DSHS Grand Rounds

April 30

Allergies and Asthma: Epidemiology, Causes and Treatments

Presenters: Jackee Kayser, MD, Dell Children's Medical Center of Central Texas; Roberto Rodriguez, MD, MPH, Texas Dept. of State Health Services

Logistics

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Logistics (cont.)

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Disclosure to the Learner

Requirement of Learner

Participants requesting continuing education contact hours or a certificate of attendance must register in TRAIN, attend the entire session, and complete the online evaluation within two weeks of the presentation.

Commercial Support

This educational activity received no commercial support.

Disclosure of Financial Interests

Our speaker, Jackee Kayser, MD is affiliated with Dell Children's Medical Center of Central Texas.

Planning committee members have no relevant financial relationships to disclose.

Off Label Use

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David Lakey, MD
DSHS Commissioner
is pleased to introduce today's
DSHS Grand Rounds speakers

Allergies and Asthma: Epidemiology, Causes and Treatments

Jackee Kayser, MD, Dell Children's
Medical Center of Central Texas

Roberto Rodriguez, MD, MPH, Texas
Department of State Health Services

Asthma overview

Roberto Rodriguez, M.D., M.P.H.
Medical Officer
Health Promotion & Chronic Disease Prevention
Texas Department of State Health Services

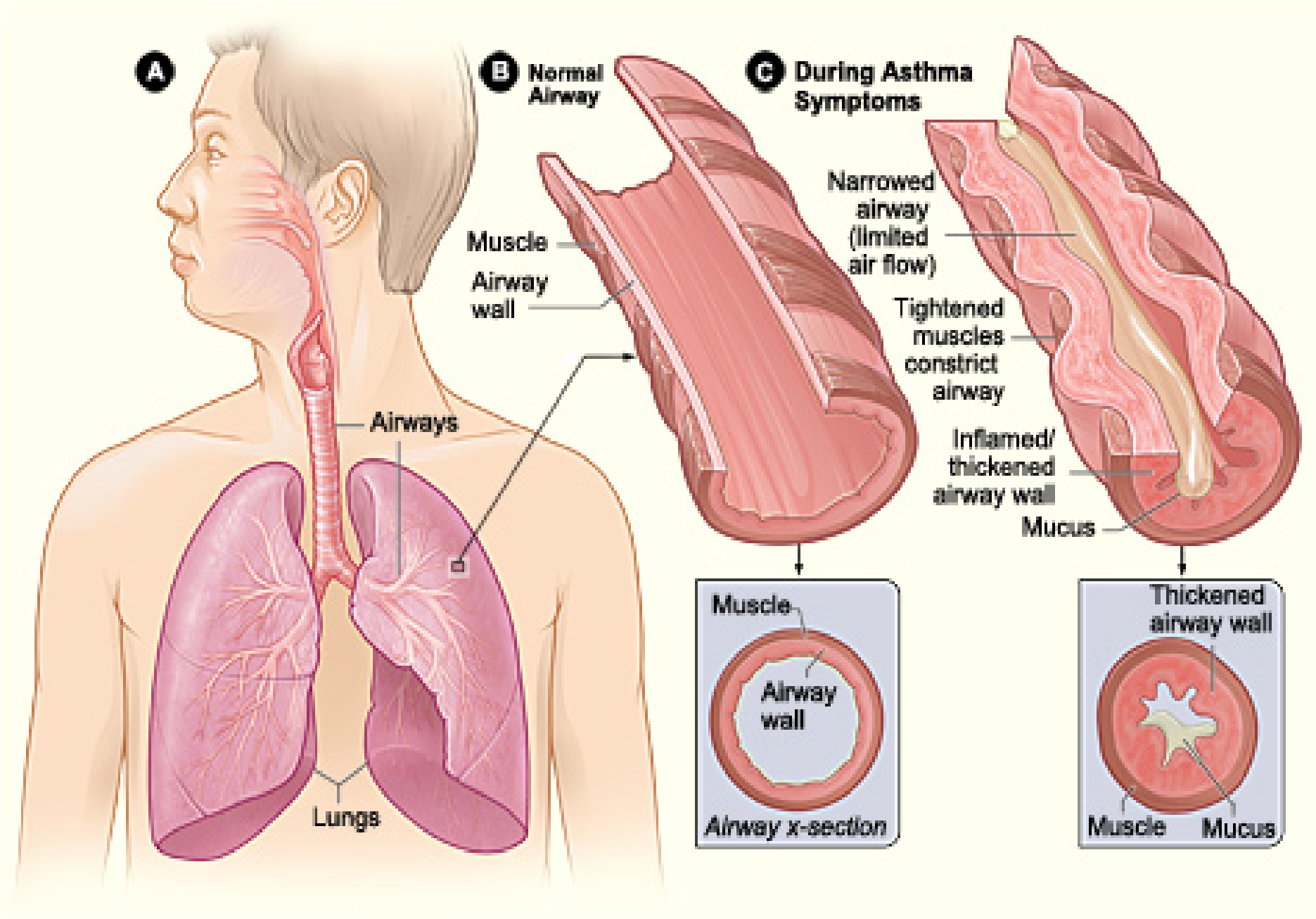
What is Asthma?

* "Asthma is a chronic lung disease that inflames and narrows the airways. Asthma causes recurring periods of wheezing (a whistling sound when you breathe), chest tightness, shortness of breath, and coughing. The coughing often occurs at night or early in the morning."

  -National Heart, Lung, and Blood Institute

Clinical features of asthma

* Airway hypersensitivity
* Reversible bronchospasm
* Airway inflammation and mucus production…
* Typical symptoms:
  * Cough
  * Wheeze
  * Chest tightness
  * Shortness of breath


A
B Normal Airway
C During Asthma Symptoms
Muscle
Airway wall
Airways
Lungs
Narrowed airway (limited air flow)
Tightened muscles constrict airway
Inflamed/ thickened airway wall
Mucus
Muscle
Airway wall
Airway x-section
Thickened airway wall
Muscle
Mucus

Usual triggers

* Allergens
  * Dust
  * Animal dander
  * Cockroaches
  * Mold
  * Pollens from trees, grasses, and flowers

Usual triggers

* Irritants
  * Cigarette smoke
  * Air pollution
  * Chemicals or dust in the workplace (occupational asthma)
  * Compounds in home décor products or aerosols (such as hairspray)

Usual triggers

* Viral upper respiratory infections
* Physical activity
* Medicines
  * Aspirin or NSAIDs
  * Nonselective beta-blockers
* Sulfites in foods and drinks

Does wheezing=asthma?

* Lots of kids wheeze!
* Cohort of 826 children, categorized in 4 groups
  * Never wheezed (51.5%)
  * Transient early wheezing <3 yrs (19.9%)
  * Later-onset wheezing 3-6 yrs (15%)
  * Persistent wheezing (13.7%)

Martinez FD, Wright AL, Taussig LM, et al. Asthma and wheezing in the first six years of life. The Group Health Medical Associates. N Engl J Med 1995; 332:133

Natural history of wheeze

* 60% of kids with wheezing <3 years had no wheezing at age 6
  * Slightly lower lung function after birth and at age 6 despite outgrowing wheezing, attributed to smaller airways
  * Higher likelihood of maternal smoking

Martinez FD, Wright AL, Taussig LM, et al. Asthma and wheezing in the first six years of life. The Group Health Medical Associates. N Engl J Med 1995; 332:133

Natural history of wheeze

* Persistent wheezers had highest rate of asthma compared to other groups (46%)
  * No difference in lung function after birth
  * Lowest lung function compared to other groups at age 6
  * Higher likelihood of maternal asthma hx and elevated IgE

Martinez FD, Wright AL, Taussig LM, et al. Asthma and wheezing in the first six years of life. The Group Health Medical Associates. N Engl J Med 1995; 332:133

Natural history of wheeze

* Risk factors for persistent wheezing/asthma diagnosis:
  * Frequent symptoms in the first year of life
  * Eczema (atopy)
  * Elevated IgE levels
  * Maternal history of asthma
  * Maternal smoking

Martinez FD, Wright AL, Taussig LM, et al. Asthma and wheezing in the first six years of life. The Group Health Medical Associates. N Engl J Med 1995; 332:133

Natural history of wheeze

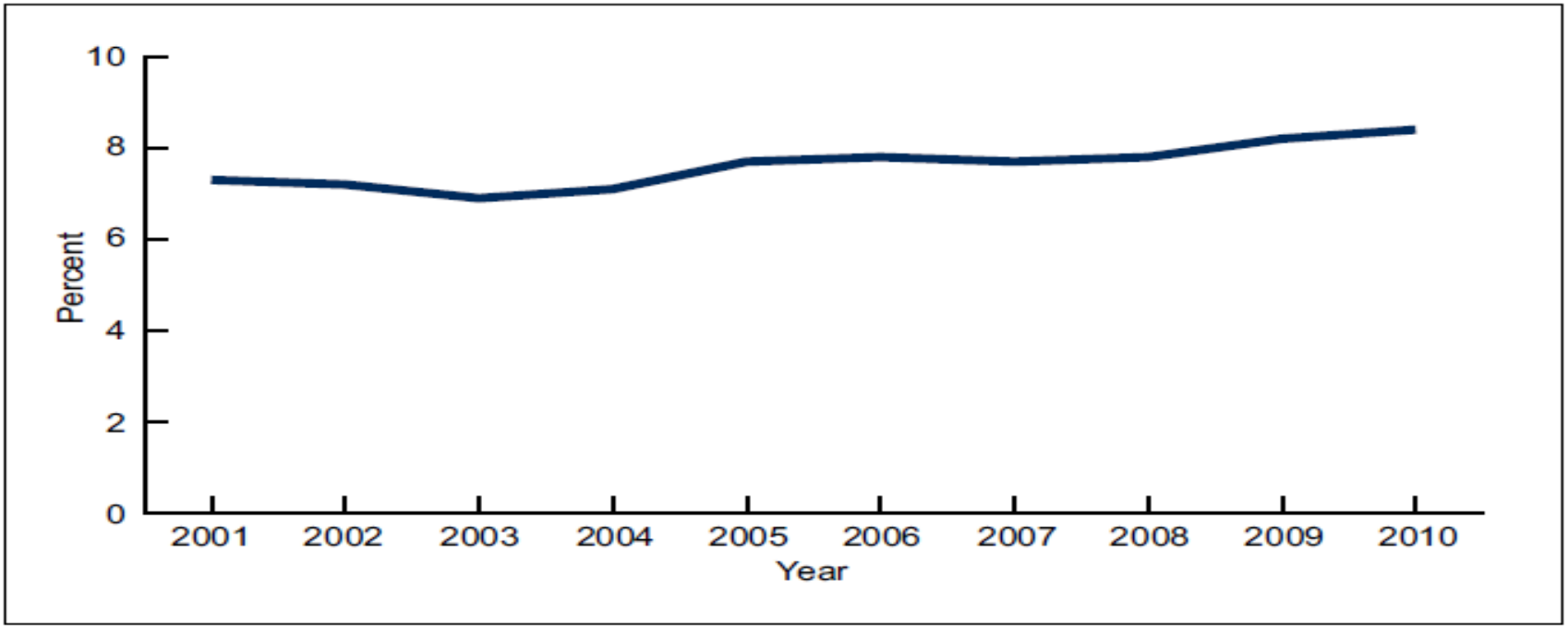
* CONCLUSIONS: The majority of infants with wheezing have transient conditions associated with diminished airway function at birth and do not have increased risks of asthma or allergies later in life. In a substantial minority of infants, however, wheezing episodes are probably related to a predisposition to asthma.

Martinez FD, Wright AL, Taussig LM, et al. Asthma and wheezing in the first six years of life. The Group Health Medical Associates. N Engl J Med 1995; 332:133

Asthma epidemiology and health services data

Asthma prevalence increased from 2001 to 2010 and is now at its highest level.

Figure 1. Asthma prevalence in the United States, 2001–2010



NOTES: Asthma prevalence refers to percentage of people who have ever been diagnosed with asthma and still have asthma. Data are age adjusted to the 2000 U.S. standard population. Access data table for Figure 1 at: http://www.cdc.gov/nchs/data/databriefs/db94_tables.pdf#1.
SOURCE: CDC/NCHS, National Health Interview Survey.

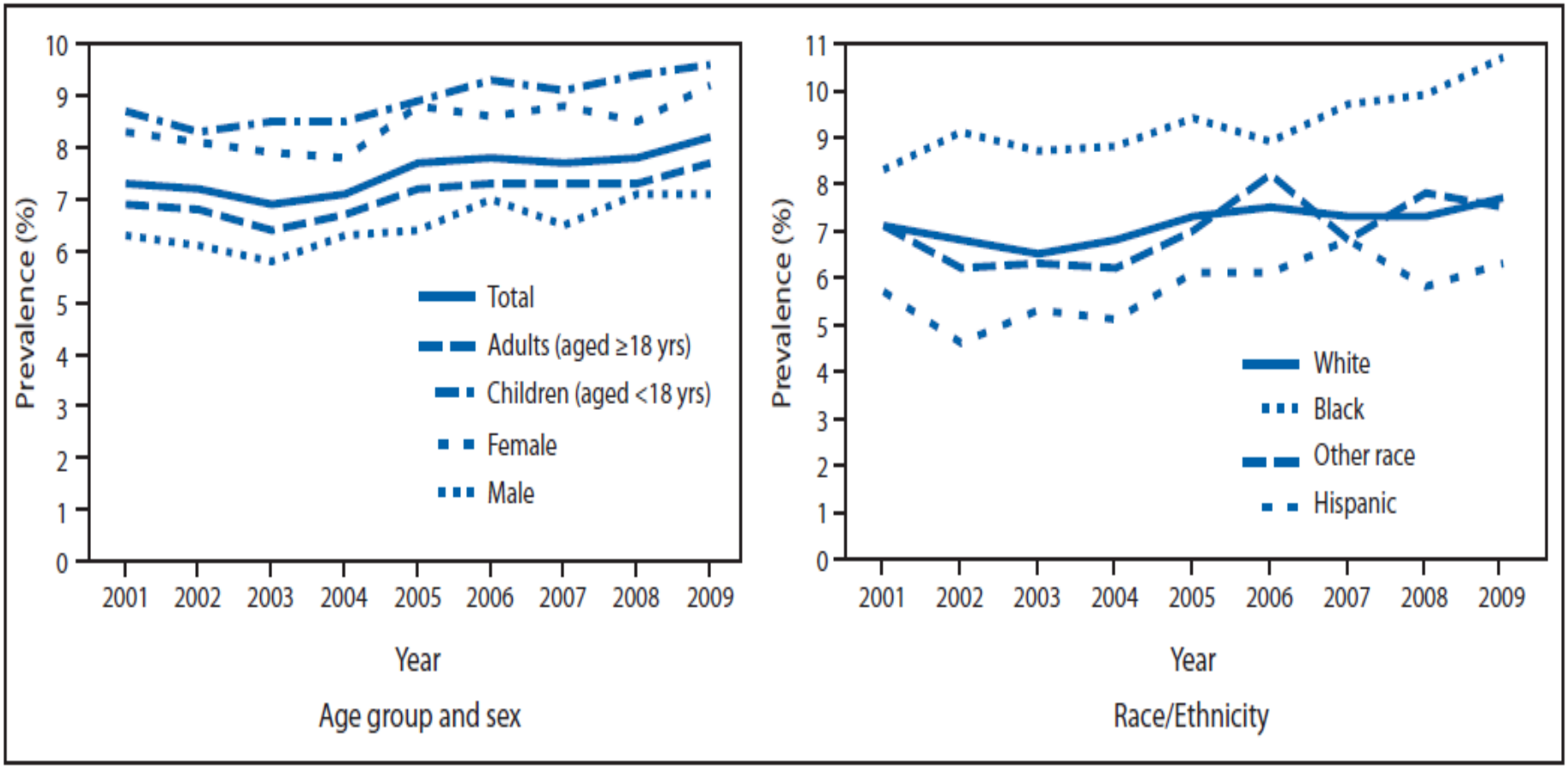
Data Brief 94. Trends in Asthma Prevalence, Health Care Use, and Mortality in the United States, 2001–2010

Data table for Figure 1. Asthma prevalence: United States, 2001–2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Percent (standard error)									
Current asthma prevalence	7.3	7.2	6.9	7.1	7.7	7.8	7.7	7.8	8.2	8.4

NOTE: Age adjusted to the 2000 U.S. standard population.
SOURCE: CDC/NCHS, National Health Interview Survey.

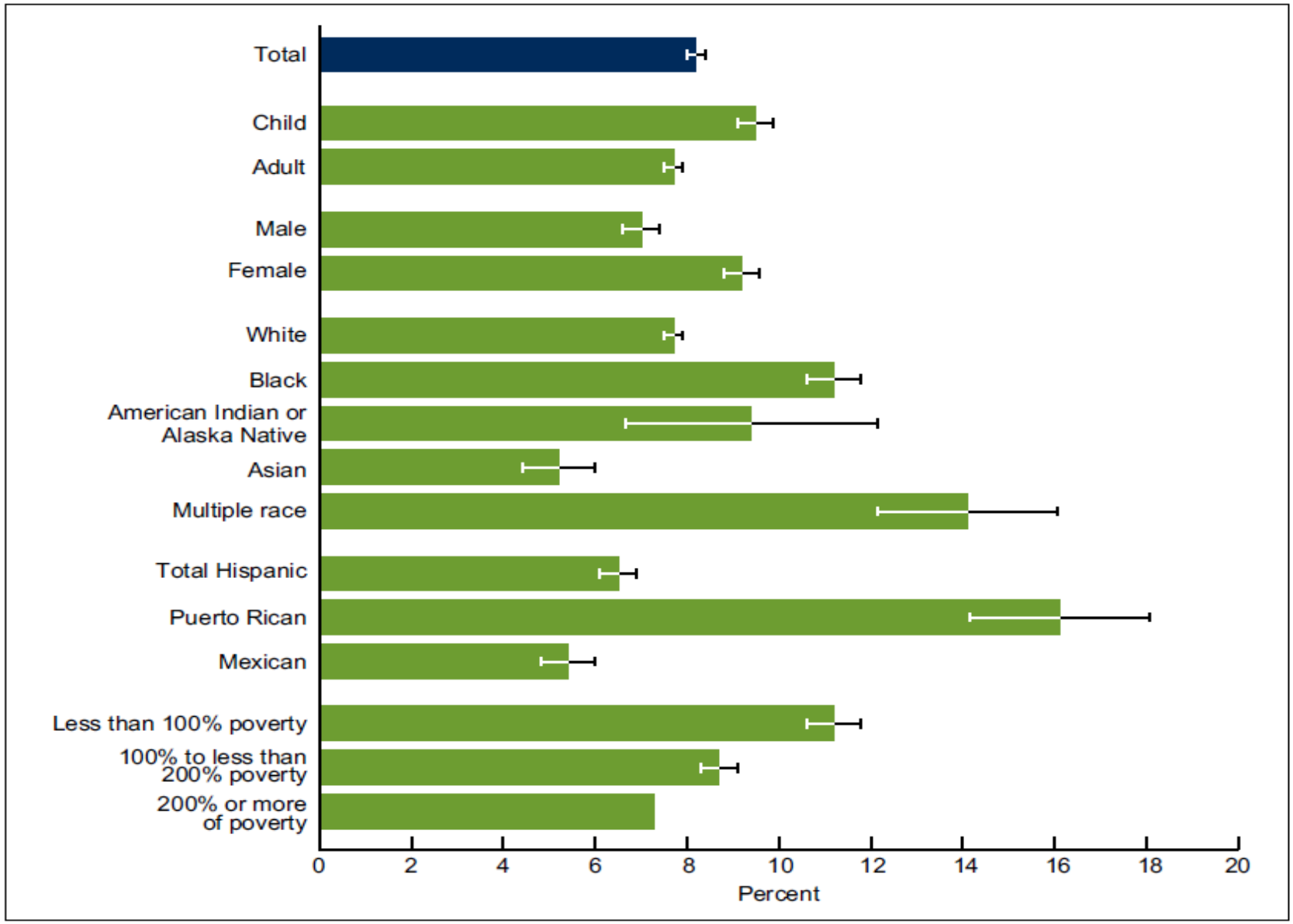
FIGURE 1. Current asthma prevalence,* by age group,† sex, and race/ethnicity — National Health Interview Survey, United States, 2001–2009



* Includes persons who answered "yes" to the questions: "Have you ever been told by a doctor or other health professional that [you/your child] had asthma?" and "Do [you/your child] still have asthma?"

† Age-adjusted to the 2000 U.S. population, except age-group–specific estimates.

Figure 2. Asthma prevalence, by selected demographic characteristics: United States, average annual 2008–2010



95% confidence interval.

NOTES: Asthma prevalence refers to percentage of people who have ever been diagnosed with asthma and still have asthma. Access data table for Figure 2 at: http://www.cdc.gov/nchs/data/databriefs/db94_tables.pdf#2.

SOURCES: CDC/NCHS, Health Data Interactive and National Health Interview Survey.

Prevalence of Current Asthma Among Children[3], Texas, 2011

	Est. Number of Cases	Prevalence (95% CI)
Total	556,773	8.0 (6.7, 9.3)
Gender		
Male	305,732	8.6 (6.8, 10.4)
Female	249,464	7.4 (5.6, 9.3)
Race/Ethnicity		
White	201,043	8.2 (6.3, 10.1)
Black	95,244	11.5 (7.1, 15.8)
Hispanic	227,212	6.6 (4.8, 8.5)
Other	10,237	7.1 (2.0, 12.1)
Age Group (years)		
0-4	96,043	5.3 (3.1, 7.6)
5-9	190,587	10.3 (7.3, 13.3)
10-14	128,380	8.6(6.2, 11.1)
15-17	100,530	9.4 (6.3, 12.6)

Prevalence of Current Asthma Among Adults, Texas[3], 2011

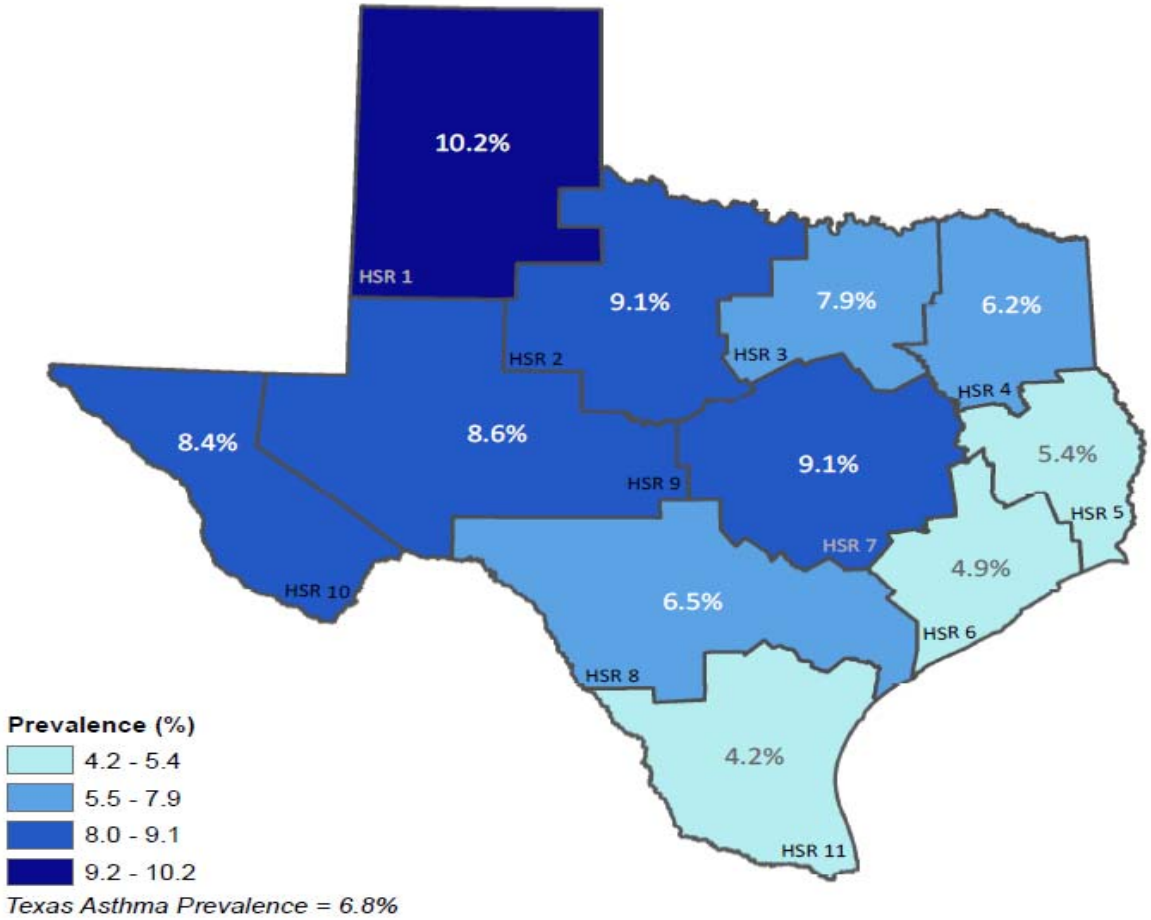
	Est. Number of Cases	Prevalence (95% CI)
Total	1,352,057	7.4 (6.7, 8.1)
Gender		
Male	460,496	5.1 (4.2, 6.0)
Female	891,560	9.7 (8.6, 10.7)
Race/Ethnicity		
White	830,908	9.2 (8.2, 10.2)
Black	207,590	10.2 (7.5, 13.0)
Hispanic	256,336	4.2 (3.2, 5.2)
Other	43,815	5.2 (2.8, 7.5)
Age Group (years)		
18-29	204,640	4.9 (3.4, 6.3)
30-44	405,803	7.7 (6.3, 9.0)
45-64	498,079	8.5 (7.3, 9.7)
65+	216,196	8.1 (6.8, 9.3)
Smoking Status		
Current	330,948	9.6 (7.7, 11.5)
Former	352,429	9.0 (7.5, 10.5)
Never	661,095	6.2 (5.4, 7.0)
Weight Status		
BMI ≤ 24.9	369,943	6.4 (5.2, 7.6)
BMI 25.0-29.9	414,000	6.9 (5.8, 8.0)
BMI 30.0-39.9	241,557	7.9 (6.2, 9.5)
BMI ≥ 40	257,112	12.3 (9.6, 14.9)

TEXAS Department of State Health Services

Asthma Health Facts 2011
Texas Asthma Control Program

Texas

Adult Current Asthma Prevalence by Health Service Region (HSR), Texas, 2012



Data Classification: Quantiles.
Data Source: 2012 Texas Behavioral Risk Factor Surveillance System (BRFSS), Center for Health Statistics, Texas Department of State Health Services.

Create by Erin Wickerham,2/28/14

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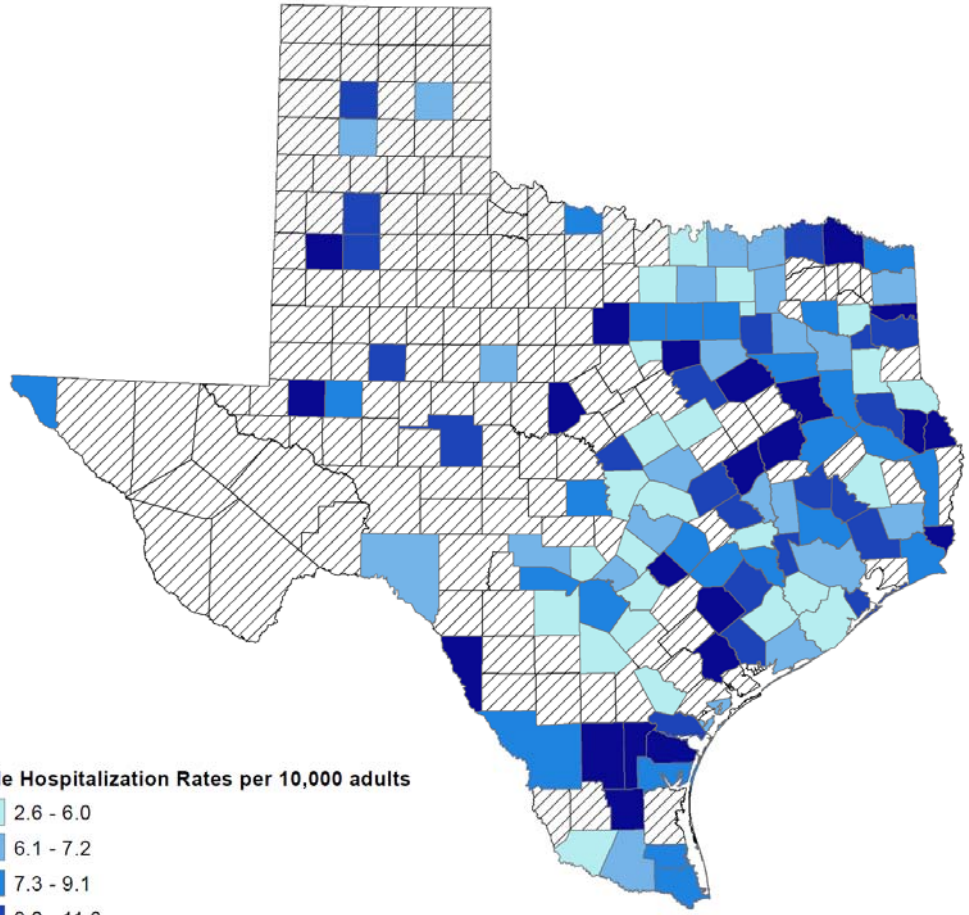
TEXAS Department of State Health Services

Asthma Hospitalization Rates Per 10,000 Persons Per Year Among Adults (18+ years) by County, Texas, 2012



Crude Hospitalization Rates per 10,000 adults

- 2.6 - 6.0
- 6.1 - 7.2
- 7.3 - 9.1
- 9.2 - 11.6
- 11.7 - 27.0
- Excluded County

Texas = 7.7 per 10,000 adults

Data Classification: Quantiles
Data Source: Inpatient Hospital Discharge Public Use Data File, 2012.
Center for Health Statistics, Texas Department of State Health Services.
An asthma hospitalization is a hospital record listing ICD-9 Codes 439.0-439.9 as the principal diagnosis.

Created by Erin Wickerham, 3/13/14

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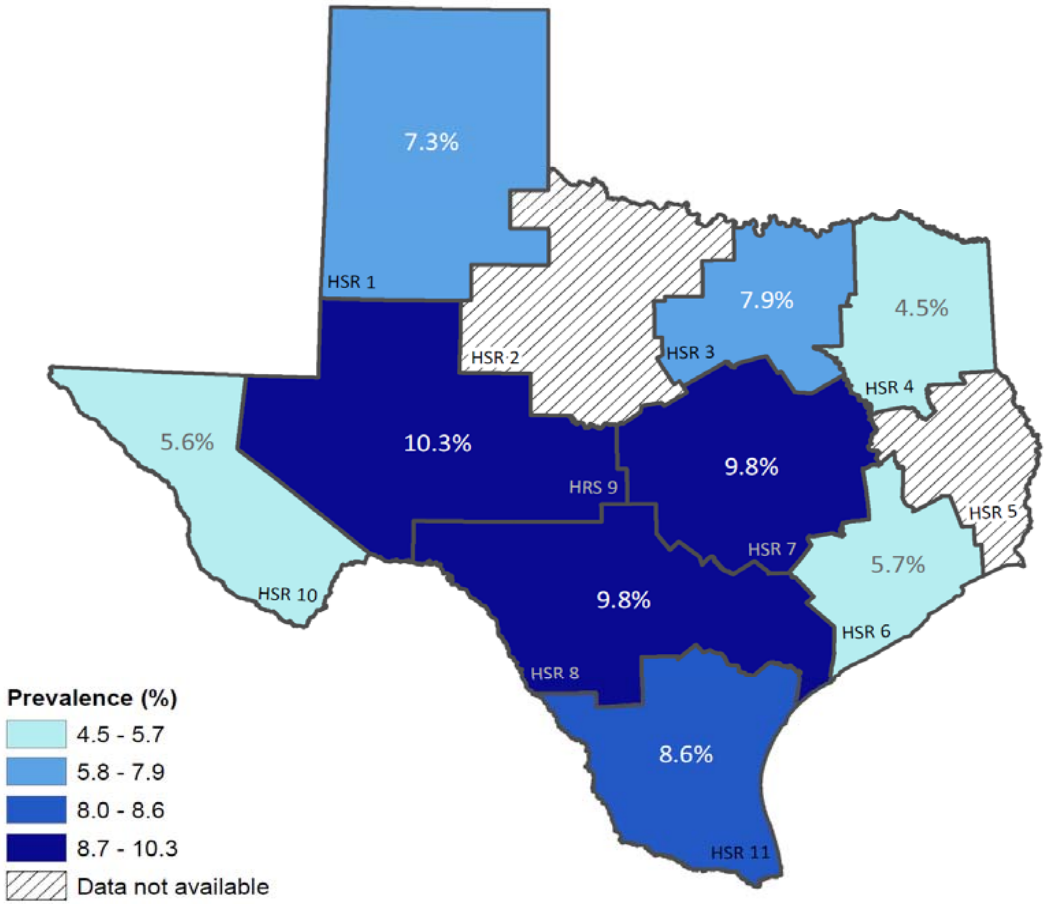
Childhood Current Asthma Prevalence by Health Service Region (HSR), Texas, 2012



Prevalence (%)

- 4.5 - 5.7
- 5.8 - 7.9
- 8.0 - 8.6
- 8.7 - 10.3
- Data not available

Texas Asthma Prevalence = 7.8%

Data Categorization: Quantiles.
Data Source: 2012 Texas Behavioral Risk Factor Surveillance System (BRFSS), Center for Health Statistics, Texas DSHS.

Created by Erin Wickerham, 10/28/2013

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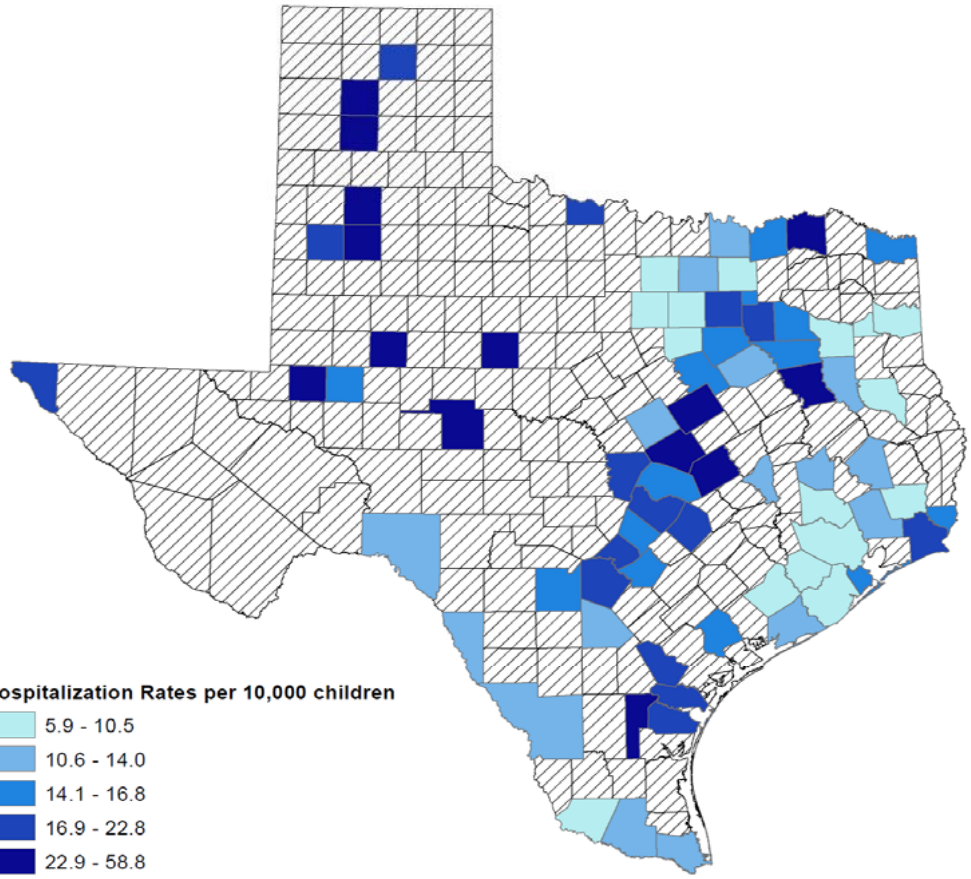
TEXAS Department of State Health Services

Asthma Hospitalization Rates
Per 10,000 Persons Per Year Among Children
(0-17 years) by County, Texas, 2012



Hospitalization Rates per 10,000 children

- 5.9 - 10.5
- 10.6 - 14.0
- 14.1 - 16.8
- 16.9 - 22.8
- 22.9 - 58.8
- Excluded County

Texas = 14.9 per 10,000 children

Data Classification: Quantiles
Data Source: Inpatient Hospital Discharge Public Use Data File, 2012.
Center for Health Statistics, Texas Department of State Health Services.
An asthma hospitalization is a hospital record listing ICD-9 Codes 439.0-439.9 as the principal diagnosis.

Created by Erin Wickerham, 3/13/14

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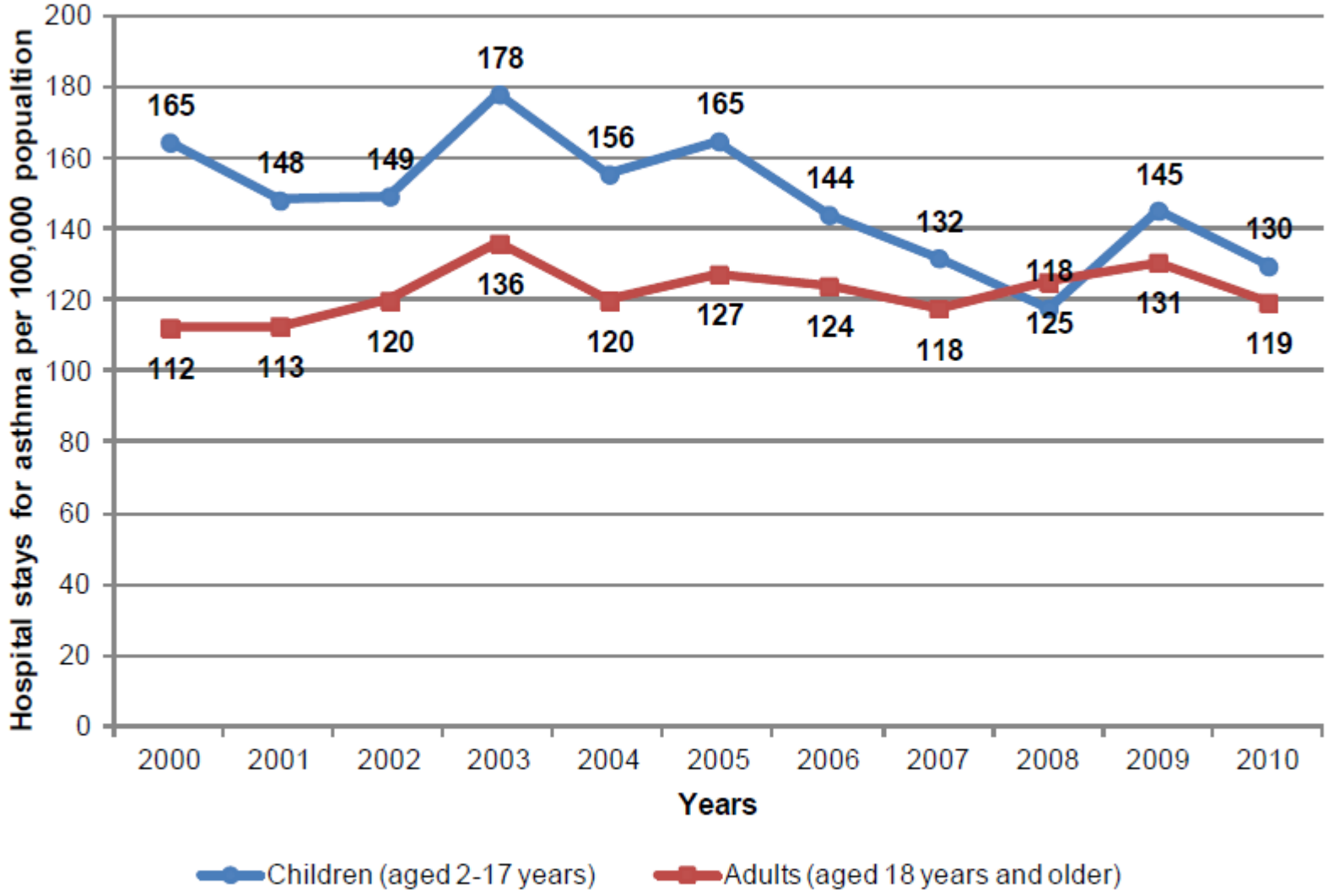
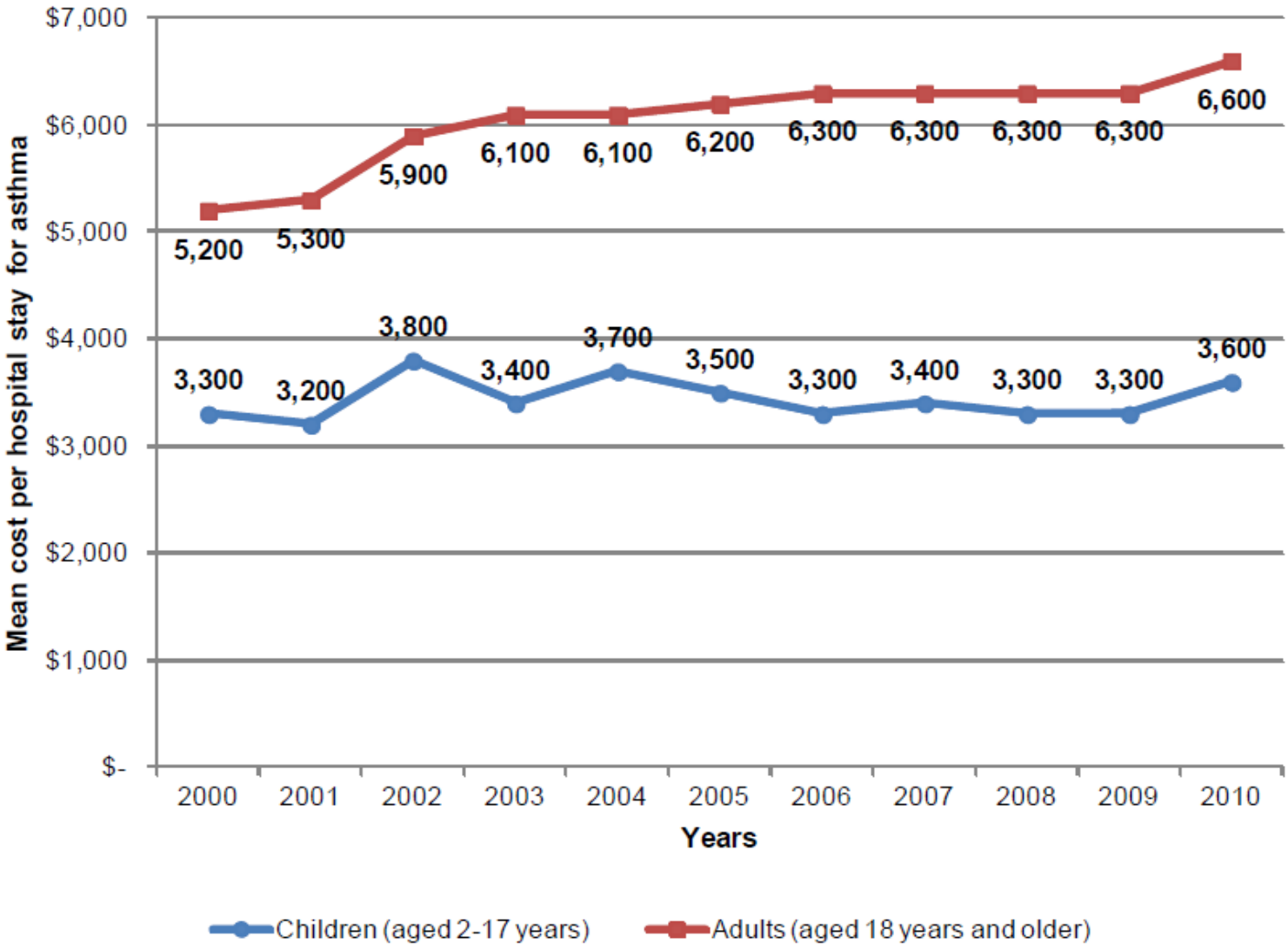
Figure 1. Trends in the rate of hospital stays for asthma per 100,000 population for children and adults, 2000–2010



Note: Rates are adjusted for age and sex.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2000–2010, and AHRQ Prevention Quality Indicators (PQIs)

Figure 2. Trends in the average cost of hospital stays for asthma for children and adults, 2000–2010



Note: Costs were adjusted for inflation to 2010 using the price index for the gross domestic product.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2000–2010, and AHRQ Prevention Quality Indicators (PQIs)

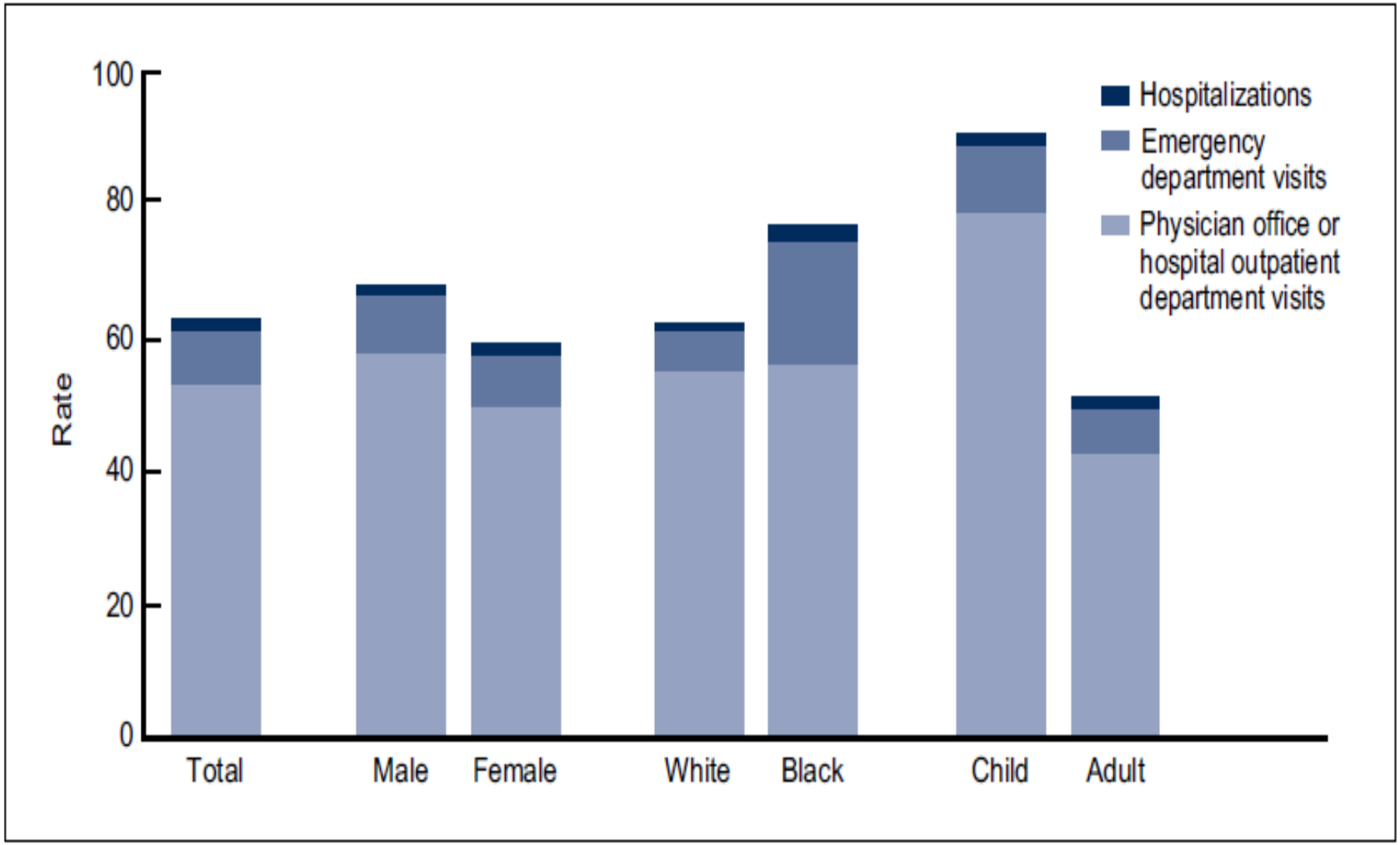
Table 1. Adjusted rate of hospital stays for asthma per 100,000 population for children and adults, 2010

Patient characteristic	Hospital stays for asthma per 100,000 population	
	Children (aged 2–17 years)	Adults (aged 18 years and older)
Total U.S.	129.7	119.3
Sex		
Male	156.5	71.2
Female	101.7	163.0
Race/ethnicity		
Non-Hispanic		
White	83.8	90.5
African American	363.9	297.9
Asian and Pacific Islander	78.2	65.4
Hispanic (of any race)	128.8	144.6
Community-level income		
First quartile (lowest income)	182.8	194.3
Second quartile	123.7	117.4
Third quartile	113.9	100.0
Fourth quartile (highest income)	95.2	72.6
Location of patient residence		
Large metropolitan	140.6	139.1
Small metropolitan	124.9	94.5
Micropolitan	97.6	99.2
Not metropolitan or micropolitan	104.0	110.0
Location of inpatient treatment		
Northeast	176.8	167.6
Midwest	104.6	120.5
South	130.3	120.8
West	119.7	76.5

Note: Rates are adjusted for age and sex.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS) and State Inpatient Databases (SID) disparities analytic file, 2010, and AHRQ Prevention Quality Indicators (PQIs)

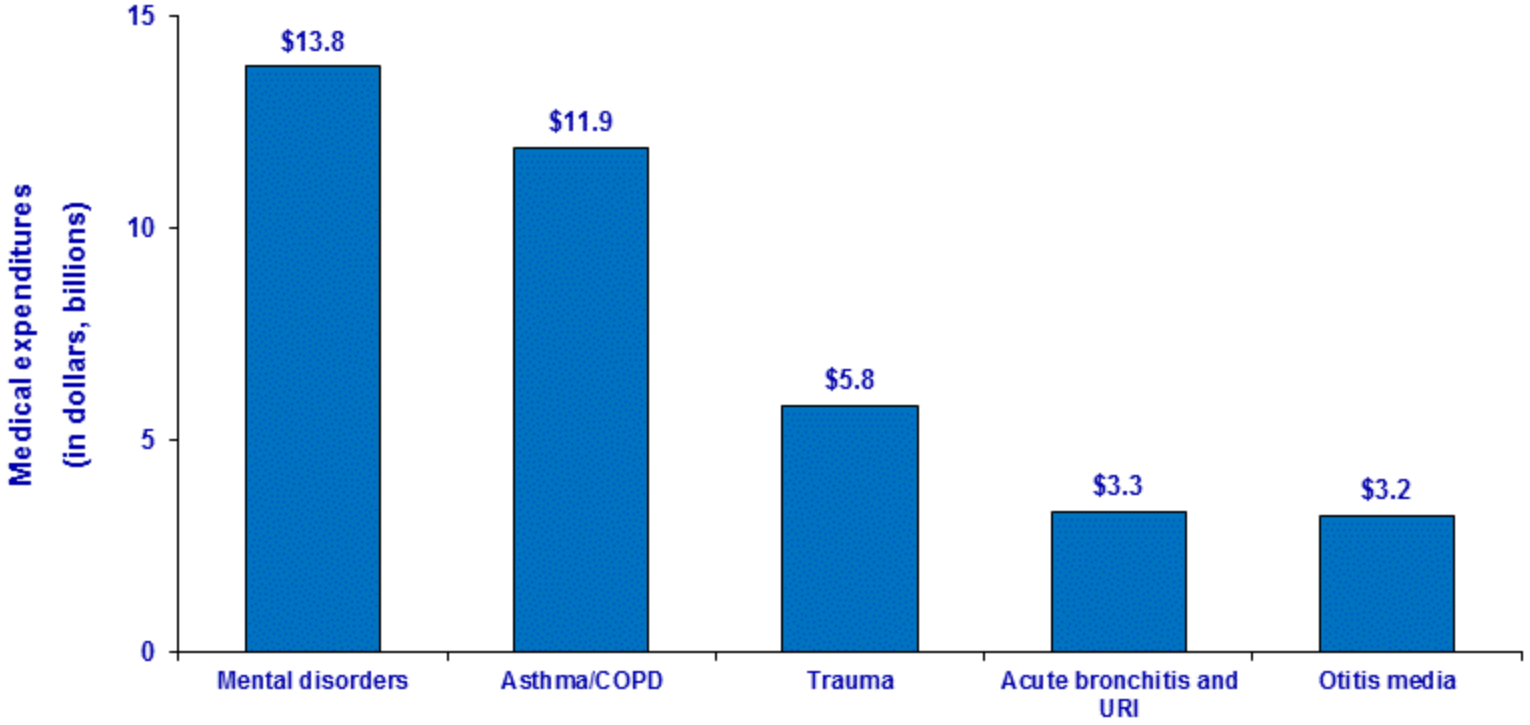
Figure 4. Asthma health care encounters per 100 persons with asthma: United States, 2001–2009



NOTE: Access data table for Figure 4 at: http://www.cdc.gov/nchs/data/databriefs/db94_tables.pdf#4.

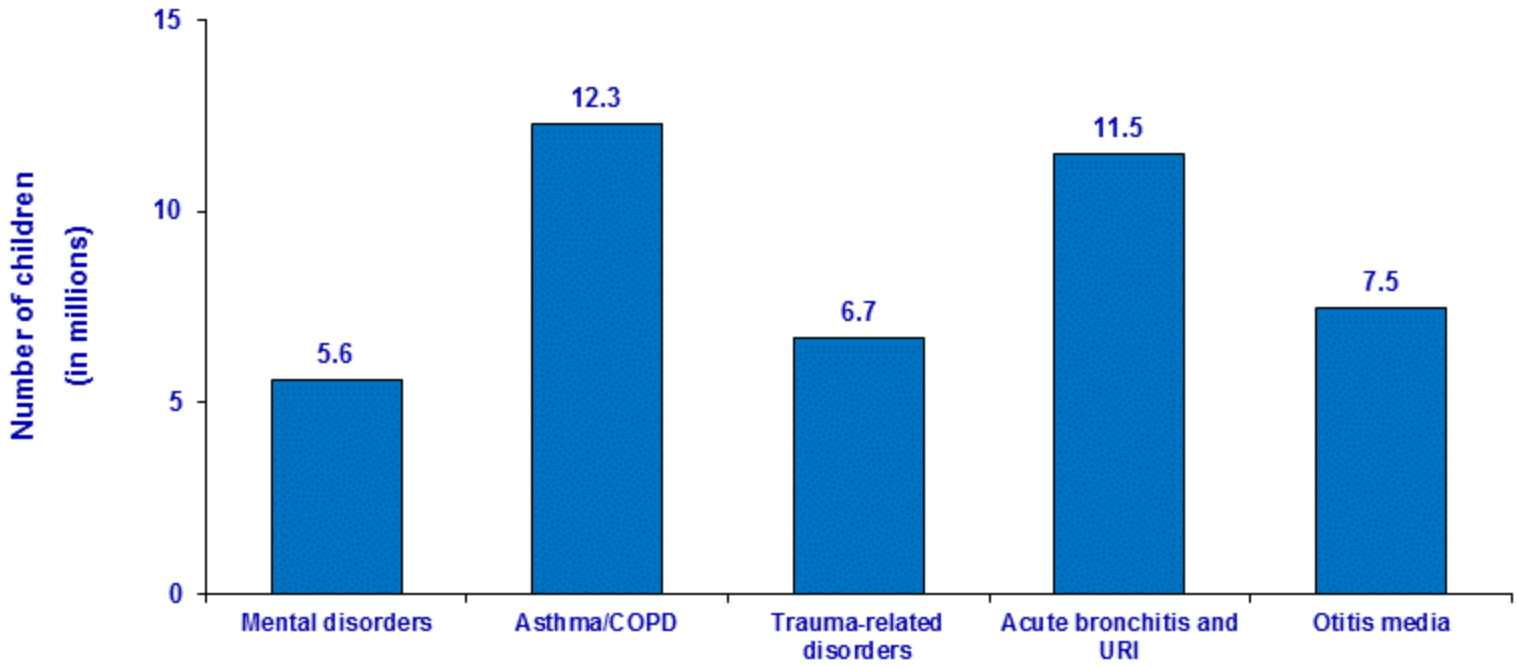
SOURCES: CDC/NCHS, National Ambulatory Medical Care Survey, National Hospital Ambulatory Medical Care Survey, National Hospital Discharge Survey, and National Health Interview Survey.

Figure 1. Expenditures for the five most costly conditions in children, 2011



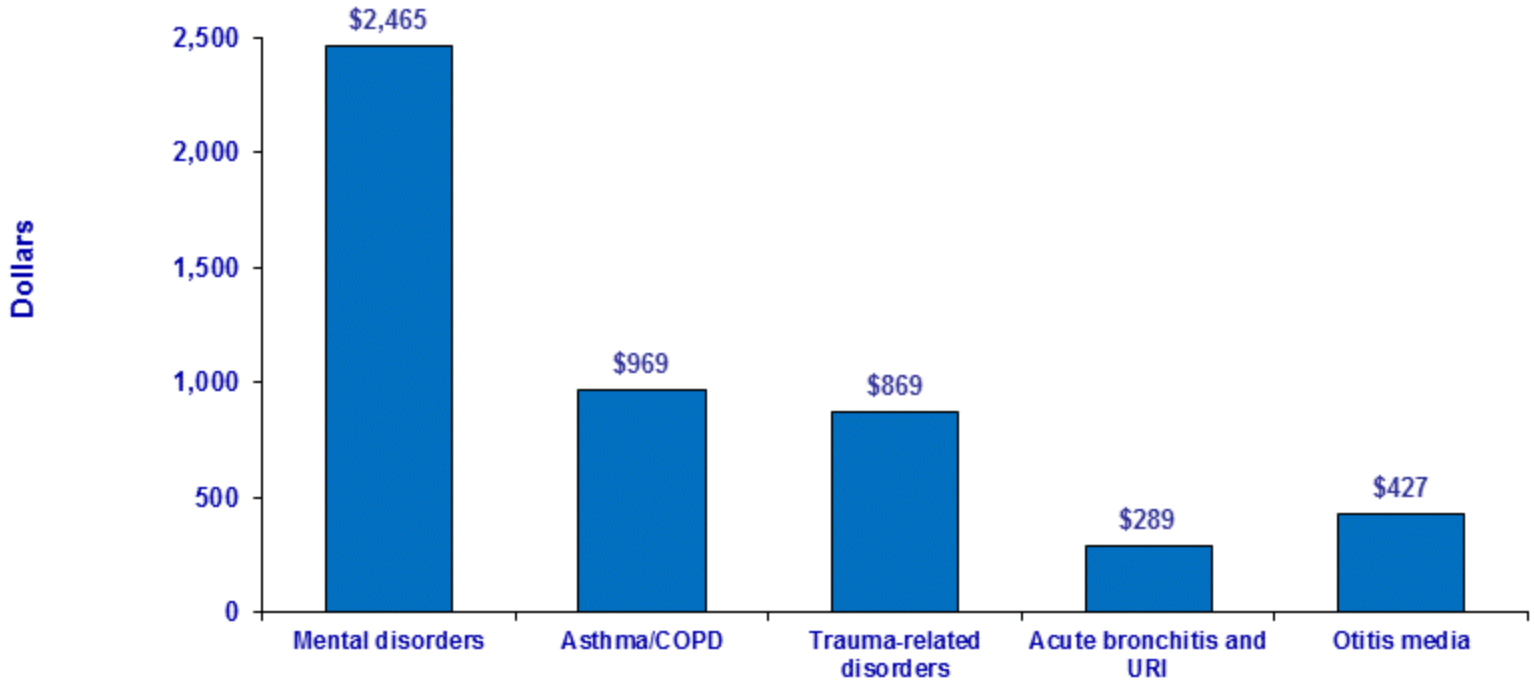
Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2011

Figure 2. Number of children with expenses for the five most costly conditions, 2011



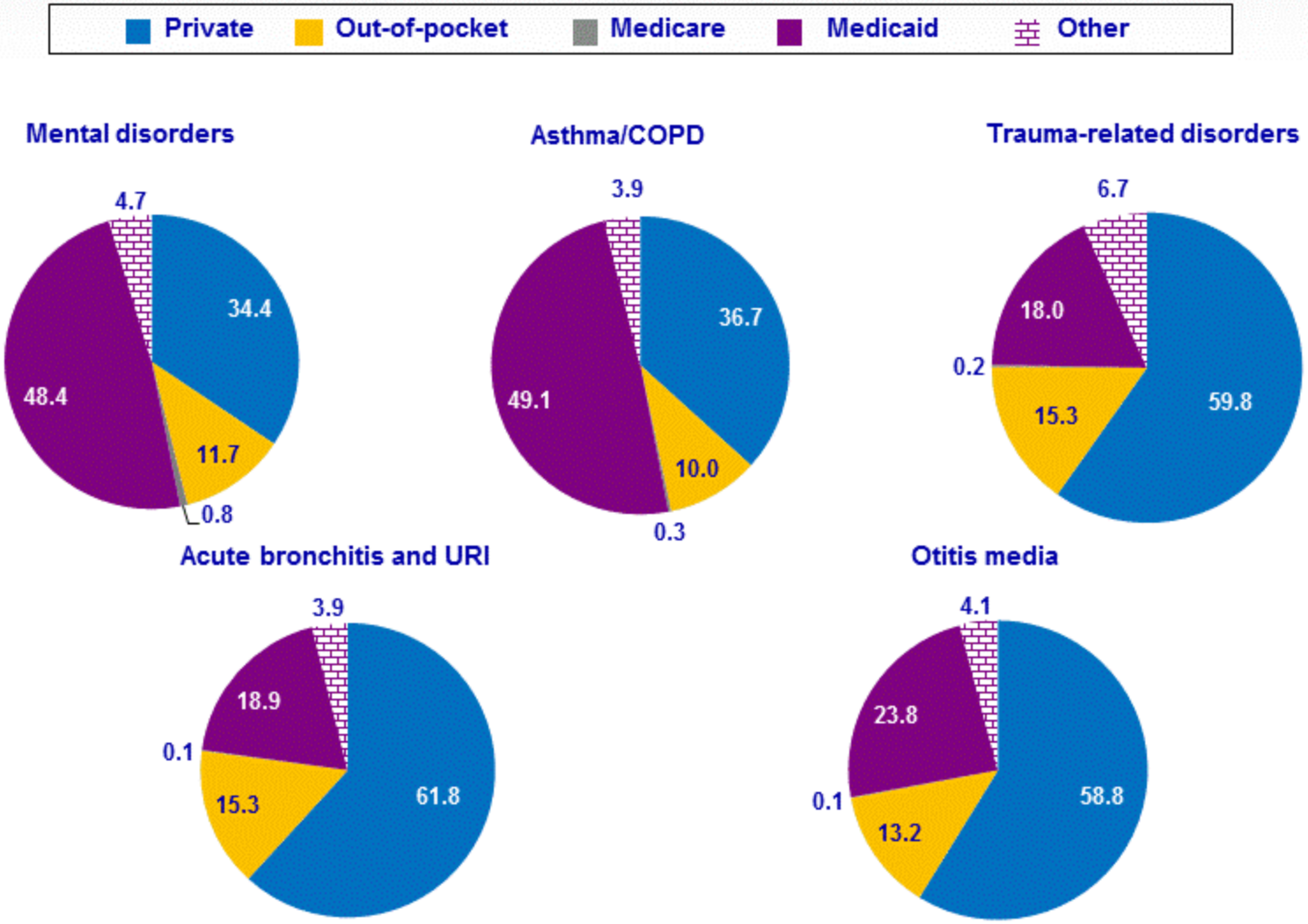
Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2011

Figure 3. Average expenditures per child with expenses for the five most costly conditions, 2011



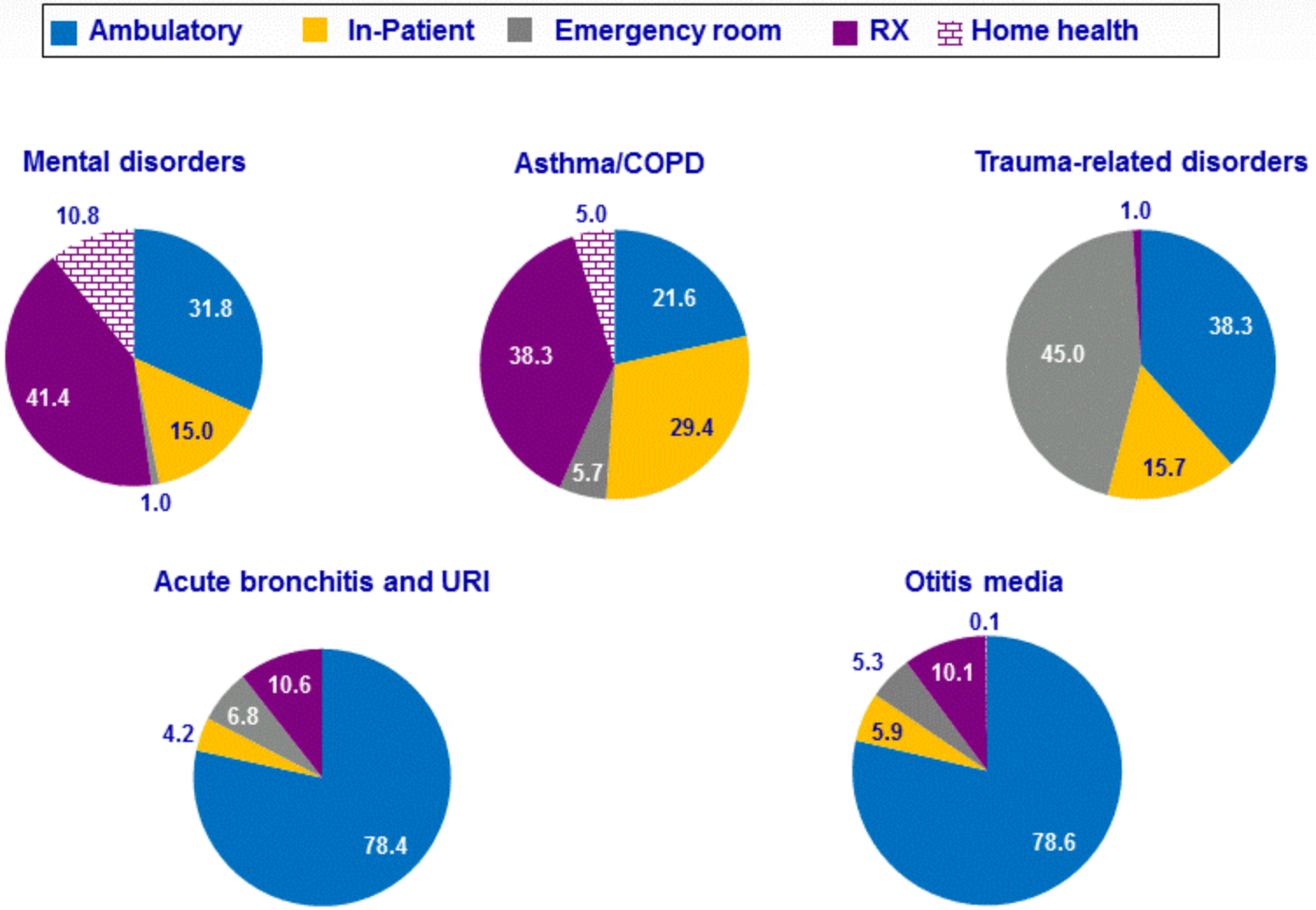
Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2011

Figure 4. Percentage distribution of annual expenditures for the five most costly conditions in children, by source of payment, 2011



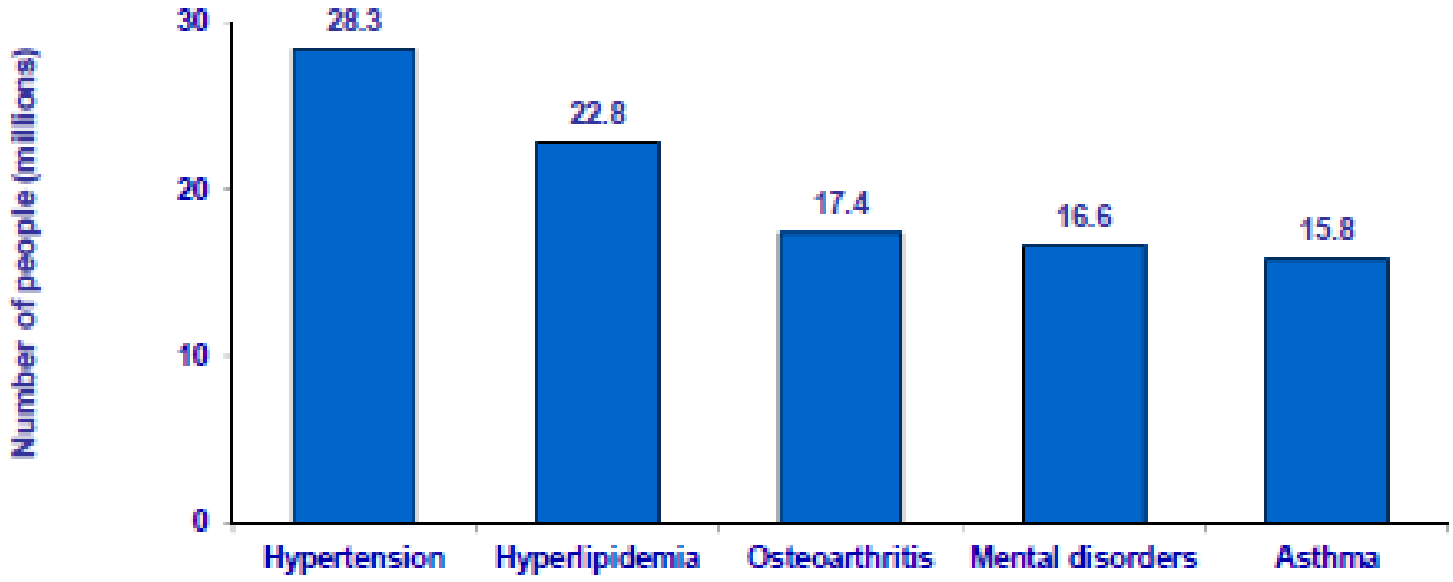
Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2011

Figure 5. Percentage distribution of annual expenditures for the five most costly conditions in children, by type of service, 2011



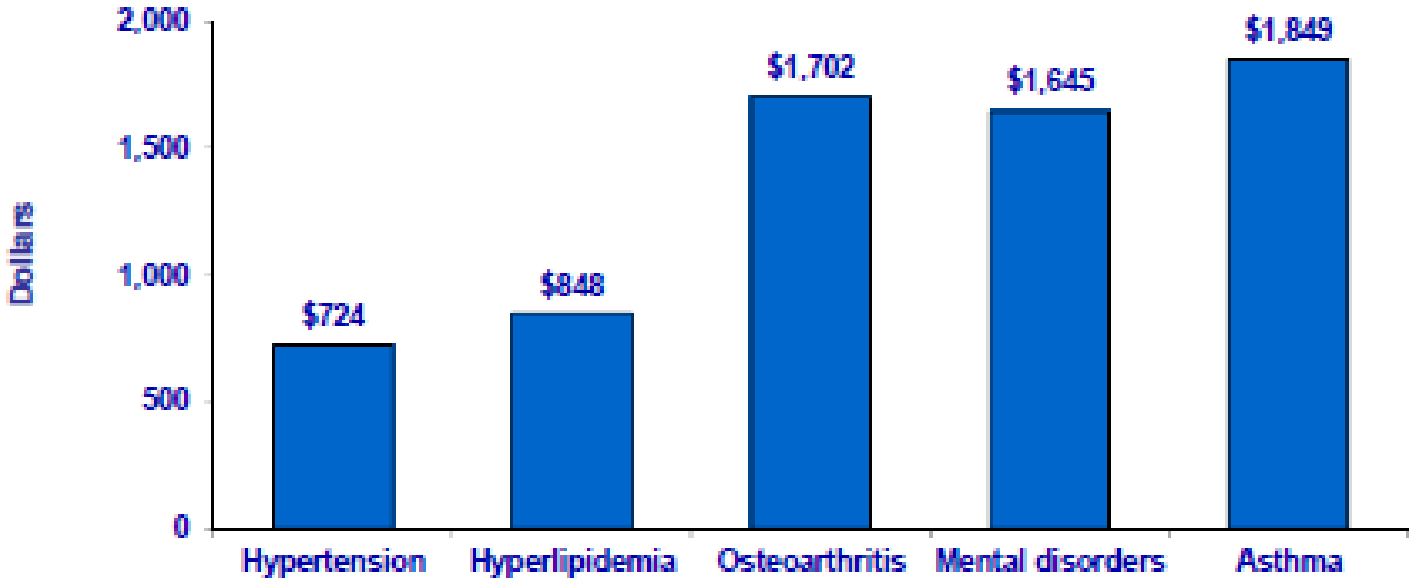
Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2011

Figure 1. Number of people treated for the five most commonly treated conditions, ages 40 to 64, 2009



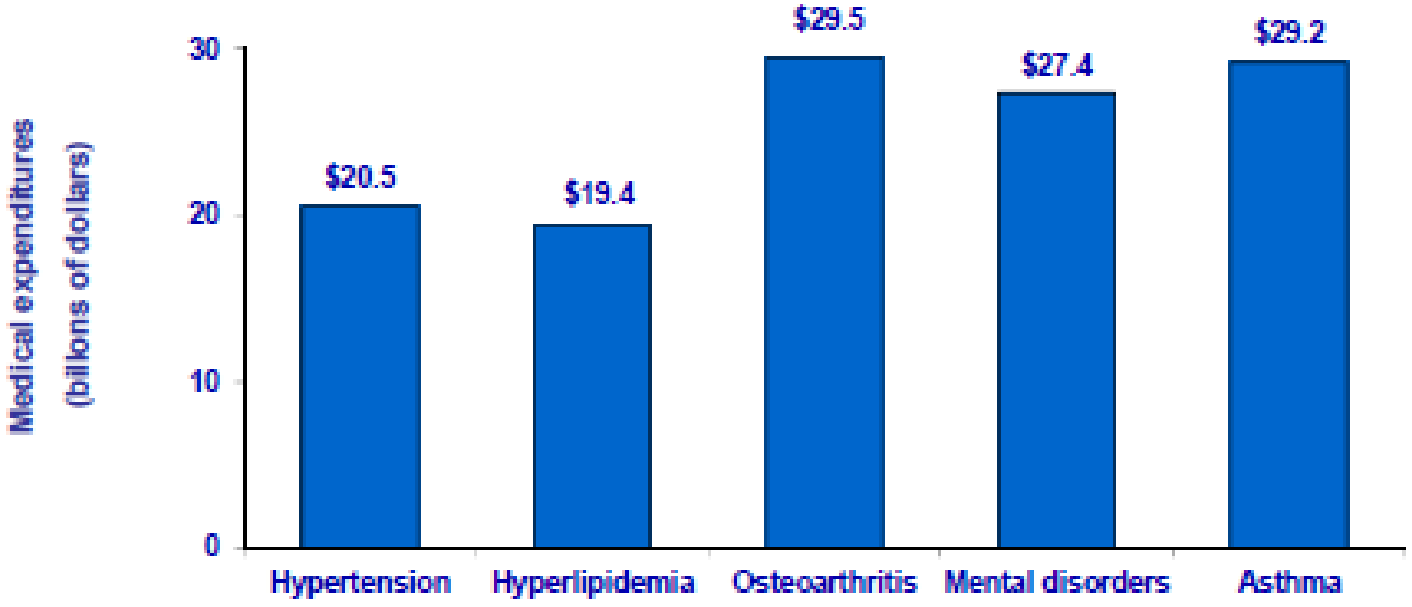
Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2009

Figure 2. Average expenditures per person with expenses for the five most commonly treated conditions, adults ages 40 to 64, 2009



Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2009

Figure 3. Expenditures for the five most commonly treated conditions, adults ages 40 to 64, 2009



Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2009

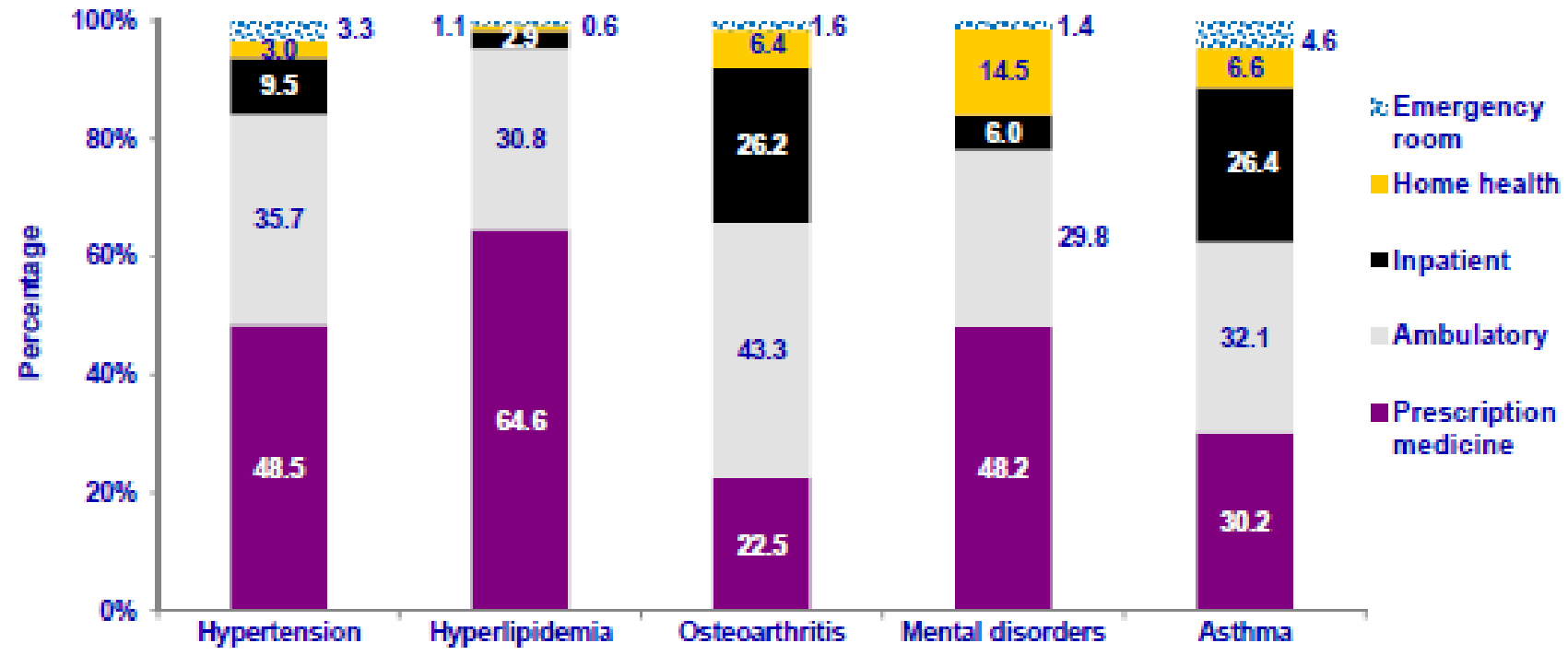
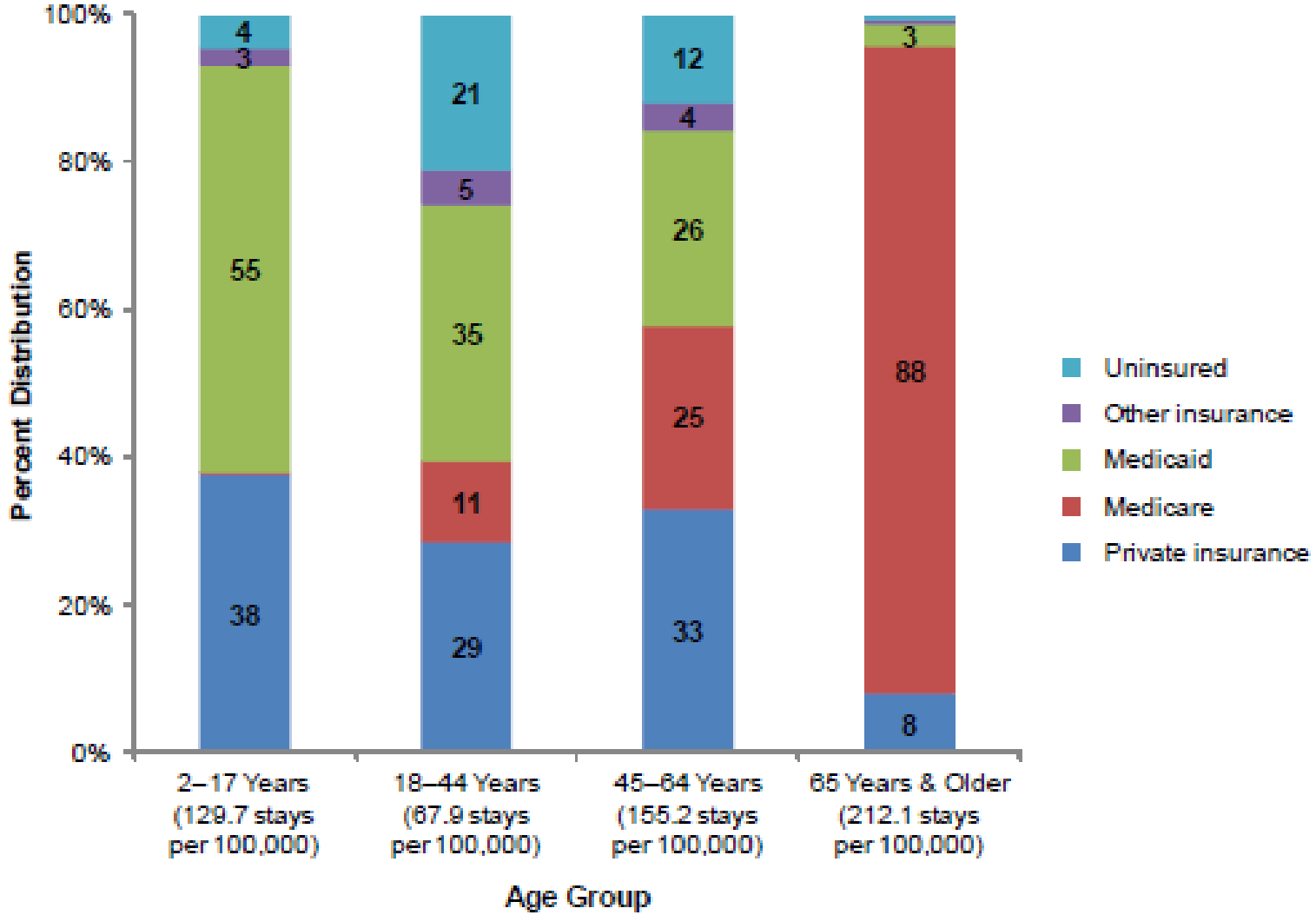


Figure 4. Percentage distribution of annual expenditures for the five most commonly treated conditions, adults ages 40 to 64, by type of service, 2009

Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2009

Figure 3. Distribution of hospital stays for asthma by age group and primary expected payer, 2010



Note: Percentages less than 2 percent are not labeled. The Medicare percentage for children aged 2–17 years is not visible because it is only 0.2 percent.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2010, and AHRQ Prevention Quality Indicators (PQIs)

Asthma Comorbidity

TABLE 2. Number and prevalence of children and teens aged 2–19 years participating in the Maryland Healthy Kids study (2005–2010) who were screened for or received a diagnosis of an obesity-related condition, by body mass index (BMI) percentile and selected characteristics

Characteristic	BMI below the 85th percentile		BMI in the 85th–94th percentiles		BMI at or above the 95th percentile		Total no.	p-value*
	No.	Prevalence (%)	No.	Prevalence (%)	No.	Prevalence (%)		
Total	**6,769**	**62.2**	**1,790**	**16.5**	**2,323**	**21.4**	**10,882**	
Diagnosed medical condition								
Asthma	1,825	27.0	535	29.9	779	33.5	**3,139**	<0.001
Depression	307	4.5	88	4.9	168	7.2	**563**	<0.001
Dyslipidemia	226	3.3	64	3.6	183	7.9	**473**	<0.001
Sleep apnea	98	1.5	33	1.8	77	3.3	**208**	<0.001
Diabetes	44	0.7	21	1.2	58	2.5	**123**	<0.001
Hypertension	43	0.6	13	0.7	61	2.6	**117**	<0.001
Tibia vara	48	0.7	20	1.1	27	1.2	**95**	0.027
Acanthosis nigricans	<6	—†	<6	—†	34	1.5	**40**	<0.001
Overweight	9	0.1	16	0.9	49	2.1	**74**	<0.001
Obesity	33	0.5	70	3.9	519	22.3	**622**	<0.001
Morbid obesity	<6	—†	<6	—†	62	2.7	**70**	<0.001

Hurt L, Pinto CD, Watson J, Grant M, Gielner J; Armed Forces Health Surveillance Center. Diagnosis and screening for obesity-related conditions among children and teens receiving medicaid - Maryland, 2005-2010. MMWR Morb Mortal Wkly Rep. 2014 Apr 11;63(14):305-8.

Asthma Comorbidity

TABLE 2. Number and prevalence of children and teens aged 2–19 years participating in the Maryland Healthy Kids study (2005–2010) who were screened for or received a diagnosis of an obesity-related condition, by body mass index (BMI) percentile and selected characteristics

Characteristic	BMI below the 85th percentile		BMI in the 85th–94th percentiles		BMI at or above the 95th percentile		Total no.	p-value*
	No.	Prevalence (%)	No.	Prevalence (%)	No.	Prevalence (%)		
Total	**6,769**	**62.2**	**1,790**	**16.5**	**2,323**	**21.4**	**10,882**	
Diagnosed medical condition								
Asthma	1,825	27.0	535	29.9	779	33.5	**3,139**	<0.001
Depression	307	4.5	88	4.9	168	7.2	**563**	<0.001
Dyslipidemia	226	3.3	64	3.6	183	7.9	**473**	<0.001
Sleep apnea	98	1.5	33	1.8	77	3.3	**208**	<0.001
Diabetes	44	0.7	21	1.2	58	2.5	**123**	<0.001
Hypertension	43	0.6	13	0.7	61	2.6	**117**	<0.001
Tibia vara	48	0.7	20	1.1	27	1.2	**95**	0.027
Acanthosis nigricans	<6	—†	<6	—†	34	1.5	**40**	<0.001
Overweight	9	0.1	16	0.9	49	2.1	**74**	<0.001
Obesity	33	0.5	70	3.9	519	22.3	**622**	<0.001
Morbid obesity	<6	—†	<6	—†	62	2.7	**70**	<0.001

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Quality-of-life and comorbid conditions among adults with current asthma, Texas, 2011

Erin Wickerham
Texas Asthma Control Program
Office of surveillance, evaluation, and research
Texas Department of State Health Services

2013 BRFSS Conference, Atlanta, GA
March 26th, 2013

TEXAS Department of State Health Services

INTRODUCTION

* Adults with a chronic condition, like asthma, often have comorbidities
* Quality-of-life may be impacted by the presence of one or more chronic conditions
* Study objective: Examine the association between quality-of-life, comorbidities, and asthma status among adults in Texas

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OBJECTIVES

* Determine the associations between current asthma and quality-of-life among adults in Texas
* Describe the associations between asthma and other chronic conditions
* Explore quality-of-life measures among persons with asthma and additional chronic conditions

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METHODS

Five comorbid chronic conditions

- Obesity
- Additional lung disease (COPD, emphysema, chronic bronchitis)
- Depression
- Diabetes
- High blood pressure

Three quality-of-life measures

- Physical health not good on 5 or more of last 30 days
- Mental health not good on 5 or more of last 30 days
- Poor physical or mental health kept participant from doing usual activities on 5 or more of last 30 days

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METHODS

- For each comorbid condition, created a 4-category variable with asthma
  - Diabetes Example: 0 = no diabetes, no asthma,

  1= Diabetes but no asthma, 2 = Asthma but no diabetes,

  3 = Diabetes and asthma

- Logistic regression models

Predictors	Outcomes
Current asthma	• Comorbid conditions • Quality-of-life measures
4-category comorbidity variables	• Quality-of-life measures

- Models adjusted for sex, age, race/ethnicity, education, employment status, marital status, smoking status (current/non-current), health insurance coverage

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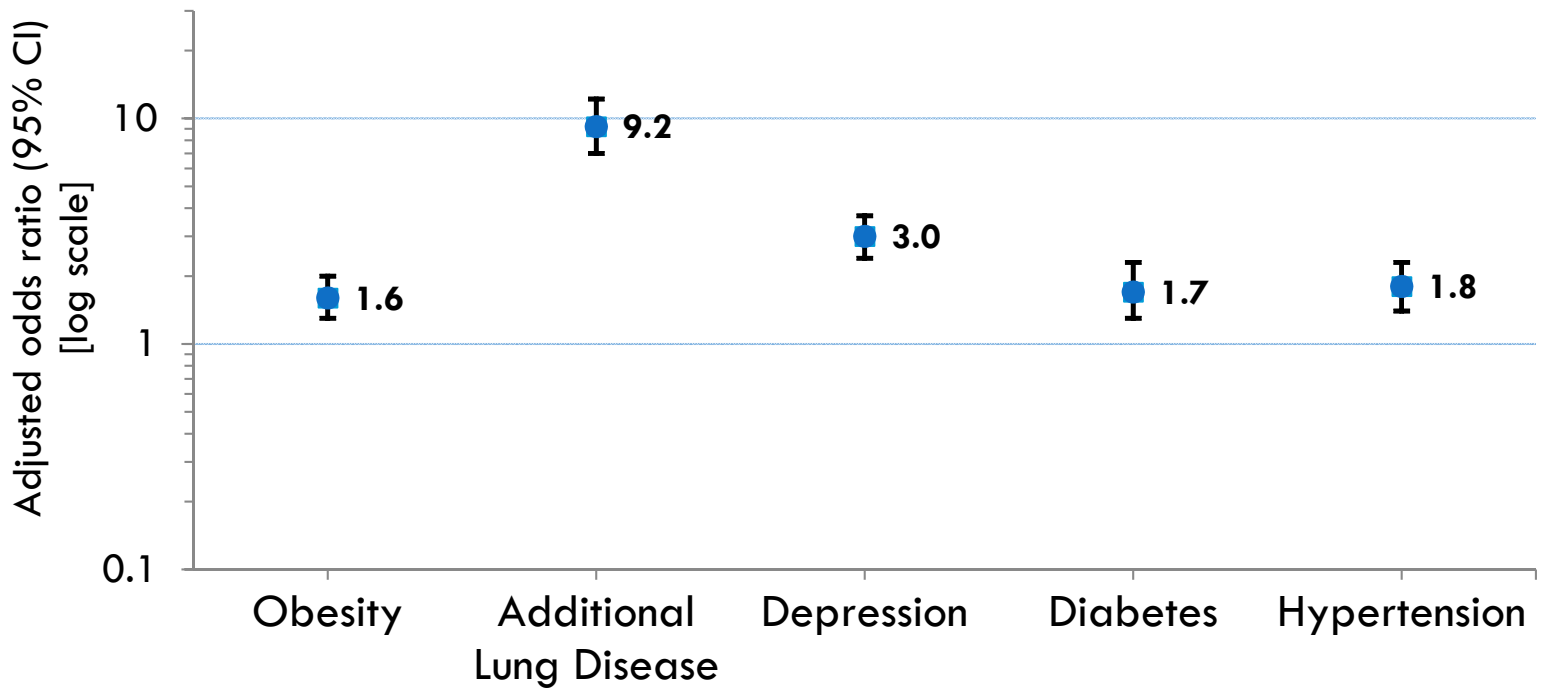
RESULTS

	Current Asthma (%) [N=1,256]	No Current Asthma (%) [N = 13,607]	P-value
COMORBIDITIES			
Obesity (BMI ≥ 30)	38.9	29.8	0.0002
COPD, Emphysema, or Chronic Bronchitis	26.8	3.7	<.0001
Depression	38.7	14.6	<.0001
Diabetes	14.7	9.8	0.0002
Hypertension	45.1	30.2	<.0001
QUALITY-OF-LIFE			
Physical health not good	40.9	18.8	<.0001
Mental health not good	36.6	19.3	<.0001
Activities limited due to poor physical or mental health	29.7	11.9	<.0001

RESULTS

Adjusted* Odds Ratios for Comorbid Conditions Comparing Adults with Current Asthma vs. No Current Asthma



*Models adjusted for sex, age, race/ethnicity, education, employment status, marital status, smoking status, health insurance coverage.

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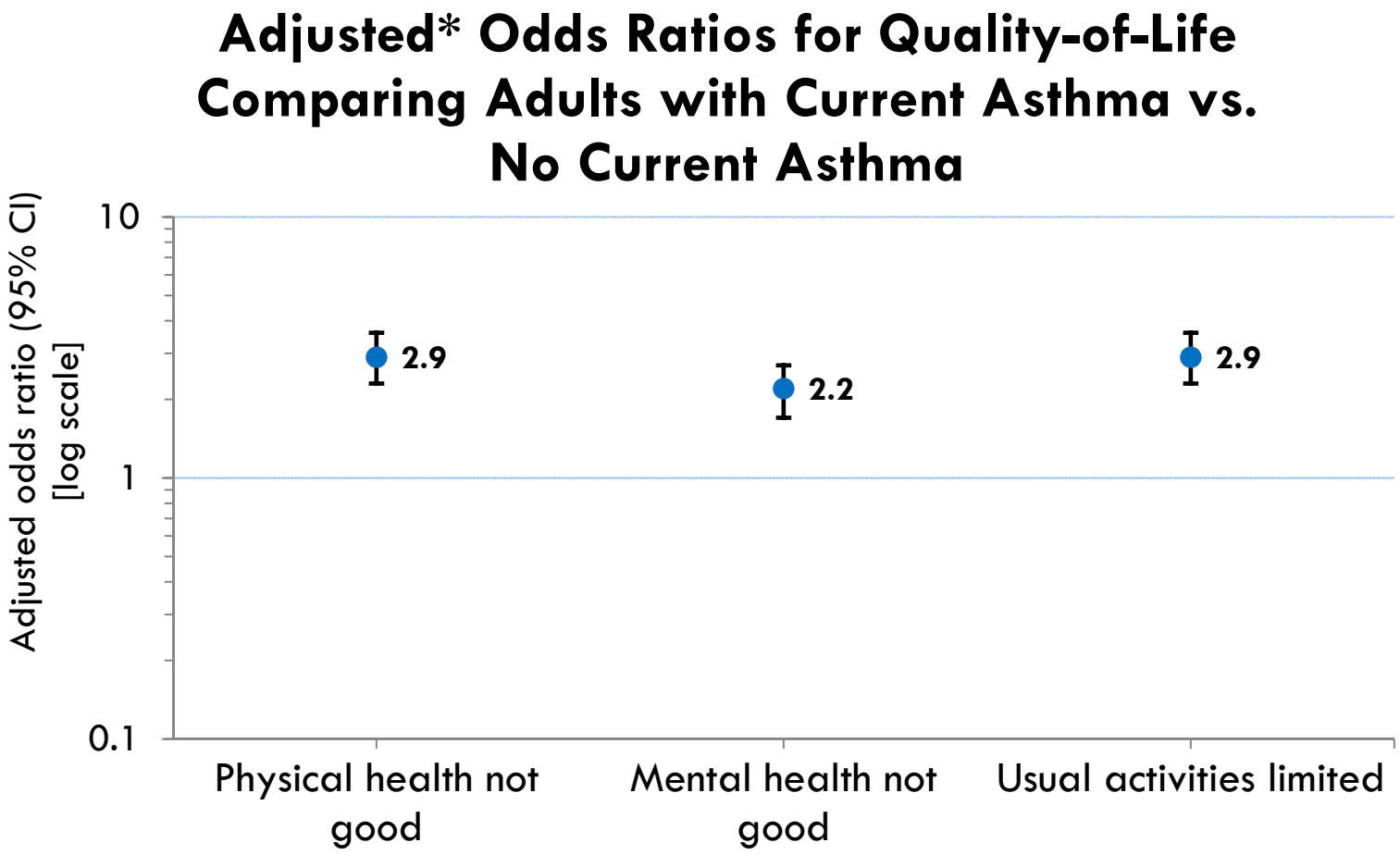
RESULTS



*Models adjusted for sex, age, race/ethnicity, education, employment status, marital status, smoking status, health insurance coverage.

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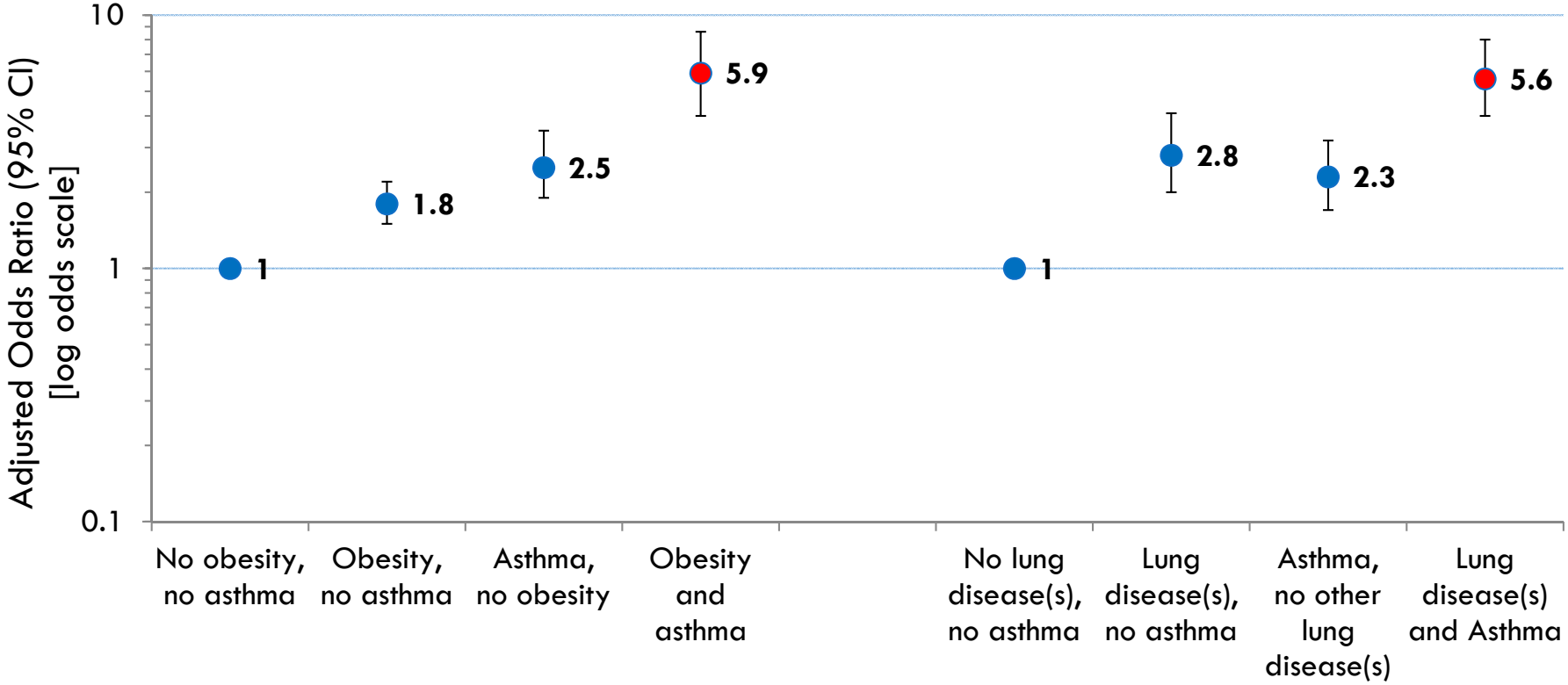
RESULTS

Adjusted* Odds Ratios for 'Activities Limited Due to Poor Physical or Mental Health' By Chronic Condition(s)



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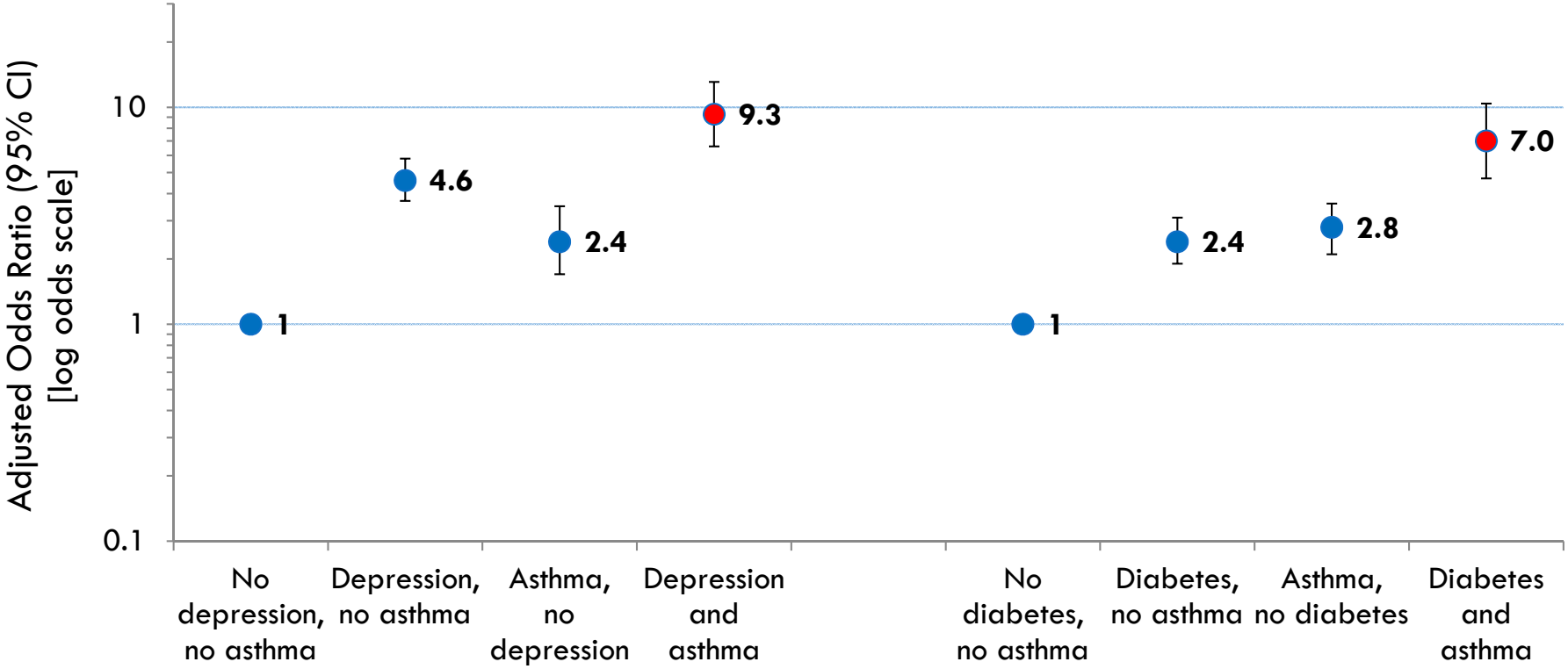

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RESULTS

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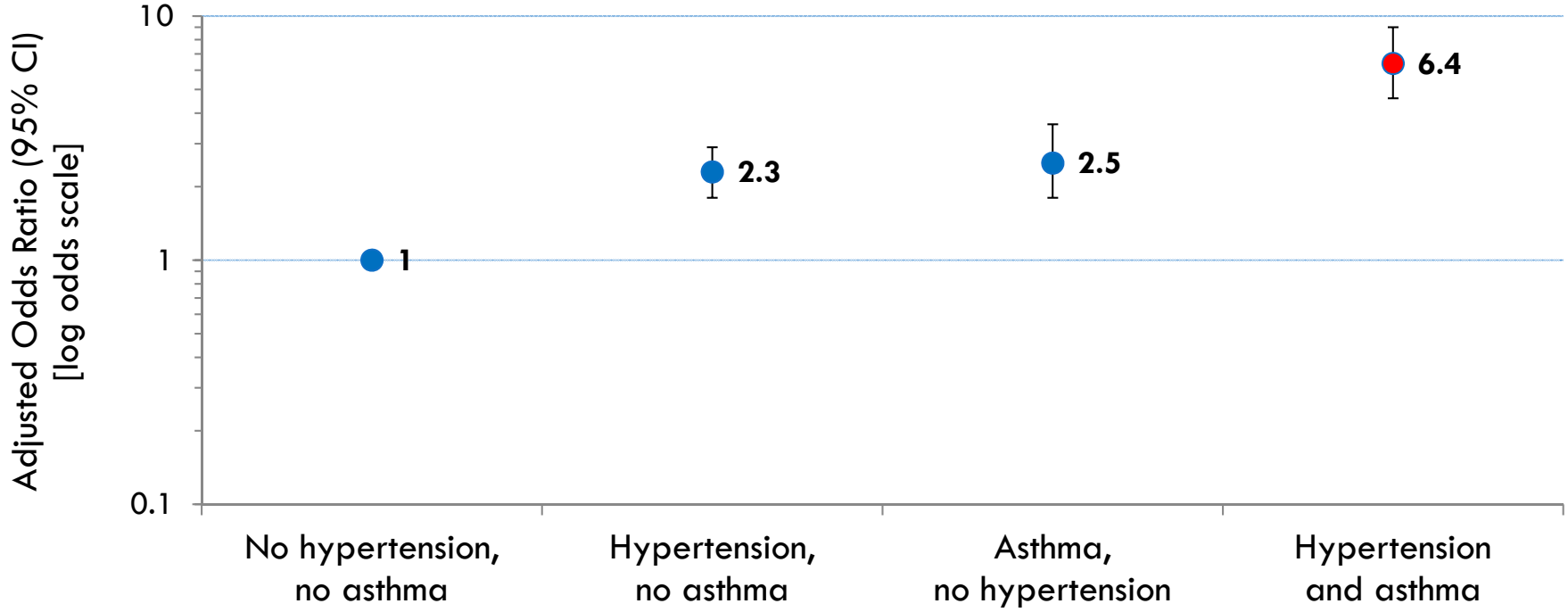

*Models adjusted for sex, age, race/ethnicity, education, employment status, marital status, smoking status, health insurance coverage.

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LIMITATIONS

- Only self-reported, physician diagnosed chronic conditions – Undiagnosed conditions not captured
- Time factor
  - Current: Asthma and obesity
  - Ever: Diabetes, depression, chronic lung conditions, hypertension
    - Medication use and/or self-management of chronic conditions not considered
- Other quality-of-life measures and chronic conditions not included

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CONCLUSIONS

* It is common for adults with asthma to have other chronic health conditions such as obesity; COPD, emphysema, or chronic bronchitis; depression, diabetes, and hypertension

* Consider impact on quality-of-life of asthma with at least one other chronic condition when planning and implementing asthma interventions

* Opportunity to collaborate with other chronic disease programs for health promotion and disease management

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Asthma
Classification, Management
Treatment

Jackee Kayser, M.D.
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A & I Medical Director, Dell Children's Hospital
Austin, Texas

NHLB Expert Panel Report 3

EPR-3 (The Expert Panel Report 3, Guidelines for the Diagnosis and Management of Asthma):

* Is a comprehensive set of guidelines for asthma diagnosis and management developed in 2007 through the National Asthma Education and Prevention Program coordinated by the NHLBI.
* Brings the best available scientific knowledge to clinical practice
* Builds on asthma guidelines issued in 1991 and 1997 and an update on selected topics released in 2002
* Consists of a Full Report and a Summary Report

What are EPR-3 Recommendations

EPR-3 includes detailed recommendations on the following areas of asthma management:

* Diagnosis
* Assessment and monitoring
* Patient education
* Control of factors contributing to asthma severity
* Pharmacological treatment of asthma
* Exacerbation management

Goals of EPR

* Focus on monitoring asthma control as the goal for asthma therapy and distinguishing between classifying asthma severity and monitoring asthma control
* Focus on impairment and risk as the two key domains of severity and control, and multiple measures for assessment
* Modifications in the stepwise approach to managing asthma long term

Goals of EPR

* New emphasis on multifaceted approaches to patient education and to the control of environmental factors or comorbid conditions that affect asthma
* Modifications to treatment strategies for managing asthma exacerbations

Key Concepts

EPR-3 is built on the following key concepts:

* Severity and control
* Impairment and risk
* Therapy goals
* Four components of care
* Stepwise approach

Severity and Control

SEVERITY

* Intrinsic intensity of disease process
* Assessed to initiate therapy

CONTROL

* Degree to which signs and symptoms are minimized due to therapy
* Goals of therapy are met
* Assessed to monitor and adjust therapy

Current Impairment & Future Risk

Current Impairment

* Components are:
* Symptoms (day, night)
* Reliever therapy
* Activity
* Lung function

Future Risk

* Components are:
* Exacerbations
* Loss of lung function
* Medication side effects

Goal of Therapy: Asthma Control

Reduce Impairment:

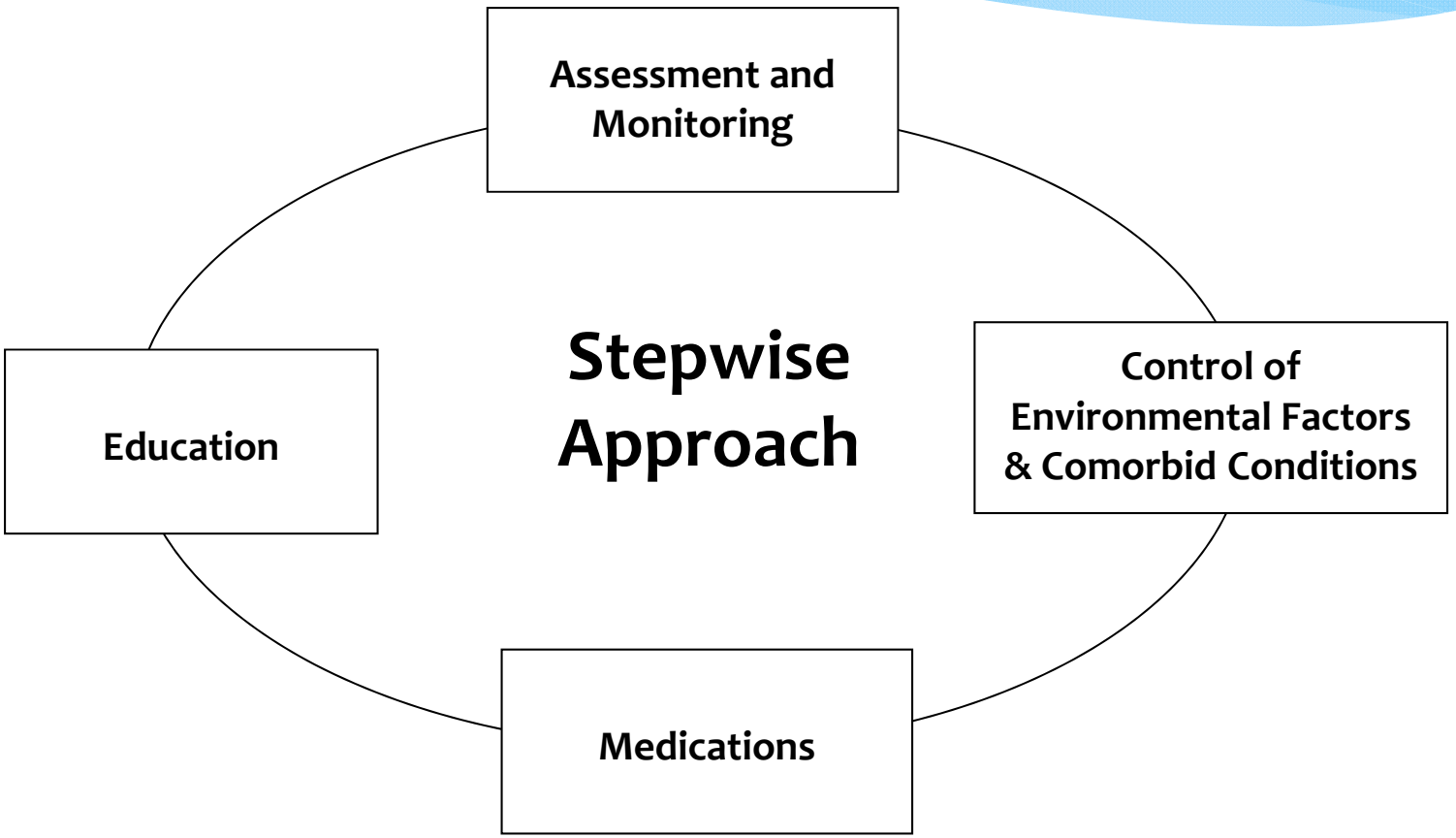
* Prevent chronic and troublesome symptoms (e.g., coughing or breathlessness in the daytime, in the night, or after exertion)
* Require infrequent use (≤2 days per week) of inhaled SABA for quick relief of symptoms (not including prevention of exercise-induced bronchospasm (EIB))
* Maintain (near) normal pulmonary function
* Maintain normal activity levels (including exercise and other physical activity and attendance at work or school)
* Meet patients' and families' expectations of and satisfaction with asthma care

Goal of Therapy: Reduce Risk

Reduce Risk:

* Prevent recurrent exacerbations of asthma and minimize the need for ED visits or hospitalizations
* Prevent loss of lung function; for children, prevent reduced lung growth
* Provide optimal pharmacotherapy with minimal or no adverse effects of therapy

Stepwise Approach to Asthma Control



Charts & Age Groups

EPR-3 provides charts to help the clinician assess severity and control. There are also step charts to aid in making medication decisions.

EPR-3 divides patients into three age groups:

* Ages 0 – 4
* Ages 5 - 11
* Ages 12 – adult

Each age group has its own severity, control, and step charts.

Age 0-4	Age 5-11	Age 12 and older

Components of Severity		Classification of Asthma Severity ≥ 12 years of age (Not currently taking long-term contol medication)			
		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3-4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta2-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily, and not >1x/on any day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Normal FEV1/FVC: 8-19 yr 85% 20-39 yr 80% 40-59 yr 75% 60-80 yr 70%	Lung function	• Normal FEV1 between exacerbations • FEV1>80% predicted • FEV1/FVC normal	• FEV1>80% predicted • FEV1/FVC normal	• FEV1>60% but <80% predicted • FEV1/FVC reduced 5%	• FEV1 <60% predicted • FEV1/FVC reduced > 5%
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year(see note)	≥2/year (see note)		
		Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category.			
		Relative annual risk of exacerbations may be related to FEV1			
Recommended Step for Initiating Therapy (See figure 4-1b for treatment steps.)		Step 1	Step 2	Step 3	Step 4
				and consider short course of oral systemic corticosteroids	
		In 2-6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Key: FEV1, forced expiratory volume in 1 second; FVC, forced vital capacity; ICU, intensive care unit

EPR 3 **Notes**

Age 0-4	Age 5-11	Age 12 and older

Components of Control		Classification of Asthma Control (≥ 12 years of age)		
		Well Controlled	**Not Well Controlled**	**Very Poorly Controlled**
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤2x/month	1-3x/week	≥4x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta2-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	FEV1 or peak flow	>80% predicted/ personal best	60-80% predicted/ personal best	<60% predicted/ personal best
	Validated Questionnaires ATAQ ACQ ACT	 0 ≤0.75* ≥20	 1-2 ≥1.5 16-19	 3-4 N/A ≤15
Risk	Exacerbations	0-1/year	≥2/year (see note)	
		Consider severity and interval since last exacerbation.		
	Progressive loss of lung function	Evaluation requires long-term followup care		
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment		• Maintain current step • Regular followup every 1-6 months to maintain control. • Consider step down if well controlled for at least 3 months	• Step up 1 step and • Reevaluate in 2-6 weeks. • For side effects: consider alternative treatment options.	• Consider short course of oral systemic corticosteroids. • Step up 1-2 steps, and • Reevaluate in 2 weeks. • For side effects, consider alternative treatment options.

*ACQ values of 0.76-1.4 are indeterminate regarding well-controlled asthma.
Key: EIB, exercise-induced bronchospasm; FEV1, forced expiratory volume in 1 second. See notes for full name and sources of ATAQ, ACQ, ACT.

EPR 3 **Notes**

Age 0-4 | Age 5-11 | Age 12 and older

Stepwise Approach for Managing Asthma (Youths ≥12 years of age)

Intermittent Asthma

Persistent Asthma: Daily Medication

Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

Step 1
Preferred:
SABA PRN

Step 2
Preferred:
Low-dose ICS
Alternative:
Cromolyn, LTRA, Nedocromil, or Theophylline

Step 3
Preferred:
Low-dose ICS + LABA
OR
Medium-dose ICS
Alternative:
Low-dose ICS + either LTRA, Theophylline, or Zileuton

Step 4
Preferred:
Medium-dose ICS + LABA
Alternative:
Medium-dose ICS + either LTRA, Theophylline, or Zileuton

Step 5
Preferred:
High-dose ICS + LABA
AND
Consider Omalizumab for patients who have allergies

Step 6
Preferred:
High-dose ICS + LABA + oral systemic corticosteroid
AND
Consider Omalizumab for patients who have allergies

Step up if needed

(first, check adherence, environmental control, and comorbid conditions)

Assess Control

Step down if possible

(and asthma is well controlled at least 3 months)

Each step: Patient education, environmental control, and management of comorbidities.

Steps 2-4: consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

Quick-Relief Medication for All Patients

- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Use of SABA or use >2 days a week for symptom relief (not prevention if EIB) generally indicates inadequate control and the need to step up treatment.

Key: **Alphabetical order is used when more than one treatment option is listed within either preferred or alternative therapy.** EIB, exercise-induced bronchospasm; ICS, inhaled corticosteroid; LABA, inhaled long-acting beta2-agonist; LTRA, leukotriene

EPR 3 Notes

Diagnosis Recommendations

EPR-3 includes recommendations for establishing an asthma diagnosis:

* Use medical history and physical examination to determine that symptoms of recurrent episodes of airflow obstruction are present
* Use spirometry in all patients older than 5 years of age to determine that airway obstruction is at least partially reversible
* Consider alternative causes of airway obstruction

Precipitant	Infancy	Early Childhood	Later Childhood	Early Adulthood
Respiratory infection (mainly viral)	++++	+++	++	+++
Foods	+	+	+	+
Household Inhalants	+	+++	+++	+++
Outdoor (seasonal inhalants)		++	+++	++
Exercise/cold air	+	++	+++	++
Aspirin and other nonsteroidal antiinflammatory drugs	?	?	+	+
Emotional Factors	+	+	+	+

Biermann CW and Pearlman DS (eds): Allergic Diseases from Infancy to Adulthood. 2nd ed. Philadelphia, WB Saunders Co, 1988

Case Study

Visit #1

Case Study: Applying EPR-3

This case study consists of two visits:

* Visit 1: First visit after diagnosis. Assess severity to initiate therapy.
* Visit 2: Follow-up visit. Assess control to adjust therapy.

The Patient

* An 18-year-old male newly diagnosed with asthma
* This is his first asthma visit
* He is not taking long-term control medications

Environmental Control and Co-morbidities

* When the patient's asthma was diagnosed, the clinician asked questions about possible exposure and sensitivity to allergens. The patient reported symptoms consistent with house dust mite allergy.
* The clinician performed a skin test to confirm that the patient has an allergic sensitivity to house dust mites. The test results confirm that the patient is highly allergic to house dust mites.

Environmental Control and Co-morbidities

* The clinician explains to the patient that his house dust mite allergy may be aggravating his asthma. The clinician tells the patient what steps to take to control house dust mite exposure.
* The clinician also evaluates the patient for co-morbidities that could aggravate asthma. The clinician diagnoses GERD and starts treatment.

Assessing Severity

* The patient is not taking long-term control medications
* The clinician assesses the patient's asthma severity:
  * Symptoms: daily
  * Nighttime awakenings: once or twice a month
  * SABA use: none
  * Interference with normal activity: minor
  * Lung function: FEV1 = 85 (> 80% predicted), FEV1/FVC = normal
  * Exacerbations: 1 in past year requiring oral corticosteroids

Patient Data in the Severity Chart

Components of Severity		Classification of Asthma Severity ≥ 12 years of age (Not currently taking long-term contol medication)			
		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3-4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta2-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily, and not >1x/on any day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Normal FEV1/FVC: 8-19 yr 85% 20-39 yr 80% 40-59 yr 75% 60-80 yr 70%	Lung function	• Normal FEV1 between exacerbations • FEV1>80% predicted • FEV1/FVC normal	• FEV1>80% predicted • FEV1/FVC normal	• FEV1>60% but <80% predicted • FEV1/FVC reduced 5%	• FEV1 <60% predicted • FEV1/FVC reduced > 5%
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year(see note)	≥2/year (see note)		
		Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category.			
		Relative annual risk of exacerbations may be related to FEV1			
Recommended Step for Initiating Therapy (See figure 4-1b for treatment steps.)		Step 1	Step 2	Step 3	Step 4
				and consider short course of oral systemic corticosteroids	
		In 2-6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Asthma Severity Classification

Components of Severity		Classification of Asthma Severity ≥ 12 years of age (Not currently taking long-term contol medication)			
		Intermittent	Persistent		
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Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
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				and consider short course of oral systemic corticosteroids	
		In 2-6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Step 3: Medications Age 12 to Adult

Stepwise Approach for Managing Asthma (Youths ≥12 years of age)

Intermittent Asthma

Persistent Asthma: Daily Medication

Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

Step 1
Preferred:
SABA PRN

Step 2
Preferred:
Low-dose ICS
Alternative:
Cromolyn, LTRA, Nedocromil, or Theophylline

Step 3
Preferred:
Low-dose ICS + LABA OR Medium-dose ICS
Alternative:
Low-dose ICS + either LTRA, Theophylline, or Zileuton

Step 4
Preferred:
Medium-dose ICS + LABA
Alternative:
Medium-dose ICS + either LTRA, Theophylline, or Zileuton

Step 5
Preferred:
High-dose ICS + LABA
AND
Consider Omalizumab for patients who have allergies

Step 6
Preferred:
High-dose ICS + LABA + oral systemic corticosteroid
AND
Consider Omalizumab for patients who have allergies

Each step: Patient education, environmental control, and management of comorbidities.

Steps 2-4: consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

Quick-Relief Medication for All Patients

- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Use of SABA or use >2 days a week for symptom relief (not prevention if EIB) generally indicates inadequate control and the need to step up treatment.

Step up if needed

(first, check adherence, environmental control, and comorbid conditions)

Assess Control

Step down if possible

(and asthma is well controlled at least 3 months)

Additional Medications

Stepwise Approach for Managing Asthma (Youths ≥12 years of age)

Intermittent Asthma

Persistent Asthma: Daily Medication

Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

Step 1
Preferred:
SABA PRN

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Alternative:
Cromolyn, LTRA, Nedocromil, or Theophylline

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Step up if needed

(first, check adherence, environmental control, and comorbid conditions)

Assess Control

Step down if possible

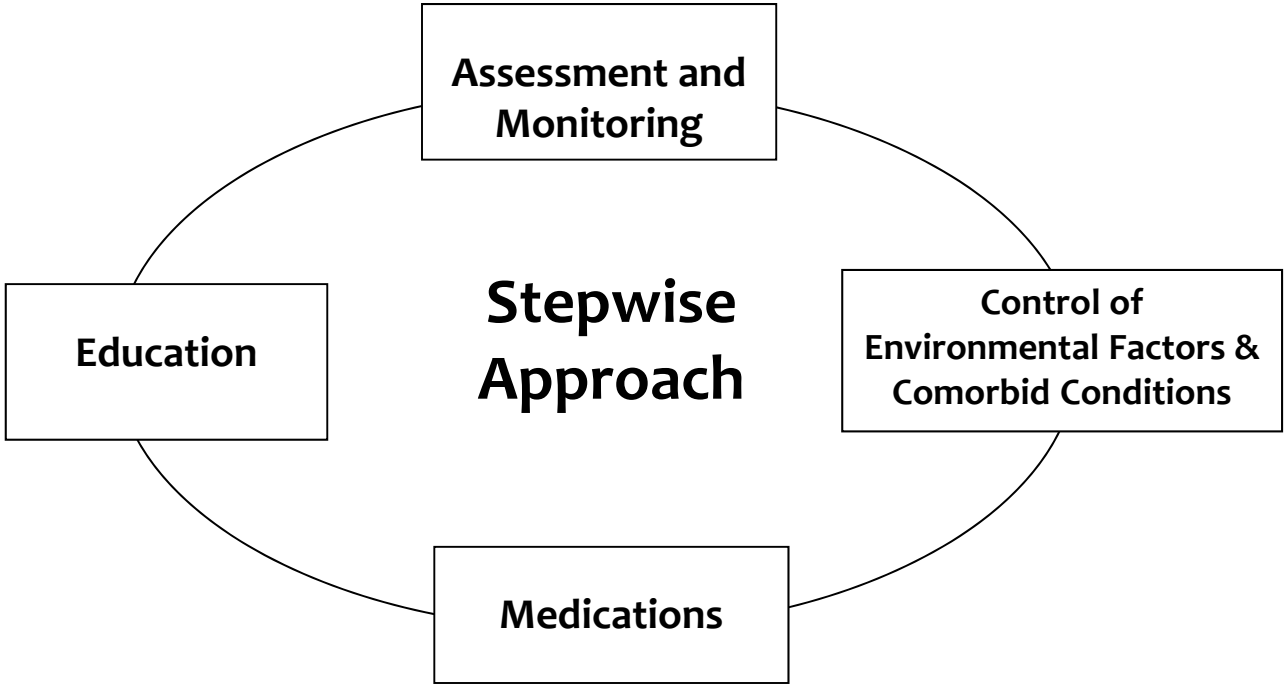
(and asthma is well controlled at least 3 months)

Education

* The clinician works with the patient to develop a written asthma action plan
* The clinician also discusses key asthma education messages with the patient

Completion of Initial Visit

* Note how the clinician applied the four components of care and the stepwise approach during this initial visit
* The patient is scheduled for a follow-up visit in four weeks



Case Study

Follow-up Visit

Second Visit

- The patient returns four weeks later for the first follow-up visit
- The clinician assesses asthma control:
  - Symptoms: 2x / week
  - Nighttime awakenings: 2x / week
  - Interference with normal activity: none
  - SABA use: 2x / week
  - Lung function: FEV1 = 85 (> 80% predicted)
  - ACT score: 17
  - Exacerbations: 0 since last visit
  - Treatment-related side effects: none

Second Visit

* The clinician also assesses key aspects of the four components of care:
  * Patient is taking effective measures to control exposure to house dust mites
  * Patient's GERD is under control
  * Patient is adherent to medications
  * Patient is not experiencing side effects from medications
  * Patient's inhaler technique is good

Patient Data in the Control Chart

Components of Control		Classification of Asthma Control (≥ 12 years of age)		
		Well Controlled	**Not Well Controlled**	**Very Poorly Controlled**
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤2x/month	1-3x/week	≥4x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta2-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	FEV1 or peak flow	>80% predicted/ personal best	60-80% predicted/ personal best	<60% predicted/ personal best
	Validated Questionnaires ATAQ ACQ ACT	 0 ≤0.75* ≥20	 1-2 ≥1.5 16-19	 3-4 N/A ≤15
Risk	Exacerbations	0-1/year	≥2/year (see note)	
		Consider severity and interval since last exacerbation.		
	Progressive loss of lung function	Evaluation requires long-term followup care		
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment		• Maintain current step • Regular followup every 1-6 months to maintain control. • Consider step down if well controlled for at least 3 months	• Step up 1 step and • Reevaluate in 2-6 weeks. • For side effects: consider alternative treatment options.	• Consider short course of oral systemic corticosteroids. • Step up 1-2 steps, and • Reevaluate in 2 weeks. • For side effects, consider alternative treatment options.

Recommended Action

- The patient's asthma is not well controlled
- Step up one step and reevaluate in 2 – 6 weeks

Components of Control		Classification of Asthma Control (≥ 12 years of age)		
		Well Controlled	**Not Well Controlled**	**Very Poorly Controlled**
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
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Stepping Up One Step

Stepwise Approach for Managing Asthma (Youths ≥12 years of age)

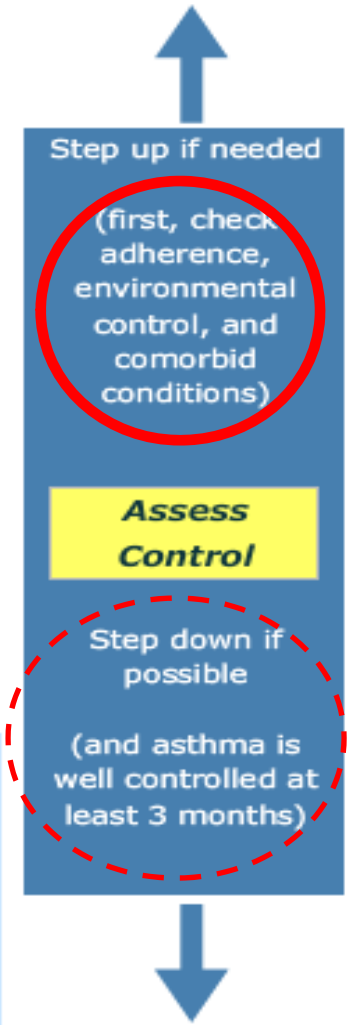
Intermittent Asthma	Persistent Asthma: Daily Medication Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.				
Step 1 *Preferred:* SABA PRN	**Step 2** *Preferred:* Low-dose ICS *Alternative:* Cromolyn, LTRA, Nedocromil, or Theophylline	**Step 3** *Preferred:* Low-dose ICS + LABA OR Medium-dose ICS *Alternative:* Low-dose ICS + either LTRA, Theophylline, or Zileuton	**Step 4** *Preferred:* Medium-dose ICS + LABA *Alternative:* Medium-dose ICS + either LTRA, Theophylline, or Zileuton	**Step 5** *Preferred:* High-dose ICS + LABA AND Consider Omalizumab for patients who have allergies	**Step 6** *Preferred:* High-dose ICS + LABA + oral systemic corticosteroid AND Consider Omalizumab for patients who have allergies

Each step: Patient education, environmental control, and management of comorbidities.

Steps 2-4: consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

Quick-Relief Medication for All Patients

- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Use of SABA or use >2 days a week for symptom relief (not prevention if EIB) generally indicates inadequate control and the need to step up treatment.

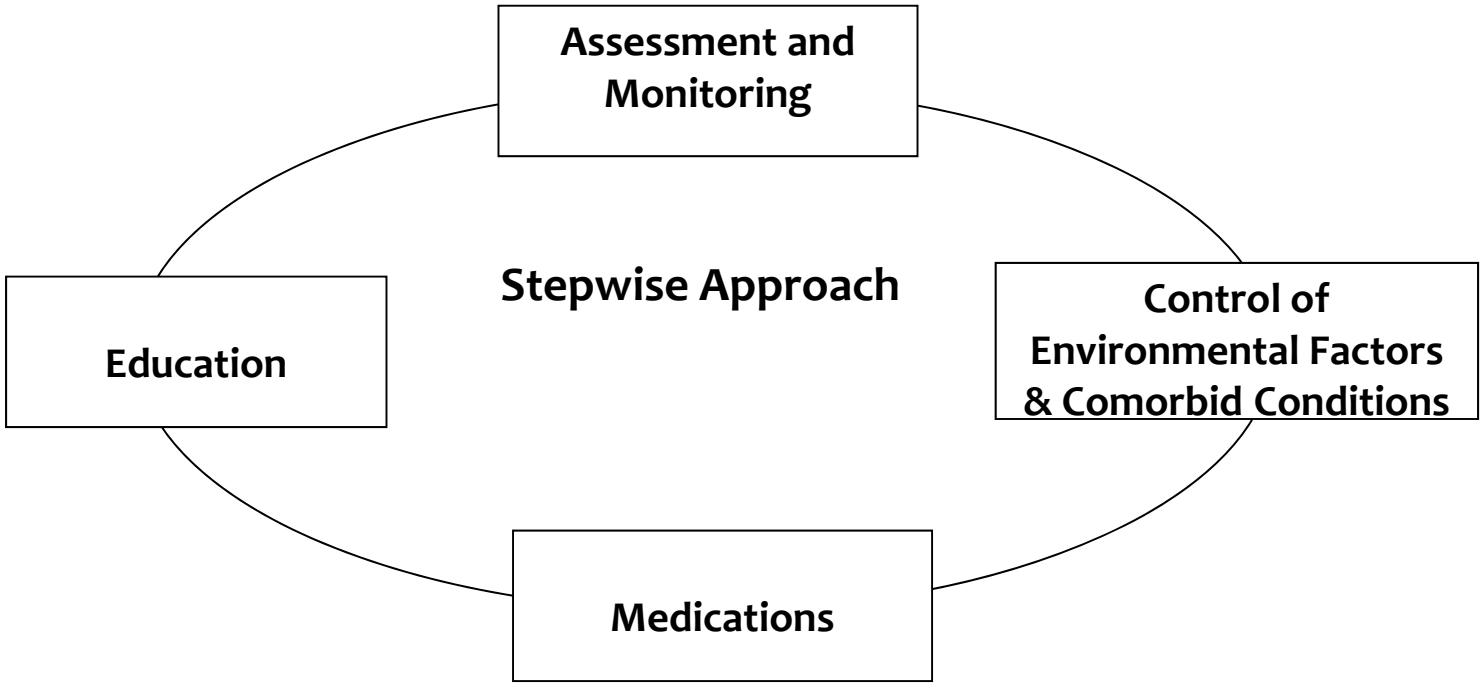


Education

* The clinician reviews the patient's written asthma action plan with the patient. The patient shows a good understanding of the plan.
* The clinician then reviews key educational messages with the patient, and makes sure that the patient fully understands.

Monitoring

* The patient will return in four weeks.
* Since asthma is a chronic illness that changes over time, the patient returns for a follow-up visit at least every six months, even when their asthma is well controlled.
* Note that the clinician applied the four components of care and the stepwise approach during this visit.



Managing Exacerbations

Managing Exacerbations: Home

To manage exacerbations at home, develop a written asthma action plan that instructs patients how to:

* Recognize early signs, symptoms, and peak expiratory flow (PEF) measures that indicate worsening asthma
* Adjust medications (increase SABA and, in some cases, add oral systemic corticosteroids) and remove or withdraw from environmental factors contributing to the exacerbation
  * Note that doubling of the dose of inhaled corticosteroids is no longer recommended for home treatment of exacerbations
* Monitor response and seek medical care if there is serious deterioration or lack of response to treatment

Managing Exacerbations: Urgent or Emergency Care

To manage exacerbations in an urgent or emergency care situation: Assess severity

* Treat to relieve hypoxemia and airflow obstruction and reduce airway inflammation
* Monitor response with serial assessment of lung function measures, pulse oximetry, and symptoms
* Discharge with medication and patient education
* Provide at discharge:
  * Medications: SABA, oral systemic corticosteroids; continue or consider initiating ICS
  * Referral to follow-up care
  * An emergency department asthma discharge plan
  * Review of inhaler technique and, whenever possible, environmental control measures

Questions and Answers

Janna Zumbrun Assistant Commissioner, Division for Disease Control and prevention Services,DSHS

Remote sites can send in questions by typing in the *GoToWebinar* chat box or email GrandRounds@dshs.state.tx.us.

For those in the auditorium, please come to the microphone to ask your questions.

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May 7

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Presenter: James L. Lukefahr, MD
Professor of Pediatrics, Univ. of Texas Health Science Center San Antonio