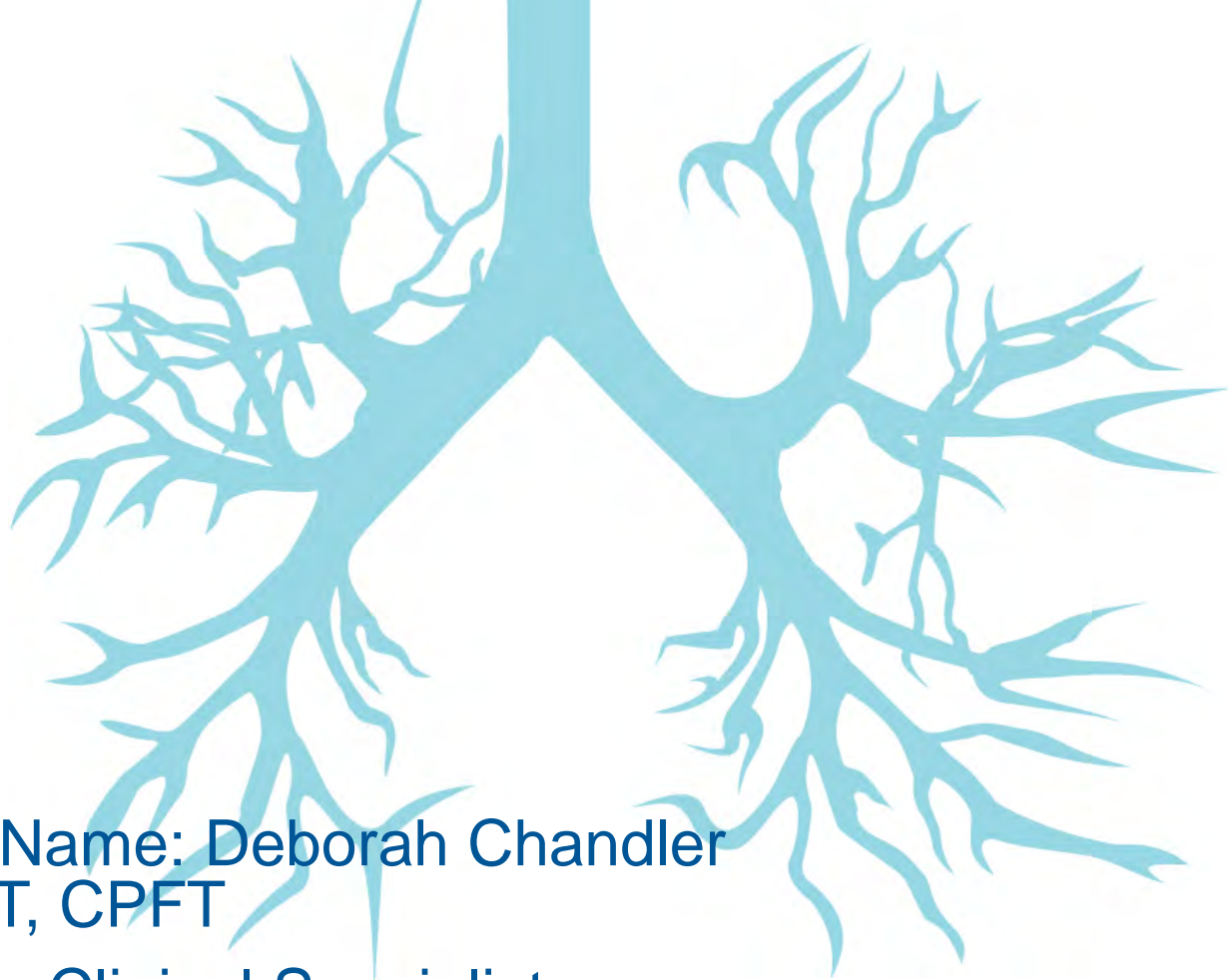


# Is it Asthma?



Presenter Name: Deborah Chandler  
BSRT, RRT, CPFT

Respiratory Clinical Specialist



# Disclaimer



**Name of presenter: Deborah Chandler**

**Name of employer: Methapharm**

I recognize that I must follow all guidelines and criteria regarding vested interest. Yes, I have the following real or perceived conflicts of interest that relate to this presentation:

- **I am an employee of Methapharm - manufacturer and distributor of Provocholine® and distributor of Aridol®**

# Objectives



**At the conclusion of this presentation the attendee will be able to:**

- Discuss prevalence and economic burden of asthma in the United States
- Review common signs & symptoms of, as well as phenotypes of asthma
- Recognize disease states that mimic asthma symptoms
- Discuss and know when to utilize the available objective tests for diagnosing asthma
- Identify and discuss available medications, indications and guidelines pertaining to asthma



# Prevalence



## Global

- According to the World Health Organization 235 million have asthma worldwide.
- Worldwide problem
- Prevalence highest among children
- Middle to lower income families have a higher mortality



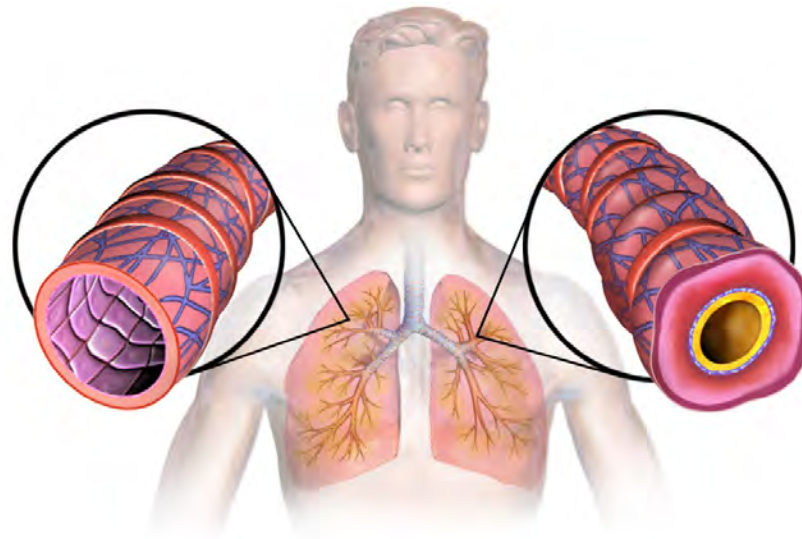


# Prevalence



## USA

- 25 million Americans have Asthma
- 1 in 13 Americans
- Asthma has been increasing in numbers since 1980's



CDC.gov. (2018). CDC - Asthma. [online]

5

NHLBI EPR3: guidelines for the diagnosis and management of asthma—summary report, 2007. . Published October 2007.

Image cred <https://creativecommons.org/licenses/by-sa/4.0it> – [BruceBlaus](#)

# Question 1



On average, \_\_\_\_\_ people die from asthma every day in the USA.

- A. 5
- B. 10
- C. 20
- D. 25



# Question 1



Every day

# 10 People DIE

from an Asthma Attack!!!





# Economic Burden of Asthma



## Chronic Disease affects:

- Quality of life
- Productivity at work and school
- Use of healthcare resources
- Mortality







# How Much Does Asthma Cost?



## 2008-2013 – Direct Medical Costs

- 213,994 pooled sample
- 10,237 had treated asthma (at least one medical or pharmaceutical encounter or claim associated with asthma)
- Annual per-person cost \$3,266, 2015 US dollars, or \$50.3 BILLION attributed to:
  - \$1830 / prescription medication
  - \$640 / office visits
  - \$529 / hospitalizations
  - \$176 / hospital based outpatient visits
  - \$105 / emergency room visits



# How Much Does Asthma Cost?



2008-2013

## Losses

- Missed work and school days - **\$3 Billion**
- Asthma-related mortality - **\$29 Billion**
- Medical Cost - **\$50.3 Billion**

**Totaling \$82 Billion**



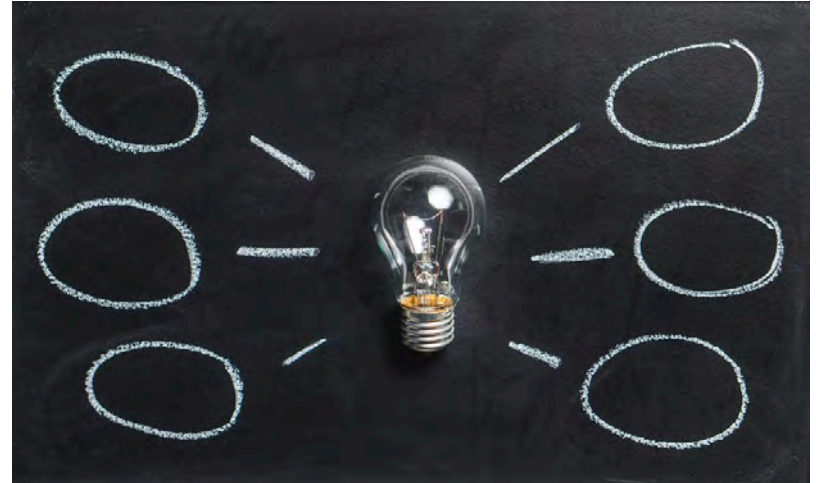


# What Impacts Costs?



## Factors

- New treatment options
- Federal and state policies
- Price fluctuations
- Healthcare market
- Effectiveness of asthma control programs



## Question 2



The first study of the economic burden of asthma was done in

- A. 1955
- B. 1974
- C. 1987
- D. 1990



# Increasing Economic Burden



## The Cost of Asthma

- **1990** first study of economic burden of asthma - **\$6.2 Billion**
  - Direct medical costs and productivity loss due to morbidity and mortality
- **2007** total medical costs - **\$37.2 Billion**
  - \$2,078 / adults, \$1,005/children
- **2011** total national cost - **\$56 Billion**
  - \$3,856 / person

# Costs in Subgroups



## Medical Expenditure Panel Survey Data

The total unadjusted medical costs of asthmatics vs non asthmatics, showed asthmatics were more than double the cost (approx. \$3300 per year)

### Examples of subgroups with higher per person medical costs:

- Adults (\$3760)
- Medicare (\$3720)
- Poor (\$3581)

# Economic Burden of Asthma



## Absenteeism

- Children with asthma missed 2.3 additional school days annually
- Adult with asthma missed 1.8 days of work





# Limitations of Study



## What wasn't included?

### Nonmedical costs:

- Transportation
- Appointment wait time
- Pre-absenteeism

(present but not fully functional at work due to illness)

- Pain and suffering





# So?

## The question...



Asthma and Allergy  
Foundation of America





# Asthma is Not Simply Asthma



## Genotype & Phenotype

### **Genotypes:**

The genetic makeup of an organism or group of organisms with reference to a single trait, set of traits or an entire complex of traits.

### **Phenotypes:**

The observable properties of an organism that are produced by the interaction of the genotype and the environment



# Types of Asthma



## Phenotypes

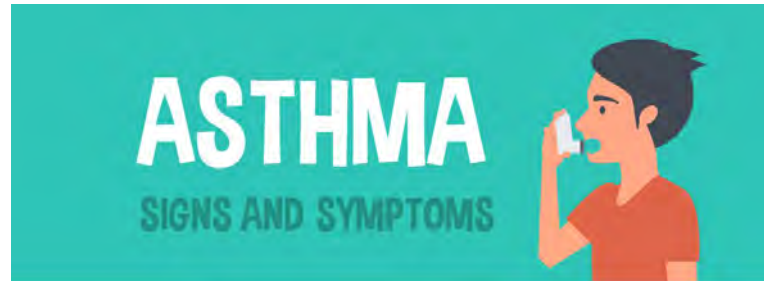




# Is It Asthma?



## Signs and Symptoms



**SHORTNESS  
OF BREATH**



**DIFFICULTY  
BREATHING**



**DRY COUGH**



**NIGHT COUGH**



**WHEEZING**



**CHEST PAIN  
OR TIGHTNESS**

# Diagnosing Asthma

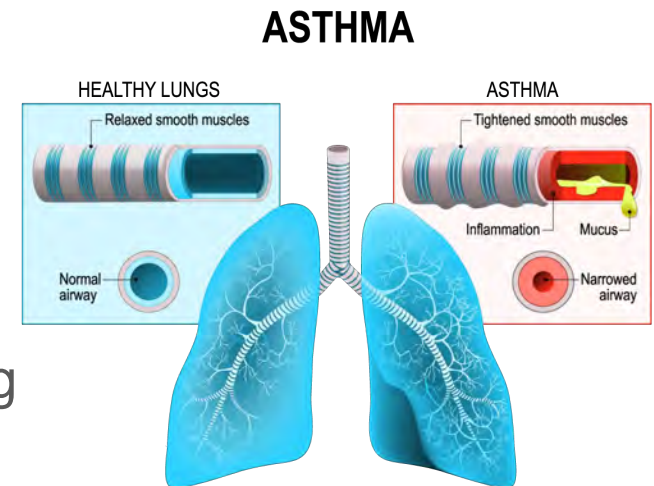


## What is being done?

Research found that diagnosis often based on symptoms alone:

- Wheezing
- Shortness of breath
- Cough

Not confirming diagnosis with objective testing



## Question 3

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68% of asthma diagnosis are confirmed by spirometry

- A. True
- B. False



# Reevaluation of Asthma in Adults



Research shows

## 2017 a study published in JAMA looked at patients with a current asthma diagnosis

710 patients with a current diagnosis of asthma were selected to participate

- 613 patients completed the entire study
- 56% of those patients did not have objective testing as part of their initial diagnosis
- 203 were found to NOT have asthma





# All that Wheezes is Not Asthma!



## Diseases that share symptoms with asthma

- Congestive Heart Failure
- Vocal Cord Dysplasia
- Vocal Cord Paralysis
- Allergies
- GERD / Aspiration
- Sinusitis
- Myocardial Ischemia
- Bronchiectasis
- Tumors
- Pulmonary Aspergillosis







# Why is this Relevant?



## Primary care models

- Quality of asthma care has improved over time
- Using asthma indicators will provide foundation for quality improvement
- Trending towards payment being tied to performance and bundled primary care systems vs traditional fee-for-service

## Question 4



Spirometry is the only objective test available to identify asthma.

- A. True
- B. False



# Objective Testing



## What is the role?

- What tests can we use?
- Why do we use them?
- Should we use objective testing on-going to monitor patients and to step down medications?





# Test



## Spirometry with and without bronchodilator

**What is it?** A physiological test that measures how an individual inhales or exhales volumes of air as a function of time

**Why do it?** Valuable as a screening test of general respiratory health, to evaluate symptoms, signs or abnormal laboratory tests, to measure the effect of disease on pulmonary function

**How do we do it?** three distinct phases to the FVC maneuver:

- 1) maximal inspiration
- 2) a “blast” of exhalation
- 3) continued complete exhalation to the end of test

**Is there reimbursement?** Yes



# Objective Tests



Patients may respond differently, depending on the type of test

## Direct

- Methacholine Challenge Test
- Histamine

## Indirect

- Exercise
- Eucapnic Voluntary Hyperventilation
- Mannitol
- Cold air

# Question 5



## Direct Challenge tests

- A. Directly stimulate smooth muscles cells
- B. May cause inflammation
- C. May cause airway hyperresponsiveness
- D. All of the above



# Direct Bronchial Challenge Test



## Methacholine Challenge Test

**What is it?** The administration of methacholine chloride a bronchoconstrictor through a nebulizer that acts directly on the airway smooth muscle.

**Why do it?** The primary indication is to help determine if current respiratory symptoms may be due to asthma or to make that diagnosis less likely.

**How do we do it?** Inhalation of increasing doses of methacholine. Spirometry is performed 30 and 90 seconds post nebulizer. FEV<sub>1</sub> is monitored throughout test, watching for a 20% fall from baseline FEV<sub>1</sub>.

**Is there reimbursement?** Yes



# Direct Bronchial Challenge Test



## Histamine

**What is it?** Inhalation of a nebulized solution of histamine. Starting with a low dose and progressing to higher doses.

**Why do it?** Similar to methacholine, to help rule out asthma

**How do we do it?** Inhalation of increasing doses of histamine. Spirometry after each dose looking for a fall of 20% in FEV<sub>1</sub>.

**Is there reimbursement?** Yes





## Question 6



### Indirect challenge tests

- A. Are easier to perform than direct challenge tests
- B. Do not require spirometry
- C. Stimulate the release of broncho-constricting mediators
- D. All of the above



# Indirect Bronchial Challenge Test



## Exercise Challenge Test

**What is it?** Serial PFTs after a specific exercise or hyperpnea challenge are used to determine if EIB is present and to quantify the severity of the disorder

**Why do it?** Ample data showing that EIB occurs commonly in athletes at all levels

**How do we do it?** Spirometry after a specific exercise – treadmill or stationary bicycle. FEV<sub>1</sub> is typically measured at 5, 10, 15, and 30 minutes after exercise, but may be more frequent if a severe response is expected.

**Is there reimbursement?** Yes

Smoliga, James M, Pnina Weis, Kenneth W Rundell. Exercise induced bronchoconstriction in adults: evidence based diagnosis and management. *BMJ* 2016;352:h6951 doi: 10.1136/bmj.h6951 (Published 13 January 2016)

35 Brannan, John D. and Celeste Porsbjerg. *Immunol Allergy Clin N Am* 38 (2018) Testing for Exercise-Induced Bronchoconstriction pp 215– 229

[https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HomeHealthPPS/coding\\_billing.html](https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HomeHealthPPS/coding_billing.html)



# Indirect Bronchial Challenge Test



## Eucapnic Voluntary Hyperventilation

**What is it?** An indirect bronchoprovocation test

**Why do it?** To rule out EIB in athletes. EIB is prevalent in athletes even without an asthma diagnosis

**How do we do it?** Subject breathes a dry gas during MVV maneuver followed by serial spirometry to assess FEV<sub>1</sub>. A drop of  $\geq 10\%$  in FEV<sub>1</sub> constitutes a positive study.

Subject completes a period of voluntary hyperpnea with a dry gas inhalant, which desiccates the airways, mimicking the osmotic priming stimulus to EIB

**Is there reimbursement?** Yes

Brannan, John D. and Celeste Porsbjerg. Immunol Allergy Clin N Am 38 (2018) Testing for Exercise-Induced Bronchoconstriction pp 215– 229

Anderson SD. "Indirect" Challenges from Science to clinical practice. Eur Clin Respir J. 2016;3:31096

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# Indirect Bronchial Challenge Test



## Cold Air Challenge

**What is it?** Used to identify EIB

**Why do it?** Patient reports symptoms of EIB but initial spirometry or inhalation challenge tests were negative

**How do we do it?** Patient hyperventilates for approximately 3-4 minutes while breathing a mixture of 5% CO<sub>2</sub>, 21% O<sub>2</sub>, 74% N<sub>2</sub> cooled to -10°C and -20°C/14°F and -4° F

Similar method as Exercise or EVH, cooling the air

**Is there reimbursement?** Yes



# Indirect Bronchial Challenge Test



## Mannitol

**What is it?** Inhalation of dry powder in increasing concentrations followed by spirometry. Mannitol causes a drying effect in the airways. Mannitol is a naturally occurring sugar, dry powder, hypertonic stimulus.

**Why do it?** Easy, reproducible test to aide in diagnosing EIB

**How do we do it?** The patient inhales increasing doses of mannitol with their FEV<sub>1</sub> measured after each dose to determine the level of bronchial hyperresponsiveness. Watching for a 15% drop from baseline FEV<sub>1</sub> or a 10% fall between doses of mannitol.

**Is there reimbursement?** Yes

Parsons et al. An Official American Thoracic Society Clinical Practice Guideline: Exercise-induced Bronchoconstriction. Am J Respir Crit Care Med Vol 187, Iss. 9, pp 1016-1027, May 1, 2013

Hallstrand TS, Leuppi JD, Joos G, et al. ERS technical standard on bronchial challenge testing: pathophysiology and methodology of indirect airway challenge testing. Eur Respir J 2018

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# Test



## Impulse Oscillometry

**What is it?** An impulse consisting of a mixture of sound waves of different frequencies is generated by the loud speaker at the mouth.

**Why do it?** Noninvasive method which to measure respiratory mechanics. Does not require effort by patient, can be performed by patients unable to do spirometry.

**How do we do it?** Sound waves are superimposed over normal tidal breathing

**Is there reimbursement?** Yes



# Test



## Fractional Exhaled Nitric Oxide (FeNO)

**What is it?** A simple, noninvasive measurement of inflammation in the lung and can be used as a complimentary measurement in managing asthmatic patients

**Why do it?** Nitric Oxide (NO) is produced in the lungs and present in exhaled breath. It is an indication of inflammation in the lung

**How do we do it?** Simple, noninvasive single, slow – steady exhaled breath measurement

**Is there reimbursement?** Varies by provider

Dweik, R. A. et al. An Official ATS Clinical Practice Guideline: Interpretation of Exhaled Nitric Oxide Levels (FENO) for Clinical Applications. May 2011.

Manaker, S. Fractional Exhaled Nitric Oxide Inflamed Coverage Achieves Remission. Chest 149. May 2016. Paid Medicare claims, 2007-2014, for Current Procedural Terminology code 95012, measurement of fractional exhaled nitric oxide.

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# Medications



## Alphabet Soup

- SABA
- SAMA
- LAMA
- LABA
- LTRA
- Combo Meds:
  - SABA/ICS
  - SABA/LAMA
  - SABA/LAMA/ICS
- Biologics







# Managing Asthma

## GINA recommendations



### Global Initiative for Asthma (GINA)

- 3 months stable asthma
- Step down meds
- Safe and practical approach



# Managing Asthma

ATS



Control = Manifestations of asthma reduced or removed by treatment

## Emphasizing:

1. Level of control = symptoms and ADL to achieve optimum quality of life
2. Future risk of losing control, exacerbating, accelerated decline in lung function, and side effects of tx.



# Managing Asthma



## ATS

### How do we gain better control?

- Increase awareness of asthma guidelines
- Signs and symptoms
- Future risk





# Managing Asthma



## Consequences of Overtreatment

- Quality of life
- Cost of medication
- Side effects
- Psychological effects
- Economic burden





# Are you sure it is Asthma?

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Total cost of asthma  
**\$82 BILLION**



# Is It Asthma?



## Summary

- Asthma has signs and symptoms shared with many disease states
- Asthma prevalence is continuing to grow
- Medications are becoming increasingly specific
- There are multiple phenotypes of asthma
- Objective testing may help reduce the number of patients misdiagnosed, underdiagnosed or over-diagnosed with asthma



# Thank you!



## Questions?

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