–2009, average length of stay for patients with a primary diagnosis of asthma varied widely by county. The highest average length of stay for patients with a primary diagnosis of asthma was experienced by residents of Monroe County (4.7 days), shown in Figure 12. The lowest average length of stay for patients with a primary diagnosis of asthma was experienced by residents of Fayette County (2.6 days) Counties with the highest average length of stay significantly above the state average were located in extreme Northeast Ohio and the middle of the Appalachian region. Most counties below the state average length of stay are in South Central Ohio.

The longest average hospital stays were for adults age 65 and over. The length of stay for this age category dropped dramatically between 2007 and 2008, from 4.7 days to 3.8 days.

From 2004 through 2009 average length of stay for hospital discharges for patients with a primary diagnosis of asthma stayed fairly consistent for both sexes. In 2009, the average length of stay was 3.5 days for patients with a primary diagnosis of asthma, and females tended to stay longer than males, 3.8 vs. 3.0 days, respectively.

FIGURE 10

Average Length of Stay for Patients with a Primary Diagnosis of Asthma, by Sex and Year, Ohio, 2004-2009

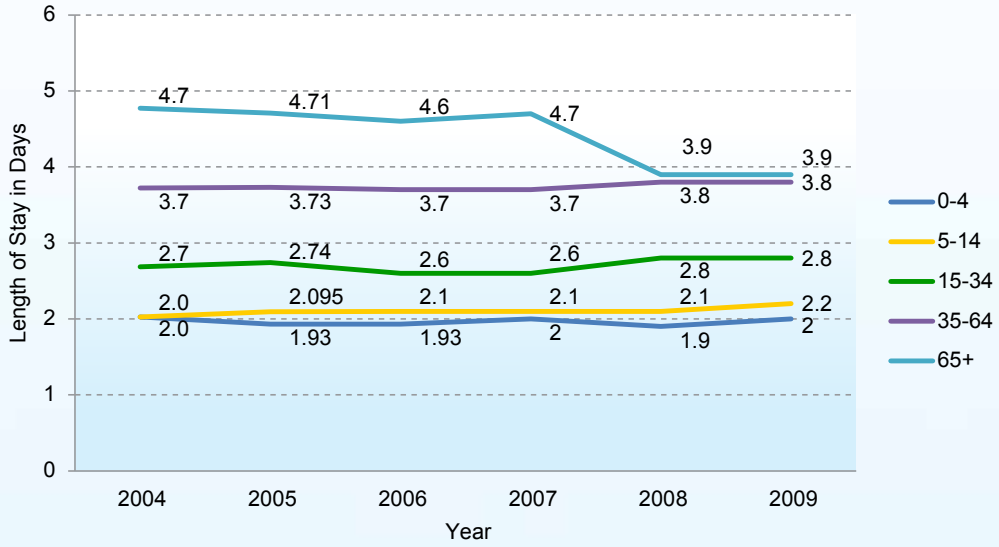


Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

The two youngest age groups had the shortest average length of stays. The longest average stays were for adults age 65 and over. The length of stay for this age category dropped dramatically between 2007 and 2008, from 4.7 days to 3.9 days. Children under age 15 have significantly shorter stays than adults over age 35.

FIGURE 11

Average Length of Stay, in Days, for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, Ohio, 2004-2009

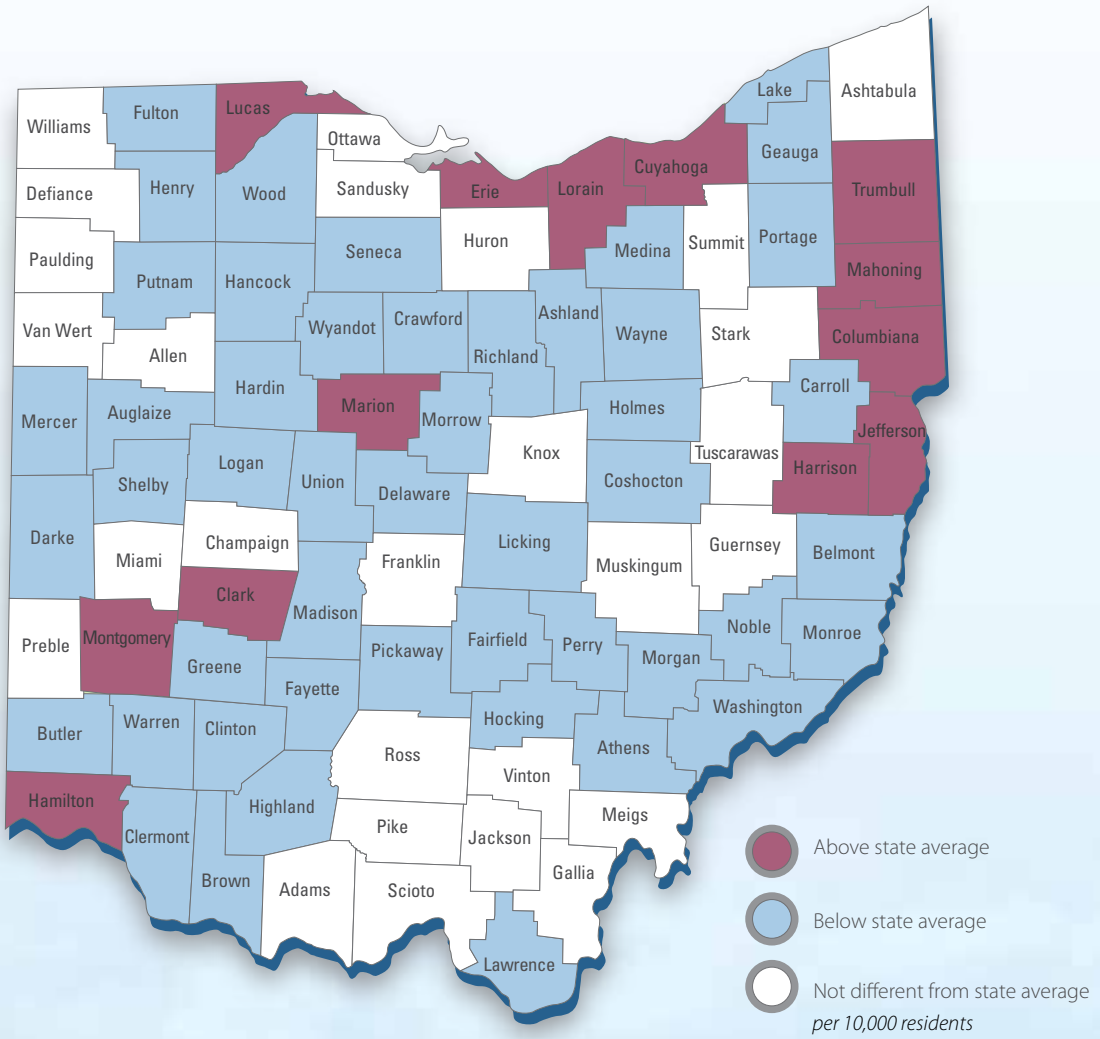


Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

The highest average length of stay for patients with a primary diagnosis of asthma was experienced by residents of Monroe County (4.7 days). The lowest average length of stay for patients with a primary diagnosis of asthma was experience by residents of Fayette County (2.6 days).

Counties with the highest average length of stay significantly above the state average were located in extreme Northeast Ohio and the middle of the Appalachian region. Most counties below the state average length of stay are in South Central Ohio.

FIGURE 12 Comparision of Average Length of Stay for Inpatient Hospital Discharges for Patients with a Primary Diagnosis of Asthma, by County, Ohio 2007-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

What are Average Charges for Asthma Inpatient Hospitalizations in Ohio?

The average charge for an inpatient stay due to a primary diagnosis of asthma increased from $10,163 in 2005 to $14,648 in 2009, a 44.1 percent increase in five years (Figure 13), unadjusted for inflation.

With longer average lengths of stay, it stands to reason that females with a primary diagnosis of asthma have higher average charges for inpatient hospitalization. Females had an average charge of $15,574 per stay, compared to males at $12,945 in 2009, as shown in Figure 14.

Children under age 5 with a primary diagnosis of asthma had the lowest average charges of any age group, at $8,205 per stay, which is consistent with their short average length of stay, displayed in Figure 15. Adults age 65 and over have the highest average charges at $18,436 per stay. Average inpatient hospital charges for patients with a primary diagnosis of asthma are increasing the fastest among children under 5 years of age, at 48.0 percent from 2005 through 2009. They are rising slowest among children aged 5 through 14, increasing 34.2 percent from 2005 through 2009.

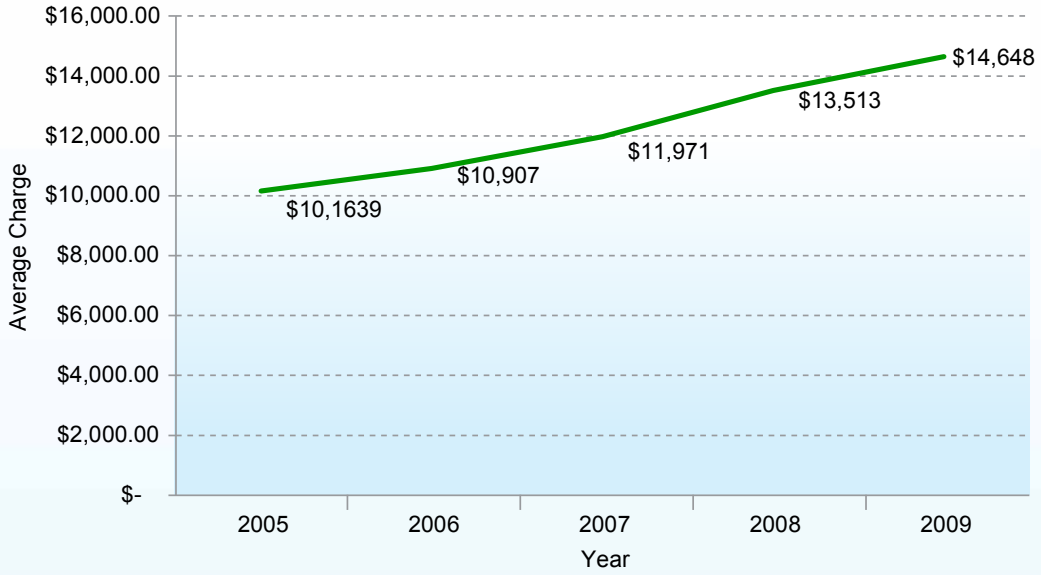
Average charges for a hospital stay due to primary diagnosis of asthma varied widely among counties, shown in Figure 16. The highest average charge was experienced among Lucas County residents, at $17,967, and the lowest average charge was among Crawford County residents, at $6,486. As shown in Figure 19, counties with average hospital charges significantly higher than the state average contains counties and surrounding areas of the major cities of Toledo, Akron, Dayton, and Cleveland. Counties with charges significantly below average charges are mostly rural counties.

Children under age 5 with a primary diagnosis of asthma had the lowest average charges of any age group, at $8,205 per stay

The average cost for an inpatient stay due to a primary diagnosis of asthma increased from $10,163 in 2005 to $14,648 in 2009, a 44.1 percent increase, unadjusted for inflation.

FIGURE 13

Average Charges for Inpatient Hospital Discharges for Patients with a Primary Diagnosis of Asthma by Year, Ohio 2005-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

Both sexes saw significant increases in the charges for hospital stays for patients with a primary diagnosis of asthma from 2005- 2009. Females consistently had significantly higher charges for hospital stays than males.

FIGURE 14

Average Charges at Inpatient Hospital Discharge for Patients with a Primary Diagnosis of Asthma, by Sex and Year, Ohio, 2005-2009

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

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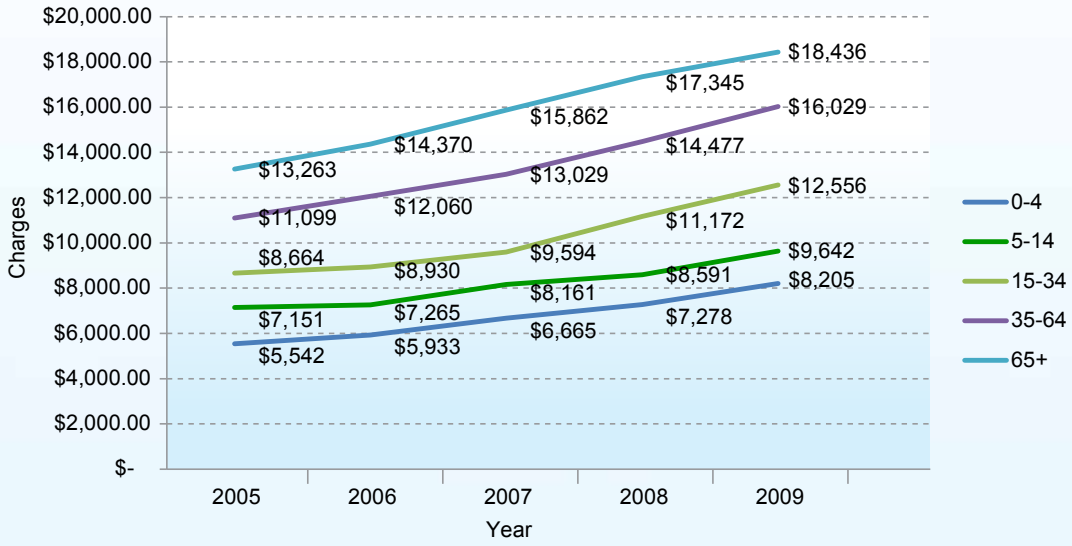
While the discharge rates for patients with a primary diagnosis of asthma are highest for children under 5 years of age, the larger costs are found among older adults, who tend to have longer stays. Children under age 15 have significantly fewer charges per visit than adults over 35 years of age.

FIGURE 15

Average Charges at Inpatient Hospital Discharge for Patients with a Primary Diagnosis of Asthma by Age Group and Year, Ohio, 2005-2009

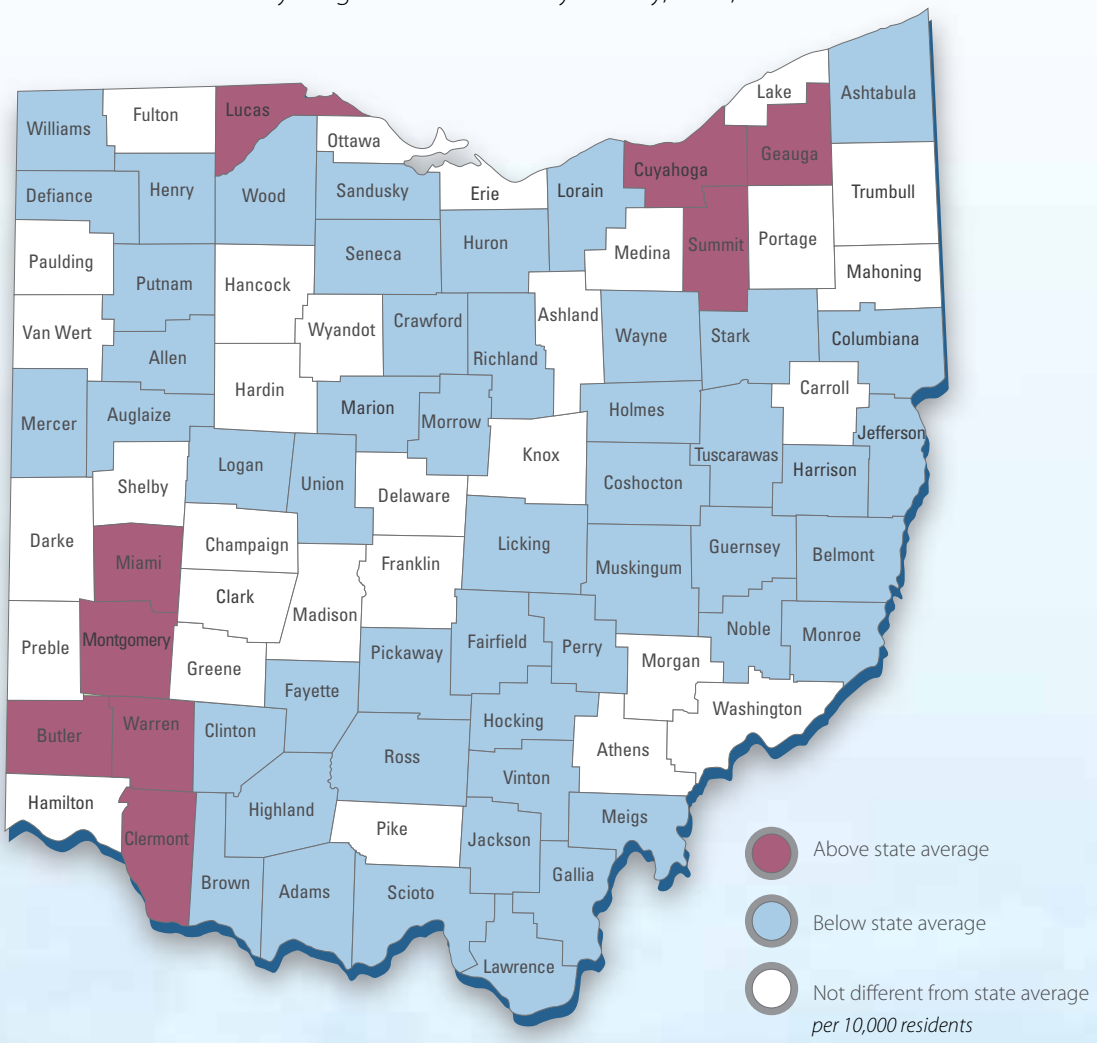


Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

Counties with average hospital charges significantly higher than the state average include counties and surrounding areas of the major cities of Toledo, Akron, Dayton, and Cleveland. Counties with charges significantly below state average charges are mostly rural and Appalachian counties.

FIGURE 16

Comparision of Average Charges at Inpatient Hospital Discharge of Patients with a Primary Diagnosis of Asthma by County, Ohio, 2007-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

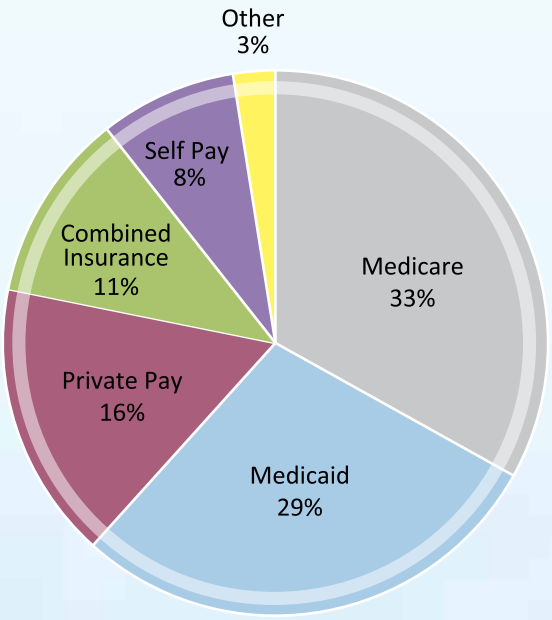
Who are the Payers for Inpatient Hospital Discharges for Asthma?

The majority of these inpatient hospital stays for patients with a primary diagnosis of asthma are paid for by public funds, as shown in Figure 17. In 2009, the payer for 33.0 percent of these cases was Medicare, and 29.0 percent by Medicaid. Private pay insurance paid for 16 percent, and a combination of other insurance paid for 11 percent.

The majority of inpatient hospital charges related to a primary diagnosis of asthma are paid for by the public funds of Medicare and Medicaid.

FIGURE 17

Payers for Hospital Inpatient Stays for Patients with a Primary Diagnosis of Asthma, Ohio, 2007-2009



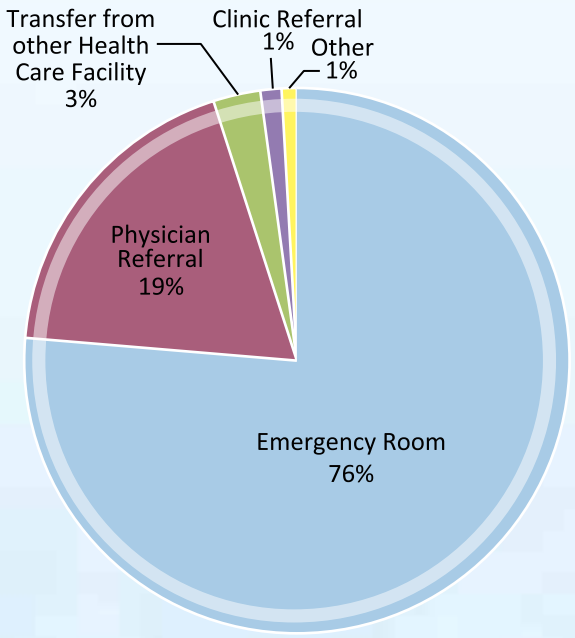
Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

Who Admits Asthma Patients to the Hospital?

Figure 18 shows that most inpatient hospital admissions of patients with a primary diagnosis of asthma are made from the emergency department (76 percent). Another 19.0 percent of patients are admitted by a physician's referral, with much smaller percentages admitted from HMO referral and clinic referral. Three percent are transferred from another health care facility.

The majority of patients admitted to the hospital with a primary diagnosis of asthma are admitted from the emergency department (76 percent).

FIGURE 18 Original Admission Source for Inpatient Hospital Stays for Patients with a Primary Diagnosis of Asthma, Ohio, 2007-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

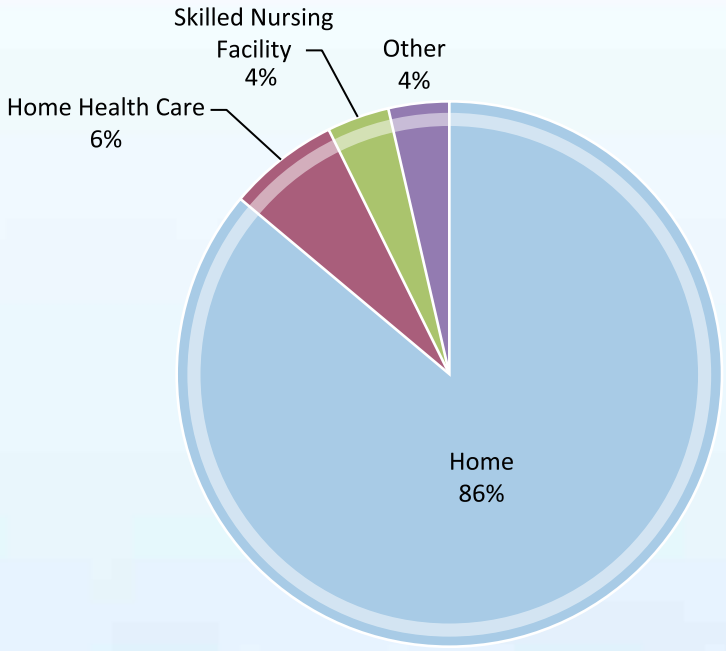
Where do asthma patients go after hospitalization?

In 2009, upon discharge from the hospital, 86 percent of patients with primary diagnosis of asthma were discharged to home, and an additional 6 percent were discharged to home with home health care, as shown in Figure 19. Smaller groups went to a skilled nursing facility (4 percent), or another destination (4 percent).

In 2009, upon discharge from the hospital, 86 percent of patients with primary diagnosis of asthma were discharged to home.

FIGURE 19

Discharge Status of Inpatient Hospital Stays for Patients with a Primary Diagnosis of Asthma, Ohio, 2007-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

RECOMMENDATIONS

The Ohio Statewide Asthma Plan has several goals and objectives in its section "Action to Change the Course of Asthma" that relate to decreasing inpatient hospitalizations related to asthma. This section of the plan outlines specific goals and objectives to reducing the burden of asthma in Ohio. They reflect the major areas of priority as identified by the Ohio Department of Health Asthma Program and the Ohio Asthma Coalition.

These include:

GOAL 3

Decrease the number of asthma hospitalizations, emergency department, and urgent care visits.

OBJECTIVE 3.1

Increase the percentage of asthma patients who receive self-management education, including developing and using a customized self-management plan, recognizing early signs or symptoms of an asthma episode, understanding what to do during an asthma episode or attack, and adjusting medications according to the individualized Asthma Action Plan.

OBJECTIVE 3.2

Improve systems and policies to support asthma management in work, schools, clinical, and home settings.

OBJECTIVE 3.3

Identify and reduce exposure to outdoor asthma triggers.

Goal 3 represents the heart of what the Ohio Statewide Asthma Plan is trying to accomplish. By improving self-management of asthma through identified and evidence-based guidelines, we are confident we will see a decrease in associated asthma morbidity. However, we realize that sustainable outcomes will not be achieved without systems and policy changes to support these changes. Systems and policy changes must be multi-focused and must approach asthma not only in a clinical setting, but everywhere that people with asthma live, work, learn, and play.

The Ohio Asthma Coalition is focusing on developing evidence-based initiatives appropriate for statewide implementation, and will be implementing these multi-focal interventions in a limited way to assure effectiveness before beginning statewide implementation (clinical, school, and home in early phases).

Recommendations

- Physicians should recommend inhaled corticosteroids as the best option for anti-inflammatory therapy for adult and childhood asthma. In particular, physicians should recommend that people with frequent symptoms, severe asthma exacerbations or both should receive regular treatment with inhaled corticosteroids.

- Education is an essential component of asthma therapy and should be offered to all patients. Educational interventions may be of particular benefit in patients with severe asthma, at the time of emergency department visits and admissions to hospitals, and also at follow-up visits.

- Asthma education should aim primarily at changing patient behavior, rather than simply improving knowledge. Patients with asthma-related morbidity and frequent emergency department and hospital use should receive targeted asthma education. Structured education, with a written self-management plan, regular office visits and review of key concepts can reduce the number of inpatient hospital visits.

- Allergens to which a person is sensitized should be identified and a systematic program to eliminate, or at least to substantially reduce, allergen exposure in sensitized people should be undertaken. Examples of allergen reduction can include eliminating cats or dogs in the home, avoiding tobacco smoke, and ensuring a home free of dampness. For people sensitized to house dust mites, appropriate environmental controls should be used to reduce the size of dust mite colonies.

Conclusion

Unfortunately, in Ohio, poor control remains prevalent among children and adults with asthma, resulting in preventable morbidity, emergency department visits, admissions to hospitals and even death.

In many cases, poor asthma outcomes can be avoided by ensuring that inhaled corticosteroids are started early and used as long-term maintenance therapy, with special care taken to ensure patient compliance. Other important elements to maintaining good asthma control are environmental control measures, asthma education, treatment of comorbidities, such as tobacco use and diabetes, and appropriate use of a variety of short-term and long-term asthma therapies.

Technical Notes

Statistical Significance

The standard used in this document to assess the significance of a statistical test is p-value = 0.05. A p value less than or equal to 0.05 indicates that there is at most a 5 percent chance of observing a difference, given that, in reality, rates are similar. In this case, the result is considered statistically significant. If the p value is greater than 0.05, chance cannot be excluded as a likely explanation for the observed difference, so the result is not considered statistically significant.

The purpose of a confidence interval (CI) is to estimate the statistical uncertainty around a particular measure. Confidence intervals can also be used to determine if the difference between two percentages or rates are statistically significantly different. If the confidence intervals do not overlap, the groups are likely to be significantly different from each other. In this report, 95% confidence intervals are provided for rates.

TABLE 1

Number of Hospital Discharges for Patients in Ohio with a Primary Diagnosis of Asthma, by Sex and Year, 2004-2009

Year	Total	Male	Female
2004	17,661	6,381	11,280
2005	19,258	6,743	12,515
2006	18,444	6,656	11,788
2007	17,797	6,301	11,496
2008	19,541	6,606	12,935
2009	19,578	6,908	12,670

TABLE 2

Numbers of Ohio Hospital Discharges for Patients with a Primary Diagnosis of Asthma and for Patients with Any Mention of Asthma, by Sex and Year, 2005-2009

Year	Male-Primary	Female- Primary	Male-Any	Female-Any
2005	6,743	12,515	27,315	65,392
2006	6,656	11,788	29,008	69,554
2007	6,301	11,496	28,964	70,088
2008	6,606	12,935	30,505	72,107
2009	6,908	12,670	31,237	74,602

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 3

Ohio Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Sex and Year, 2004-2009

Year	Total	Lower CI	Upper CI	Male-Primary	Lower CI	Upper CI	Female-Primary	Lower CI	Upper CI	Male-Any	Lower CI	Upper CI	Female-Any	Lower CI	Upper CI
2005	16.7	16.4	18.8	12	11.7	14.1	21.2	20.8	23.3	48.7	48.1	49.2	110.8	110.0	111.7
2006	16	15.7	18.1	11.8	11.5	13.9	19.9	19.6	22.1	51.7	51.1	52.3	117.9	117.0	118.8
2007	15.4	15.2	17.5	11.2	10.9	13.3	19.5	19.1	21.6	51.6	51.0	52.2	118.8	117.9	119.7
2008	16.9	16.7	19	11.7	11.4	13.8	21.9	21.5	24	54.4	53.7	55.0	122.2	121.3	123.1
2009	17	16.7	19	12.3	12	14.4	21.4	21.1	23.6	55.7	55.0	56.3	126.5	125.6	127.4

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 4

Ohio Hospital Discharges for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, 2004-2009

Age Group	Year					
	2004	2005	2006	2007	2008	2009
0-4	2,490	2,620	2,628	2,271	2,187	2,222
5-14	2,035	2,081	1,818	1,858	1,746	2,053
15-34	2,025	2,076	2,041	2,017	2,081	2,191
35-64	7,049	7,963	7,626	7,556	8,637	8,533
65+	4,062	4,518	4,331	4,095	4,890	4,579

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 5

Ohio Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma and Any Mention of Asthma, by Age Group and Year, 2004-2009

Age Group	Year					
	2004	2005	2006	2007	2008	2009
0-4	33.6	35.3	35.5	30.6	29.5	30.0
5-14	13.3	13.6	11.9	12.2	11.5	13.5
15-34	6.7	6.8	6.7	6.6	6.8	7.2
35-64	15.2	17.2	16.4	16.3	18.6	18.4
65+	26.0	28.9	27.7	26.2	31.3	29.3

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 6

Number of Inpatient Hospital Discharges in Ohio for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, 2004-2009

Age Group	Year					
	2004	2005	2006	2007	2008	2009
0-4	2,490	2,620	2,628	2,271	2,187	2,222
5-14	2,035	2,081	1,818	1,858	1,746	2,053
15-34	2,025	2,076	2,041	2,017	2,081	2,191
35-64	7,049	7,963	7,626	7,556	8,637	8,533
65+	4,062	4,518	4,331	4,095	4,890	4,579

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 7

Ohio Inpatient Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, 2004-2009

Age Group	Year																	
	2004	Lower CI	Upper CI	2005	Lower CI	Upper CI	2006	Lower CI	Upper CI	2007	Lower CI	Upper CI	2008	Lower CI	Upper CI	2009	Lower CI	Upper CI
0-4	33.6	32.3	36.2	35.3	34.0	38.0	35.5	34.1	38.1	30.6	29.4	33.2	29.5	28.3	32.1	30.0	28.7	32.6
5-14	13.3	12.8	15.6	13.6	13.1	15.9	11.9	11.4	14.2	12.2	11.6	14.4	11.5	10.9	13.7	13.5	12.9	15.7
15-34	6.7	6.4	8.8	6.8	6.5	8.9	6.7	6.4	8.8	6.6	6.3	8.7	6.8	6.5	8.9	7.2	6.9	9.3
35-64	15.2	14.8	17.3	17.2	16.8	19.3	16.4	16.1	18.6	16.3	15.9	18.4	18.6	18.2	20.8	18.4	18.0	20.5
65+	26.0	25.2	28.4	28.9	28.1	31.3	27.7	26.9	30.1	26.2	25.4	28.6	31.3	30.4	33.7	29.3	28.4	31.7

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 8 Number of Ohio Inpatient Hospital Discharges and Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by County and Sex, 2007-2009

County	Male Number	Female Number	Total Number	Male Rate	Female Rate	Total Rate	Significantly Different from State Average
Adams	38	99	137	9.1	23.2	16.2	no
Allen	200	269	469	12.8	16.9	14.9	no
Ashland	47	81	128	5.8	9.7	7.8	lower
Ashtabula	158	371	529	10.6	24.0	17.4	no
Athens	26	42	68	2.8	4.3	3.6	lower
Auglaize	53	86	139	7.7	12.1	9.9	lower
Belmont	44	131	175	4.3	12.8	8.5	lower
Brown	38	113	151	5.8	17.0	11.5	lower
Butler	450	824	1,274	8.6	15.1	11.9	lower
Carroll	13	46	59	3.0	10.6	6.8	lower
Champaign	46	93	139	7.9	15.5	11.7	lower
Clark	309	534	843	15.2	24.5	20.0	higher
Clermont	198	426	624	6.9	14.5	10.8	lower
Clinton	45	98	143	7.2	14.9	11.1	lower
Columbiana	254	434	688	15.6	26.6	21.1	no
Coshocton	30	69	99	5.6	12.4	9.1	lower
Crawford	22	44	66	3.4	6.4	5.0	lower
Cuyahoga	3,823	7,324	11,148	20.8	35.8	28.7	higher
Darke	33	89	122	4.3	11.2	7.8	lower
Defiance	54	89	143	9.5	15.2	12.4	no
Delaware	102	173	275	4.3	7.2	5.7	lower
Erie	168	296	464	14.8	25.0	20.0	no
Fairfield	89	173	262	4.2	8.2	6.2	lower
Fayette	16	53	69	3.9	12.3	8.2	lower
Franklin	1,952	2,961	4,913	11.9	17.2	14.6	no
Fulton	45	82	127	7.2	12.7	10.0	lower
Gallia	63	136	199	13.9	28.8	21.5	no
Geauga	81	226	307	5.5	15.2	10.4	lower
Greene	159	240	399	6.9	9.8	8.4	no
Guernsey	46	93	139	7.8	15.0	11.5	lower
Hamilton	1,599	2,911	4,510	13.1	21.8	17.6	higher
Hancock	38	91	129	3.5	8.0	5.8	lower
Hardin	26	58	84	5.6	11.9	8.8	lower
Harrison	45	74	119	19.9	31.3	25.7	higher
Henry	31	48	79	7.2	10.9	9.1	lower
Highland	43	89	132	6.9	13.8	10.4	lower

Table 8 continued on page 34

TABLE 8
continued from page 33

Number of Ohio Inpatient Hospital Discharges and Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by County and Sex, 2007-2009

County	Male Number	Female Number	Total Number	Male Rate	Female Rate	Total Rate	Significantly Different from State Average
Hocking	24	47	71	5.6	10.7	8.2	lower
Holmes	19	55	74	3.1	8.8	6.0	lower
Huron	123	196	319	13.9	21.4	17.7	higher
Jackson	38	91	129	7.9	17.5	12.9	lower
Jefferson	157	338	495	15.9	31.4	24.0	higher
Knox	65	155	220	7.5	17.2	12.5	lower
Lake	281	571	852	8.2	15.9	12.1	lower
Lawrence	74	146	220	8.2	14.9	11.7	lower
Licking	127	280	407	5.5	11.7	8.7	lower
Logan	38	78	116	5.6	11.0	8.3	lower
Lorain	625	1,174	1,799	14.0	25.5	19.8	higher
Lucas	1,053	1,621	2,674	15.6	22.5	19.2	higher
Madison	41	90	131	6.0	15.9	10.5	lower
Mahoning	501	849	1,351	14.4	22.6	18.7	higher
Marion	155	304	459	15.0	32.6	23.3	higher
Medina	144	265	409	5.7	10.3	8.0	lower
Meigs	39	39	78	11.6	11.1	11.4	lower
Mercer	16	35	51	2.6	5.7	4.2	lower
Miami	149	281	430	10.0	18.3	14.2	no
Monroe	2	15	17	0.9	7.0	4.0	lower
Montgomery	1,152	1,868	3,020	14.9	22.3	18.7	higher
Morgan	16	25	41	7.4	11.4	9.4	no
Morrow	24	43	67	4.6	8.3	6.5	lower
Muskingum	113	267	380	9.2	20.1	14.9	lower
Noble	14	22	36	5.6	12.4	8.4	lower
Ottawa	57	134	191	9.4	21.4	15.5	no
Paulding	28	30	58	9.8	10.4	10.1	no
Perry	37	63	100	7.1	11.9	9.5	lower
Pickaway	65	83	148	7.5	11.1	9.2	lower
Pike	27	79	106	6.5	18.7	12.7	lower
Portage	188	333	521	8.2	13.9	11.1	lower
Preble	55	93	148	8.8	14.8	11.8	no
Putnam	30	44	74	5.8	8.5	7.1	lower
Richland	119	262	381	6.2	14.1	10.1	lower
Ross	123	214	337	10.3	19.9	14.9	no
Sandusky	103	144	247	11.5	15.6	13.6	no

Table 8 continued on page 35

TABLE 8
continued from page 34

Number of Ohio Inpatient Hospital Discharges and Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by County and Sex, 2007-2009

County	Male Number	Female Number	Total Number	Male Rate	Female Rate	Total Rate	Significantly Different from State Average
Scioto	108	189	297	9.7	16.1	13.0	no
Seneca	54	113	167	6.4	13.1	9.8	lower
Shelby	37	55	92	5.0	7.6	6.3	lower
Stark	531	1,133	1,664	9.7	19.2	14.6	lower
Summit	855	1,561	2,416	10.8	18.5	14.8	no
Trumbull	389	853	1,242	12.5	25.9	19.4	no
Tuscarawas	154	236	390	11.5	16.9	14.2	no
Union	29	78	107	4.3	10.5	7.5	lower
Van Wert	14	32	46	3.3	7.2	5.3	lower
Vinton	11	36	47	5.6	17.9	11.8	lower
Warren	145	350	495	4.7	11.7	8.1	lower
Washington	69	129	198	7.7	13.7	10.7	lower
Wayne	99	274	373	5.8	15.9	10.9	no
Williams	55	96	151	9.6	16.7	13.2	no
Wood	126	199	325	6.9	10.3	8.7	lower
Wyandot	10	26	36	3.0	7.5	5.3	lower
Total State	**18,892**	**34,660**	**53,554**	**11.8**	**20.3**	**16.2**	no

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 9

Average Length of Stay In Days for Inpatient Hospital Stays for Patients in Ohio with a Primary Diagnosis of Asthma by Sex and Year, 2004-2009

Year	Male	Female	All
2004	2.8	3.7	3.4
2005	2.8	3.8	3.4
2006	2.8	3.7	3.4
2007	2.9	3.7	3.4
2008	3.1	3.9	3.6
2009	3.0	3.8	3.5

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 10 Average Length of Stay In Days for Inpatient Hospital Stays for Patients in Ohio with a Primary Diagnosis of Asthma, by Age Group and Year, 2004-2009

Age Group	Year					
	2004	2005	2006	2007	2008	2009
0-4	2.0	1.9	1.9	2 .0	1.9	2 .0
5-14	2.0	2.1	2.1	2.1	2.1	2.2
15-34	2.7	2.7	2.6	2.6	2.8	2.8
35-64	3.7	3.7	3.7	3.7	3.8	3.8
65+	4.8	4.7	4.6	4.7	3.9	3.9

TABLE 11 Average Length of Stay for Patients in Ohio with a Primary Diagnosis of Asthma and Any Mention of Asthma, by County and Year, 2007-2009

County	2007	2008	2009	2007-2009 Average	Significantly Different from State Average
Adams	3.0	3.8	3.4	3.4	no
Allen	3.0	2.5	2.9	2.8	lower
Ashland	2.3	3.5	4.8	3.5	no
Ashtabula	3.7	4.2	3.9	4.0	higher
Athens	3.2	5.4	3.1	3.9	no
Auglaize	2.4	2.9	2.9	2.7	no
Belmont	3.6	3.8	3.8	3.7	no
Brown	3.0	3.4	2.8	3.1	no
Butler	3.9	3.8	3.6	3.8	no
Carroll	4.1	3.8	2.9	3.6	no
Champaign	4.1	3.3	3.3	3.6	no
Clark	3.8	4.1	3.6	3.8	no
Clermont	3.7	4.0	3.8	3.8	no
Clinton	3.2	3.5	3.3	3.3	no
Columbiana	3.8	3.8	3.9	3.8	no
Coshocton	3.2	3.0	3.1	3.1	no
Crawford	3.0	3.2	2.5	2.9	no
Cuyahoga	3.6	3.6	3.6	3.6	no
Darke	2.5	3.6	3.0	3.0	no
Defiance	2.4	3.0	3.2	2.9	lower
Delaware	3.2	3.0	2.9	3.0	lower
Erie	3.8	4.3	3.6	3.9	higher

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 11

continued from page 36

Average Length of Stay for Patients in Ohio with a Primary Diagnosis of Asthma and Any Mention of Asthma, by County and Year, 2007-2009

County	2007	2008	2009	2007-2009 Average	Significantly Different from State Average
Fairfield	3.1	3.1	3.2	3.1	lower
Fayette	2.8	2.5	2.6	2.6	lower
Franklin	3.1	3.3	3.1	3.2	lower
Fulton	3.1	3.7	2.7	3.2	no
Gallia	3.0	3.4	3.1	3.2	no
Geauga	3.8	4.3	4.0	4.0	no
Greene	3.4	3.2	2.5	3.1	no
Guernsey	3.3	4.5	2.7	3.5	higher
Hamilton	3.2	3.5	3.6	3.4	no
Hancock	3.7	3.3	3.3	3.4	no
Hardin	2.9	3.9	4.6	3.8	no
Harrison	4.5	4.3	4.1	4.3	no
Henry	2.8	3.1	3.2	3.0	no
Highland	3.1	2.6	2.4	2.7	lower
Hocking	3.0	3.2	4.4	3.5	no
Holmes	4.0	4.1	3.3	3.8	no
Huron	2.9	3.4	3.0	3.1	no
Jackson	3.0	3.2	3.1	3.1	no
Jefferson	3.9	4.6	4.4	4.3	higher
Knox	3.4	4.2	3.3	3.6	no
Lake	3.8	4.3	4.1	4.0	higher
Lawrence	3.3	3.9	3.3	3.5	no
Licking	2.9	2.9	3.2	3.0	lower
Logan	3.0	3.0	3.1	3.0	lower
Lorain	3.2	4.1	3.8	3.7	higher
Lucas	3.4	3.6	3.3	3.4	no
Madison	4.2	3.0	3.0	3.4	no
Mahoning	3.7	4.0	3.9	3.9	higher
Marion	3.0	3.3	4.0	3.4	no
Medina	3.5	3.3	3.1	3.3	no
Meigs	2.9	2.9	2.8	2.9	no
Mercer	2.8	2.8	2.9	2.8	no
Miami	3.7	4.4	4.4	4.2	higher
Monroe	4.4	4.7	5.0	4.7	higher
Montgomery	3.1	3.3	3.1	3.2	no
Morgan	5.4	3.5	2.7	3.9	no

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

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TABLE 11
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Average Length of Stay for Patients in Ohio with a Primary Diagnosis of Asthma and Any Mention of Asthma, by County and Year, 2007-2009

County	2007	2008	2009	2007-2009 Average	Significantly Different from State Average
Morrow	4.0	2.9	3.7	3.5	no
Muskingum	3.9	3.7	3.6	3.7	no
Noble	2.4	2.9	4.5	3.3	no
Ottawa	3.6	4.0	3.3	3.6	no
Paulding	2.8	4.0	2.6	3.1	no
Perry	3.5	2.8	3.4	3.2	lower
Pickaway	3.2	2.8	3.3	3.1	lower
Pike	3.0	3.2	3.6	3.2	no
Portage	3.6	3.4	3.7	3.5	no
Preble	3.8	2.9	2.9	3.2	lower
Putnam	2.3	3.0	2.6	2.6	no
Richland	3.4	3.8	3.3	3.5	no
Ross	3.0	2.8	2.3	2.7	lower
Sandusky	3.5	3.3	3.2	3.3	no
Scioto	3.8	3.3	3.9	3.7	no
Seneca	2.6	3.1	3.3	3.0	no
Shelby	3.7	3.2	2.8	3.2	no
Stark	3.5	3.6	3.5	3.6	no
Summit	3.6	3.8	3.9	3.8	no
Trumbull	4.1	4.0	4.1	4.1	higher
Tuscarawas	3.3	3.9	3.8	3.7	no
Union	3.6	2.7	2.4	2.9	lower
Van Wert	2.4	2.5	2.1	2.3	no
Vinton	2.4	3.5	4.2	3.4	no
Warren	3.2	3.7	3.8	3.6	no
Washington	3.9	4.7	3.9	4.2	higher
Wayne	3.5	3.4	3.6	3.5	no
Williams	4.1	3.8	3.1	3.7	no
Wood	3.1	3.2	3.4	3.2	no
Wyandot	3.5	3.1	2.7	3.1	no
Ohio	3.6	3.6	3.6	3.6	no

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 12 Average Length of Stay for Patients in Ohio with a Primary Diagnosis of Asthma and Any Mention of Asthma, by Sex and Year, 2007-2009

	Sex		
Year	Male	Female	Total
2005	$8,773.52	$10,911.77	$10,163.49
2006	$9,356.76	$11,782.16	$10,907.05
2007	$10,484.04	$12,787.37	$11,971.83
2008	$12,151.62	$14,241.11	$13,513.50
2009	$12,945.21	$15,574.08	$14,648.47

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 13 Average Charges for Inpatient Hospital Stays for Patients in Ohio with a Primary Diagnosis of Asthma by County and Year, 2007-2009

County	2007	2008	2009	2007-2009 Average	Significantly Different from State Average
Adams	$6,543.60	$9,402.35	$8,019.31	$7,988.42	lower
Allen	$9,889.77	$8,819.40	$11,117.56	$9,942.24	lower
Ashland	$6,184.55	$9,805.19	$19,849.68	$11,946.47	lower
Ashtabula	$11,163.02	$12,283.13	$8,954.71	$10,800.29	no
Athens	$9,619.77	$24,726.59	$12,011.43	$15,452.60	no
Auglaize	$5,650.05	$9,165.51	$9,942.71	$8,252.76	lower
Belmont	$10,269.14	$10,366.05	$10,527.37	$10,387.52	lower
Brown	$8,205.60	$10,762.57	$11,002.44	$9,990.20	lower
Butler	$12,766.18	$15,655.62	$15,492.18	$14,637.99	higher
Carroll	$9,562.26	$8,183.38	$6,012.85	$7,919.50	lower
Champaign	$12,135.76	$8,994.20	$10,343.03	$10,491.00	lower
Clark	$11,045.69	$12,369.77	$13,138.19	$12,184.55	no
Clermont	$12,425.36	$16,107.10	$16,848.91	$15,127.12	higher
Clinton	$9,147.62	$9,734.56	$11,772.57	$10,218.25	lower
Columbiana	$6,929.01	$7,857.60	$8,321.77	$7,702.79	lower
Coshocton	$7,752.30	$7,764.96	$9,123.08	$8,213.45	lower
Crawford	$5,742.92	$6,486.50	$7,880.50	$6,703.31	lower
Cuyahoga	$13,368.54	$14,549.06	$15,741.42	$14,553.01	higher
Darke	$7,513.66	$13,502.82	$11,213.45	$10,743.31	no
Defiance	$8,584.46	$10,624.00	$12,562.63	$10,590.36	lower
Delaware	$12,492.22	$12,456.44	$13,665.68	$12,871.45	no
Erie	$10,897.87	$11,873.97	$11,617.92	$11,463.25	no

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

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TABLE 13

continued from page 39

Average Charges for Inpatient Hospital Stays for Patients in Ohio with a Primary Diagnosis of Asthma by County and Year, 2007-2009

County	2007	2008	2009	2007-2009 Average	Significantly Different from State Average
Fairfield	$9,387.62	$9,535.80	$9,868.23	$9,597.22	lower
Fayette	$8,255.86	$7,011.84	$8,196.67	$7,821.46	lower
Franklin	$12,926.04	$13,776.32	$13,723.06	$13,475.14	no
Fulton	$12,171.99	$16,389.49	$13,577.61	$14,046.36	no
Gallia	$8,723.93	$9,898.55	$10,925.10	$9,849.19	lower
Geauga	$12,608.79	$17,062.36	$17,278.22	$15,649.79	higher
Greene	$13,631.98	$14,403.93	$11,922.64	$13,319.52	no
Guernsey	$8,839.05	$10,398.49	$6,746.75	$8,661.43	lower
Hamilton	$11,973.46	$14,386.83	$16,183.27	$14,181.19	no
Hancock	$9,051.42	$7,554.92	$8,641.25	$8,415.86	lower
Hardin	$8,330.53	$8,547.72	$18,306.79	$11,728.35	lower
Harrison	$9,631.19	$8,550.52	$10,349.04	$9,510.25	lower
Henry	$8,673.86	$9,259.83	$10,093.73	$9,342.47	lower
Highland	$9,667.90	$8,052.14	$7,165.36	$8,295.13	lower
Hocking	$9,964.81	$9,171.25	$15,977.02	$11,704.36	lower
Holmes	$8,498.94	$10,104.14	$8,591.05	$9,064.71	lower
Huron	$8,552.43	$9,873.73	$10,837.55	$9,754.57	lower
Jackson	$8,344.49	$9,212.01	$9,669.92	$9,075.47	lower
Jefferson	$8,795.47	$9,826.33	$10,216.97	$9,612.92	lower
Knox	$7,902.29	$11,522.53	$9,383.53	$9,602.78	no
Lake	$12,306.06	$15,004.02	$16,230.56	$14,513.55	no
Lawrence	$8,633.50	$10,448.45	$8,731.82	$9,271.26	lower
Licking	$7,088.28	$7,799.95	$9,994.06	$8,294.10	lower
Logan	$8,384.42	$9,166.93	$10,545.61	$9,365.65	lower
Lorain	$9,582.78	$11,340.34	$12,071.94	$10,998.35	lower
Lucas	$15,961.06	$17,966.58	$18,540.77	$17,489.47	higher
Madison	$14,506.82	$12,154.09	$12,298.76	$12,986.56	no
Mahoning	$12,923.65	$14,021.98	$15,446.55	$14,130.73	no
Marion	$8,106.42	$10,393.51	$12,490.50	$10,330.14	lower
Medina	$11,946.27	$13,109.00	$13,308.68	$12,787.98	no
Meigs	$8,359.80	$9,417.31	$9,160.16	$8,979.09	lower
Mercer	$6,900.50	$9,045.14	$13,512.70	$9,819.45	lower
Miami	$13,776.33	$17,684.96	$21,711.13	$17,724.14	higher
Monroe	$10,478.23	$7,546.79	$12,753.76	$10,259.59	lower
Montgomery	$14,217.13	$17,705.56	$18,712.61	$16,878.43	higher
Morgan	$13,264.42	$10,801.29	$8,244.92	$10,770.21	no

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 13

continued from page 40

Average Charges for Inpatient Hospital Stays for Patients in Ohio with a Primary Diagnosis of Asthma by County and Year, 2007-2009

County	2007	2008	2009	2007-2009 Average	Significantly Different from State Average
Morrow	$11,042.30	$9,657.89	$12,931.64	$11,210.61	lower
Muskingum	$9,242.39	$9,715.76	$11,578.42	$10,178.86	lower
Noble	$9,332.75	$8,437.14	$13,165.71	$10,311.87	lower
Ottawa	$11,548.96	$12,915.72	$14,933.81	$13,132.83	no
Paulding	$6,538.67	$11,469.05	$9,047.26	$9,018.33	no
Perry	$8,170.14	$7,322.35	$9,956.17	$8,482.89	lower
Pickaway	$10,508.16	$10,499.51	$16,903.68	$12,637.12	lower
Pike	$7,735.85	$11,588.60	$13,250.19	$10,858.21	no
Portage	$12,867.79	$12,278.08	$14,892.72	$13,346.20	no
Preble	$15,222.65	$12,538.12	$13,766.48	$13,842.42	no
Putnam	$7,922.12	$9,133.38	$10,250.83	$9,102.11	lower
Richland	$7,684.46	$8,913.15	$9,626.89	$8,741.50	lower
Ross	$8,849.62	$8,541.81	$8,107.85	$8,499.76	lower
Sandusky	$10,839.56	$10,092.10	$12,212.58	$11,048.08	lower
Scioto	$10,870.40	$11,059.17	$14,079.96	$12,003.18	lower
Seneca	$9,931.35	$10,111.78	$11,492.54	$10,511.89	lower
Shelby	$9,890.37	$10,513.96	$10,526.43	$10,310.25	no
Stark	$7,076.52	$8,844.67	$9,547.73	$8,489.64	lower
Summit	$15,182.20	$16,858.37	$19,294.59	$17,111.72	higher
Trumbull	$14,940.13	$14,770.58	$17,425.93	$15,712.21	no
Tuscarawas	$5,637.12	$7,084.12	$7,803.67	$6,841.64	lower
Union	$11,526.24	$9,247.00	$9,278.14	$10,017.13	lower
Van Wert	$6,814.44	$9,679.07	$11,946.57	$9,480.03	no
Vinton	$6,982.68	$9,376.03	$13,165.34	$9,841.35	lower
Warren	$12,515.95	$16,585.16	$19,951.76	$16,350.96	higher
Washington	$12,654.19	$16,634.53	$13,862.64	$14,383.79	no
Wayne	$7,912.44	$9,041.99	$11,077.26	$9,343.90	lower
Williams	$8,729.99	$8,906.26	$7,724.62	$8,453.62	lower
Wood	$11,975.42	$10,866.82	$13,934.77	$12,259.00	lower
Wyandot	$8,534.72	$11,239.84	$6,801.87	$8,858.81	no

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 14

Admission Source for Inpatient Hospital Stays for Ohio Patients with a Primary Diagnosis of Asthma, by Year, 2005-2009

Year	2005		2006		2007		2008		2009	
Admission Source	Number	%	Number	%	Number	%	Number	%	Number	%
Physician Referral	4396	22.8	4000	21.69	3475	19.5	3768	19.2	3411	17.4
Clinic Referral	313	1.6	279	1.51	275	1.5	264	1.3	175	0.8
Medical Doctor	107	0.5	142	0.77	120	0.6	124	0.6	201	1.0
Transfer from Hospital	259	1.3	368	2	345	1.9	389	1.9	440	2.2
Transfer from SNF	17	0.1	22	0.12	26	0.1	55	0.2	136	0.6
Transfer from other health care facility	206	1.1	234	1.27	65	0.3	66	0.3	62	0.3
Emergency Room	13951	72.44	13382	72.55	13482	75.75	14841	75.95	15136	77.3
Court/Law	4	0.02	4	0.02	1	0.01	2	0.01	2	0.01
Unknown	5	0.0	12	0.0	5	0.0	13	0.07	6	0.0

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 15 Average Length of Stay in Days and Charges in Dollars for Inpatient Stays for Patients in Ohio with a Primary Diagnosis of Asthma, by Age Group, Sex, and Year, 2005-2009

Year	Age Group (years)	LOS Male (in days)	LOS Female (in days)	LOS Total (in days)	Male	Female	Average Charges (in $)
2005	0-4	1.9	2.0	1.9	$ 5,239.33	$ 6,125.15	$ 5,542.62
	5-14	2.0	2.2	2.1	$ 6,775.50	$ 7,746.60	$ 7,151.34
	15-34	2.4	2.9	2.7	$ 8,726.24	$ 8,633.56	$ 8,664.58
	35-64	3.4	3.8	3.7	$11,043.21	$11,117.31	$11,099.51
	65+	4.3	4.9	4.7	$12,584.77	$13,491.44	$13,263.97
2006	0-4	1.9	2.0	1.9	$5,696.99	$ 6,286.65	$ 5,933.52
	5-14	2.1	2.1	2.1	$7,065.81	$ 7,587.78	$ 7,265.29
	15-34	2.4	2.9	2.7	$8,424.42	$ 9,205.56	$ 8,930.22
	35-64	3.4	3.8	3.7	$11,932.94	$12,105.90	$12,060.83
	65+	4.1	4.8	4.6	$13,205.18	$14,780.05	$14,370.06
2007	0-4	1.9	2.2	2.0	$6,186.75	$ 7,576.83	$6,665.22
	5-14	2.1	2.2	2.1	$8,310.15	$ 7,905.85	$ 8,161.15
	15-34	2.4	2.7	2.6	$9,285.79	$ 9,762.99	$ 9,594.52
	35-64	3.5	3.8	3.7	$12,962.13	$13,051.98	$13,029.01
	65+	4.4	4.8	4.7	$15,525.71	$15,970.91	$15,862.76
2008	0-4	1.9	2.0	1.9	$7,260.14	$ 7,311.06	$7,278.03
	5-14	2.1	2.1	2.1	$8,700.76	$ 8,429.32	$8,591.22
	15-34	2.6	2.9	2.8	$10,879.12	$11,335.40	$11,172.77
	35-64	3.5	3.9	3.8	$14,165.82	$14,588.57	$14,477.01
	65+	4.6	5.0	4.9	$17,449.53	$17,306.66	$17,345.36
2009	0-4	1.9	2.0	2.0	$7,532.45	$ 9,525.56	$8,205.20
	5-14	2.1	2.3	2.2	$9,325.37	$10,165.74	$9,642.35
	15-34	2.6	2.9	2.8	$11,668.02	$13,041.26	$12,556.33
	35-64	3.4	3.9	3.8	$15,880.33	$16,081.50	$16,029.82
	65+	4.5	4.7	4.7	$18,957.22	$18,254.35	$18,436.71

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 16

Payers for Inpatient Hospital Stays for Ohio Patients with a Primary Diagnosis of Asthma, by Year, 2005-2009

Year	2005		2006		2007		2008		2009	
Payer	Number	%	Number	%	Number	%	Number	%	Number	%
Unknown	9	0.1	25	0.1	25	0.1	32	0.2	17	0.1
Self Pay	1380	7.2	1408	7.9	1408	7.9	1463	7.5	1591	8.1
Work Comp	46	0.2	25	0.1	25	0.1	39	0.2	27	0.1
Medicare	5407	28.1	4967	27.9	4967	27.9	5439	27.8	5255	26.8
Medicaid	4323	22.5	2485	14.0	2485	14.0	2158	11.0	2231	11.4
Other Government	203	1.1	111	0.6	111	0.6	144	0.7	99	0.5
Com Ins	2083	10.8	2108	11.8	2108	11.8	2182	11.2	2195	11.2
Blue Cross Crossover	16	0.1	10	0.1	10	0.1	14	0.1	6	0.0
Champus	58	0.3	36	0.2	36	0.2	45	0.2	45	0.2
Other	284	1.5	227	1.3	227	1.3	209	1.1	113	0.6
Blue Cross Primary	1018	5.3	1084	6.1	1084	6.1	1210	6.2	1103	5.6
HMO	1939	10.1	1205	6.8	1205	6.8	1372	7.0	1141	5.8
PPO	1019	5.3	775	4.4	775	4.4	720	3.7	667	3.4
Medicaid HMO	825	4.3	2366	13.3	2366	13.3	2824	14.5	3369	17.2
Blue Cross HMO	247	1.3	280	1.6	280	1.6	368	1.9	317	1.6
Medicare HMO	309	1.6	531	3.0	531	3.0	1142	5.8	1220	6.2
Bad Debt Uncompensated	22	0.1	2	0.0	2	0.0	4	0.0	4	0.0
Charity Uncompensated	22	0.1	28	0.2	28	0.2	32	0.2	66	0.3
HCAP	48	0.3	124	0.7	124	0.7	144	0.7	113	0.6
Z	0	0	0	0	0	0	0	0	1	0

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

TABLE 17

Discharge Status for Inpatient Hospital Stays for Patients in Ohio with a Primary Diagnosis of Asthma, 2007-2009

Discharge Status	Percentage	2007-2009
Home	86.1	48,993
Home Health Care	6.6	3,757
Skilled Nursing Facility	3.7	2,106
Other	3.6	2,049

Source: Ohio Hospital Association Statewide Clinical-Financial Data Base Years 2004-2009.

Description of Data

The hospital discharge data was collected by the Ohio Hospital Association and provided to the Ohio Department of Health for analysis. The data are given by the hospitals to OHA on a voluntary basis.Data collected between 2004-2009 were analyzed for this report.

Asthma was defined by the following range of ICD-9-CM Codes:

493 Asthma

493.0 Extrinsic asthma
Asthma:
- Allergic with stated cause
- Atopic
- Childhood
- Hay
- Platinum
- Hay fever with asthma

493.1 Intrinsic asthma
- Late-onset asthma

493.2 Chronic obstructive asthma
- Asthma with chronic obstructive pulmonary disease (COPD)

493.9 Asthma, unspecified
Asthma (bronchial) (allergic NOS)
Bronchitis:
- Allergic
- Asthmatic

When the hundredth decimal is used it indicates:

0 without mention of status asthmaticus
1 with status asthmaticus

Abstracted from International Classification of Diseases, 9th revision, Clinical Modification, issued by the US Department of Health and Human Services. Available in electronic versions from http://www.cdc.gov/nchs/about/otheract/icd9/abticd9.htm. Annual updates and revisions are available at http://www.cms.hhs.gov/medlearn/icd9code.asp. Published copies of ICD-9-CM are available from a variety of sources and should be found in any medical library.

The variables analyzed included the number of asthma-related discharges; average length of stay in the hospital in days, hospital discharge rates per 10,000 of the resident population; and crude hospital discharge rates per 10,000 of the estimated population with asthma by age, sex, primary payer, and county of residence. "Any mention of asthma" referred to a diagnosis of asthma being present in one of the 15 available diagnosis fields in the hospital record.

Hospital discharges with invalid dates of birth, age, unknown sex, and lengths of stay greater than 365 days were excluded from the analysis. All analyses were performed using SAS version 9.1 (SAS Institute, Cary, NC).

Crude rates were calculated by using the estimate for Ohio's resident population as the denominator. Age-adjusted rates were not calculated using the direct method to the U.S. 2000 standard population since the population ages are very similar. Rates were calculated as the number of hospital discharges per 10,000 persons. The Ohio resident population was obtained from the U.S. Census Bureau using the censal 2000 population estimates and the 2004-2009 intercensal population estimates.

Rates were calculated by using the estimate for Ohio's resident population as the denominator. Rates with the Ohio population as the denominator are useful to describe hospital discharges for asthma in the entire Ohio population.

Crude rates provide a useful summary measure to compare similar populations of different sizes, but crude rates are sensitive to differences in age compositions. An age-adjusted rate is a measure that controls for the effects of age differences on health event rates. When comparing across geographic areas, some method of age-adjusting is typically used to control for the influence that different population age distributions might have on health event rates. However, the age composition of Ohio is so similar to that of the US 2000 standard population recommended in current analyses that there is no need to weight data.

References

Centers for Disease Control and Prevention (2011) Vital signs: asthma prevalence, disease characteristics, and self-management education: United States, 2001--2009. MMWR *Morbidity and Mortality Weekly Report*. 2011 May 6;60(17):547-52.

Centers for Disease Control and Prevention (2009) Number and rate of discharges from short-stay hospitals and of days of care, with average length of stay, and standard error, by selected first-listed diagnostic categories: United States, 2009. http://www.cdc.gov/nchs/data/nhds/2average/2009ave2_firstlist.pdf

Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2009.

National Heart, Lung, and Blood Institute (2007) National Asthma Education and Prevention Program, 2007. Expert Panel Report 3 (EPR-3): *Guidelines for the Diagnosis and Management of Asthma - Summary Report* 2007 Bethesda, MD: U.S. Department of Health and Human Services; National Institutes of Health

The Ohio Department of Health, Asthma Program (2009) *Ohio Statewide Asthma Plan*, 2009-2014. http://www.odh.ohio.gov/~/media/ODH/ASSETS/Files/eh/asthma/ohioasthmastrategicevaluationplan.ashx

State of Ohio: Departments of Insurance, Job and Family Services, Health, and Mental Health. *Ohio Family Health Survey*, 2008. Ohio State University, Ohio Colleges of Medicine Government Resource Center, 2009. Columbus, Ohio

U.S. Census Bureau, Statistical Abstract of the United States: 2012 (131st Edition) Washington, DC, 2011; http://www.census.gov/compendia/statab/.

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