

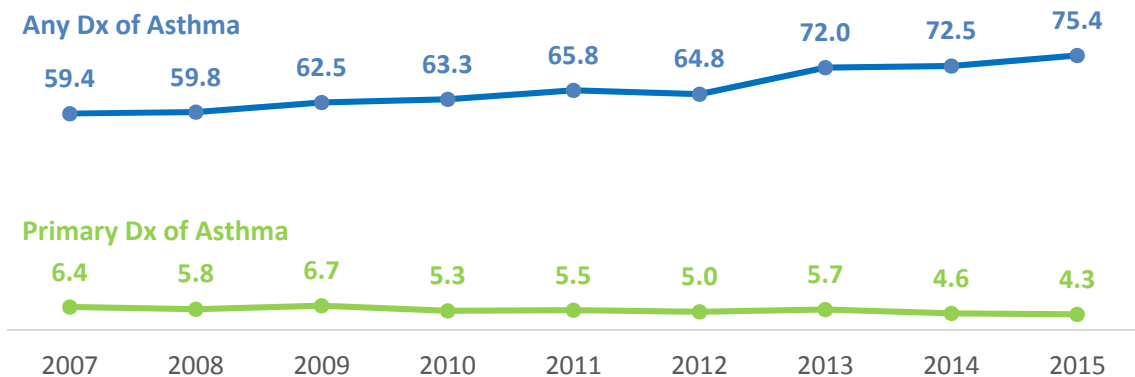
Introduction

Asthma is a chronic respiratory disease that causes inflammation of the airways and difficulty in breathing. Asthma can be exacerbated by numerous triggers and allergens such as mold, pet dander, pollen, tobacco smoke, and wood smoke. If asthma is not controlled through trigger reduction and medication adherence, exacerbations may occur which require immediate medical care. This data brief examines emergency care and hospitalizations for asthma occurring between 2007 and 2015 among Vermont residents and includes regional and age-specific rates and charges for these services.

Hospitalizations for Asthma

Inpatient hospitalizations with a *primary diagnosis* of asthma have decreased in recent years. From 2007 to 2015, the rate has decreased 32% from 6.4 to 4.3 hospitalizations per 10,000 Vermonters (Fig. 1). During the same time, hospitalizations which included asthma as *any diagnosis* have increased 27% from 59.4 to 75.4 hospitalizations per 10,000 Vermonters. For hospitalizations with a primary diagnosis of asthma, common co-occurring conditions include respiratory failure (15%), pneumonia (10%), respiratory infections (6%), tobacco use disorder (2%), and super obesity indicating a body mass index 45.0-49.9 (2%). For hospitalizations with a contributing diagnosis of asthma, common primary diagnoses were osteoarthritis (4%), pneumonia (3%), post-term pregnancy (3%), septicemia (2%), cystic fibrosis (2%), and atrial fibrillation (1%) and largely reflect common causes for hospitalization among Vermonters.

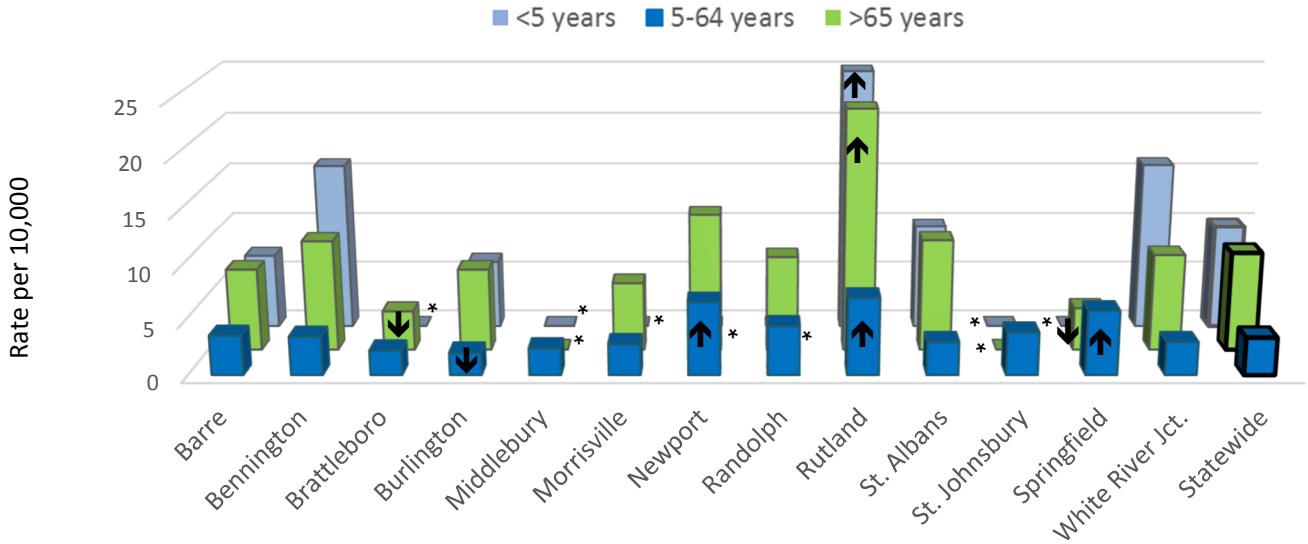
Fig. 1. Hospitalizations for Asthma among Vermonters, All Ages, VUHDDS (Rate per 10,000)



When hospitalizations for asthma were assessed by major age groups, rates of hospitalizations were highest among Vermonters less than five years of age (9.9 per 10,000), followed by those over 65 years of age (9.3 per 10,000) (Fig. 2). The rates of hospitalization among these groups were almost 3 times greater than among those 5-65 years of age (3.5 per 10,000).

When hospitalization rates were further broken down by geographic regions, the Rutland region had rates of hospitalization for asthma significantly higher than the statewide rate for each age grouping. Newport and Springfield HSAs also had higher rates of hospitalizations among those 5-64 years of age. Compared to the statewide rate, Burlington Hospital Service Area (HSA) had lower rates of hospitalizations among those 5-64 years old while Springfield and Brattleboro HSAs had lower rates among those greater than 65 years of age.

Fig. 2 Hospitalizations for Asthma by HSA and Age, Dx1= Asthma, VUHDDS 2013-2015 †



↑ Significantly higher than the statewide rate, ↓ Significantly lower than the statewide rate
 † Age-adjusted by the 2000 U.S. Standard population, * number suppressed due to insufficient sample size.

The average duration of a hospitalization with a primary diagnosis of asthma was 3.7 days in 2007 and decreased to 2.9 days in 2015 (Fig. 3). The decline in the rate of hospitalization with asthma as a primary diagnosis and decrease in the average length of stay for asthma care over recent years have dramatically decreased the annual total number of days that Vermonters have been hospitalized for asthma from 1,499 total days in 2007 to 789 days in 2015.

The average length of stay for a hospitalization with a primary diagnosis of asthma among Vermonters ranged from 2.5 days in the Brattleboro HSA to 3.7 days per hospitalization in the Rutland and St. Albans HSAs (Fig. 4). Those in the Brattleboro HSA had a significantly shorter hospital stay than the Vermont statewide average. The duration of hospitalization may be reflective of the severity of asthma exacerbation.

Fig. 3 Duration of Hospitalizations for Asthma (Dx1), VUHDDS

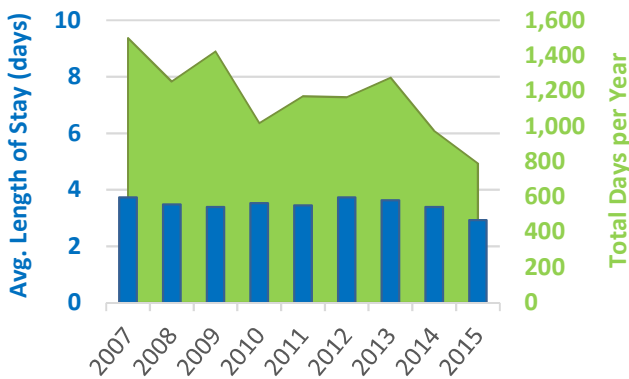
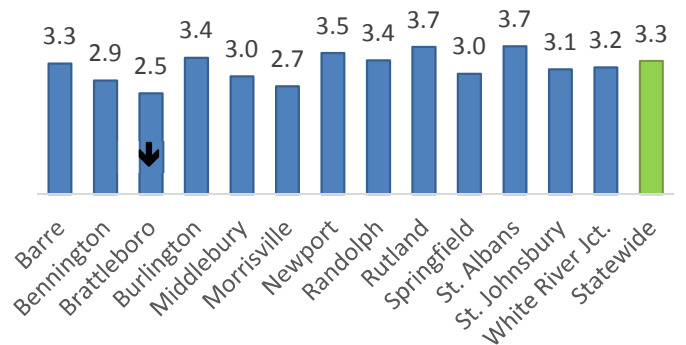


Fig. 4 Avg. Duration of Hospitalization for Asthma (Dx1) (days) (VUHDDS 2013-2015)



↓ Significantly lower than the statewide rate

The average charge for a hospitalization for asthma ranged from \$10,118 in 2007 to \$14,673 in 2015. The largest increase occurred between 2011 and 2012 and the maximum average charge was \$17,511 in 2012 (Fig. 5). Meanwhile the total amount charged for asthma hospitalizations was \$4.1 million in 2007 and \$4.0 million in 2015. In spite of increases in charges for care, a recent decrease in the total number of hospitalizations and duration of hospitalization has contained the cost of hospitalizations for asthma. Medicare was the primary payer for the largest proportion of these hospital stays (41%), followed by Medicaid (32%) and private insurers (24%)(Fig. 6).

Fig. 5 Charges for Hospitalizations of Vermonters for Asthma (Dx1), VUHDDS

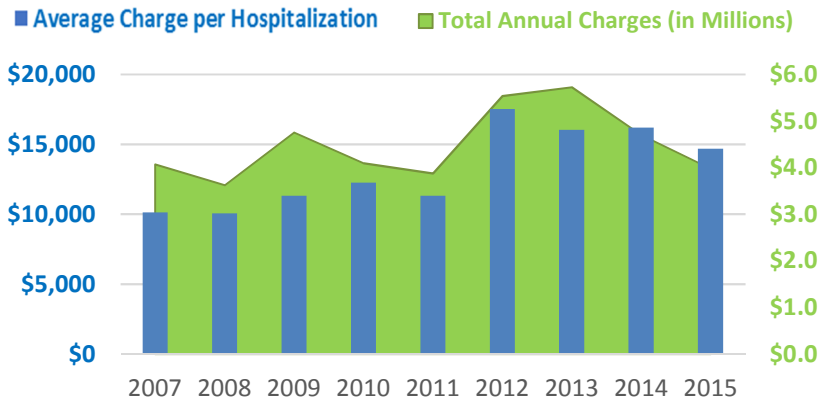
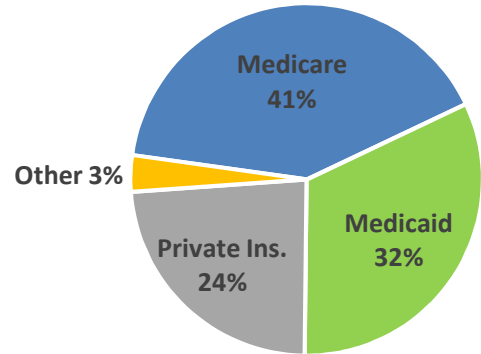


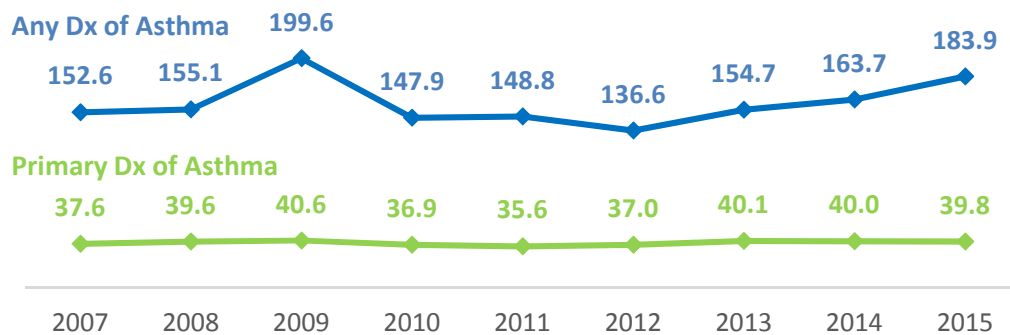
Fig. 6 Primary Payer of Hospitalizations for Asthma (Dx1), VUHDDS 2015



Emergency Department Visits for Asthma

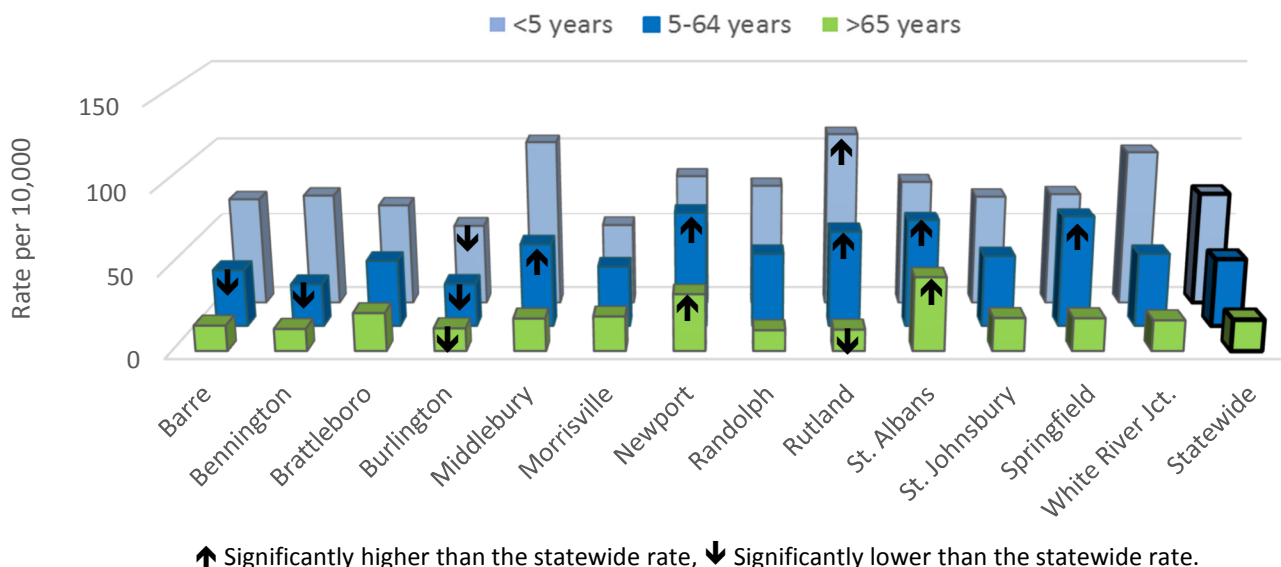
The rate of emergency department (ED) visits with a *primary diagnosis* of asthma has been relatively stable from 2007 to 2015, while the rate for *any diagnosis* of asthma increased 20% from 152.6 to 183.9 visits per 10,000 Vermonters (Fig. 7). For ED visits with a primary diagnosis of asthma, common secondary diagnoses included *streptococcus* or other acute upper respiratory infections (6%), hypertension (3%), cough (2%), long-term medication use (2%), esophageal reflux (1%), and diabetes (1%). For ED visits with a contributing diagnosis of asthma, primary diagnoses were reflective of common reasons for ED visits including respiratory infection (3%), chest pain (3%), urinary tract infection (1%), open hand wound (1%), and back pain (1%).

Fig. 7 ED Visits for Asthma among Vermonters, All Ages, VUHDDS (Rate per 10,000)



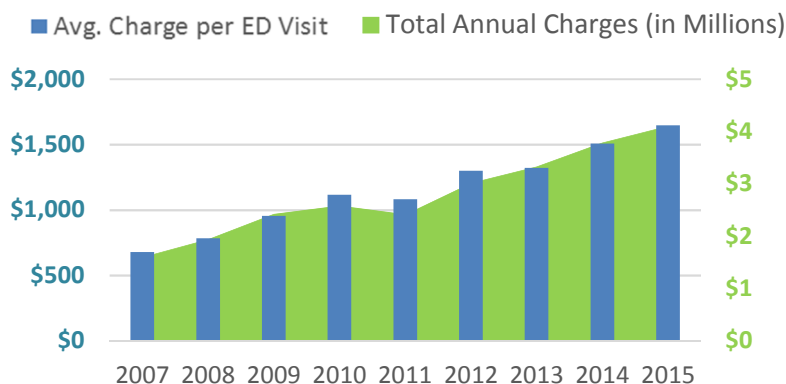
When examining ED visits with a primary diagnosis of asthma by age grouping, children under the age of 5 had the highest rates (72.0 per 10,000) followed by those 5-65 years of age (42.4 per 10,000), while those over 65 years of age had the lowest rate (19.4 per 10,000) (Fig. 8). When rates of ED visits for asthma were further examined by HSA geographic region, the Burlington HSA had lower rates for each age group as compared to the statewide rates. Newport, St. Albans and Rutland HSAs had significantly higher rates of ED visits for asthma than the statewide rates for two of the age groupings while the rate for Springfield and Middlebury HSAs were higher only among those 5-64 years of age. In addition, Barre and Bennington had lower rates among those 5-64 years of age and Rutland's ED rate among those over 65 was lower than the corresponding statewide rate.

Fig. 8 ED Visits for Asthma (Dx1) by HSA and Age, VUHDDS 2013-2015

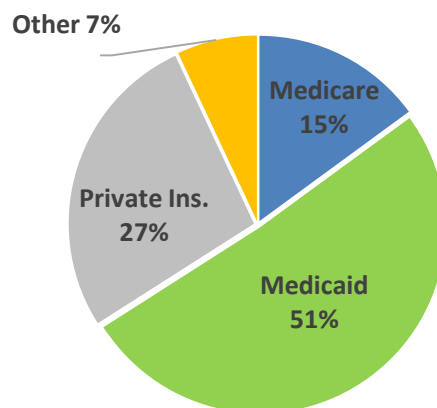


The average charge for an ED visit with a primary diagnosis of asthma has more than doubled between 2007 and 2015 (Fig. 9). In 2007, the average charge was \$679 which has steadily risen to \$1,647 in 2015. Although that rate of ED visits for asthma as a main diagnosis has been stable over this time, with increasing costs per ED visit, the total amount charged for asthma related ED visits has risen from \$1.6 million in 2007 to \$4.1 million in 2015. Medicaid was the primary payer for the majority of the ED visits for asthma in 2015 (51%), followed by private insurers (27%) and Medicare (15%) (Fig. 10).

**Fig. 9 Charges for ED Visits of Vermonters
Dx1=Asthma, VUHDDS**



**Fig. 10 Primary Payer for Asthma
ED Visits (Dx1), VUHDDS 2015**



Summary

Recent data regarding ED visits and hospitalizations for asthma show an encouraging decrease in the rate of hospitalizations with asthma as a primary diagnosis and a decrease in the average number of days one is hospitalized. However, there continue to be regional disparities in the rate of hospitalizations for asthma. The Rutland HSA continues to have the highest rates of hospitalization for asthma across all age categories as well as high rates of ED visits for asthma among those less than 65 years of age.

While hospitalizations for asthma have traditionally been the main contributor to the cost of care for asthma, in 2015 the total amount charged for ED visits with a primary diagnosis of asthma surpassed the total amount charged for asthma hospitalizations. This change resulted from the decrease in total annual numbers of days for asthma hospitalizations in addition to a sharp increase in the average cost of ED visits for asthma.

As respiratory infection was a common co-occurring condition with asthma, per CDC guidelines, those with asthma should receive the annual flu shot in addition to the pneumonia vaccine.

The Vermont Asthma Program is working to reduce the burden of asthma among all Vermonters. For more information regarding guideline-based care for asthma, use of CPT codes for asthma education provided by a certified asthma educator, smoking cessation supports including counseling and free nicotine replacement therapy, or resources for home visiting please contact the Vermont Asthma Program.

Resources to Reduce the Burden of Asthma among Vermonters

- ① Vermont Asthma Program: <http://healthvermont.gov/prevent/asthma/index.aspx>
- ② Physician's Guide to Managing and Diagnosing Asthma: http://www.nhlbi.nih.gov/guidelines/asthma/asthma_qrg.pdf
- ③ Find support for you or a loved who is ready to quit smoking: <http://802quits.org/>
- ④ CDC vaccination guidelines for those with asthma: <https://www.cdc.gov/asthma/flu.html>

For More Information

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Data Notes

Vermont Uniform Hospital Discharge Data Set (VUHDDS): Hospital and emergency department discharge data are collected from in-state hospitals and from hospitals in bordering states. The VUHDDS data set was narrowed to only include Vermont residents for this analysis. A primary asthma diagnosis refers to when asthma was listed as the first diagnosis code. Any asthma diagnosis refers to when asthma is listed as any of the twenty diagnosis codes. Patients admitted to the hospital from the emergency department are included in the hospital discharge data set and are not included in the emergency discharge data set. NH changed the way in which they process their data in 2009 and may contribute to any difference observed between 2010 and prior year data. In addition, beginning in 2014 data from MA is no longer included, but has minimal impact on these analyses.

† As these measures are Healthy Vermonters Measures, values are age-adjusted to the 2000 standard population per U.S. Healthy People methodology.

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