Asthma Pharmacology: Medications and Devices

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Objectives

Upon completion of this workshop participants will be able to:

- Classify the different medications used to treat asthma
- Describe the correct technique for the devices used to deliver those medications
- List the correct priming and cleaning instructions for each type of device
2007 NIH Asthma Guidelines-Step Therapy

**Persistent Asthma: Daily Medication for Ages 5–11**
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:* LTRA, cromolyn, nedocromil, or theophylline

**Step 3**
*Preferred:* Either Low-dose ICS + either LABA, LTRA, or theophylline
*Alternative:* Medium-dose ICS

**Step 4**
*Preferred:* Medium-dose ICS + LABA
*Alternative:* High-dose ICS + either LTRA or theophylline

**Step 5**
*Preferred:* High-dose ICS + LABA
*Alternative:* High-dose ICS + either LTRA or theophylline + oral systemic corticosteroid

**Step 6**
*Preferred:* High-dose ICS + LABA + oral systemic corticosteroid
*Alternative:* High-dose ICS + either LTRA or theophylline + oral systemic corticosteroid

**Patient education at EVERY encounter**

**Assess control**
Step up therapy if needed (first, check adherence, inhaler technique, environmental control, and comorbid conditions)

Step down if possible (and asthma is well controlled at least 3 months)
Delivery Devices
Characteristics of Inhaled Particles

- Deposition varies with devices
- Particle size varies by device
- Emulsifiers (stabilizing agent designed to encourage suspension of ingredients)
- Excipients (an inert substance that forms a vehicle for the active drug)
  - Must have no interaction with drug
  - Must be stable for handling
  - Must be pharmacologically inert
Characteristics of Pressurized Metered Dose Inhalers (pMDI)

- Propellants
- Drug formulation
- Solution vs. suspension
- Particle size
- Built in spacer (Aerospan)
- Breath actuated (ProAir Respiclick)
- Not all have counters
- Number of doses varies (handout)
- Priming and Cleaning varies with device (handout)

Newman, S. Principles of Metered-Dose Inhaler Design, Resp Care, Sept 2005, V 50 No 9
Components of a pMDI
# Choosing an inhaler device for children ≤5 years

<table>
<thead>
<tr>
<th>Age</th>
<th>Preferred device</th>
<th>Alternate device</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–3 years</td>
<td>Pressurized metered dose inhaler plus dedicated spacer with face mask</td>
<td>Nebulizer with face mask</td>
</tr>
<tr>
<td>4–5 years</td>
<td>Pressurized metered dose inhaler plus dedicated spacer with mouthpiece</td>
<td>Pressurized metered dose inhaler plus dedicated spacer with face mask, or nebulizer with mouthpiece or face mask</td>
</tr>
</tbody>
</table>
Characteristics of Dry Powder Inhalers (DPI)

- For use by those 4 years of age and older\(^1\)
- Can NOT be combined with a VHC\(^1\)
- Requires rapid (2-3 seconds) deep inhalation followed by a 10-second breath-hold\(^1\)
- Some devices are sensitive to moisture or to damage to the dosing mechanism if dropped\(^2\)
- Number of doses varies (handout)
- Priming and Cleaning varies with device (handout)

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Components of DPI
Devices Used to Aid Medication Delivery

- Spacers and Valved Holding Chambers (VHC) increase medication delivery to the lower airways
  - By reducing oral deposition of particles and
  - By enhancing activation-inhalation coordination
- Spacer is a generic term for any open tube placed on the pMDI mouthpiece to extend its distance from the mouth
- VHCs are manufactured with a one-way valve that prevents exhalation into the device
- NOT used with breath actuated devices or DPIs
Valved Holding Chambers

- Most MDI’s should be used with a holding chamber or spacer
  - Holding chambers are better because they have valves that keep the medicine inside the chamber until it is inhaled
- MDI’s used alone deposit much of the medication in the mouth, throat or stomach depending on technique
Metered Dose Inhaler Steps

- Remove cap
- Check for foreign body
- Insert inhaler into holding chamber
- *Shake for 5 seconds
- *Stand, tilt head back or keep level
- *Exhale to function residual
- *Place mouthpiece in mouth/mask firmly over face
- *Actuate canister once
- *Take a slow, deep breath and hold for 5+5 seconds

- *For mask, hold mask over face until child takes 5 to 6 breaths
- *Remove mouthpiece/mask and exhale
- Wait 30-60 seconds
- Repeat * steps replacing cap after second puff
- After last puff rinse mouth and spit out water if ICS
- Wipe face with damp cloth if using mask
- Describe how to determine if MDI is empty
Dry Powder Inhaler Steps

- Remove cover
- Check foreign body
- Load dose
- * Tilt head back or keep level
- * Exhale (away from inhaler) to functional residual
- * Place mouthpiece in mouth
- * Initiate slow, deep breath
- * Hold breath for 10 seconds (5+5)

- * Remove from mouth and exhale
- If additional puffs ordered wait 60 seconds and repeat * steps
- Replace cover
- After last puff rinse mouth and spit out water if ICS
- Describe how to determine if DPI is empty
Pro Air RespiClick® Inhaler Steps

- Make sure cap is closed before each dose
- Hold inhaler in upright position to open
- Open cap fully (this loads the dose)
- Put mouthpiece in mouth and close lips
- Make sure vent at top of mouthpiece is not obstructed
- Breath in deeply through the mouth

- Hold breath for about 10 seconds, then exhale
- Close the cap
- Repeat steps for second dose
Valved Holding Chambers

- Valved holding chambers (VHC) should be cleaned weekly
  - Wash all parts of your holding chamber in warm soapy water
  - DO NOT rinse off the soapy water, just let the spacer air dry
  - DO NOT share chambers
  - Replace the holding chamber if the valve does not open and close completely
CPT Code for Teaching Inhaler

- 94664: Demonstration and/or evaluation of patient utilization of an aerosol generator, nebulizer, metered dose inhaler or IPPB device
- Education must be given separate from a nebulizer treatment
Valved Holding Chambers
Compressor and Nebulizer
Characteristics of Nebulizers

- Allow for drug delivery in individuals who cannot use MDIs or DPIs.\(^1\)
- Optimal technique requires slow tidal breathing with occasional deep breaths.\(^1\)
- Never use “blow by” (holding the open tube or mask near the individual's nose or mouth).\(^1\)
- More expensive and time-consuming than MDIs with VHCs, and output dependent on device and operating parameters.\(^1\)
- If not cleaned properly, there is a risk for transmission of bacterial infections.\(^1\)
- After each use, take apart the nebulizer and wash all parts (except tubing and finger valve) in liquid dish soap and water. Rinse with water and shake off any excess. Reattach the nebulizer pieces and tubing to the air compressor and turn on the compressor to dry the nebulizer quickly. Make sure the nebulizer is completely dry before storing.\(^2\)

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Disposable vs. Reusable Nebulizers

- Will add pictures later
Checking Inhaler Technique

• Most patients use devices incorrectly even when given good instructions
• Good technique can become bad between visits
• Most health care providers are not able to demonstrate good technique
• A reliable, validated device does exist to check inhaler technique
In-check Dial

- Device used to check inhaler technique
- Billable teaching
- Should be used at every visit to confirm proper inhaler technique

### Optimum Inspiratory Flow

<table>
<thead>
<tr>
<th>Inhaler</th>
<th>L/min 20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
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<th>80</th>
<th>90</th>
<th>100</th>
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<th>120</th>
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<tbody>
<tr>
<td>Accuhaler / Diskus</td>
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<td>Turbuhaler / Turbohaler</td>
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<td>Easi-breathe / Surehaler</td>
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<tr>
<td>Low resistance pMDI</td>
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</tbody>
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June 2000
Original In-Check Dial

Scale
(30 - 370 l/min)

Mouthpiece

Magnet & Weight

Pointer (red)

in-check
New In-Check Dial
Asthma Medications
Types of Asthma Medications

- Divided into two categories
  - Controllers-used everyday even when patient does not have symptoms
  - Relievers-taken at first sign of symptoms to prevent worsening
Controllers

- **Inhaled Corticosteroids (ICS)**
  - Anti-inflammatory; works on multiple mediators of asthma to reduce inflammation
- **Nedocromil**—no longer available
- **Cromolyn**—no longer available
- **Leukotriene Receptor Antagonists (LTRA)**
  - Inhibits actions of leukotrienes
- **Theophylline**
  - Relaxes smooth muscle, may have mild anti-inflammatory effect
Controllers

- Inhaled corticosteroids—**first line therapy** for all levels of persistent asthma
- Use everyday even when asthma is well controlled
- Significantly lower side effect profile than oral steroids
- Do not work quickly and are not taken to relieve symptoms but are continued if symptoms develop
- May take several weeks of use to see full results
Inhaled Corticosteroids (ICS)

Q-var®
Flovent HFA®
Flovent Diskus®
Alvesco®
Asmanex®
Aerospan®
Pulmicort®
Inhaled Corticosteroids (ICS)

- Most effective anti-inflammatory therapy for persistent asthma
- Bind to glucocorticoid receptors in the cell to block many inflammatory processes
- Available in formulations for the nebulizer, MDIs, DPIs, and oral preparations
Beclomethasone (Q-var®)

- Available in doses of 40 or 80 mcg/puff
- Indicated for ages 5 and up
- Dosage 5-11 years: 80 mcg to 160 mcg/day administered twice a day
- 12 years and up: 80 mcg to >480 mcg/day administered twice a day
- Category C
Budesonide (Pulmicort®) Respules

- Available in doses of 0.25mg (green box) or 0.50mg (purple) or 1mg (black)
- **Maximum** recommended dose is 2 mg/day
  - administered once or twice a day
- Indicated for ages 12 months to 8 years
- Not to be used with ultrasonic nebulizers
- Suspension - must be gently mixed not shaken
- Generic vials may look different
- Category B
Budesonide (Pulmicort®) Flexhaler

- Available in 90 mcg and 180 mcg/puff
- Indicated for ages 5 years and older
- Dosage 180- >1200 mcg/day
- Category B
Ciclesonide (Alvesco®)

- Available in doses of 80 or 160 mcg/puff
- Indicated for ages 12 and up
- Dosage 80 to 320 mcg total daily dose
- Administered twice a day
- Dosage based on asthma severity
- Category C
Flunisolide (Aerospan™)

- Available in one strength 80 mcg/puff
- Indicated for ages 6 years and up
- Daily dose based on age
  - 6-11 160-320mcg/day
  - 12 and up 320-640mcg/day
- Administered twice a day
- Category C
Fluticasone Furoate (Arnuity®Ellipta®)

- Available in doses of 100 or 200 mcg/inhalation
- Indicated for ages 12 years and up
- Daily dose 100-200mcg/day
- Administered once a day
- Category C
Fluticasone Propionate (Flovent®) HFA/MDI

- Available in doses of 44 or 110 or 220mcg/puff
- Lowest recommended starting dose is 88 mcg BID
- Maximum recommended dose is based on age:
  - <4 years 176 mcg to >352 mcg
  - 5-11 years 88 mcg to >352 mcg
  - > 12 years 88 mcg to >440 mcg
- Administered BID
- Category C
Fluticasone Propionate (Flovent®) DPI (diskus)

- Available in doses of 50 or 100 or 250 mcg/inhalation
- Indicated for ages 5 years and older
- Daily dose 100->500 mcg/day
- Administered twice a day
- Category C
Mometasone (Asmanex®)

- Available as 110 or 220 mcg/puff
- Indicated for ages 4 and up
- Dosages: 4-11 years 110 mcg/day; ages 12 years up 220- >440 mcg/day
- Approved for once daily dosing
- Category C
Combination Therapy

- Inhaled corticosteroid (ICS) plus Long acting Beta Agonist (LABA)
- Used when ICS therapy alone is not adequate to control symptoms
- LABAs should only be given with ICS NEVER alone when treating asthma
Black Box Warning for Long Acting Beta Agonists (LABA)

- Long-acting beta2-adrenergic agonists (LABA), such as ___________, one of the active ingredients in ___________, increase the risk of asthma-related death. Data from a large placebo-controlled US trial that compared the safety of another LABA (salmeterol) with placebo added to usual asthma therapy showed an increase in asthma-related deaths in subjects receiving salmeterol. This finding with salmeterol is considered a class effect of LABA. Currently available data are inadequate to determine whether concurrent use of inhaled corticosteroids (ICS) or other long-term asthma control drugs mitigates the increased risk of asthma-related death from LABA. Available data from controlled clinical trials suggest that LABA increase the risk of asthma-related hospitalization in pediatric and adolescent patients.

- Therefore, when treating patients with asthma, physicians should only prescribe ____________for patients not adequately controlled on a long-term asthma control medication, such as an inhaled corticosteroid, or whose disease severity clearly warrants initiation of treatment with both an inhaled corticosteroid and a LABA. Once asthma control is achieved and maintained, assess the patient at regular intervals and step down therapy (e.g., discontinue ____________) if possible without loss of asthma control and maintain the patient on a long-term asthma control medication, such as an inhaled corticosteroid. Do not use ____________for patients whose asthma is adequately controlled on low- or medium-dose inhaled corticosteroids [see Warnings and Precautions]
SMART Study
Budesonide and Formoterol (Symbicort®)

- Available in 80/4.5 and 160/4.5 per puff
- Indicated for ages 12 and up
- Dosed at 2 puffs twice a day
- Starting dose based on asthma severity
- Category C
Fluticasone Furoate and Vilanterol (Breo® Ellipta®)

- Available as 100/25 and 200/25
- 200/25 is for asthma
- Indicated for ages 18 and up
- One puff daily
- Category C
Fluticasone Propionate and Salmeterol (Advair®) HFA

- Available in 45/21, 115/21 and 230/21 per puff
- Indicated for ages 12 and up
- Dosed at 2 puffs twice a day
- Starting dose based on asthma severity
- Category C
Fluticasone Propionate and Salmeterol (Advair®) DPI

- Available in 100/50, 250/50 and 500/50 per puff
- Indicated for ages 12 and up
- Dosed at 1 puff twice a day
- Starting dose based on asthma severity
Mometasone and Formoterol (Dulera®)

- Available in 100/5 and 200/5/puff
- Indicated for ages 12 and up
- Dosage 2 puffs twice a day
- Starting dose based on asthma severity
- Category C
Leukotriene Modifiers

- Leukotriene modifiers (leukotriene antagonists) are medicines used to prevent asthma.
- They work by blocking the action of leukotrienes. They are not recommended as the first line therapy.
- Leukotrienes are inflammatory chemicals the body releases after coming in contact with an allergen.
- Leukotrienes cause tightening of airway muscles and the production of excess mucus and fluid.
Montelukast (Singulair®)

- Is a Leukotriene Receptor Agonist (LTRA)
- Available in 4 mg, 5 mg and 10 mg
- Dosed on age not weight
- Granules 4 mg-mixed with food
- Chewable- 4 and 5 mg tablets
- Swallow -10 mg tablet

Side Effects
- Nightmares
- Headaches
- GI upset
- Psychiatric disorders
Zafirlukast (Accolate®)

- Available in 10 mg or 20 mg tablets
- Dosing for ages 5-11 years 10 mg PO BID
- For ages 12 years and up 20 mg PO BID
- Administer 1 hour before or 2 hours after meals
- Use with caution in patients on warfarin (P450 pathway)
- Requires monitoring of liver enzymes prior to starting and intermittently during treatment
- Category B
Zileuton (Zyflo CR®)

- 5- Lipoxygenase inhibitor
- Available as 600 mg tablets
- Indicated for ages 12 and up
- Dosage 1200 mg twice a day
- Administer 1 hour before or 2 hours after meals
- Use with caution in patients on warfarin (P450 pathway)
-Requires monitoring of liver enzymes prior to starting and intermittently during treatment
- Category C
Mast Cell Stabilizers

- Cromolyn sodium-Intal®
- Nedocromil-Tilade®
- No longer available in the U.S.A.
Other Controller Medications

- Immunomodulators
- Methyloxanthines
IgE Inhibitors

- Omalizumab (Xolair®) binds to high affinity receptors on mast cells and basophil and low affinity receptor on macrophages, dendritic cells and B lymphocytes
- First approved for patients 12 and up with allergic asthma (IgE between 70 and 300 and + test for perennial allergen) in 2003; later approved for CIU for patients 12 and up
- Patient must be poorly controlled on ICS
Indications

- Moderate to severe asthma
- With positive skin test or in vitro reactivity to perennial aeroallergen
- Symptoms not adequately controlled on inhaled corticosteroids (ICS)
New Xolair® Changes

- Now approved for 6-11 year olds only for allergic asthma
- New serum IgE levels 30-1300
- Weight still a factor in dosing
Table 3: Subcutaneous Xolair Doses Every 2 or 4 Weeks* for Pediatric Patients with Asthma Who Begin Xolair Between Ages of 6 to <12 Years

<table>
<thead>
<tr>
<th>Pre-treatment serum IgE (IU/mL)</th>
<th>Body weight</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>20-25 kg</td>
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<tr>
<td>Dosing Freq.</td>
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<tr>
<td>Every 4 Weeks</td>
<td></td>
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<tr>
<td>30-100</td>
<td>75</td>
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<tr>
<td>&gt;100-200</td>
<td>150</td>
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<td>&gt;200-300</td>
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<td>&gt;300-400</td>
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<td>&gt;1100-1200</td>
<td>300</td>
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<tr>
<td>&gt;1200-1300</td>
<td>300</td>
</tr>
</tbody>
</table>

*Dosing Frequency:
- **Green**: Subcutaneous doses to be administered every 4 weeks
- **Blue**: Subcutaneous doses to be administered every 2 weeks

DO NOT DOSE
Omalizumab (Xolair®)

- An immunomodulator-Anti-IgE preparation administered sub-cutaneously
- For patients with moderate to severe asthma
- Approved for ages 6 years and up
- Dosage based upon weight and IgE level
- Administered every 2-4 weeks
- Patient must have allergy to perennial aeroallergen, IgE level of 30-1300 IU/mL and asthma inadequately controlled by ICS therapy
Interlukin-5 (IL-5)

- IL-5 is a cytokine produced by a number of cell types
- Is essential for the maturation of eosinophils in the bone marrow and their release into the blood
- Acts only on eosinophils and basophils causing maturation, growth, activation and survival
- Only eos and basos possess IL-5 receptors
Anti-IL-5—Mepolizumab (Nucala®)

- Total of 1,327 subjects evaluated in 3 randomized, placebo-controlled multicenter trials of 24 to 52 weeks duration (Trials 1, 2 and 3)
- In trials 1 & 2 (n=1,192) subjects had a history of 2 or more exacerbations in the year prior to enrollment despite regular use of high-dose ICS plus and additional controller
- In trial 3 (n=135) subjects required daily oral steroids in addition to high-dose ICS and additional controller
Adverse events ≥3% and More Common than Placebo

- Headache
- Injection site reaction
- Back pain
- Fatigue
- Influenza
- UTI
- Upper abdominal pain
- Pruritus
- Eczema
- Muscle spasms
Long Term Safety

- 998 subjects have received Nucala in ongoing open-label studies during which additional cases of herpes zoster have been reported.
- 15/260 subjects developed anti-mepolizumab antibodies.
- Pregnancy
  - exposure registry [www.mothertobaby.org/asthma](http://www.mothertobaby.org/asthma)
  - Not teratogenic in mice
  - No adverse effect on fetal or neonatal growth in monkeys
Outcomes

- Fewer exacerbations
- Greater reduction of oral corticosteroid use
- No change in FEV1
Anti-IL-5—Mepolizumab (Nucala®)

- Indicated for add-on maintenance treatment of patients with severe asthma age 12 and older and with an eosinophilic phenotype
- No requirements for IgE levels
- Dosage 100 mg. administered subcutaneously once every 4 weeks regardless of weight
Anit-IL-% Reslizumab (Cinqair™) (Previously Cinquil)

- Total of 981 subjects evaluated in 4 randomized, placebo-controlled studies 16 to 52 weeks in duration
- In trials 1 & 2 (n=953) subjects had blood eosinophil count of at least 400 mcL, on medium-high dose ICS plus LABA
- Patients on OCS at baseline was 11%
- Trials 1 & 2 were 52 weeks duration
Anit-IL-% Reslizumab (Cinqair™)

- Study 3 (n=315) required blood eosinophil count of at least 400 mcL, no OCS. No notation of ICS dose.
- Study 4 (n=496) no requirement for blood eosinophils but 80% of subjects had a screening with eos count of < 400 and OCS not allowed. No notation of ICS dose.
Adverse events

- Anaphylaxis—Cinqair 0.6%; placebo 0.3%
- Malignancy—Cinqair 0.6%; placebo 0.3%
- No other adverse events listed
Outcomes

- Fewer exacerbations
- Reduced need for OCS
- Fewer ED visits
- Fewer hospitalizations
Theophylline

- A methylxanthine
- Available as a liquid, tablet, capsule and sustained release tablet preparations
- Starting dose 10 mg/kg/day adjust dose to achieve serum level of 5-15 mcg/ml
- High level of risk for overdose, interacts with many other medications
- Typically used only be specialists to manage severe asthma
Medications to Treat Allergic Rhinitis

- Poorly controlled AR can contribute to poorly controlled asthma
- Inhaled Nasal Steroids (INS) are first line treatment for allergic rhinitis
- Anticholinergic nasal sprays are sometimes added to INS therapy for excess nasal secretions
- Nasal antihistamines are also used
Inhaled Nasal Steroids

- Flunisolide (Nasonex®)
- Fluticasone (Flonase® and Veramyst®)
- Beclomethasone (Q-Nasl®)
- Budesonide (Rhinocort®)
- Ciclesonide (Omnaris® and Zetona®)
- Mometasone (Nasonex®)
- Triamcinolone (Nasacort AQ®)
Other Nasal Sprays

- Anticholinergic—Ipatripoium (Atrovent®)
- Antihistamine—Azelastine (Astelin® and Astepro®); Olpatadine (Patanase®)
- Antihistamine and Fluticasone (Dymista®)
Instructions for Nasal Sprays

- Shake gently
- Remove cap
- Blow nose
- Tip head forward
- Insert tip of applicator into the nostril
- Use opposite hands to administer
- Spray once in each nostril, breath out through the mouth
- Repeat if dose requires
- For antihistamines gently massage nose after dosing
Relievers

Albuterol

Ventolin®

ProAir HFA®

ProAir RespiClick®

Levalbuterol

Proventil®

Xopenex®
Relievers

- Reliever NOT rescue
- Meant to be used quickly to relieve symptoms of asthma
- Should be used at first sign of symptoms
- If asthma is well controlled, should not be needed more than twice a week during the day or twice a month at night
- Do not count doses used prior to exertion to prevent EIB
Albuterol (Proventil®, Ventolin®, ProAir®)

- 90 mcg/puff
- Indicated for ages 4 and up
- Dose 2 puffs every 4-6 hours for relief of symptoms; 2 puffs 15 minutes prior to exertion to prevent EIA
Albuterol (ProAir® Respiclick)

- 90mcg/puff
- Indicated for ages 12 and up
- Dose 2 puffs every 4-6 hours for relief of symptoms; 2 puffs 5 minutes prior to exertions to prevent EIA
Levalbuterol (Xopenex®)

- 45 mcg/puff
- Indicated for ages 4 and up
- Dose 2 puffs every 4-6 hours for relief of symptoms; 2 puffs 15 minutes prior to exertion to prevent EIA
- 1 puff may be sufficient in some patients
Nebulized Relievers

- Albuterol 2.5 mg per vial
- Levalbuterol (Xopenex®) 1.25 mg, 0.63 mg, 0.31 mg
- Ipatropium (Atrovent®) 250 mg per vial
- Administered by mask or mouthpiece via nebulizer
- NO BLOW-BYs
Ipratropium Bromide (Atrovent®)

- Anticholinergic
- Available as MDI and nebulizer solution
- Approved for ages 12 and up
- EPR III recommended usage for asthma is 4-8 puffs or 500 mg (via nebulizer) with selective SABA in the ED
- Not recommended for prolonged use due to lack of evidence to support efficacy
Other Relievers

- Prednisone
- Prednisolone
- Methylprednisolone
- Injectable steroids

- Given for short periods of time for exacerbations
- Inhaled steroids should be started at the same time if patient not already on ICS
Oral Systemic Corticosteroids

- Dosing for short bursts is 1-2 mg/kg/day to maximum dose of 60 mg
- Given once a day or split and given twice a day
- Typically given for 3-10 days
- Should be taken with food
Medications that may worsen asthma

Beta blockers

- Medications prescribed to treat numerous conditions including heart conditions, high blood pressure, migraine headache, and, in eye drop form, glaucoma.
- Risk of reducing the effect of bronchodilation effect of albuterol.
- Examples: labetalol, propranolol, timolol ophthalmic drops
Medications that may worsen asthma

ACE inhibitors

- Medications prescribed to treat hypertension (high blood pressure), heart failure, acute myocardial infarction (heart attack), and proteinuria in IgA nephropathy.

- ACE inhibitors may cause dry, hacking, nonproductive cough that usually occurs within the first few months of treatment and should generally resolve within 1-4 weeks after discontinuation of the ACE inhibitor. Should consider other causes of the cough (i.e. pulmonary congestion as in heart failure).

- Examples: lisinopril, captopril, other “–pril” drugs
Medications that may have undesired side effects

SSRIs (selective serotonin reuptake inhibitors)

- Medications prescribed to treat depression, anxiety, OCD, and other psychiatric conditions
- Some SSRIs may cause QTc prolongation (dysrhythmia) depending on dose. Beta-agonists (i.e. albuterol) may produce ECG changes (flattening of the T wave, prolongation of the QTc interval, ST segment depression).
- Examples: Prozac, Lexapro, Celexa
INHALER INSTRUCTIONS

All inhalers should be stored and used at room temperature.
All inhalers should be used with a valved holding chamber (VHC) or closed mouth technique.
**Open mouth technique is not valid for these inhalers.**
After using any inhaled corticosteroid the patient should be instructed to rinse their mouth out and expectorate the water.

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>PRIMES</th>
<th>WHEN TO REPRIME</th>
<th>NUMBER OF DOSES</th>
<th>CLEANING INSTRUCTIONS</th>
<th>OTHER NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RELIEVERS</strong></td>
<td></td>
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</tr>
<tr>
<td>ProAir HFA™ (albuterol)</td>
<td>3</td>
<td>&gt; 14 days</td>
<td>200</td>
<td>Clean plastic actuator weekly with warm running water for 30 seconds. Dry overnight. DO NOT get metal canister wet. Once actuator is dry insert canister in the actuator, shake well and spray twice.</td>
<td></td>
</tr>
<tr>
<td>ProAir Respiclick™ (albuterol) <strong>Breath Actuated Device</strong></td>
<td>0</td>
<td>Never</td>
<td>200</td>
<td>If mouthpiece needs cleaning, gently with it with a dry cloth or tissue. <strong>DO NOT USE WITH SPACER OR VALVED HOLDING CHAMBER.</strong></td>
<td></td>
</tr>
<tr>
<td>Proventil HFA® (albuterol)</td>
<td>4</td>
<td>New and if &gt; 14 days</td>
<td>200</td>
<td>Clean plastic actuator weekly with running water for 30 seconds. Dry overnight. DO NOT get metal canister wet.</td>
<td><strong>NO COUNTER</strong></td>
</tr>
<tr>
<td>Ventolin HFA® (albuterol)</td>
<td>4</td>
<td>&gt; 14 days Reprime if dropped.</td>
<td>200 (Ventolin Reli-On 60)</td>
<td>Clean plastic actuator weekly with running water for 30 seconds. Dry overnight. DO NOT get metal canister wet. Once actuator is dry insert canister in the actuator, shake well and spray once.</td>
<td>Store the inhaler with the mouthpiece down</td>
</tr>
<tr>
<td>Xopenex HFA® (levalbuterol)</td>
<td>4</td>
<td>&gt; 3 days</td>
<td>200 (**80)</td>
<td>Clean plastic actuator weekly with running water for 30 seconds. Dry overnight. DO NOT get metal canister wet.</td>
<td><strong>NO COUNTER</strong></td>
</tr>
<tr>
<td>CONTROLLERS</td>
<td>PRIMES</td>
<td>REPRIME</td>
<td>DOSES</td>
<td>CLEANING</td>
<td>OTHER</td>
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<tr>
<td><strong>Metered dose inhalers</strong></td>
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<tr>
<td>Advair HFA® (fluticasone/salmeterol)</td>
<td>4</td>
<td>&gt; 4 weeks with 2 primes or if dropped</td>
<td>120 (**60)</td>
<td>Wipe spray opening with dry Q-tip then wipe mouthpiece with clean damp tissue at least weekly. Do not take canister out of actuator. Allow to dry overnight before putting cap back on.</td>
<td>Reprime if canister is dropped. Store with mouthpiece down.</td>
</tr>
<tr>
<td>3 strengths per actuation</td>
<td>45mcg/21mcg</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>115mcg/21mcg</td>
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<tr>
<td></td>
<td>230mcg/21mcg</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Aerospan™ (flunisolide)</td>
<td>2</td>
<td>&gt;2 weeks</td>
<td>60 120</td>
<td>No cleaning required per manufacturer</td>
<td>NO COUNTER</td>
</tr>
<tr>
<td>80 mcg per actuation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alvesco® (ciclesonide)</td>
<td>3</td>
<td>&gt;10 days</td>
<td>60</td>
<td>Wipe mouthpiece weekly with dry tissue or cloth</td>
<td>Does not need to be shaken before use.</td>
</tr>
<tr>
<td>Available in 2 strengths</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>80 mcg/actuation</td>
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<tr>
<td></td>
<td>160 mcg/actuation</td>
<td></td>
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</tr>
<tr>
<td>Dulera® (mometasone/Formoterol)</td>
<td>4</td>
<td>&gt;5 days</td>
<td>120 (**60)</td>
<td>Wipe mouthpiece with dry wipe after every 7 days of use</td>
<td>Store 60 dose canister with mouthpiece down or sideways</td>
</tr>
<tr>
<td>2 strengths per actuation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>100 mcg/5 mcg</td>
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<tr>
<td></td>
<td>200 mcg/5 mcg</td>
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</tr>
<tr>
<td>Flovent HFA®</td>
<td>4</td>
<td>&gt;7 days or if dropped</td>
<td>120</td>
<td>Wipe spray opening with damp Q-tip then wipe mouthpiece with clean damp tissue weekly</td>
<td>Reprime if canister is dropped. Store with mouthpiece down.</td>
</tr>
<tr>
<td>3 strengths per actuation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>44 mcg</td>
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<tr>
<td></td>
<td>110 mcg</td>
<td></td>
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<tr>
<td></td>
<td>220 mcg</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>MEDICATION</td>
<td>PRIMES</td>
<td>REPRIME</td>
<td>DOSES</td>
<td>CLEANING</td>
<td>OTHER</td>
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</tr>
<tr>
<td>QVAR HFA® (beclomethasone) 2 strengths per actuation 40 mcg 80 mcg</td>
<td>2</td>
<td>&gt; 10 days</td>
<td>120</td>
<td>Clean mouthpiece weekly with clean, dry tissue or cloth</td>
<td></td>
</tr>
<tr>
<td>Symbicort HFA® (budesonide/formoterol) 2 strengths per actuation 80mcg/4.5mcg 160mcg/4.5mcg</td>
<td>2</td>
<td>&gt; 10 days</td>
<td>120 (**60)</td>
<td>Wipe inside and outside of mouthpiece with clean, dry cloth</td>
<td>Reprime if canister is dropped. Store with mouthpiece down. Discard within 3 months of opening the foil pouch.</td>
</tr>
<tr>
<td><strong>Dry Powder Inhalers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advair Diskus® (fluticasone/salmeterol) 3 strengths per actuation 100mcg/50mcg 250mgg/50mcg 500mcg/50mcg</td>
<td>0</td>
<td>NA</td>
<td>60 (**14)</td>
<td>Do not wash the mouthpiece or any part of the diskus.</td>
<td>Hold diskus in level, flat position with the mouthpiece towards you. Slide lever away from you until it clicks. Once the lever is pushed back, don't close the diskus, do not tilt the diskus, do not play with the lever. Never breathe out into the Diskus. Discard one month after opening the foil pouch.</td>
</tr>
<tr>
<td>Arnuity® (fluticasone furoate) 2 strengths per actuation 100mcg 200mcg</td>
<td>0</td>
<td>NA</td>
<td>30 (**14)</td>
<td>No cleaning instructions given.</td>
<td>Dose is loaded when inhaler is opened. Discard 6 weeks after opening tray. Do not breathe out into the mouthpiece. Do not block vent.</td>
</tr>
<tr>
<td>MEDICATION</td>
<td>PRIMES</td>
<td>REPRIME</td>
<td>DOSES</td>
<td>CLEANING</td>
<td>OTHER</td>
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</tr>
<tr>
<td>Breo® Ellipta® (fluticasone furoate and vilanterol) 100mcg/25mcg 200mcg/25mcg</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>Wipe mouthpiece with dry cloth after taking medication.</td>
<td>Open the cover (should hear a click), exhale away from mouthpiece, place in mouth and inhale slowly. Do not block vent.</td>
</tr>
<tr>
<td>Flovent Diskus® (fluticasone) 3 strengths per actuation 50mcg 100mcg 250mcg</td>
<td>0</td>
<td>NA</td>
<td>60 (**28)</td>
<td>Do not wash the mouthpiece or any part of the diskus.</td>
<td>Hold diskus in level, flat position with the mouthpiece towards you. Slide lever away from you until it clicks. Once the lever is pushed back, don't close the diskus, do not tilt the diskus, do not play with the lever. Never breathe out into the Diskus. Discard one month after opening the pouch.</td>
</tr>
<tr>
<td>Pulmicort Flexhaler® (budesonide) 2 strengths per actuation 90mcg 180mcg</td>
<td>2</td>
<td>When first opened</td>
<td>90mcg 60 180mcg 120</td>
<td>Wipe outside once a week with a dry tissue</td>
<td>After two primes first dose must be loaded. Hold Flexhaler upright when opening. Twist brown grip fully in one direction as far as it will the twist it fully back in the other direction to load. Do not exhale into inhaler. Replace cover when done.</td>
</tr>
</tbody>
</table>

Created by Christine Wagner, 5-2008, revised 5-14-17. Source of information Patient Instruction sheets and pharmaceutical websites.
CURRICULUM VITAE
Christine Waldman Wagner RN, MSN, CPNP-PC, FNP-BC, AE-C
1310 Concho Trail
Mansfield, Texas 76063
Cwagnerr1029@gmail.com

PROFILE

Experienced nurse practitioner board certified in pediatrics (CPNP) by the Pediatric Nursing Certification Board and in family practice (FNP-BC) by the American Nurse’s Credentialing Center. Also board certified as an Asthma Educator (AE-C) by the National Asthma Educator Certification Board.

Extensive clinical experience working with children and adults with acute and chronic problems.

Developed and presented numerous programs for allied health professionals on multiple topics including patient education, health literacy, diagnosis and treatment of allergies, asthma and other nursing issues. Trained facilitator for Problem Based Learning.

Faculty Associate - Texas Woman’s University

EDUCATION

Post Master of Science in Nursing
Houston Baptist University Family Nurse Practitioner Program

Master of Science in Nursing
University of Texas School of Nursing, Houston, Texas Health Science Center Pediatric Nurse Practitioner Program
Thesis: Nurse’s Perceptions of their Role as a Patient Educator.

Bachelor of Science in Nursing
University of Texas School of Nursing, Houston, Texas Health Science Center

WORK EXPERIENCE

August, 2014 to present   Asthma Educator and Program Development
My Children’s Pediatric Practices
Dallas, TX

March, 2007 to June, 2014   Department of Pulmonary Medicine
Nurse Practitioner and Asthma Educator
Children’s Medical Center of Dallas
1935 Medical District Drive
Dallas, TX 75235

March, 2010 to present   Faculty Associate/Clinical Instructor
Texas Woman’s University
College of Nursing
Dallas, Texas
August, 2006 to Dec 2006  Adjunct Professor  
Texas Woman's University  
College of Nursing  
Houston, Texas

July, 2002 to March, 2007  Nurse Practitioner Associate, Asthma Educator  
Allergy and Asthma Associates  
1140 Business Center Drive, #402  
Houston, TX 77043 (Previous practice purchased)

February, 1999 to July, 2002  Nurse Practitioner Associate, Asthma Educator  
Allergy, Sinus and Asthma Professionals  
Linda J. Gorin, MD  
920 Frostwood, Suite 790  
Houston, Texas 77024

Additional work history available upon request

MEMBERSHIPS

American Academy of Allergy, Asthma and Immunology
American College of Allergy, Asthma and Immunology
Association of Asthma Educators
Texas Asthma Coalition-former board member
North Texas Asthma Consortium-former board member
Founding member and first president of the Association of Asthma Educators
Past board member and vice chairperson of the National Asthma Educator Certification Board

AWARDS

American Academy of Allergy, Asthma and Immunology Allied Health Professionals Recognition Award 2011
Great 100 Nurses Dallas-Ft Worth 2009
Association of Asthma Educator's Asthma Educator of the Year 2003

PUBLICATIONS


PRESENTATIONS

“Health Literacy-what is it and how do I measure it?”

“Inhaler Transition: New Changes for Patient Education”

“New NAEPP Asthma Guidelines Update”

“Utilization of Allied Health Professionals in the Administration of Anti-IgE Therapy”

“Improving Patient-Provider Communication”

“Physical Assessment of the Patient with Asthma and Allergies”

“Patient Education for the Patient with Asthma”

“Diagnosis and Management of Asthma by the Pediatric Nurse Practitioner”

“Asthma-Practical Approaches for Allied Health Professionals”

“Anaphylaxis: Optimizing Management and Prevention”

RESEARCH

The Gap between Knowledge and Action in Healthy Eating, poster presentation at National Association of Pediatric Nurse Practitioners, 2012

Does the presence of a scale in the home influence weight in pediatric asthma patients? Unpublished; study completed in 2013.

LISCENSURE AND CERTIFICATIONS
Texas RN/ ANP Lisc. #449805
Licensed as ARNP with prescribing privileges

Pediatric Nurse Practitioner Cert. #95397.
Family Nurse Practitioner Cert. #03377359-22.
Asthma Educator Cert. #0005
Allergic Rhinitis Management

Karen L. Gregory, DNP, APRN, CNS, RRT, AE-C, FAARC

Oklahoma Allergy and Asthma Clinic
Georgetown University
OBJECTIVES

• Discuss the Symptoms and Epidemiology of Allergic Rhinitis
• Identify Classification and Co-morbidities of Allergic Rhinitis
• Discuss Subjective Symptoms of Allergic Rhinitis
• Discuss Physical Examination of person with AR
• Identify various methods of Pharmacotherapy for Allergic Rhinitis
• Discuss Patient Education for Management of Allergic Rhinitis
Allergic Rhinitis

A symptomatic disorder of the nose resulting from an IgE-mediated immunological reaction following exposure to allergen

The major symptoms:
rhinorrhea, nasal itching, obstruction and sneezing which are reversible either spontaneously or with treatment

World Allergy Organization (WAO), 2016  http://www.worldallergy.org/
Allergic Rhinitis: Epidemiology

- 16.9 million adults and 6.7 million children
- 400 million people worldwide
- 2 million annual lost school days and 6 million lost work days
- Economic burden: $3.4 billion

The nasal allergic response

**IMMEDIATE (early) RESPONSE**
- Sneezing
- Pruritus
- Rhinorrhea
- Nasal obstruction
- Ocular symptoms

**LATE-PHASE RESPONSES**
- Nasal obstruction
- Rhinorrhea
- Nasal hyperresponsiveness

**Endothelial cell activation**
- Leukocyte infiltration and activation (lymphocytes, eosinophils, basophils)

**Cytokines**
- Chemokines
- IL-4
- IL-13

**Dendritic cell**
- Allergen

**T-lymphocyte**
- IL-4
- IL-13

**B-lymphocyte**
- IgE
Sensitization Phase:
Development of the Th2 cell response, B cell and allergen-specific IgE response

Early Response:
IgE-mediated mast cell degranulation upon exposure to allergens represents the early response

Late Response:
Recruitment of T cells, eosinophils and basophils
Rhinitis Phenotypes

- Allergic Rhinitis
- Infectious Rhinitis
- Non-allergic Non-infectious Rhinitis
- Mixed
Allergic Rhinitis: Differential Diagnosis

**Non-allergic:**
- gustatory rhinitis
- Rhinitis medicamentosa
- Infectious
- Hormonal

**Physical Obstruction:**
- Foreign body obstruction
- Cleft palate
- Nasal septal deviation
- Nasal polyps
- Laryngopharyngeal reflux
- Hypertrophy nasal turbinates

**Other:**
- Cystic fibrosis
- Primary ciliary dyskinesia/ciliary dysfunction
- Sinus disease
- Vasculitis
- (granulomastosis)
- Cerebrospinal fluid rhinorrhea
Impact on Quality of Life

- Impaired quality of life
- Reduced performance at school and work
  School and work absence
- Sleep disruption
- Impaired learning
- Associated asthma, sinusitis, otitis media
Allergic Rhinitis: Co-morbidities

- Asthma
- Conjunctivitis
- Chronic otitis media with effusion
- Eustachian tube dysfunction
- Sleep impairment including OSA
- Rhino sinusitis- hyposmia
- Pollen-food cross-reactivity
- Laryngeal irritation
**Allergic Rhinitis: Classification**

**Seasonal AR**
- Symptoms are rapid & reproducible
- Onset driven by reactions to seasonal aeroallergens
- Duration of symptoms varies by the length of exposure, geographic location, & climate

**Episodic AR**
Symptoms occur only after exposure to specific allergens

**Perennial AR**
- Symptoms persist perennially with or without seasonal exacerbations

**Episodic**
- Mild
- Mild-Moderate
- Moderate-Severe
- Severe

**Intermittent vs Persistent**

ARIA Classification

**Intermittent**
< 4 days per week
or < 4 weeks

**Mild**
normal sleep
& no impairment of daily activities, sport, leisure
& normal work and school
& no troublesome symptoms

**Persistent**
> 4 days week and
> 4 weeks

**Moderate-severe**
*one or more items*
- abnormal sleep
- impairment of daily activities, sport, leisure
- abnormal work and school
- troublesome symptoms

**ARIA Classification**

**Persistent**
- >4 days week and
- > 4 weeks

**Moderate-severe**
- one or more items
  - abnormal sleep
  - impairment of daily activities, sport, leisure
  - abnormal work and school
  - troublesome symptoms

**Intermittent**
- < 4 days per week
- or < 4 weeks

**Mild**
- normal sleep
- no impairment of daily activities, sport, leisure
- normal work and school
- no troublesome symptoms

Subjective Presentation

Sneezing
Rhinorrhea
Ocular and nasal pruritus
Pruritic palate
Post-nasal drip
Frequent throat clearing
Cough
Malaise/fatigue
Olfactory dysfunction

Clinical pearl....

Significant complaints of congestion, particularly if unilateral, might suggest the possibility of structural obstruction, such as a polyp, foreign body, or deviated septum.
Medical History

History of atopy
Early onset
Concurrent allergic disorders
Lower respiratory symptoms
Predominance of upper airway symptoms
Correlations with allergen exposure
Correlation with medications
Family history
Physical Examination

- Infraorbital edema & darkening → allergic shiners
- Demie-Morgan lines
- Transverse allergic crease
- Malocclusion and a high-arched palate
- Nasal turbinates: pale, blue-gray, edematous mucosa, clear rhinorrhea
- Oropharynx: post nasal drainage, "cobblestoning"
Physical Examination
Nasal Polyps

- Allergic rhinitis is a common coexisting disease in patients with chronic sinusitis
- Sinonasal inflammation is found in most cystic fibrosis (CF) patients
- Concomitant diagnosis of sinusitis is significantly higher in the children with GERD.
Allergic Conjunctivitis

- Intense ocular pruritus
- Hyperemia
- Watering
- Periorbital edema

- Occurs 50 to 70% of individuals with allergic rhinitis

Diagnosis of Rhinitis

- Characteristics of symptoms
- Suggestive Clinical History
- Detailed personal and family allergic history
- Physical examination
- Sensitization testing

Imaging studies
- CT for concomitant condition (CRS)
- X-rays have a limited value

Endoscopy
- Usually performed by ENT providers
Diagnosis of allergic rhinitis

**Intermittent symptoms**
- **Mild**: Not in preferred order oral H1 blocker or intranasal H1-blocker and/or decongestant or LTRA
- **Moderate-severe**: Not in preferred order oral H1 blocker or intranasal H1-blocker and/or decongestant or intranasal CS or LTRA (or cromone)
  - In persistent rhinitis review the patient after 2–4 weeks
  - If failure: step-up
  - If improved: continue for 1 month

**Persistent symptoms**
- **Mild**: In preferred order intranasal CS, H1 blocker or LTRA (or cromone)
- **Moderate-severe**: Review the patient after 2–4 weeks
  - Improved
    - Step-down and continue treatment for >1 month
    - Add or increase intranasal CS dose
  - Failure
    - Review diagnosis
    - Review compliance
    - Query infections or other causes
    - Rhinorrhea add ipratropium
    - Blockage add decongestant or oral CS (short term)
    - Failure
    - Referral to specialist

Check for asthma especially in patients with severe and/or persistent rhinitis

**Allergen and irritant avoidance may be appropriate**

**If conjunctivitis**
- Add oral H1-blocker or intraocular H1-blocker or intraocular cromone (or saline)

**Consider specific immunotherapy**

ARIA, 2010
Computed Tomography (CT)

- Moderate congestion right middle nasal turbinate
- Bilateral obstructed OMC
- Minimal left, mild to moderate right ethmoiditis
- Mild bilateral sphenoiditis
Pharmacotherapy
ARIA Classification

- **Mild Intermittent**
  - Intra-nasal steroid
  - Local cromolyn
  - Oral or local non-sedative H<sub>1</sub> blocker
  - Intra-nasal decongestant (<10 days) or oral decongestant
  - Allergen and irritant avoidance

- **Moderate Persistent**

- **Moderate Severe Persistent**
  - Immunotherapy
Goal of Therapy

Block symptoms

- Early-phase response
- Late-phase response
Allergen avoidance

Intranasal corticosteroids

Oral & intranasal antihistamines

Leukotriene receptor antagonists

Intranasal anticholinergics

Intranasal cromlyn

Decongestant

Allergen immunotherapy (SCIT/SLIT)
Nasal Sprays
## Pharmacologic Options: Intranasal

### Intranasal steroids
- Beclomethasone dipropionate – Q-Nasl
- Budesonide – Rhinocort
- Ciclesonide – Omnaris
- Ciclesonide – Zetonna
- Flunisolide – Nasarel
- Fluticasone furoate - Veramyst
- Fluticasone propionate – Flonase
- Mometasone furoate - Nasonex
- Triamcinionlone – Nasacort AQ

### Intranasal antihistamine
- Azelastine – Astelin, Astepro
- Olopatadine - Patanase

### Combinations intranasal
- Azelastine/fluticasone propionate – Dymista

### Anticholinergic
- Ipratropium bromide – Atrovent

### Mast Cell inhibitor
- Cromolyn Sodium

### Intranasal Decongestion
- Phenylephrine - Neo-Synephrine
- Oxymetazoline – Afrin
Nasal Corticosteroids

- Reduce mucosal inflammation
- Reduce late phase reactions and nasal hyperresponsiveness
- Reduce mucosal mast cells
- Reduce acute allergic reactions
- Suppression of glandular activity and vascular leakage
- Induce vasoconstriction

Reduce symptoms and exacerbations

World Allergy Organization, 2016
**Intranasal Corticosteroid**

Intranasal corticosteroids have the greatest efficacy at relieving all 4 primary symptoms of allergic rhinitis.

First-line treatment for allergic rhinitis patients who have moderate to severe disease!

**Mechanism of Action:**
- Decrease inflammatory cells and inhibit release cytokines
- Epithelial cells are an important target for corticosteroids
  INCS concentration is high at the epithelial surface.

**Onset of Action:** can be < 30 minutes. Peak effect 2 to 3 hours
Maximal effect may require 2 to 4 weeks
<table>
<thead>
<tr>
<th>Drug</th>
<th>Minimum Age for Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone</td>
<td>4 years</td>
</tr>
<tr>
<td>Budesonide (Rhiocort Aqua)</td>
<td>6 years</td>
</tr>
<tr>
<td>Ciclesonide (Omnairs)</td>
<td>6 years</td>
</tr>
<tr>
<td>Flunisolide</td>
<td>6 years</td>
</tr>
<tr>
<td>Fluticasone furoate (Veramyst)</td>
<td>2 years</td>
</tr>
<tr>
<td>Fluticasone propionate (Flonase)</td>
<td>4 years</td>
</tr>
<tr>
<td>Mometasone (Nasonex)</td>
<td>2 years</td>
</tr>
<tr>
<td>Triamcinolone acetonide</td>
<td>2 years</td>
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</tbody>
</table>
Adverse Effects: Nasal Steroids

- Throat irritation
- Nasal dryness
- Burning
- Epistaxis
- Dysguesia
- Complications of growth
**Intranasal Antihistamine**

**Mechanism of Action**

H1 antagonist

Prevention of mast cell and basophil degranulation

Down-regulation of adhesion molecules and chemokines

Reduction of inflammatory cytokine expression

Suppression of neurogenic enhancement of inflammation

Augmentation of inflammatory cell apoptosis
Intranasal Antihistamine

- Higher concentration of the drug delivery to the site of reaction
- Improved efficacy for nasal symptoms compared to systemic antihistamines.
- May exert a local anti-inflammatory effect
- Systemic absorption with potential sedation as a side effect
- Sparse effects on comorbid conditions—conjunctival symptoms

Onset: 15 to 30 minutes  
Age: 5 years Azelastine
Adverse Effects: Intranasal Antihistamine

- Bitter taste
- Somnolence
Combination of Intranasal Corticosteroid and Intranasal Antihistamine

- Improvement in the Total Nasal Symptom Score (TNSS) with combination therapy

- Azelastine nasal spray and fluticasone nasal spray in combination may provide a substantial therapeutic benefit for patients with seasonal allergic rhinitis compared with therapy with either agent alone

Ipratropium bromide

- Anticholinergic (parasympatholytic) agent
- Inhibits vagal-mediated reflexes by antagonizing the action of acetylcholine, inhibits secretions from the serous and seromucous glands lining the nasal mucosa

Onset of action: generally 30 minutes
Age 6 years
Adverse Effects: Intranasal Anticholinergic

- Dryness of the nasal mucosa
- Epistaxis
- Headache.
- Urinary retention and glaucoma has been reported

→ Adherence problems because of administration requirements of two or three times daily
Intranasal Cromolyns

Cromolyn

- Mast cell stabilizer
- Inhibits mast cell release of histamine and other inflammatory mediators by inhibiting the intermediate conductance chloride channel pathways of mast cells, eosinophils, epithelial and endothelial cells, fibroblasts, and sensory neurons
- Blocks symptoms associated with the immediate- and late-phase nasal allergen challenge

Onset of Action: 4 to 7 days – full benefit may take weeks

Minimum age for use: 2 years
Intranasal Cromolyns

- Used for maintenance treatment of allergic rhinitis
- Episodic rhinitis: administer prior to allergen exposure
- Inadequate data for comparing leukotriene antagonists and antihistamines
- Inferior efficacy of compared to other first-line medications for allergic

➔ Adherence problems administration requirements of 3 – 4 times daily
Adverse Effects - Cromolyn

Epistaxis
Nasal irritation
Sneezing

Favorable efficacy and safety profile makes their use an acceptable option for preventative measures for nasal allergy symptoms.
Intranasal Decongestants

Ephedrin, pseudoephedrine, xylometazoline

• Potent vasoconstrictor sympathomimetic agents
• Act on adrenergic receptors causing vasoconstriction in the nasal mucosa, resulting in decreased inflammation.
• Used for rescue medication for rhinitis with congestion for no longer than 3 to 5 days
• No anti-allergic or anti-inflammatory action
• Nasal decongestants are contraindicated in pregnancy

Onset of Action: within 10 minutes

AGE: should be avoided <6 years, and use caution in 6-12 years and > 60, and any patient with cardiovascular conditions
Adverse Effects: Intranasal Decongestants

• Rhinitis medicamentosa
• Nasal irritation

Overuse by patients is common
Oral Agents
Antihistamines

Block H1 receptor

Onset of action: 15 to 30 minutes
Pharmacotherapy: Antihistamine

First Generation
- Chlorpheniramine
- Diphenhydramine
- Hydroxyzine
- Promethazine

Leukotriene receptor antagonists
- Montelukast

Oral decongestants
- Pseudoephedrine
- Phenylephrine

Second Generation
- Cetirizine
- Loratadine
- Fexofenadine
- Levocetirizine
- Desloratadine

Mast cell stabilizer
- Cromolyn Sodium
Antihistamine: First Generation

- Lipophilic
- Readily cross the blood-brain barrier resulting in central nervous system effects
- Limited by adverse effects due to anticholinergic stimulation
- Sedation side effects from early antihistamines can be tolerated in some patients if taken at night before sleep
- Paradoxical stimulation of the CNS can also occur in children

- Ethanolamines – diphenhydramine: Benedryl
- Alkylamines chlorpheniramine: Chlor-Trimeton
- Piperazines hydroxyzine: Atarax
- Phenothiazines promethazine: Phenergan
**Antihistamine: Second Generation**

- Strong H1 receptor selectivity
- Less permeability through the blood-brain barrier → exception of cetirizine
- Weak anticholinergic action
- Minimal potentions for sedation
- Longer half-live
- Rapid onset
- Less effective for nasal congestion
- Less effective than intranasal steroids for nasal symptoms
- Similar effectiveness to intranasal steroids for ocular symptoms
Minimum age for use

- cetirizine: 6 months
- loratadine: 2 years
- desloratadine: 6 months
- fexofenadine: 2 years
- levocetirizine: 6 months
Adverse Effects: First Generation

- Potential to induce sedation due to significant capacity of crossing the blood–brain barrier

- Anticholinergic effects such as drying of mucous membranes, urinary retention, constipation, tachycardia, and blurred vision (may preclude use in elderly)

- Rapidly metabolized → must be administered three or four times a day
Must note on RX for all antihistamines →

this drug may cause drowsiness do not drive or operate machinery, avoid alcohol”

Labels for pseudoephedrine products must state →

"Do not take this product if you are now taking a prescription monoamine oxidase inhibitor (MAOI) (certain drugs for depression, psychiatric or emotional conditions, or Parkinson's disease), or for two weeks after stopping the MAOI drug”
Leukotriene Receptor Antagonists (LTRAs)

Block leukotriene receptor
Reduces the inflammatory response in nasal tissue
Comparable to oral antihistamine, but less effective than intranasal corticosteroids.

Concurrent asthma and allergic rhinitis, montelukast can improve both conditions.

Onset: 2 hours
Minimum age for use: 6 months
Adverse Events Leukotriene

Good safety profile

Occasional reports of:

- Headache
- Gastrointestinal symptoms
- Rash
- Associated behavioral changes
Decongestants

- Pseudoephedrine

- Mechanism of Action: Vasoconstrictor reduces nasal congestion

Onset of Action: rapid

Minimum age for use: 2 years → usually not started until 4 years old
Adverse Effects: Decongestant

- Insomnia
- Irritability
- Palpitations
- Tremors
- Hypertension

- Headache
- Urinary retention
- Tachycardia
- Dizziness
- Elevated intraocular pressure
Contraindications for Decongestants

- Cardiac disease
- Hypertension
- Kidney disease
- Diabetes
- Glaucoma
- Hyperthyroid
- Prostate disease
- Depression
- Use of MAOI antidepressant
**Allergic Conjunctivitis (AC)**

What is the most densely mast cell populations of human tissues?

- conjunctiva and periorbital area

The conjunctival surface is accessible to allergens and is the site of allergic reactions

Characterized by classical symptoms:

- ocular pruritus
- tearing/watery
- edema
- chemosis
- redness of the eyes
IgE mediated:
Seasonal & Perennial Allergic Conjunctivitis

Antihistamines with mast cell-stabilizing properties

- Block histamine receptors in the conjunctiva and eyelids, thus inhibiting the actions of the primary mast cell-derived mediator → reduces the late phase of the allergic response

- Inhibit mast cell degranulation, limiting the release of histamine, tryptase, and prostaglandin D2

- olopatadine – Patanol, Pataday, Pazeo
- alcaftadine – Lastacaft
- bepotastine – Bepreve
- azelastine HCl – Optivar
- epinastine – Elestat
- ketotifen fumarate -- generic Ketotifen
- emedastine – Emadine
**Antihistamines with mast cell-stabilizing properties**

**Dosing**
- Dosing is twice per day for most products.
- Pataday, Pazeo, and Lastacaft are once-daily preparations

**Onset of action** is within minutes for most drugs
→ at least two weeks of therapy should be allowed in order to assess the full efficacy of prophylactic therapy with these agents

**Adverse Affects**
- Headache
- Increased ocular dryness
- Poor taste

Consider refrigerating the drops before use.
Vasoconstrictor/antihistamine combinations

**Antihistamine:** blocks histamine receptors in the conjunctiva and eyelids, thus inhibiting the actions of the primary mast cell-derived mediator

**Vasoconstrictor:** activates the postjunctional, alpha-adrenergic receptors found in blood vessels, causing vasoconstriction and decreased conjunctival edema

**naphazoline and pheniramine**
Naphcon-A, Opcon-A, Visine-A

Dosing is up to 4 times daily during acute symptoms.

- Short-term (< 2 weeks) or episodic use only.
- Regular use > 2 can lead to rebound hyperemia
- May have increased eye redness for several days after medication is discontinued
Mast Cell Stabilizers

- Full efficacy is reached 5 to 14 days after therapy has been initiated
- Not useful for acute symptoms
- Dosing of mast cell stabilizers is 4 times daily
- Because of limitations, mast cell stabilizers are often impractical
- May provide an option for seasonal allergic conjunctivitis when other therapies are not tolerated

- cromolyn sodium—Opticrom
- nedocromil -- Alocril
- lodoxamide-tromethamine—Alomide
- pemirolast -- Alamast
Allergy Immunotherapy (AIT)

Modify the underlying cause of the disease, with proved long-term benefits

“Despite numerous clinical trials and meta-analyses proving AIT efficacious, it remains underused and is estimated to be used in less than 10% of patients with allergic rhinitis or asthma worldwide virtually no controversy about the use of AIT in the treatment of allergic rhinitis and allergic asthma”

1911

Noon and Freeman were the first researchers to test pollen allergen immunotherapy in a patient cohort.
**Allergy Immunotherapy**

<table>
<thead>
<tr>
<th>Indications</th>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• IgE-mediated disease</td>
<td>• Malignant diseases</td>
</tr>
<tr>
<td>• Sensitization is relevant for the symptoms</td>
<td>• Autoimmune diseases</td>
</tr>
<tr>
<td>• Symptoms are of sufficient severity and duration</td>
<td>• Current therapy with beta blockers</td>
</tr>
<tr>
<td>• Availability of a standardized high-quality allergen extract of the specific allergen intended to be used for immunotherapy</td>
<td>• Asthma patients with FEV1 below 70% under treatment, or</td>
</tr>
<tr>
<td></td>
<td>• uncontrolled asthma</td>
</tr>
<tr>
<td></td>
<td>• Pregnancy at the start of immunotherapy</td>
</tr>
<tr>
<td></td>
<td>• Acute infections e.g. common cold with fever</td>
</tr>
</tbody>
</table>
Immunotherapy: SCIT vs SLIT-T

**SCIT**

- Effective in patients with seasonal rhinitis (high-quality evidence)
- Induces long-term remission (moderate evidence)
- Effective in patients with perennial rhinitis (moderate evidence)
- Indirect evidence suggests SCIT is more effective than SLIT in patients with SAR
- Evidence base in children is less convincing-- more studies are needed
- Local side effects (pain and swelling) are common and well tolerated
- SCIT requires administration in a specialist clinic
- Adherence is easily monitored
- Direct comparative evidence versus SLIT is weak, and definitive trials are needed

Immunotherapy: SCIT vs SLIT-T

- Effective in patients with seasonal rhinitis (high-quality evidence)
- Induces long-term remission (high-quality evidence)
- Effective in patients with perennial rhinitis (high-quality evidence)
- Indirect evidence suggests SLIT-T is better tolerated and safer than SCIT in patients with SAR
- Evidence base in children is less convincing; more studies are needed.
- Local side effects (itching and swelling) are common and well tolerated
- SLIt-T can be self-administered (adherence can be a problem)
- Direct comparative evidence vs SCIT-T is weak - definitive trials needed

## RCT: ARIA Update 2010

<table>
<thead>
<tr>
<th>No of RCTs</th>
<th>SCIT Recommendations</th>
<th>SLIT -T Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/63 (1 data from meta-analysis)/0</td>
<td>Suggests the use of pollen and HDM SCIT for AR in adults and children and for concomitant AR and asthma</td>
<td>Suggests the use of pollen and HDM SLIT for AR in adults and of pollen SLIT in children</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not suggest HDM SLIT in children for treatment of AR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suggests SLIT in patients with AR plus asthma for asthma treatment</td>
</tr>
</tbody>
</table>

Sublingual Immunotherapy

3 sublingual allergen tablets approved in the United States:

Oralair: 5-grass - Stallergenes, Antony, France
Ragwitek: Short ragweed Merck Whitehouse Station, NJ
Grastek: Timothy grass Merck, Whitehouse Station NJ
Management
Management of Allergic Rhinitis

- Basic pathophysiology
- Allergen avoidance
  Environmental control measures and allergen avoidance involve both the avoidance of known allergens and avoidance of nonspecific, or irritant, triggers.
- Pharmacotherapy
  Medical Treatment Regimen
  Adherence
House Dust Mite Allergen Avoidance

• Provide adequate ventilation to decrease humidity
• Wash bedding at least weekly at 120°F
• Encase pillow and mattresses in allergen impermeable covers
• Use vacuum cleaner with HEPA filter
• Avoid feather bedding
• Consider removing carpet, curtains, pets and stuffed toys from bedroom
Aeroallergen Avoidance Strategies

- HEPA filters
- Bedding encasements
- Remove fabric curtains
- Vacuum at least twice a week
- Remove pets from home or bedroom
- Wash pets regularly
- Ensure dry indoor condition
- Use ammonia to remove mold
- Eradicate cockroaches
- Remain indoors with windows closed at peak pollen times
- Use air-conditioning
Administering a nasal steroid
Patient Education: Nasal Saline Rinse

CDC Preparation Guidelines

http://www.cdc.gov/parasites/naegleria/sinus-rinsing.html
**Highlights**

- Allergen-specific IgE to as supported by detailed history is crucial to identify allergen sensitization and correlation of reported symptoms.
- Intranasal corticosteroids are the mainstay of treatment for allergic rhinitis.
- Allergic rhinitis is strongly linked with asthma and conjunctivitis.
References

References

References

- Wallace DV, Dykewicz MS, Bernstein DI, et al; Joint Task Force on Practice Parameters; American Academy of Allergy, Asthma & Immunology; American College of Allergy, Asthma and Immunology; Joint Council of Allergy, Asthma and Immunology. The diagnosis and management of rhinitis: an updated practice parameter. *J Allergy Clin Immunol.* 2008;122(2 Suppl):S1-S84.
- World Allergy Organization (WAO), 2016  http://www.worldallergy.org/
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Curriculum Vitae

Professional Experience

December, 2011 to present
Georgetown University
School of Nursing and Allied Health
37th and O Street
N.W., Washington D.C. 2005
Job title: Assistant Professor

September, 2007 to present
Oklahoma Allergy and Asthma Clinic
750 NE 13th
Oklahoma City, OK 73104
Job title: Doctor of Nursing Practice
Clinical Nurse Specialist/
Advanced Practice Register Nurse, Board Certified
Pulmonary Disease Management Specialist
Certified Asthma Educator

September, 2006 to 2009
University of Oklahoma, Oklahoma City, OK 73117
College of Nursing
Job title: Instructor

March, 2006 to August, 2007
Children’s Medical Center of Dallas, Dallas, Texas
Allergy, Asthma, and Immunology Clinic
1935 Medical District Drive
Dallas, TX 75235
Job title: Advanced Practice Registered Nurse, Board Certified
Clinical Nurse Specialist
Certified Asthma Educator
September, 1999 to March, 2006, Oklahoma City, OK
Oklahoma Allergy and Asthma Clinic
750 NE 13th
Oklahoma City, OK 73104
Job title: Clinical Nurse Specialist/Advanced Practice Register Nurse, Board Certified
Pulmonary Disease Management Specialist
Registered Respiratory Therapist
Certified Asthma Educator

March, 1997 to September, 1999:
AirWise Asthma Clinic, LLC
3434 NW 56th Street
Oklahoma City, OK 73112
Job title: Co-owner, Pulmonary Disease Management Specialist/Asthma Educator, Respiratory Care Practitioner and Registered Nurse

March, 1985 to March, 1997:
Mercy Health Center
4300 McAuley Blvd
Oklahoma City, OK 7312
Job title: Pulmonary Rehabilitation Coordinator
Asthma Services Coordinator
Asthma Educator
Respiratory Care Practitioner

January, 1986 to September, 1987 (part-time)
Abbey Foster Home Care, Oklahoma City, OK
Oklahoma City, Oklahoma
Job title: Clinical Respiratory Therapist

Education

Rose State College, Midwest City, Oklahoma,
Associate in Applied Science, Respiratory Therapy, August, 1985

University of Central Oklahoma, Edmond, Oklahoma
Continuing education and undergraduate studies

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma
Bachelor of Science Nursing, May, 1999

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma
Masters of Science in Nursing, August, 2003
Clinical Nurse Specialist
Advanced Practice Nursing: Nurse Practitioner/Clinical Nurse Specialist
Core Practicum September, 1999 to August, 2002

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma, Clinical Practice for Patient Management and Prescription of Medication, 2004.

Chatham University, Pittsburgh, Pennsylvania, Doctorate of Nursing Practice, August, 2011.

**License and Certification**

Advanced Practice Registered Nurse – Board Certified, Clinical Nurse Specialist, American Nursing Credentialing Center

Prescriptive Authority, US Department of Justice, Drug Enforcement Administration, Washington, DC

Registered Respiratory Therapist, National Board of Respiratory Care

Respiratory Care Practitioner, Oklahoma State Board of Medical Licensure

Advanced Practice Registered Nurse/ Acute Care Clinical Nurse Specialist, Prescriptive Authority, Oklahoma Board of Nursing

Advanced Practice Registered Nurse/Clinical Nurse Specialist Acute Care, Prescriptive Authority, Board of Nurse Examiners for the State of Texas

Advanced Practice Registered Nurse/Clinical Nurse Specialist Acute Care, Board of Nursing Washington DC

Asthma Educator Certification, National Asthma Educator Certification Board 2002 to 2009, 2009-2016, 2016-2021

Basic Life Support, CPR Instructor, American Heart Association (1984 to Present)

**Professional Organizations and Activities**

American Academy of Allergy, Asthma and Immunology, 2005 to present
American Academy of Allergy, Asthma and Immunology, 2015 to present
Allied Health Education Committee
American Academy, Allergy Asthma and Immunology, Allergic Skin Diseases, August, 2015 to present
American Academy, Allergy Asthma and Immunology, Continue Medical Education and Maintenance of Certification Committee, August, 2016 to present
American Association for Respiratory Care liaison for the American Association of Critical Care Nurses, 2009 to 2012
American College of Allergy, Asthma and Immunology, 2000 to present
American Lung Association of Oklahoma, volunteer 1984 to present
American Red Cross, volunteer 1999 to present
Association of Asthma Educators, 2000 to present
Board of Medical Licensure and Supervision State of Oklahoma
  Respiratory Care Practitioner Advisory Committee, 2003-2006
Medical Reserve Corp, 2008 to present
Ministries of Jesus, Advanced Practice Nurse, Pulmonary Clinic, 2003 to present
National Asthma Education Certification Board, test item writer, 2005 to 2007
Oklahoma Association of Cardiovascular and Pulmonary Rehabilitation
  President, 1995 to 1997
Oklahoma Asthma Initiative, 1997 to present, Medical Chair, 2010 to 2012
Phi Theta Kappa 1984 to 1986
Sigma Theta Tau International, 2002 to present
Rose State College, Respiratory Therapy, Clinical Advisory Board, Midwest City, Oklahoma. 2008 to present
University of Central Oklahoma, College of Nursing, Edmond, Oklahoma, Advisory Board, November, 2012 to present
**Academic Council**

American Association for Respiratory Care, Chronic Obstructive Pulmonary Disease Education Course, Faculty, 2005 to present.
American Association for Respiratory Care, Asthma Educators Certification Preparatory Course, Faculty, 2007 to present.
Association of Asthma Educators, Asthma Educators Certification Review Course, 2004 to present.
Chatham University, Doctor of Nursing Practice preceptor, December, 2016 to present
Rose State College, Adjunct Faculty, 1986 to 2006, 2007 to present.

**Research Interest and Projects**

Patient Quality of Life Study for patients with asthma and allergic disease, 1999 to 2002
Oklahoma Allergy and Asthma Clinic, Asthma Disease Management Outcome Study, 2002-2004
Camp Second Wind, extensive educational day camp for children with asthma
Asthma Management Workshops for rural healthcare professionals, 2002-2005
Development of patient education, literature and booklets 2002-2005
Developing asthma educating modules for asthma educators (Association of Asthma Educators) 2004-2010
Asthma and Traffic Density research project, Dallas, Texas, 2006-2007
Asthma Disparity in Rural Health Care, 2010 to present
Achieving Asthma Control in Pediatric Asthma, Medicaid population, 2010 to present

**Awards**

Outstanding Clinical Practice Award, University of Oklahoma, 2003
Outstanding Professional Service Award, University of Oklahoma, 2003
Excellence in Nursing Practice Award, Sigma Theta Tau, Beta Delta Chapter, 2005
Outstanding Asthma Educator of the Year 2012-2013, Association of Asthma Educators

**Journal Reviewer**

2010-2014 *Journal of Asthma and Allergy Educators*
2015 to present – *Pediatric Allergy, Immunology and Pulmonology*
Presentations (2006 to present)


August, 2006 Association of Asthma Educators, Advanced Spirometry, Atlanta, Georgia.

October, 2006, Asthma Management, Oklahoma Asthma Initiative, American Lung Association of Oklahoma, Midwest City, Oklahoma.


July, 2007, Association of Asthma Educators, Pregnancy and Asthma, St. Louis, Missouri.


August, 2007, Advance Practice Services Annual Conference, Children’s Medical Center of Dallas, Advances in Pediatric Asthma, Dallas, Texas.

March, 2008, Asthma Management, Genetech, Oklahoma City, Oklahoma.

June, 2008, Oklahoma School Nurses Institute, Asthma at School, Edmond, Oklahoma.

July, 2008, Association of Asthma Educators, Novel Approaches to Adult Learning in Patients with Asthma, San Mateo, California.


December, 2008, American Association for Respiratory Care, Asthma Educators Certification Review Course, Anaheim, California.


February, 2009, Advanced Practice Nurse Pharmacology Workshop, Management and Treatment of Asthma: Guideline Update and Implications for IgE Mediated Therapy, University of Oklahoma, College of Nursing, Oklahoma City, Oklahoma.


April, 2009, Oklahoma Association of Clinical Nurse Specialist, Asthma Management Using Evidenced Based Practice, Oklahoma City, Oklahoma.

May, 2009, American Association for Respiratory Care Chronic Obstruction Pulmonary Disease Education Course, Miami, Florida.

June, 2009, Management and Treatment of Asthma: Guideline Update and Implication for IgE Mediated Therapy, Lula, Mississippi.
June, 2009, Management and Treatment of Asthma: Guideline Update and Implication for IgE Mediated Therapy, Oklahoma City, Oklahoma.
July, 2009, Novel Approaches to Adult Asthma Education, Asthma teleconference, Centers of Disease Control.
August, 2009, Managing Food Allergy and the Pediatric Patient, New Orleans, Louisiana., Association of Asthma Educators.
August, 2009, Food Allergy and Anaphylaxis, New Orleans, Louisiana, Association of Asthma Educators.
October, 2010, Anatomy of an Asthma Action Plan, Tulsa, Oklahoma Oklahoma Society for Respiratory Care

December, 2010 Asthma Self Management Program, American Association for Respiratory Care, Las Vegas, Nevada.


March, 2012 Vitamin D and Asthma, American Academy of Asthma, Allergy, and Immunology Annual Conference, Orlando, Florida.
March, 2012, Asthma Management, American College of Asthma, Allergy, and Immunology Annual Conference, Orlando, Florida.

April, 2012, Asthma Management, Francis Tuttle Vo-Tech Center, Oklahoma City, Oklahoma.


for Respiratory Care Conference, Rochester, New York.
February, 2013 Vitamin D and Asthma Update, American Academy of 
Asthma, Allergy and Immunology Annual Conference, San Antonio, 
Texas.
February, 2013 Anaphylaxis: Advance Proficiency in Clinical Practice, San 
Antonio, Texas.
April, 2013 Patient Education- Can You Hear Me Know? Wellstar, Atlanta, 
Georgia.
May, 2013 Overview of Asthma in the Pediatric Population, Advance Practice 
Nurses of Oklahoma, Oklahoma City, Oklahoma
August, 2013 Association of Asthma Educators National Conference, 
Anaphylaxis: Advance Proficiency in Clinical Practice.
November, 2013 New York State Respiratory Convention, Vitamin D and 
Asthma: What is the connection?
February, 2014, Asthma Update 2014: Advancing Clinical Management 34th 
Annual Respiratory Conference, Seven Springs, Pennsylvania
February, 2014, Differentiating Asthma from COPD: Why is This So Hard? 
American Academy of Allergy, Asthma, and Immunology Conference, San 
Diego, California
March, 2014, Atopic Dermatitis: Advancing Proficiency in Management, 
American Academy of Allergy, Asthma, and Immunology Conference, San 
Diego, California
March, 2014 Anaphylaxis: Advancing Proficiency in Recognition, Management 
and Risk Reduction. American Academy of Allergy, Asthma, and 
Immunology Conference, San Diego, California
October, 2014, The Affordable Care Act: Good, Bad, or Indifferent. 2014 Doctor 
of Nursing Practice Conference, Nashville, Tennessee.
February, 2015. Atopic dermatitis, beyond the surface: From filaggrin to foods 
American Academy of Allergy, Asthma, and Immunology Conference, 
Houston, Texas.
American Academy of Allergy, Asthma, and Immunology Conference, 
Houston, Texas.
University of Oklahoma College of Nursing 2015 Pharmacology 
Conference, Oklahoma City, Oklahoma.
March, 2015. Pulmonary exacerbation management, 2015 Pulmonary Education 
Conference. American Association for Respiratory Care. Washington DC.
Education Conference. American Association for Respiratory Care. Washington DC
Pennsylvania Respiratory Conference, Pittsburgh, Pennsylvania.
May, 2015. Enhancing the immune system to prevent infections in patients with
September, 2015. Vitamin D and Asthma: What is the Connection? Rainbow Respiratory Conference, Rainbow Babies & Children's Hospital, Cleveland, Ohio.
March, 2016. The link between vitamin D and the treatment of asthma. American Academy of Allergy, Asthma and Immunology, Los Angeles, California.
September, 2016 Patient Education: Can You Hear Me Now? Massachusetts Society for Respiratory Care, Cape Code, Massachusetts
November, 2016 Interesting Dermatological Cases in an Allergy Practice, American College of Allergy Asthma and Immunology, San Francisco, California
November, 2016 Severe Refractory Asthma, Monaghan Respiratory Conference, Cleveland, Ohio
November, 2016 Effective Patient Education in Patient-Centric Care, Monaghan Respiratory Conference, Cleveland, Ohio.
March, 2017 Silencing Chronic Cough in the Adult and Child: Diagnosis, Treatment and Prevention, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia
March, 2017 Shifting Paradigm: Focus on Prevention of Asthma Development and Exacerbation: A Team Approach – Meet the Challenge: Reduce Exacerbation and Achieve Control, Treatment and Prevention, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia
March, 2017 Narrative Interviewing to Improve Asthma Management Strategies Strategies to Cultivate Self-Management Skills, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia
Poster Presentation

September, 2011 Achieving Asthma Control in Pediatric Patients, Doctor of Nursing Practice Annual Conference, New Orleans, Louisiana.
February, 2013, Pediatric Asthma, Sigma Theta Tau International, Beta Delta Chapter-at-Large Conference, Oklahoma City, Oklahoma.
April 27, 2015, Affordable Care Act: Ready, Set, Go. National Organization of Nurse Practitioner Faculty, Baltimore, Maryland.

Book – Chapter


Publications


CHRONIC COUGH AND ACOS

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Columbia University School of Nursing
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COI DISCLOSURE

Teva
## Cough as a Presenting Complaint

### Table 8. Number and percent distribution of emergency department visits with corresponding standard errors, by the 20 leading principal reason for visit: United States, 2006

<table>
<thead>
<tr>
<th>Principal reason for visit and RVC code</th>
<th>Number of visits in thousands</th>
<th>Standard error in thousands</th>
<th>Percent distribution</th>
<th>Standard error of percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>All visits</td>
<td>110,191</td>
<td>5,276</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Stomach and abdominal pain, cramps and spasms</td>
<td>8,057</td>
<td>442</td>
<td>6.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Chest pain and related symptoms</td>
<td>6,392</td>
<td>401</td>
<td>5.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Fever</td>
<td>4,485</td>
<td>277</td>
<td>3.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Headache, pain in head</td>
<td>3,354</td>
<td>233</td>
<td>2.8</td>
<td>0.1</td>
</tr>
<tr>
<td>Back symptoms</td>
<td>3,304</td>
<td>272</td>
<td>2.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>3,007</td>
<td>200</td>
<td>2.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Cough</td>
<td>2,966</td>
<td>188</td>
<td>2.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Vomiting</td>
<td>2,635</td>
<td>192</td>
<td>2.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Pain, site not referable to a specific body system</td>
<td>2,512</td>
<td>168</td>
<td>2.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Symptoms referable to throat</td>
<td>2,276</td>
<td>197</td>
<td>1.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Lacerations and cuts—upper extremity</td>
<td>1,870</td>
<td>130</td>
<td>1.6</td>
<td>0.1</td>
</tr>
<tr>
<td>Nausea</td>
<td>1,804</td>
<td>141</td>
<td>1.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Accident, not otherwise specified</td>
<td>1,737</td>
<td>171</td>
<td>1.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Motor vehicle accident, type of injury unspecified</td>
<td>1,714</td>
<td>149</td>
<td>1.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Earache or ear infection</td>
<td>1,677</td>
<td>136</td>
<td>1.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Vertigo—dizziness</td>
<td>1,577</td>
<td>122</td>
<td>1.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Leg symptoms</td>
<td>1,545</td>
<td>111</td>
<td>1.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Skin rash</td>
<td>1,513</td>
<td>118</td>
<td>1.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Injury, other and unspecified type—head, neck, and face</td>
<td>1,506</td>
<td>164</td>
<td>1.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Low back symptoms</td>
<td>1,511</td>
<td>125</td>
<td>1.3</td>
<td>0.1</td>
</tr>
<tr>
<td>All other reasons</td>
<td>63,399</td>
<td>2,746</td>
<td>53.2</td>
<td>0.6</td>
</tr>
</tbody>
</table>
National Center for Health Statistics

Ambulatory Care Use and Physician office visits

Data are for the U.S.

Adults who had contact with health care professional
- Percent of adults who had contact with a health care professional in the past year: 83.6%

Source: Summary Health Statistics Tables for U.S. Adults, National Health Interview Survey, 2015, Table A-1B [PDF - 252 KB]

Children who had contact with health care professional
- Percent of children who had contact with a health care professional in the past year: 93.0%

Source: Summary Health Statistics Tables for U.S. Children, National Health Interview Survey, 2015, Table C-8 [PDF - 328 KB]

Hospital outpatient visits
- Number of visits: 125.7 million
- Number of visits per 100 persons: 41.0

Source: National Hospital Ambulatory Medical Care Survey, 2011 Outpatient Department Summary Tables, table 1 [PDF - 445 KB]

Physician office visits
- Number of visits: 922.6 million
- Number of visits per 100 persons: 296.7
- Percent of visits to primary care physicians: 83.2%
- Most frequent principal illness-related reason for visit: cough
TYPES OF COUGH


<table>
<thead>
<tr>
<th>TABLE 1. TYPES OF COUGHS AND CAUSES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>Acute</td>
</tr>
<tr>
<td>Subacute</td>
</tr>
<tr>
<td>Chronic</td>
</tr>
</tbody>
</table>
**OTC**

- oral antitussives
- expectorants
- topical antitussives
- variety of dosage forms
- single-entity
- combination products that contain a protussive agent and an antitussive
- also natural products

**TABLE 2: OTC COUGH PRODUCTS**

- Advil Cold and Sinus
- Benylin Cough & Chest Congestion for People with Diabetes
- Benylin Dry Cough Syrup
- Benylin Dry Cough Night Syrup
- Benylin DM Tickly Throat & Cough Syrup
- Benylin DM-E Cough & Chest Congestion with Warming Sensation Syrup
- Benylin Cough & Chest Congestion Syrup
- Benylin Children Dry Cough Syrup
- Benylin Children Cough Night Syrup
- Coricidin Cough & Cold
- Creomulsion Cough Medicine
- Creomulsion for Children
- Delsym Cough 12 hour
- Delsym Cough and Chest Congestion
- Delsym Cough and Cold Night Time
- Delsym Cough and Cold Daytime
- Children’s Delsym Cough and Chest Congestion DM
- Mucinex Expectorant
- Mucinex DM
- Mucinex Fast-Max DM Max
- Robitussin 12 Hour Cough Relief
- Robitussin Maximum Strength Nighttime Cough DM
- Robitussin Maximum Strength Cough + Chest Congestion Capsules
- Robitussin Chest Congestion
- Robitussin Cough + Chest Congestion DM
- Robitussin Long-Acting Cough
- Robitussin Medi-Soothers DM
- Robitussin Sugar-Free Cough + Chest Congestion DM
- Robitussin Children’s Extended-Release 12 Hour Cough Relief
- Sucrets Sore Throat & Cough
- Triaminic Cough and Congestion
- Triaminic Day Time Cold & Cough
- Triaminic Night Time Cold & Cough
- Theracyn Cold & Cough
- Tylenol Cold
- Vicks Formula 44
- Vicks Dayquil
- Vicks Nyquil Cough Relief Syrup
**EXPECTORANTS (PROTUSIVES)**

- **Guaifenesin**
  - Only FDA-approved expectorant
  - Indicated for the symptomatic relief of acute ineffective, productive cough
  - Not associated with any known drug interactions and is generally well tolerated
  - Available in liquids, syrups, granules, tablets, and liquid-filled capsules
  - Should not be used to treat chronic cough associated with chronic lower respiratory tract diseases, such as asthma, COPD, or smoker’s cough

Terrie (2016) Pharmacy times
ANTITUSSIVES

- *Dextromethorphan*
  - Most OTC cough suppressants contain dextromethorphan
  - indicated for suppressing nonproductive cough caused by chemical or mechanical respiratory tract irritation
  - dosage forms include syrups, liquids, suspensions, liquid filled gel caps, granules, and lozenges.
  - 15- to 30-minute onset of action and a duration of effect of 3 to 6 hours
  - one of the 2 most commonly abused cough medications, especially among adolescents
    - when taken in large quantities produces euphoria and hallucinations

Terrie (2016) Pharmacy times
Antitussives

- **Diphenhydramine**
  - nonselective first-generation antihistamine with significant sedating and anticholinergic properties
  - approved by the FDA as an antitussive but not considered a first-line antitussive, but
  - found in many cold and allergy products, along with other ingredients
  - Acts centrally in the medulla to increase cough threshold
  - It is indicated for the suppression of nonproductive cough caused by chemical or mechanical respiratory tract irritation

Terrie (2016) Pharmacy times
ANTITUSSIVES

- **Codeine**
  - At antitussive dosages, codeine is classified as a Schedule 5 narcotic and is available without a prescription in many states.
  - Indicated for the suppression of nonproductive cough caused by chemical or mechanical respiratory tract irritation.
  - Acts centrally on the medulla to increase the cough threshold and, when administered at antitussive doses, has low toxicity and little risk of addiction.
  - Should be used with caution in individuals with asthma, COPD, respiratory depression, and drug addictions.

Terrie (2016) Pharmacy times
Camphor and menthol, the only 2 FDA-approved topical antitussives, are found in ointments and inhalation form. Patients should be counseled on the proper use of these agents and directed to follow the manufacturer’s instructions. Menthol is also found in many throat lozenges for treating cough.
Treatment of Unexplained Chronic Cough
CHEST Guideline and Expert Panel Report

Peter Gibson, MBBS; Gang Wang, MD, PhD; Lorcan McGarvey, MD; Anne E. Vertigan, PhD, MBA, BAppSc (SpPath); Kenneth W. Altman, MD, PhD; and Surinder S. Birring, MB ChB, MD; on behalf of the CHEST Expert Cough Panel
PROTOCOL BASED ASSESSMENT

Careful review of management prior to referral

Considering the following

Any remaining investigations to be undertaken?

YES

Other investigation(s) review with results and treat as indicated

NO

Were trials of therapy optimal?

NO

Optimize treatment

YES

Patient adherent?

YES

Manage nonadherence

NO

Cough resolved?

YES

Consider the following

Speech and language intervention

Empiric trial of gabapentin

Referral to specialist cough clinic

Recruit to clinical trial

NO

Make diagnosis of “difficult to treat” cough

NO

Cough resolved

YES
ACCNP COUGH GUIDELINES

- In adult patients with unexplained chronic cough and negative tests for bronchial hyperresponsiveness and eosinophilia (sputum eosinophils, exhaled nitric oxide), we suggest that inhaled corticosteroids **not** be prescribed (Grade 2B).

- In adult patients with unexplained chronic cough, we suggest a therapeutic trial of gabapentin as long as the potential side effects and the risk-benefit profile are discussed with patients before use of the medication, and there is a reassessment of the risk-benefit profile at 6 months before continuing the drug (Grade 2C).

- In adult patients with unexplained chronic cough and a negative workup for acid reflux disease, we suggest that proton pump inhibitor therapy **not** be prescribed (Grade 2C)
## Cough Research Directions

**TABLE 9** Future Research Directions in UCC

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Study Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the diagnostic criteria for UCC?</td>
<td>What does an ideal study look like [PICCD]?</td>
</tr>
<tr>
<td>Is there evidence of a specific phenotype of UCC? [e.g., based on sex, BMI, post viral history]</td>
<td>P: population: how should the population be selected and assessed prior to entry</td>
</tr>
<tr>
<td>What is the place of cough sensitivity testing in UCC?</td>
<td>I: description of the intervention</td>
</tr>
<tr>
<td>Is UCC a diagnosis of exclusion?</td>
<td>C: placebo effect in cough studies</td>
</tr>
<tr>
<td>What is the place of cough sensitivity tests such as capsaicin in UCC?</td>
<td>O: outcomes measures: objective, subjective; response characteristics,</td>
</tr>
<tr>
<td>What is the prevalence of UCC when intervention fidelity to cough diagnosis is adequately assessed?</td>
<td>D: design: discuss relative merits of different designs, eg randomized vs. before-after; parallel vs cross-over; single vs. multiple interventions</td>
</tr>
<tr>
<td>What is the place of assessment and treatment for nonacid gastroesophageal reflux in the assessment of UCC?</td>
<td></td>
</tr>
<tr>
<td>What is the comparative efficacy of diagnostic testing vs. empiric corticosteroid trials for assessment of eosinophilia airway diseases associated with chronic cough?</td>
<td></td>
</tr>
</tbody>
</table>

**PICO** = population, intervention, comparison, outcome. See Table 7 legend for expansion of other abbreviation.
GINA AND GOLD GUIDELINES
BACKGROUND

- For patients with respiratory symptoms, infectious diseases and non-pulmonary conditions need to be distinguished from chronic airways disease

- In patients with chronic airways disease, the differential diagnosis differs by age
  - Children and young adults: most likely to be asthma
  - Adults >40 years: COPD becomes more common, and distinguishing asthma from COPD becomes more difficult

- Many patients with symptoms of chronic airways disease have features of both asthma and COPD
  - This has been called the Asthma-COPD Overlap Syndrome (ACOS)

- ACOS is not a single disease
  - It is likely that a range of different underlying mechanisms and origins will be identified
Patients with features of both asthma and COPD have worse outcomes than those with asthma or COPD alone
- Frequent exacerbations
- Poor quality of life
- More rapid decline in lung function
- Higher mortality
- Greater health care utilization

Reported prevalence of ACOS varies by definitions used
- Concurrent doctor-diagnosed asthma and COPD are found in 15–20% of patients with chronic airways disease
- Reported rates of ACOS are between 15–55% of patients with chronic airways disease, depending on the definitions used for ‘asthma’ and ‘COPD’, and the population studied
- Prevalence varies by age and gender
Asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. [GINA 2016]
### Asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. [GINA 2016]

### COPD

COPD is a common preventable and treatable disease, characterized by persistent airflow limitation that is usually progressive and associated with enhanced chronic inflammatory responses in the airways and the lungs to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patients. [GOLD 2016]
DEFINITIONS

Asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. [GINA 2016]

COPD

COPD is a common preventable and treatable disease, characterized by persistent airflow limitation that is usually progressive and associated with enhanced chronic inflammatory responses in the airways and the lungs to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patients. [GOLD 2016]

Asthma-COPD overlap syndrome (ACOS) [a description]

Asthma-COPD overlap syndrome (ACOS) is characterized by persistent airflow limitation with several features usually associated with asthma and several features usually associated with COPD. ACOS is therefore identified by the features that it shares with both asthma and COPD. A specific definition for ACOS cannot be developed until more evidence is available about its clinical phenotypes and underlying mechanisms.
For an adult who presents with respiratory symptoms:

1. **Does the patient have chronic airways disease?**

2. **Syndromic diagnosis of asthma, COPD and ACOS**

3. **Spirometry**

4. **Commence initial therapy**

5. **Referral for specialized investigations (if necessary)**
STEP 1 – DOES THE PATIENT HAVE CHRONIC AIRWAYS DISEASE?

STEP 1

DIAGNOSE CHRONIC AIRWAYS DISEASE

Do symptoms suggest chronic airways disease?

Yes  No  Consider other diseases first
STEP 1 — DOES THE PATIENT HAVE CHRONIC AIRWAYS DISEASE?

- Clinical history: consider chronic airways disease if
  - Chronic or recurrent cough, sputum, dyspnea or wheezing, or repeated acute lower respiratory tract infections
  - Previous doctor diagnosis of asthma and/or COPD
  - Previous treatment with inhaled medications
  - History of smoking tobacco and/or other substances
  - Exposure to environmental hazards, e.g. airborne pollutants

- Physical examination
  - May be normal
  - Evidence of hyperinflation or respiratory insufficiency
  - Wheeze and/or crackles
STEP 1 — DOES THE PATIENT HAVE CHRONIC AIRWAYS DISEASE?

- Radiology (CXR or CT scan performed for other reasons)
  - May be normal, especially in early stages
  - Hyperinflation, airway wall thickening, hyperlucency, bullae
  - May identify or suggest an alternative or additional diagnosis, e.g. bronchiectasis, tuberculosis, interstitial lung disease, cardiac failure

- Screening questionnaires
  - Designed to assist in identification of patients at risk of chronic airways disease
  - May not be generalizable to all countries, practice settings or patients
  - See GINA and GOLD reports for examples
STEP 2 — SYNDROMIC DIAGNOSIS OF ASTHMA, COPD AND ACOS

- Assemble the features that, when present, most favor a diagnosis of typical asthma or typical COPD

- Compare the number of features on each side
  - If the patient has ≥3 features of either asthma or COPD, there is a strong likelihood that this is the correct diagnosis

- Consider the level of certainty around the diagnosis
  - Diagnoses are made on the weight of evidence
  - The absence of any of these features does not rule out either diagnosis, e.g. absence of atopy does not rule out asthma
  - When a patient has a similar number of features of both asthma and COPD, consider the diagnosis of ACOS
**STEP 2**

**SYNDROMIC DIAGNOSIS IN ADULTS**

(i) Assemble the features for asthma and for COPD that best describe the patient.

(ii) Compare number of features in favour of each diagnosis and select a diagnosis

<table>
<thead>
<tr>
<th>Features: if present suggest -</th>
<th>ASTHMA</th>
<th>COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of onset</strong></td>
<td>Before age 20 years</td>
<td>After age 40 years</td>
</tr>
<tr>
<td><strong>Pattern of symptoms</strong></td>
<td>Variation over minutes, hours or days</td>
<td>Persistent despite treatment</td>
</tr>
<tr>
<td></td>
<td>Worse during the night or early morning</td>
<td>Good and bad days but always daily symptoms and exertional dyspnea</td>
</tr>
<tr>
<td></td>
<td>Triggered by exercise, emotions including laughter, dust or exposure to allergens</td>
<td>Chronic cough &amp; sputum preceded onset of dyspnea, unrelated to triggers</td>
</tr>
<tr>
<td><strong>Lung function</strong></td>
<td>Record of variable airflow limitation (spirometry or peak flow)</td>
<td>Record of persistent airflow limitation (FEV₁/FVC &lt; 0.7 post-BD)</td>
</tr>
<tr>
<td><strong>Lung function between symptoms</strong></td>
<td>Normal</td>
<td>Abnormal</td>
</tr>
<tr>
<td><strong>Past history or family history</strong></td>
<td>Previous doctor diagnosis of asthma</td>
<td>Previous doctor diagnosis of COPD, chronic bronchitis or emphysema</td>
</tr>
<tr>
<td></td>
<td>Family history of asthma, and other allergic conditions (allergic rhinitis or eczema)</td>
<td>Heavy exposure to risk factor: tobacco smoke, biomass fuels</td>
</tr>
<tr>
<td><strong>Time course</strong></td>
<td>No worsening of symptoms over time. Variation in symptoms either seasonally, or from year to year</td>
<td>Symptoms slowly worsening over time (progressive course over years)</td>
</tr>
<tr>
<td></td>
<td>May improve spontaneously or have an immediate response to bronchodilators or to ICS over weeks</td>
<td>Rapid-acting bronchodilator treatment provides only limited relief</td>
</tr>
<tr>
<td><strong>Chest X-ray</strong></td>
<td>Normal</td>
<td>Severe hyperinflation</td>
</tr>
</tbody>
</table>

**DIAGNOSIS**

- Asthma
- Some features of asthma
- Features of both
- Some features of COPD
- COPD

**CONFIDENCE IN DIAGNOSIS**

- Asthma
- Asthma
- Could be ACOS
- Possibly COPD
- COPD

**NOTE:** • These features best distinguish between asthma and COPD. • Several positive features (3 or more) for either asthma or COPD suggest that diagnosis. • If there are a similar number for both asthma and COPD, consider diagnosis of ACOS.
Step 3
Perform spirometry

Marked reversible airflow limitation (pre-post bronchodilator) or other proof of variable airflow limitation

FEV1/FVC < 0.7 post-BD
STEP 3 - SPIROMETRY

- Essential if chronic airways disease is suspected
  - Confirms chronic airflow limitation
  - More limited value in distinguishing between asthma with fixed airflow limitation, COPD and ACOS

- Measure at the initial visit or subsequent visit
  - If possible measure before and after a trial of treatment
  - Medications taken before testing may influence results

- Peak expiratory flow (PEF)
  - Not a substitute for spirometry
  - Normal PEF does not rule out asthma or COPD
  - Repeated measurement may confirm excessive variability, found in asthma or in some patients with ACOS
## STEP 3 - SPIROMETRY

<table>
<thead>
<tr>
<th>Spirometric variable</th>
<th>Asthma</th>
<th>COPD</th>
<th>ACOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal FEV₁/FVC pre- or post-BD</td>
<td>Compatible with asthma</td>
<td>Not compatible with diagnosis (GOLD)</td>
<td>Not compatible unless other evidence of chronic airflow limitation</td>
</tr>
<tr>
<td>Post-BD FEV₁/FVC &lt;0.7</td>
<td>Indicates airflow limitation; may improve</td>
<td>Required for diagnosis by GOLD criteria</td>
<td>Usual in ACOS</td>
</tr>
<tr>
<td>FEV₁ ≥80% predicted</td>
<td>Compatible with asthma (good control, or interval between symptoms)</td>
<td>Compatible with GOLD category A or B if post-BD FEV₁/FVC &lt;0.7</td>
<td>Compatible with mild ACOS</td>
</tr>
<tr>
<td>FEV₁&lt;80% predicted</td>
<td>Compatible with asthma. A risk factor for exacerbations</td>
<td>Indicates severity of airflow limitation and risk of exacerbations and mortality</td>
<td>Indicates severity of airflow limitation and risk of exacerbations and mortality</td>
</tr>
<tr>
<td>Post-BD increase in FEV₁ &gt;12% and 200mL from baseline (reversible airflow limitation)</td>
<td>Usual at some time in course of asthma; not always present</td>
<td>Common in COPD and more likely when FEV₁ is low</td>
<td>Common in ACOS, and more likely when FEV₁ is low</td>
</tr>
<tr>
<td>Post-BD increase in FEV₁ &gt;12% and 400mL from baseline</td>
<td>High probability of asthma</td>
<td>Unusual in COPD. Consider ACOS</td>
<td>Compatible with diagnosis of ACOS</td>
</tr>
</tbody>
</table>

GINA 2016, Box 5-3
**STEP 4**

**INITIAL TREATMENT***

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Asthma drugs</th>
<th>No LABA monotherapy</th>
<th>No LABA monotherapy</th>
<th>ICS and consider LABA +/- LAMA</th>
<th>COPD drugs</th>
<th>COPD drugs</th>
</tr>
</thead>
</table>

*Consult GINA and GOLD documents for recommended treatments.*
Initial pharmacotherapy choices are based on both efficacy and safety

If syndromic assessment suggests asthma as single diagnosis
- Start with low-dose ICS
- Add LABA and/or LAMA if needed for poor control despite good adherence and correct technique
- Do not give LABA alone without ICS

If syndromic assessment suggests COPD as single diagnosis
- Start with bronchodilators or combination therapy
- Do not give ICS alone without LABA and/or LAMA

If differential diagnosis is equally balanced between asthma and COPD, i.e. ACOS
- Start treatment as for asthma, pending further investigations
- Start with ICS at low or moderate dose
- Usually also add LABA and/or LAMA, or continue if already prescribed
For all patients with chronic airflow limitation:
- Treat modifiable risk factors including advice about smoking cessation
- Treat comorbidities
- Advise about non-pharmacological strategies including physical activity, and, for COPD or ACOS, pulmonary rehabilitation and vaccinations
- Provide appropriate self-management strategies
- Arrange regular follow-up

See GINA and GOLD reports for details
# Pharmacologic Management of COPD

<table>
<thead>
<tr>
<th>Patient Group</th>
<th>Preferred</th>
<th>Alternative</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SAMA or SABA prn</td>
<td>SAMA or SABA or SABA+SAMA</td>
<td>Theophylline</td>
</tr>
<tr>
<td>B</td>
<td>LAMA or LABA</td>
<td>LAMA and LABA</td>
<td>SABA and/or SAMA Theophylline</td>
</tr>
<tr>
<td>C</td>
<td>ICS/LABA combination or LAMA</td>
<td>LAMA and LABA or LAMA and PDE4 inhibitor or LABA and PDE4 Inh</td>
<td>SABA and/or SAMA Theophylline</td>
</tr>
<tr>
<td>D</td>
<td>ICS/LABA combination and/or LAMA</td>
<td>ICS/LABA combination and LAMA or ICS/LABA combination and PDE4 inhibitor or LAMA and LABA or LAMA and LABA or LAMA and PDE4 inhibitor</td>
<td>Carbocysteine N-acetylcysteine SABA and/or SAMA Theophylline</td>
</tr>
</tbody>
</table>
COMMON TREATMENTS FOR THE MEDICAL MANAGEMENT OF COPD

**Prn**

- Short-acting bronchodilators prn
  (SABA or SAMA - short-acting muscarinic antagonist)

**Daily management**

- LABA and/or LAMA
- SABA and/or SAMA
- Combination therapy (inhaled corticosteroids and long-acting beta 2 agonists (ICS/LABA)
- Combination therapy (ultra long-acting bronchodilators)

**Other medications**

- Theophylline
- PDE4 inhibitor
COMMON TREATMENTS FOR THE MEDICAL MANAGEMENT OF COPD

Quick-relief

SABAs: Ventolin, Proventil, Proair MDI and Respliclick, Xopenex
SAMA: Atrovent

Daily management

SABA/SAMA Combo: Combivent, Duoneb
LABA: Serevent salmeterol, Brovana nebulizer arformoterol
LAMA: Turdoza aclidinium,
ULABA: Striverdi olodaterol, Arcapta indacaterol
ULAMA: Spireva tiotropium, Incruze umeclidinium
ULABA/ULAMA Combos: Stiolto tiotropium and umeclidinium, Anoro umeclidinium and vilanterol

ICS/LABA Combination: Advair, Dulera, Symbicort, Breo

Theophylline
PDE4 inhibitor: Daliresp
COMMON TREATMENTS FOR THE MEDICAL MANAGEMENT OF COPD

SAMA- short-acting muscarinic antagonist
OR
LAMA- long-acting muscarinic antagonist
SABA/SAMA AND ULABA/ULAMA COMBINATIONS

Cholinergic nerve

ACh

Antimuscarinic

M2 (-)

M3 (+)

Smooth muscle

β2AR

Relaxation

β2-agonist

Gs

Gs

AC

β2AR

Out

In

cAMP

ATP

PKA (active)

PK (inactive)

Relaxation
**Theophylline**

- PDE3 inhibitor
- Mild bronchodilator that has diuretic effects and skeletal muscle inotropic action
- Keep therapeutic levels on low side
Recommended for patients with severe airflow limitation, symptoms of chronic bronchitis, and a history of exacerbations whose disease is not adequately controlled by long-acting bronchodilators.

Albeit safe, its significant side effects (diarrhea, nausea, weight loss) make it intolerable in some patients.
COMPLEMENTARY ACTION OF BRONCHODILATORS
TREATMENT OF COPD FLARES

**SABAs and SAMAs**
- Rapid-acting bronchodilators

**Antibiotics**
- Controversial
- 5-10 days
- Evidence for patients with increased sputum, purulent sputum or increased dyspnea

**“Burst” of systemic corticosteroids**
- Indicated for the treatment of acute exacerbations
- 40mg x 5 days
Oxidants recognized to have an important role in the pathogenesis of COPD (cigarette smoke generates oxidant radicals able to modify the structure of the respiratory tract and enhance and sustain lung inflammation.

Exogenous supplementation of antioxidant compounds partially counteract the oxidative stress?
STEP 5
SPECIALISED INVESTIGATIONS
or REFER IF:
• Persistent symptoms and/or exacerbations despite treatment.
• Diagnostic uncertainty (e.g. suspected pulmonary hypertension, cardiovascular diseases and other causes of respiratory symptoms).
• Suspected asthma or COPD with atypical or additional symptoms or signs (e.g. haemoptysis, weight loss, night sweats, fever, signs of bronchiectasis or other structural lung disease).
• Few features of either asthma or COPD.
• Comorbidities present.
• Reasons for referral for either diagnosis as outlined in the GINA and GOLD strategy reports.
STEP 5 — REFER FOR SPECIALIZED INVESTIGATIONS IF NEEDED

- Refer for expert advice and extra investigations if patient has:
  - Persistent symptoms and/or exacerbations despite treatment
  - Diagnostic uncertainty, especially if alternative diagnosis (e.g. TB, cardiovascular disease) needs to be excluded
  - Suspected airways disease with atypical or additional symptoms or signs (e.g. hemoptysis, weight loss, night sweats, fever, chronic purulent sputum). Do not wait for a treatment trial before referring
  - Suspected chronic airways disease but few features of asthma, COPD or ACOS
  - Comorbidities that may interfere with their management
  - Issues arising during on-going management of asthma, COPD or ACOS
<table>
<thead>
<tr>
<th>Investigation</th>
<th>Asthma</th>
<th>COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLCO</td>
<td>Normal or slightly elevated</td>
<td>Often reduced</td>
</tr>
<tr>
<td>Arterial blood gases</td>
<td>Normal between exacerbations</td>
<td>In severe COPD, may be abnormal between exacerbations</td>
</tr>
<tr>
<td>Airway hyperresponsiveness</td>
<td>Not useful on its own in distinguishing asthma and COPD. Higher levels favor asthma</td>
<td></td>
</tr>
<tr>
<td>High resolution CT scan</td>
<td>Usually normal; may show air trapping and increased airway wall thickness</td>
<td>Air trapping or emphysema; may show bronchial wall thickening and features of pulmonary hypertension</td>
</tr>
<tr>
<td>Tests for atopy (sIgE and/or skin prick tests)</td>
<td>Not essential for diagnosis; increases probability of asthma</td>
<td>Conforms to background prevalence; does not rule out COPD</td>
</tr>
<tr>
<td>FENO</td>
<td>If high (&gt;50ppb) supports eosinophilic inflammation</td>
<td>Usually normal. Low in current smokers</td>
</tr>
<tr>
<td>Blood eosinophilia</td>
<td>Supports asthma diagnosis</td>
<td>May be found during exacerbations</td>
</tr>
<tr>
<td>Sputum inflammatory cell analysis</td>
<td>Role in differential diagnosis not established in large populations</td>
<td></td>
</tr>
</tbody>
</table>

GINA 2016, Box 5-5
COLUMBIA UNIVERSITY– SCHOOL OF NURSING
Curriculum Vitae

MAUREEN GEORGE, PHD, RN, AE-C, FAAN

January 2016

BUSINESS ADDRESS
Columbia University School of Nursing
Room 331 617 West 168th Street New York, NY 10032
Mailing Address 630 West 168th Street New York, NY 10032
E: mg3656@cumc.columbia.edu
P: 212-305-1175

HOME ADDRESS
822 Pardee Lane
Wyncote PA 19095
M: 215-260-0345

EDUCATION
PhD  2003  University of Pennsylvania School of Nursing, Philadelphia, PA  Nursing
MSN  1986  University of Pennsylvania School of Nursing, Philadelphia, PA  Nursing
            (Pulmonary Clinical Nurse Specialist)
BS  1982  York College of Pennsylvania, York, PA  Nursing

POSTGRADUATE TRAINING & FELLOWSHIP APPOINTMENTS
2011-2015  University of Pennsylvania, Philadelphia, PA Senior Fellow Center for Health Behavior Research
2004-2006  Johns Hopkins University School of Medicine, Baltimore, MD NCCAM (1F32AT0020-01) Sponsor Dr. Cynthia Rand
2005-2006  Office of Behavioral and Social Science Research, Warrenton, VA  Fellow, Summer Institute on RCTs Involving Behavioral Interventions
2005-2006  Johns Hopkins Bloomberg School of Public Heath Summer Institute of Epidemiology and Biostatistics, Graduate Training Program in Clinical Investigation

PROFESSIONAL EXPERIENCE

ACADEMIC POSITIONS
2015-  Associate Professor, Columbia University School of Nursing
2008-2015  Assistant Professor, University of Pennsylvania School of Nursing
2006-2008  Assistant Professor, Johns Hopkins University School of Nursing

CLINICAL & ADMINISTRATIVE POSITIONS
2011-2015  Faculty Advisor, United Community Clinics, student run free primary care clinic
1989-2006  Coordinator, Comprehensive Asthma and Allergy Care Program, University of Pennsylvania Health System, Philadelphia, PA
1986-1989  Pulmonary Clinical Nurse Specialist, Hospital of the University of Pennsylvania, Philadelphia, PA
            Adult Cystic Fibrosis Transition Program
            Neuromuscular Respiratory Failure Unit
            Better Breathers Club (COPD)
            Tracheostomy Team
1982-1986  Staff Nurse and Charge Nurse, Hospital of the University of Pennsylvania, Philadelphia, PA
            Medical Telemetry Unit,

CERTIFICATION/LICENSURE

Specialty certification
2002-present  Asthma Educator-Certified, National Asthma Educator Certification Board
1988-2003  Medical-Surgical Clinical Nurse Specialist, American Nurses’ Association Certification
1985-1988  Medical-Surgical Nursing, American Nurses Association Certification

Licensure 1982-present  PA (RN-254312-L)

HONORS/AWARDS/ MEMBERSHIPS IN HONORARY SOCIETIES
2016  Allied Health Professionals Recognition Award, American Academy of Asthma Allergy and Immunology
2015  The Christine Wagner President’s Lecture Keynote, Association of Asthma Educators
2013  Lifestyle Champion, AmeriHealth Caritas
2013  Department of Family and Community Health Award for Exemplary Teaching, University of Pennsylvania
2013  Exemplary Teaching Award, Department of Family and Community Health, University of Pennsylvania
2012  Dean's Innovation Award; 2nd Place, University of Pennsylvania
2011  Dean's Award for Undergraduate Scholarly Mentoring, University of Pennsylvania
2010  American Academy of Nursing Fellow
2010  Outstanding Member Award, Association of Asthma Educators
2006  Educator-of-the-Year Award, Association of Asthma Educators
2003  MHD Visiting Expert [Scholar], Ministry of Health SINGAPORE
2001  Scholarly Achievement Recognition, University of Pennsylvania Health System
2001  Outstanding Leadership Award, SEPA American Lung Association
1982-Present  Sigma Theta Tau, XI Chapter
1978-1982  Dean’s List; Cum Laude, Departmental Honors, York College of Pennsylvania

RESEARCH

Doctoral Dissertation


RESEARCH GRANTS

Grants Pending/Under Review

Using the Electronic Health Record to improve communication between Community Health Workers and the Primary Healthcare Team to enhance asthma and COPD management (CaMPR Pilot Awards 3/1/16-5/31/16). Category: IG. Effort: 0%. Source: Irving Institute for Clinical and Translational Research. Total Direct Costs: $15,000. George (PI).

Precision in Symptom Self-Management (PriSSM) Center (1P30NR016587-01, 7/1/2016-6/30/21) Category: FG. Effort: 20%. Source: NINR T (P30), National Institutes of Health. Bakken (contact), Hickey (Co PIs). Role: Co-I. First Year Direct Costs: $350,000 (Identical for all the following years)
Goal: The goal of the Precision in Symptom Self-Management (PriSSM) Center is to advance the science of symptom self-management for Latinos through a social ecological lens that takes into account variability in individual, interpersonal, organizational, and environmental factors across the life course.

WICER Precision Medicine Transdisciplinary Collaborative Center (TCC) for Advancing Health Equity (U54 NIMHD, 4/1/16-3/31/21). Category: FG. Effort: 20%. Source: NIMHD Transdisciplinary Collaborative Centers for Health Disparities Research Focused on Precision Medicine (U54), National Institutes of Health. Total Direct Costs: $1,640,555. Bakken & Luchsinger (Co PIs). Role: Co-I


Past/Present Funded Research Grants


Health Promotion for Women and Girls in Chalkidiki, Greece. M. S. Sommers and M. George, Co –Principal Investigator.2012 - 2013 U.S. Department of State ($10,000)

Beliefs associated with adherence to antiretroviral medications post prison release among HIV-positive individuals (06/01/12 – 06/30/13; extended to 10/31/2013) Category. O. % Effort: Co-investigator. Source: (University of Pennsylvania Clinical and Translational Science Awards CEAR Core Grant Award. Total Direct Costs: $10,000. Lisa Lewis, Roberta Herceg-Baron & Kathie Nixon (Co-PIs)

AAFA In-Home: A Comprehensive In-Home Assessment and Education Program for Young Children (CDC-RFA-EH10-1007). Category FG. Effort: Consultant 9/1/11-8/31/12. Source: Asthma and Indoor and Outdoor Air Quality Education Program FOA# CDC-RFA-EH10-1007. 1UE1EH0000764. Charlotte Collins (PI)
Environmental interventions for childhood asthma: minority caregivers’ preferences for Management (2010-2011). Category: O. % Effort: N/A. Source: (University of Pennsylvania Vagelos Undergraduate Research Award. Total Direct Costs: $500. George (PI)

Geriatric Education Center of Greater Philadelphia-Health equity and literacy (5-D31HP08808-02-00, 7/1/08-6/30/10). Category: FG. % Effort: 5%. Source Health Resources and Services Administration Total Direct Costs: $371,749.00. Forcena (PI)


Stress and vision fluctuations in retinitis pigmentosa. (7/1/2007-2008). Category: PG. % Effort: 5%. Source: National Institutes of Nursing Research (National Institutes of Health)/Johns Hopkins University School of Nursing Center Grant (Center for Collaborative Intervention Research). Total Direct Costs: $20,000. George (PI)


Complementary medicine/adherence in minorities with asthma (1F31AT1149-01, 7/1/2002-2004). Category: FG. % Effort: 100%. Source: National Center for Complementary and Alternative Medicine, National Institutes of Health. Total Direct Costs: $61,932. George (PI)


Disease management for adults with asthma in Medicaid HMOs: A clinical and economic analysis (RO1-HS10044-01, 1999-2000). Category: R01. % Effort 50%. Source: Agency for Health Care Policy and Research. Leonard Davis Institute (PI)


Research Projects
West Philadelphia Asthma Mixed Methods Project. (2012-2014). School of Nursing, Center for Health Behavior Research, Clinical and Translational Science Awards (Community Engagement and Research Core), Mixed Methods Research Laboratory, and the Cartographic Modeling Lab. Overall goals: To conduct a demonstration project with asthma to provide an example to UPenn researchers on how existing community data can be combined with qualitative data to identify patterns of health indicators. Role: Co-PI (with K. Glanz and F. Barg)

Publications
Journal Articles: Research, Peer Reviewed (all data-based; underline indicates mentee)


Keddem, S., Barg, F. Glanz K. Jackson, T., Green, S. George, M. (2015). Mapping the urban asthma experience: using qualitative GIS to understand contextual factors influencing asthma control. Social Science & Medicine, 140, 9-17. doi:10.1016/j.soscimed.2015.06.039


George, M., Topaz, M., Rand, C., Sommers, M.S., Glanz, K., Pantalon, M.V., Mao, J., & Shea, J. (2014). Inhaled corticosteroid beliefs, complementary and alternative medicine and uncontrolled asthma in urban minority adults Journal of Allergy and Clinical Immunology, 134, 1252–59. doi: 17.10.1016/j.jaci.2014.07.044


Townsend, K., Corry, J.M., Quigley, B., & George, M. (2012). A feasibility study of Q-sort to determine recall of skin test results and


**Journal Articles: Clinical, Peer Reviewed (underline indicates mentee)**


Gastroesophageal Reflux Disease

Karen L. Gregory, DNP, APRN, CNS, RRT, AE-C, FAARC
Oklahoma Allergy and Asthma Clinic
Georgetown University
Objectives

1. Discuss the pathophysiology of GERD
2. Describe options for treatment and management of GERD
3. Discuss factors contributing to GERD and describe the options for evaluation of refractory GERD
Gastroesophageal Reflux Disease (GERD)

American College of Gastroenterology Guidelines

Definition of GERD:

“Symptoms or complications resulting from the reflux of gastric contents into the esophagus or beyond, into the oral cavity (including larynx) or lung”.

GERD

- GERD affects approximately 20% of US adults on a weekly basis\(^1\)

- Patients with GERD classically complain of heartburn and regurgitation, which can have significant impact on quality of life

- Responsible for more than 8 million outpatient visits per year\(^2\)

- Health care cost: approximately $12-$14 billion per year\(^2\)


Prevalence of GERD

- 18.1% to 27.8% in North America
- 8.8% to 25.9% in Europe
- 2.5% to 7.8% in East Asia
- 8.7% to 33.1% in the Middle East
- 11.6% in Australia
- 23.0% in South America

GERD: Impact on Quality of Life

- Altered emotional well-being
- Altered social well-being
- Decreased productivity
- Difficulty enjoying meals
- Fatigue
- Sleep disturbance
GERD

Esophagitis

Stricture

Ulcer

Acid reflux

Narrowed tube

Harvard Health Publications, 2017
Reflux is a normal physiologic occurrence and is produced most often by transient relaxation of the lower esophageal sphincter (LES).

Transient relaxations occur more frequently in GERD.

The crural diaphragm and gastric sling fibres provide structural support and contribute to LES pressure and competence.

The ability of the LES to maintain a tone higher than structures proximal and distal is a result of spikes of calcium influx that are mediated by excitatory cholinergic neurons.

GI Motility online (May 2006) | doi:10.1038/gimo14
Phenotypic Classification of GERD

NERD* 60-70%

Erosive Esophagitis 20-30%

Barrett’s Esophagus 6-10%

Symptoms of GERD

- Heartburn
- Regurgitation
- Trouble Swallowing
- Chest Pain
- Water Brash or Increased Salivation
- Globus Sensation
- Difficulty Swallowing
- Pain with Swallowing
- Hoarseness or loss of voice
- Persistent Sore Throat
- Chronic Cough
- Recurrent Lung Infections
- Chronic Sinusitis
- Worsening Dental Disease
Foods Contributing to GERD

- Citrus fruits
- Carbonated beverages
- Fatty and fried foods
- Mint flavoring
- Tomato-based food
- Chocolate
- Caffeine
- Garlic and onions
- Spicy foods
Diagnosis of GERD

- History
- Clinical symptoms
- Response to acid suppression
- Objective testing
  - Upper endoscopy
  - Esophageal pH monitoring

The diagnosis of GERD may be difficult as both pH monitoring and endoscopy have limited sensitivity.1

A trial of treatment with PPI is recommended as the initial diagnostic step in symptomatic patients. 1

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPI trial</td>
<td>Classic GERD symptoms with no alarm symptoms</td>
</tr>
<tr>
<td>Esophageal pH monitoring</td>
<td>Refractory symptoms where GERD diagnosis is in question, pre-operative evaluation for non-erosive disease</td>
</tr>
<tr>
<td>Upper endoscopy</td>
<td>Alarm symptoms (e.g., dysphagia), PPI unresponsive patients, high risk for Barrett’s esophagus</td>
</tr>
<tr>
<td>Barium esophagram</td>
<td>Evaluation of dysphagia, otherwise not recommended for GERD evaluation</td>
</tr>
<tr>
<td>Esophageal manometry</td>
<td>Prior to anti-reflux surgery to rule out esophageal dysmotility (e.g., achalasia, scleroderma), otherwise not recommended for GERD evaluation</td>
</tr>
</tbody>
</table>
Montreal Definition of GERD

GERD is a condition which develops when the reflux of gastric content causes troublesome symptoms or complications.

Esophageal Syndromes:
- Symptomatic Syndromes
  - 1. Typical Reflux Syndrome
  - 2. Reflux Chest Pain

- Syndromes with Esophageal injury
  - 1. Reflux Esophagitis
  - 2. Reflux Stricture
  - 3. Barrett’s Esophagus
  - 4. Esophageal Adenocarcinoma

Extraesophageal Syndromes:
- Established Associations
  - 1. Reflux Cough Syndrome
  - 2. Reflux Laryngitis Syndrome
  - 3. Reflux Asthma Syndrome
  - 4. Reflux Dental Erosion Syndrome

- Proposed Associations
  - 1. Pharyngitis
  - 2. Sinusitis
  - 3. Idiopathic Pulmonary Fibrosis
  - 4. Recurrent Otitis

Vakil N. etal. Am J Gastroenterol 2006; 101: 1900-20
Complications of GERD

- Esophagitis
- Peptic stricture
- Barrett’s esophagus
- Failure to thrive
- Pulmonary / ENT disease
- Sandifer’s syndrome / torticollis
Therapeutic Modalities for GERD

Treatment of GERD

Goals

- Eliminate symptoms
- Heal esophageal mucosa
- Manage or prevent complications
- Maintain remission – for a lifetime...
Treatment

Typical symptoms that are responsive to acid suppression offer additional evidence for pathologic esophageal acid exposure → a diagnosis of GERD

Typical symptoms that do not improve → further evaluation to demonstrate the existence of GERD and evaluate for an alternate diagnosis.

Atypical symptoms or non-cardiac chest pain as their primary complaint should also be considered for further diagnostic evaluation prior to
Lifestyle Modifications

- Raising head end of the bed
- Right decubitus position during sleep
- Avoiding meals within 3 hours of bedtime
- Weight loss
- Improve their sleep hygiene → sleep reduces gastroesophageal reflux by suppressing transient lower esophageal sphincter relaxations (TLESRs).
### Treatment: Medications

<table>
<thead>
<tr>
<th>Antacids</th>
<th>H₂ receptor antagonists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaviscon</td>
<td>Prokinetics</td>
</tr>
<tr>
<td>Proton pump inhibitors</td>
<td>Baclofen</td>
</tr>
<tr>
<td></td>
<td>Carafate</td>
</tr>
</tbody>
</table>
Proton Pump Inhibitor (PPI)

- Most potent inhibitors of gastric acid secretion available and are effective for treating all acid-related disorders.

- PPI therapy is the mainstay of treatment for GERD.

- Most effective when the parietal cell is stimulated to secrete acid postprandially:
  - Relationship that has important clinical implications for timing of administration:
    - 30 minutes before a meal to maximize acid inhibition.

- Cost plays a major role in prescribing patterns of PPIs.

## Proton Pump Inhibitors

<table>
<thead>
<tr>
<th>PPI Brand</th>
<th>Brand Name</th>
<th>Dose mg</th>
<th>OTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omeprazole</td>
<td>Prilosec, Prilosec OTC</td>
<td>10, 20, 40</td>
<td>Yes</td>
</tr>
<tr>
<td>Esomeprazole</td>
<td>Nexium</td>
<td>20, 40</td>
<td>Yes</td>
</tr>
<tr>
<td>Lansoprazole</td>
<td>Prevacid, Prevacid 24 hr</td>
<td>15, 30</td>
<td>Yes</td>
</tr>
<tr>
<td>Rabeprazol</td>
<td>AcipHex</td>
<td>10, 20</td>
<td>No</td>
</tr>
<tr>
<td>Pantoprazole</td>
<td>Protonix</td>
<td>20, 40</td>
<td>No</td>
</tr>
<tr>
<td>Dexlansoprazole</td>
<td>Dexilant</td>
<td>30, 60</td>
<td>No</td>
</tr>
<tr>
<td>Omeprazole with sodium bicarbonate</td>
<td>Zegerid, Zegerid OTC</td>
<td>20, 40</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Potential Risks with PPI Use

Emerging data illustrate the potential risks associated with short- and long-term PPI therapy, including:

- *Clostridium difficile*–associated diarrhea
- community-acquired pneumonia
- osteoporotic fracture
- vitamin B12 deficiency
- inhibition of antiplatelet therapy

Clinicians should assess the continuing need for PPI therapy and use the lowest possible dose to achieve the desired therapeutic goals.

PPIs

- PPIs should not be given concomitantly with H2-antagonists, prostaglandins, somatostatin analogues (e.g., octreotide), or other antisecretory agents because of the marked reduction in their acid inhibitory effects when administered simultaneously

- An H2 antagonist can be used with a PPI provided that there is a sufficient time interval between administration of the H2 antagonist and the PPI – precise minimal time interval has not been established

Steps for Optimization of Proton Pump Inhibitor Treatment

- Lifestyle modifications
- Improve adherence
- Ensure proper dosing time
- Split the PPI dose
- Switch to another PPI
Therapeutic Approaches for Nighttime GERD

- Avoid eating at least 3 hours prior bedtime
- Elevate the head of the bed
- Avoid the right decubitus position in bed
- Turn off lights when enter bed and minimize disturbances to a normal sleep
- Treat with a PPI and if symptoms are primarily during nighttime-give before dinner
- Split PPI dose (am and pm before a meal)
- Add H2RA, carafate, Gaviscon, etc. before bedtime
- Consider nonmedical therapy
Treatment

Surgical
- Fundoplication
- LinxTM magnetic ring

Endoluminal therapies
Endoluminal fundoplication is a new, modified version of open or laparoscopic fundoplication which accesses the stomach through the mouth, eliminating the incisions
- Transoral incisionless fundoplication (TIF)
- Stretta
Indications for Surgery

- Unwillingness to remain on lifelong medical therapy
- Intolerance of medical therapy
- Medically refractory symptoms with objective evidence of GERD
- GERD in the setting of a large hiatal hernia
- Medically refractory GERD in the setting of morbid obesity
GERD Refractory to Treatment with PPIs

- Non-adherence
- Persistent esophageal acid exposure
  - Hypersecretory state
  - Large hiatal hernia
  - Nocturnal acid breakthrough
- Acid-sensitive esophagus
- Non-acid reflux
- Wrong diagnosis
- Functional heartburn → not GERD
Refractory GERD

- May affect up to one-third of the patients that consume proton pump inhibitor (PPI) once daily.
- Treatment has been primarily focused on doubling the PPI dose, despite lack of evidence of its value.
- In patients who failed PPI twice daily, medical treatment has been primarily focused on reducing transient lower esophageal sphincter relaxation rate or attenuating esophageal pain perception using visceral analgesics.
- In patients with evidence of reflux as the direct trigger of their symptoms, endoscopic treatment or anti-reflux surgery may be helpful in remitting symptoms.

Refractory GERD

Adherence to PPI therapy was found in only 60% of patients with GERD in a large population-based study. Optimal PPI dosing (before meals) was seen in only 46% of 100 patients who were referred for persistent GERD symptoms despite treatment.

The cardinal symptoms of GERD are heartburn and regurgitation.

Prevalence of GERD and its complications are increasing.

PPIs are the most effective medical therapy.

GERD may present with a variety of other symptoms, including water brash, chest pain or discomfort, dysphagia, belching, epigastric pain, nausea, and bloating.

Management of GERD may involve lifestyle modification, medical therapy and surgical therapy.

The mainstay of treatment of GERD is acid suppression which can be achieved with several classes of medications including antacids, histamine-receptor antagonists (H2RAs) or proton-pump inhibitors (PPIs).
Karen L. Gregory, DNP, APRN-BC, CNS, RRT, AE-C, FAARC
13404 Silver Eagle Trail
Edmond, Oklahoma 73013
karengregory07@gmail.com
405-922-1197 (cell)

Curriculum Vitae

Professional Experience

December, 2011 to present
Georgetown University
School of Nursing and Allied Health
37th and O Street
N.W., Washington D.C. 2005
Job title: Assistant Professor

September, 2007 to present
Oklahoma Allergy and Asthma Clinic
750 NE 13th
Oklahoma City, OK 73104
Job title: Doctor of Nursing Practice
Clinical Nurse Specialist/
Advanced Practice Register Nurse, Board Certified
Pulmonary Disease Management Specialist
Certified Asthma Educator

September, 2006 to 2009
University of Oklahoma, Oklahoma City, OK 73117
College of Nursing
Job title: Instructor

March, 2006 to August, 2007
Children’s Medical Center of Dallas, Dallas, Texas
Allergy, Asthma, and Immunology Clinic
1935 Medical District Drive
Dallas, TX 75235
Job title: Advanced Practice Registered Nurse, Board Certified
Clinical Nurse Specialist
Certified Asthma Educator
September, 1999 to March, 2006, Oklahoma City, OK
Oklahoma Allergy and Asthma Clinic
750 NE 13th
Oklahoma City, OK 73104
Job title: Clinical Nurse Specialist/Advanced Practice Register
Nurse, Board Certified
Pulmonary Disease Management Specialist
Registered Respiratory Therapist
Certified Asthma Educator

March, 1997 to September, 1999:
AirWise Asthma Clinic, LLC
3434 NW 56th Street
Oklahoma City, OK 73112
Job title: Co-owner, Pulmonary Disease Management
Specialist/Asthma
Educator, Respiratory Care Practitioner and Registered Nurse

March, 1985 to March, 1997:
Mercy Health Center
4300 McAuley Blvd
Oklahoma City, OK 7312
Job title: Pulmonary Rehabilitation Coordinator
Asthma Services Coordinator
Asthma Educator
Respiratory Care Practitioner

January, 1986 to September, 1987 (part-time)
Abbey Foster Home Care, Oklahoma City, OK
Oklahoma City, Oklahoma
Job title: Clinical Respiratory Therapist

Education

Rose State College, Midwest City, Oklahoma,
Associate in Applied Science, Respiratory Therapy, August, 1985

University of Central Oklahoma, Edmond, Oklahoma
Continuing education and undergraduate studies

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma
Bachelor of Science Nursing, May, 1999

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma
Masters of Science in Nursing, August, 2003
Clinical Nurse Specialist
Advanced Practice Nursing: Nurse Practitioner/Clinical Nurse Specialist
Core Practicum September, 1999 to August, 2002

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma, Clinical Practice for Patient Management and Prescription of Medication, 2004.

Chatham University, Pittsburgh, Pennsylvania, Doctorate of Nursing Practice, August, 2011.

License and Certification

Advanced Practice Registered Nurse – Board Certified, Clinical Nurse Specialist, American Nursing Credentialing Center

Prescriptive Authority, US Department of Justice, Drug Enforcement Administration, Washington, DC

Registered Respiratory Therapist, National Board of Respiratory Care

Respiratory Care Practitioner, Oklahoma State Board of Medical Licensure

Advanced Practice Registered Nurse/ Acute Care Clinical Nurse Specialist, Prescriptive Authority, Oklahoma Board of Nursing

Advanced Practice Registered Nurse/Clinical Nurse Specialist Acute Care, Prescriptive Authority, Board of Nurse Examiners for the State of Texas

Advanced Practice Registered Nurse/Clinical Nurse Specialist Acute Care, Board of Nursing Washington DC

Asthma Educator Certification, National Asthma Educator Certification Board 2002 to 2009, 2009-2016, 2016-2021

Basic Life Support, CPR Instructor, American Heart Association (1984 to Present)

Professional Organizations and Activities

American Academy of Allergy, Asthma and Immunology, 2005 to present
American Academy of Allergy, Asthma and Immunology, 2015 to present Allied Health Education Committee
American Academy, Allergy Asthma and Immunology, Allergic Skin Diseases, August, 2015 to present
American Academy, Allergy Asthma and Immunology, Continue Medical Education and Maintenance of Certification Committee, August, 2016 to present
American Association for Respiratory Care liaison for the American Association of Critical Care Nurses, 2009 to 2012
American College of Allergy, Asthma and Immunology, 2000 to present
American Lung Association of Oklahoma, volunteer 1984 to present
American Red Cross, volunteer 1999 to present
Association of Asthma Educators, 2000 to present
Board of Medical Licensure and Supervision State of Oklahoma
Respiratory Care Practitioner Advisory Committee, 2003-2006
Medical Reserve Corp, 2008 to present
Ministries of Jesus, Advanced Practice Nurse, Pulmonary Clinic, 2003 to present
National Asthma Education Certification Board, test item writer, 2005 to 2007
Oklahoma Association of Cardiovascular and Pulmonary Rehabilitation President, 1995 to 1997
Oklahoma Asthma Initiative, 1997 to present, Medical Chair, 2010 to 2012
Phi Theta Kappa 1984 to 1986
Sigma Theta Tau International, 2002 to present
Rose State College, Respiratory Therapy, Clinical Advisory Board, Midwest City, Oklahoma. 2008 to present
University of Central Oklahoma, College of Nursing, Edmond, Oklahoma, Advisory Board, November, 2012 to present
**Academic Council**

American Association for Respiratory Care, Chronic Obstructive Pulmonary Disease Education Course, Faculty, 2005 to present.
American Association for Respiratory Care, Asthma Educators Certification Preparatory Course, Faculty, 2007 to present.
Association of Asthma Educators, Asthma Educators Certification Review Course, 2004 to present.
Chatham University, Doctor of Nursing Practice preceptor, December, 2016 to present
Rose State College, Adjunct Faculty, 1986 to 2006, 2007 to present.

**Research Interest and Projects**

Patient Quality of Life Study for patients with asthma and allergic disease, 1999 to 2002
Oklahoma Allergy and Asthma Clinic, Asthma Disease Management Outcome Study, 2002-2004
Camp Second Wind, extensive educational day camp for children with asthma
Asthma Management Workshops for rural healthcare professionals, 2002-2005
Development of patient education, literature and booklets 2002-2005
Developing asthma educating modules for asthma educators (Association of Asthma Educators) 2004-2010
Asthma and Traffic Density research project, Dallas, Texas, 2006-2007
Asthma Disparity in Rural Health Care, 2010 to present
Achieving Asthma Control in Pediatric Asthma, Medicaid population, 2010 to present

**Awards**

Outstanding Clinical Practice Award, University of Oklahoma, 2003
Outstanding Professional Service Award, University of Oklahoma, 2003
Excellence in Nursing Practice Award, Sigma Theta Tau, Beta Delta Chapter, 2005
Outstanding Asthma Educator of the Year 2012-2013, Association of Asthma Educators

**Journal Reviewer**

2010-2014 *Journal of Asthma and Allergy Educators*
2015 to present – *Pediatric Allergy, Immunology and Pulmonology*
Presentations (2006 to present)

February, 2006, Association of Asthma Educators Review Course, San Francisco, California
August, 2006 Association of Asthma Educators, Advanced Spirometry, Atlanta, Georgia.
October, 2006, Asthma Management, Oklahoma Asthma Initiative, American Lung Association of Oklahoma, Midwest City, Oklahoma.
July, 2007, Association of Asthma Educators, Pregnancy and Asthma, St. Louis, Missouri.
August, 2007, Advance Practice Services Annual Conference, Children’s Medical Center of Dallas, Advances in Pediatric Asthma, Dallas, Texas.
March, 2008, Asthma Management, Genetech, Oklahoma City, Oklahoma.
June, 2008, Oklahoma School Nurses Institute, Asthma at School, Edmond, Oklahoma.
July, 2008, Association of Asthma Educators, Novel Approaches to Adult Learning in Patients with Asthma, San Mateo, California.
December, 2008, American Association for Respiratory Care, Asthma Educators Certification Review Course, Anaheim, California.
February, 2009, Advanced Practice Nurse Pharmacology Workshop, Management and Treatment of Asthma: Guideline Update and Implications for IgE Mediated Therapy, University of Oklahoma, College of Nursing, Oklahoma City, Oklahoma.
April, 2009, Oklahoma Association of Clinical Nurse Specialist, Asthma Management Using Evidenced Based Practice, Oklahoma City, Oklahoma.
May, 2009, American Association for Respiratory Care Chronic Obstruction Pulmonary Disease Education Course, Miami, Florida.
June, 2009, Management and Treatment of Asthma: Guideline Update and Implication for IgE Mediated Therapy, Lula, Mississippi.
June, 2009, Management and Treatment of Asthma: Guideline Update and Implication for IgE Mediated Therapy, Oklahoma City, Oklahoma.
July, 2009, Novel Approaches to Adult Asthma Education, Asthma teleconference, Centers of Disease Control.
August, 2009, Managing Food Allergy and the Pediatric Patient, New Orleans, Louisiana., Association of Asthma Educators.
August, 2009, Food Allergy and Anaphylaxis, New Orleans, Louisiana, Association of Asthma Educators.
October, 2010, Anatomy of an Asthma Action Plan, Tulsa, Oklahoma Oklahoma Society for Respiratory Care
December, 2010 Asthma Self Management Program, American Association for Respiratory Care, Las Vegas, Nevada.
July, 2011, Do they hear you now? Asthma Education. Georgia Society for Respiratory Care, Savannah, Georgia.
March, 2012 Vitamin D and Asthma, American Academy of Asthma, Allergy, and Immunology Annual Conference, Orlando, Florida.
March, 2012, Asthma Management, American College of Asthma, Allergy, and Immunology Annual Conference, Orlando, Florida.
April, 2012, Asthma Management, Francis Tuttle Vo-Tech Center, Oklahoma City, Oklahoma.
February, 2013 Vitamin D and Asthma Update, American Academy of Asthma, Allergy and Immunology Annual Conference, San Antonio, Texas.


April, 2013 Patient Education- Can You Hear Me Know? Wellstar, Atlanta, Georgia.

May, 2013 Overview of Asthma in the Pediatric Population, Advance Practice Nurses of Oklahoma, Oklahoma City, Oklahoma


November, 2013 New York State Respiratory Convention, Vitamin D and Asthma: What is the connection?


February, 2014, Differentiating Asthma from COPD: Why is This So Hard? American Academy of Allergy, Asthma, and Immunology Conference, San Diego, California

March, 2014, Atopic Dermatitis: Advancing Proficiency in Management, American Academy of Allergy, Asthma, and Immunology Conference, San Diego, California

March, 2014 Anaphylaxis: Advancing Proficiency in Recognition, Management and Risk Reduction. American Academy of Allergy, Asthma, and Immunology Conference, San Diego, California


February, 2015. Atopic dermatitis, beyond the surface: From filaggrin to foods American Academy of Allergy, Asthma, and Immunology Conference, Houston, Texas.


May, 2015. Enhancing the immune system to prevent infections in patients with

September, 2015. Vitamin D and Asthma: What is the Connection? Rainbow Respiratory Conference, Rainbow Babies & Children's Hospital, Cleveland, Ohio.


March, 2016. The link between vitamin D and the treatment of asthma. American Academy of Allergy, Asthma and Immunology, Los Angles, California.


September, 2016 Patient Education: Can You Hear Me Now? Massachusetts Society for Respiratory Care, Cape Code, Massachusetts

November, 2016 Interesting Dermatological Cases in an Allergy Practice, American College of Allergy Asthma and Immunology, San Francisco, California

November, 2016 Severe Refractory Asthma, Monaghan Respiratory Conference, Cleveland, Ohio

November, 2016 Effective Patient Education in Patient-Centric Care, Monaghan Respiratory Conference, Cleveland, Ohio.

March, 2017 Silencing Chronic Cough in the Adult and Child: Diagnosis, Treatment and Prevention, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia

March, 2017 Shifting Paradigm: Focus on Prevention of Asthma Development and Exacerbation: A Team Approach – Meet the Challenge: Reduce Exacerbation and Achieve Control, Treatment and Prevention, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia

March, 2017, Narrative Interviewing to Improve Asthma Management Strategies Strategies to Cultivate Self-Management Skills, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia
Poster Presentation

September, 2011 Achieving Asthma Control in Pediatric Patients, Doctor of Nursing Practice Annual Conference, New Orleans, Louisiana.
February, 2013, Pediatric Asthma, Sigma Theta Tau International, Beta Delta Chapter-at-Large Conference, Oklahoma City, Oklahoma.
April 27, 2015, Affordable Care Act: Ready, Set, Go. National Organization of Nurse Practitioner Faculty, Baltimore, Maryland.

Book – Chapter


Publications


5. Oklahoma Allergy and Asthma Clinic. (2002). Get your second wind, be an asthma champion. *Camp Second Wind Booklet*.


DON A. BUKSTEIN, MD

LEARNING OBJECTIVES FOR PRESENTATIONS

Disease and drug interactions in asthma/AR and anxiety/depression/ADHD”

1) DESCRIBE THE Bidirectional RELATIONSHIP BETWEEN ASTHMA, ASTHMA MEDICATIONS and ANXIETY/DEPRESSION/ADHD.
2) IDENTIFY THE UNDERLYING MECHANISMS LINKING ASTHMA AND ASTHMA MEDICATIONS TO ANXIETY/DEPRESSION/ADHD.
3) APPLY THIS EVIDENCE TO PERSONALIZED COST EFFECTIVE MANAGEMENT OF ADULT AND PEDIATRIC PATIENTS.
Asthma Depression and Anxiety

Disease and drug interactions in asthma/AR and anxiety/depression/ADHD”

1) DESCRIBE THE Bidirectional RELATIONSHIP BETWEEN ASTHMA, ASTHMA MEDICATIONS and ANXIETY/DEPRESSION/ADHD.

2) IDENTIFY THE UNDERLYING MECHANISMS LINKING ASTHMA AND ASTHMA MEDICATIONS TO ANXIETY/DEPRESSION/ADHD.

3) APPLY THIS EVIDENCE TO PERSONALIZED COST EFFECTIVE MANAGEMENT OF ADULT AND PEDIATRIC PATIENTS.

What is depression?

While we all feel sad, moody or down from time to time, some people experience these feelings intensely, for long periods of time (weeks, months or even years) and sometimes without any apparent reason. Depression is more than just a low mood – it’s a serious condition that has an impact on both physical and mental health.

Depression affects how a person feels about themselves. A person may lose interest in work, hobbies and doing things he or she normally enjoys. Some people may lack energy, have difficulty sleeping or sleep more than usual, while some
people feel anxious or irritable and find it hard to concentrate.

The good news is, just like a physical illness, depression is treatable and effective treatments are available.

**Signs of depression**

A person may be depressed if he or she has felt sad, down or miserable most of the time for more than two weeks and/or has lost interest or pleasure in usual activities, and has also experienced some of the signs and symptoms on the list below.

It’s important to note that everyone experiences some of these symptoms from time to time and every person who is experiencing depression will have all of these symptoms. The symptoms will not provide a diagnosis – for that you need to see a health professional – DO SLEEP SCREEN ON ALL ASTHMA PATIENTS ON DAILY MEDS OR WITH ABNORMAL ACT>19

Some common symptoms of depression include:

— not going out anymore, loss of interest in enjoyable activities
— withdrawing from close family and friends
— being unable to concentrate and not getting things done at work or school
— feeling overwhelmed, indecisive and lacking in confidence
— increased alcohol and drug use — loss or change of appetite and significant weight loss or gain — trouble getting to sleep, staying asleep and being tired during the day — feeling worthless, helpless and guilty — increased irritability, frustration and moodiness — feeling unhappy, sad or miserable most of the time — thoughts such as, “I’m a failure”, “Life’s not worth living”, “People would be better off without me”.

As with anxiety, there are effective treatments available for depression. For more
What are the links between anxiety, depression and asthma?

Research indicates there is a link between anxiety, depression and asthma. More than two million Australians have asthma\(^2\), and more than three million Australians are living with depression or anxiety. One in five women and one in eight men will experience depression at some time in their life.\(^3\) On average, one in four people will experience anxiety\(^3\). For people who live with asthma, this figure is even higher.

— As is the case with other chronic illnesses, research shows that people with asthma are more likely to also have depression\(^4\).

— Research shows that having both depression and asthma is worse for health compared to having depression alone or asthma alone\(^5\).

— Both asthma and depression, if untreated, can impact greatly on a person’s ability to keep active and enjoy life.

— People with untreated depression can find it difficult to concentrate and stay motivated. As a result, they may not seek help for asthma, take prescribed medication, keep appointments or follow their Asthma Action Plan.

— People with anxiety are more likely to have asthma and people with asthma are more likely to be anxious\(^6\).

— Asthma and anxiety share similar symptoms, such as difficulty breathing, racing heart and feeling lightheaded. These symptoms may also be side-effects of asthma reliever medications.

— Stress can act as a trigger for symptoms of asthma, anxiety and depression.

— Anxiety and depression make it harder for people to manage their asthma.

What are the treatments for anxiety and depression?

Managing depression and anxiety can greatly improve people’s wellbeing and quality of life as well as their asthma and their attitude towards it. People with depression and/or anxiety can find it difficult to take the first step in seeking help. They may need the support of family, friends and a health professional.

There is no one proven way that people recover from depression or anxiety and it’s different for everybody. However, there is a range of effective treatments and health professionals who can help people on the road to recovery. There are also
many things that people with depression, anxiety and asthma can do to help themselves to recover and stay well. The important thing is finding the right treatment and the right health professional that works for you.

Different types of depression and anxiety require different types of treatment. This may include physical exercise for preventing and treating mild depression or anxiety, through to psychological and medical treatment for more severe episodes. The treatment for anxiety or depression in someone with asthma involves a coordinated approach that monitors and treats the symptoms of anxiety, depression and asthma.

**Treating your asthma**

The most effective treatment for asthma involves regular medical review together with individualised asthma education, self-monitoring of symptoms, having a written Asthma Action Plan, and, for most people with asthma, taking a regular low-dose preventer medication as well as having a reliever medication for when symptoms occur.

An Asthma Action Plan is written instructions about what asthma medicines you should take, how to recognise when your asthma is getting worse, and what to do if this happens. An Asthma Action Plan gives you something to follow each day and helps you remember how to look after your asthma. It’s important to:

— monitor your asthma symptoms and need for reliever medication
— take preventer medicine (if prescribed) regularly every day to prevent asthma symptoms occurring and reduce your risk of asthma flare-ups
— contact your doctor if your asthma symptoms are getting worse
— discuss any possible medication side-effects and their impact on your asthma and mental health with your health professionals.

The doctor managing your asthma needs to know if you also have depression or anxiety, so your Asthma Action Plan can help you distinguish symptoms of depression or anxiety from symptoms of asthma.

The most effective treatments are those that combine psychological and medical care, medical monitoring, individualised asthma education and adequate community support. ASTHMA YARDSTICK
Psychological treatments

Psychological therapies may not only help with recovery, but can also help prevent a recurrence of anxiety or depression when coping with stressful life circumstances and can be provided by a psychologist, psychiatrist or other trained health professional.

— Cognitive behaviour therapy (CBT) is an effective treatment for people with depression and anxiety. It teaches people to evaluate their thinking about common difficulties, helping them to change their thought patterns and the way they react to certain situations.

— Interpersonal therapy (IPT) is also effective for treating depression and some types of anxiety. It helps resolve losses, changes and conflict in relationships.

Medication

Antidepressant medication, alongside psychological therapies, can also play a role in the treatment of moderate to severe depression and some anxiety conditions.

Making a decision about which antidepressant is best for a person can be complex. The decision will be made in consultation with a doctor, after careful assessment and consideration. The doctor should discuss differences in effects and possible side-effects of medications. Stopping medication should only be done gradually, with a doctor’s recommendation and under supervision.

It should be noted that while antidepressants seem to have no specific effect on asthma symptoms or medication, the National Asthma Council reports that it is dangerous to take sedatives when you are having an asthma flare-up or attack.

A doctor or treating health professional will take into account several factors when suggesting the most suitable treatment. Regular contact with and ongoing assessment by a doctor to check that treatments are working effectively is an important part of becoming and staying well. Most people taking medication will also benefit from a PCP AND ASTHMA EDUCATOR is a good first step to discuss your concerns. A good GP can:

— make a diagnosis
— check for any physical health problem or medication that may be contributing to the condition
— discuss available treatments
— if appropriate, work with the person to draw up a Mental Health Treatment Plan so he or she can get a Medicare rebate for psychological treatment
— provide brief counselling or, in some cases, psychological therapies
— prescribe medication
— refer a person to a mental health specialist such as a psychologist, social worker or psychiatrist.

Make sure that the doctor managing your asthma knows if you have anxiety or depression. It is recommended that they do this in the same clinic, as medical information is shared within a practice.

Psychologists are health professionals who provide psychological therapies such as cognitive behaviour therapy (CBT) and interpersonal therapy (IPT). Psychologists are not doctors and cannot prescribe medication in Australia.

Psychiatrists are doctors who specialise in mental health. They can make medical and psychiatric assessments, conduct medical tests, provide therapy and prescribe medication. Psychiatrists often use psychological treatments such as CBT, IPT and/or medication. If the condition requires hospital admission, a psychiatrist will be in charge of the person’s treatment.

Mental health nurses are specially trained to care for people with mental health conditions. They work with psychiatrists and GPs to review a person’s mental health, monitor medication and provide information about mental health conditions and treatment. Some have training in psychological therapies.

Social workers in mental health are specially trained to work with people who are experiencing difficulties in life. Social workers can help people find ways to manage more effectively some of the situations that trigger these conditions such as family issues, financial problems, work stress and living arrangements. Mental health social workers can also provide focused psychological self-help strategies.

Occupational therapists in mental health help people who, because of a mental
health condition, have difficulty participating in normal, everyday activities. Mental health occupational therapists also provide focused psychological self-help strategies.

, screening, assessment, referrals, transport to and attendance at specialist appointments, education, improving access to mainstream services, advocacy, counselling, support for family and acute distress response.

**Helpful strategies and tips**

— Talk with ONLINE Asthma AND ALLERGY NETWORK to help you learn about asthma and how you can live well.

— Learn about anxiety, depression and asthma and how these conditions interact.

— Learn how to distinguish the symptoms of asthma from the symptoms of anxiety or depression

— Plan with your doctor – have a written Asthma Action Plan and a mental health plan.

— Visit your doctor regularly to review your asthma and mental health management.

— Use your asthma medicine as prescribed. Talk about possible barriers to taking medicine, such as cost, organisation or planning, as well as what to do if your asthma worsens.

— Get help, support and encouragement from family and friends and have them help you to follow your asthma and mental health plans.

— Learn relaxation techniques.

— Get involved in social activities.

— Stay active and exercise under the supervision of a doctor.

— Eat healthily and include a wide variety of nutritious foods.

— Limit your substance use (including alcohol, tobacco and coffee).

When a person has asthma and anxiety or depression, it can affect family and friends. It’s important for family and friends to look after their own health as well as looking after the person who has asthma.
— Learn about asthma, anxiety and depression and their symptoms to help you recognise warning signs.

— Encourage the person to go to the doctor if it gets worse. Make sure you seek help if you think you need it, too.

— Support the person by helping them to follow their asthma and mental health plans. Gently remind the person to take their asthma, anxiety and depression medication regularly and to attend all their medical appointments.

Moussavi, et al. 2007, Depression, chronic diseases, and decrements in health:


Barton, C., Clarke D., Sulaiman, N., Abramson, M., 2003, “Coping as a mediator of psychosocial impediments to optimal management and control of asthma”, Respiratory Medicine 97, 747-761.
Curriculum Vitae

DON A. BUKSTEIN, M.D.

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Home Address: 11 Glen Arbor Way
Fitchburg,Wisconsin 53711

Citizenship: United States of America

Date of Birth: May 2, 1950

Place of Birth: Los Angeles, California

Family: Married, 5 adult children, 1 grandchild

Current Position: Allergist-Immunologist
Pediatric Pulmonologist
Allergy, Asthma & Sinus Center
Greenfield, Wisconsin
January 2014-present

Past Positions:
Allergist-Immunologist
Pediatric Pulmonologist
Director of Allergy and Asthma Research
Dean Medical Center
Madison, Wisconsin
August, 1982-July 2012

Hospital Staff Appointments:
Courtesy Staff, St. Marys Hospital Medical Center
Madison, Wisconsin
1982-present

Courtesy Staff, Waukesha Memorial Hospital
Waukesha, Wisconsin
2013-present
Consultant Staff, Meriter Hospital
Madison, Wisconsin
1982-present

Consultant Staff, University of Wisconsin Hospital
Madison, Wisconsin
1982-present

**Medical Licensure:**
Colorado, 1980       #22987
Wisconsin, 1982      #24889-020

**Education:**
Tulane University
New Orleans, Louisiana
B.A. in English Literature, Cum Laude, 1972

University of Missouri-Columbia
Columbia, Missouri
Doctor of Medicine, Cum Laude, 1977

**Professional Training:**
Student Research Fellow, Department of Pathology
University of Missouri-Columbia
Columbia, Missouri
1975-1976

Internship and Residency, Pediatrics
Children’s Medical Center of Dallas, University of Texas
Southwestern Medical School, Dallas, Texas
1977-1980

Fellowship in Adult and Pediatric Allergy and Immunology/
Pediatric Pulmonary Disease
National Jewish Hospital and Research Center
National Asthma Center, Denver, Colorado
1980-1982

**Additional Professional Experiences:**
Emergency Room Physician
Westside Clinic, Denver Health Department
Denver, Colorado
1980-1982

Staff Physician
Outpatient Clinic, Kaiser Permanente
Denver, Colorado
1980-1982

Director of Pediatric Allergy and Pulmonary Disease
Dean Medical Center
Madison, Wisconsin
1983-1990
Director of Pediatric ICU, Pediatric Pulmonary Medicine
St. Marys Hospital Medical Center
Madison, Wisconsin
1983-1995

Teaching and Administrative Positions:
Member of Admissions Committee
University of Missouri-Columbia
Columbia, Missouri
1975-1977

President, American Medical Student Association
University of Missouri-Columbia Chapter
Columbia, Missouri
1975-1976

Medical Student Representative, Medical Ethics Committee
American Medical Association
1976

Associate Clinical Professor, Department of Family Practice
University of Wisconsin-Madison
Madison, Wisconsin
1982-present

Assistant Clinical Professor, Department of Pediatrics
University of Wisconsin-Madison
Madison, Wisconsin
1982-present

Chairman, Public Service and Education Committee
Dean Foundation for Health, Research and Education, Inc.
Madison, Wisconsin
1995-1997

Director
Dean Foundation for Health, Research and Education, Inc.
Madison, Wisconsin
1995-1997

Awards and Honors:
Alpha Omega Alpha Honor Medical Society
University of Missouri-Columbia
1977

Robert L. Jackson Award in Pediatrics
University of Missouri-Columbia
1977

Certifications:
Diplomat, National Board of Medical Examiners
July 1978
Diplomat, American Board of Pediatrics  
October, 1982

Diplomat, American Board of Allergy and Immunology  
October 1983

Diplomat, American Board of Pediatric Pulmonary Disease  

Presentations:  
Approximately 50 presentations annually throughout the country regarding physician education, allergic disease, asthma, computerized medical records, and outcomes.

Special Interests and Procedures:  
Allergic diseases, apnea, computerized medical records, infant and childhood asthma, outcomes research, patient and physician education, pediatric bronchoscopy.

Personal Interests:  
Running, saltwater fish hobbyist, swimming, tennis.

Articles Published or Accepted:

*Incorporating Quality of Life Data into Managed Care Formulary Decisions: A Case Study with Salmeterol*  
The American Journal of Managed Care 3:11:1701-1706 (1997) Bukstein D.

*Asthma in the Workplace: Implications for the Employer*  

*Improving Allergy and Asthma Care through Outcomes Management*  
American Academy of Allergy, Asthma and Immunology (1997) Blaiss M., Bukstein D., Davis M., Luskin A.

*Point-of-Service Outcomes Data and its Effect on Asthma Treatment: A Salmeterol Pilot Investigation*  
Medical Interface 118-124 (February 1997) Bukstein D., Mackowiak J.

*Practical Approach to the Use of Outcomes in Asthma: Traveling the Road to Better Asthmatic Care,*  

*Tilarin in Combination with Astemizole,*  
Allergy No. 51 (1996) Bukstein D.

*Development and Clinical Use of the Asthma Profile,*  

*Successful Treatment of Chronic Asthma Using Point-of-Service Outcome Analysis,*  
The Utility of Outcome Information at the Point of Service, Managed Care Quarterly 3:2:26-31 (1995) Bukstein D., White E., & Martin J.


Parapneumonic Empyema in Children: Diagnosis and Management, American Family Physician (November 1992) Lewis K., Bukstein D.

Albuterol Protects Against Exercise-Induced Asthma Longer Than Metaproterenol Sulfate Pediatrics (February 1986) Berkowitz R., Schwartz, E., Bukstein D., Grunstein M., Chai H.


Protection Against Exercise-Induced Asthma Pediatrics (October 1984) Berkowitz R., Bukstein, D.


Luskin AT, Bukstein DA. U.S. and U.K. Differences in the Diagnosis and Treatment of the Elderly Asthmatic. Submitted


Bukstein DA, Luskin AT. Controlling Asthma: Physician Specialist and Patient Perspectives on Disease Management. (in press)


ABSTRACTS ACCEPTED AND PRESENTED:

Bukstein, D.A., Luskin, A.T; Use of Standardized Outcome Information to Determine Treatment and Educational Modalities for Adult Asthma. Presented at the North Central Allergy Society Meeting, Rochester, Minnesota, 1996.


Bukstein, D.A., Luskin, A.T.; Salmeterol Use and Compliance with Anti-Inflammatory Therapy. Presented at the annual meeting of the American College of Allergy, Asthma and Immunology, San Diego, 1997.

Bukstein, D.A., Luskin, A.T.; Compliance with Anti-Inflammatory Therapy. Presented at the annual meeting of the American College of Allergy, Asthma, and Immunology, San Diego, 1997.

Bukstein, D.A., Luskin, A.T.; Beta-agonist Use in Asthmatics Compliant with Anti-Inflammatory Therapy. Presented at the annual meeting of the American College of Allergy, Asthma and Immunology, San Diego, 1997.


Bukstein, D.A., Luskin, A.T.; Effect of Medication Type - Compliance with Therapy in Allergic Rhinitis Patients. Presented at the annual meeting of the American College of Asthma, Allergy and Immunology, 1999.

Bukstein, D.A., Luskin, A.T.; Non-Adherence and Poor Inhaler Skills as a major Cause of Therapeutic Failure. Presented at the annual meeting of American College of Asthma, Allergy and Immunology, Chicago, 1999.


Bukstein DA, Luskin AT, Henk HJ. Adherence to Asthma Therapy: A Retrospective Cohort Analysis. Presented at the annual meeting of the American College of Allergy, Asthma and Immunology, Seattle, 2000.


Luskin AT, Bukstein DA, Overson A. Assessing Patient Level of Satisfaction and Side Effects as a Consequence of Antihistamine Use. Presented at the annual meeting of the American College of Asthma, Allergy and Immunology, Seattle, 2000.


Luskin AT, Bukstein DA. Physician Perception of an Asthma Management Program in a Managed Care Setting. Presented at the annual meeting of the American Academy of Allergy, Asthma and Immunology, New Orleans, 2001.


Bukstein DA, Luskin AT, Bernstein BA. The Effectiveness of Inhaled Steroids by Metered Dose Inhaler with Aerochamber and Face Mask for Children ages 6 months to 4 years. Presented at the Annual Meeting of the European Respiratory Society, Stockholm, 2002.


Luskin AT, Bukstein DA, Olson RM. Predictors of Poor Outcomes in Children with Mild Persistent Asthma. Presented at the Annual Meeting of the American Academy of Asthma, Allergy and Immunology,(1078), J Allergy Clin Immunol 2003;111:S337.


Participation in Clinical Research:
Principal Investigator:
An observational study of the epidemiology and natural history of asthma: outcomes and treatment regimens (2001-2004)

Principal Investigator:
A prospective, randomized, three-phase comparison of the efficacy, safety, patient acceptance and cost of nasal irrigation versus amoxicillin or tmp sulfa in subjects with acute recurrent sinusitis who are receiving therapy in a managed care setting (2001-2002)

Principal Investigator:
A multi-center, randomized, double-blind, double-dummy, parallel group, 16-week comparison of asthma control in adolescents and adults receiving either a corticosteroid/long-acting beta-agonist asthma dry-powder inhaler combination product, a corticosteroid asthma dry-powder inhaler, a long-acting beta-agonist asthma dry-powder inhaler, or oral leukotriene asthma tablet (2001-2002)

Principal Investigator:
A phase III, multicenter, double-blind, placebo controlled, non-inferiority study assessing the effects of an investigational corticosteroid metered dose inhaler 50µg/day and 200 µg/day (ex-valve) administered once daily on growth in children with mild persistent asthma (2001-2002)

Sub-Investigator:
Antibiotic study to help manage asthma (2000-2002)

Principal Investigator:
Better Self-Management of Asthma Care in Elementary Schools (2000-2001)

Sub-Investigator:
A randomized, double-blind, multicenter study to evaluate the effect of an oral asthma medication versus an inhaled asthma medication in patients with mild persistent asthma (2000-2002)

Principal Investigator:
Oral asthma medication pharmacy study (2000-2001)

Principal Investigator:
Asthma Action Plan Compliance Study (2000)

Principal Investigator:
A randomized, double-blind, parallel group, placebo controlled, multi-center study of the efficacy and safety of two antihistamine-decongestant combination medications versus placebo in the treatment of subjects twelve years and older with seasonal allergic rhinitis (2000)

Principal Investigator:
A randomized, double-blind, multicenter study to evaluate the effect of adding either an oral asthma medication or a long-acting asthma medication to a daily inhaled asthma medication in adult asthmatics (1999-2001)

Principal Investigator:
Allergy Satisfaction and Adherence (1999)

Principal Investigator:
A randomized, double-blind, double-dummy, parallel group, 12-week comparative trial of an asthma medication combination product BID via an inhaler device versus an oral asthma medication QD in adolescents and adults with persistent asthma (1999-2000)

Sub-Investigator:
A 12-week comparison of daily doses of 100 mcg and 200 mcg of an inhaled asthma medication in an asthma inhaler device versus placebo in pediatric patients with symptomatic asthma (1999-2000)

Principal Investigator:
ATAQ Asthma Screening Educational Workplace Program (1999-2000)
Principal Investigator:

Principal Investigator:
Asthma Disease Management Initiative (1998-1999)

Sub-Investigator:
The cost effectiveness comparing two inhaled asthma medications in adult patients with asthma (1998-2000)

Principal Investigator:
A randomized, double-blind, placebo controlled, multicenter study of the efficacy, safety, and effect on quality of life, work productivity and activity Impairment of an antihistamine medication vs. placebo in the treatment of seasonal allergic rhinitis (1998)

Principal Investigator:
A randomized, double-blind study of antihistamine nasal spray monotherapy versus combination therapy of a nasal steroid and oral antihistamine in subjects with seasonal allergic rhinitis (1998)

Principal Investigator:
A multicenter, double-blind, placebo controlled, randomized trial evaluating the safety and efficacy comparing two inhaled asthma medications in patients with mild to moderate asthma (1998)

Principal Investigator:
An evaluation of a nebulizing suspension versus a nebulizer solution on asthma-related outcomes in children 2 -6 years old (1997-1998)

Principal Investigator:
A prospective, single-centered, randomized, investigator-blinded, parallel group, two phase comparison of the efficacy, safety, patient acceptance, and cost of an antibiotic medication versus amoxicillin or trimethoprim sulfa in patients with acute uncomplicated sinusitis who are receiving therapy in a managed care setting (1997-1998)

Principal Investigator:
A randomized, open label, cross-over study comparing the parent/guardian preference for an oral asthma medication tablet or an inhaled asthma medication for treatment in their children ages 6 to 11 with chronic asthma (1997-1998)

Principal Investigator:
A multi-center, double-blind, placebo-controlled, randomized trial evaluating the safety and efficacy of an inhaled asthma medication with and without an asthma inhaler device in patients with mild to moderate asthma (1997)

Principal Investigator:
A study to determine whether a dietary supplement decreases the immediate need to smoke in the workplace (1996-1997)

Principal Investigator:
A multicenter, randomized, double-blind, placebo-controlled trial of an oral asthma medication in subjects with mild to moderate asthma (1996-1997)

Principal Investigator:
A double-blind, parallel, randomized, placebo-controlled study to determine the efficacy and safety of an asthma medication given in 3 different doses in adult asthma patients (1996)

Principal Investigator:
A named-patient safety study of an inhaled asthma medication in severe asthmatic patients aged 5 years and older (1996)

Principal Investigator:
International Asthma Outcomes Registry - effectiveness of different asthma treatments In order to Improve patient care (1995-1997)

Principal Investigator:
A randomized, open-label study to assess the health related cost effectiveness comparison of two inhaled asthma medications in patients with asthma (1995-1997)

Principal Investigator:
An optional open-label extension study of four dose regimens of a nebulizing suspension and placebo in asthmatic children aged eight years and younger (1995-1997)

Principal Investigator:
Pediatric and Infant/Toddler Asthma Health Quality of Life Pilot Study (1995-1997)

Sub-Investigator:
A placebo-controlled, double-blind, efficacy and safety study comparing two inhaled asthma medications in the treatment of asthma (1995-1996)

Sub-Investigator:
A 12-month, open-label, safety and efficacy study of an inhaled asthma medication in subjects with asthma (1995-1996)

Principal Investigator:
A double-blind, randomized, placebo-controlled, multicenter, parallel-group study to investigate the efficacy and safety of an investigational medication administered twice or four times a day for the treatment of Influenza A and B viral infections (1995-1996)

Principal Investigator:
A double-blind study of four dose regimens of a nebulizing suspension and placebo in asthmatic children aged eight years and younger (1995)

Sub-Investigator:
A double-blind, parallel-group evaluation of the efficacy and quality of life outcomes of a long acting asthma medication versus placebo in asthma subjects (1994-1995)

Sub-Investigator:

Principal Investigator:
Investigational nasal spray medication therapeutic equivalency study (1994)

Principal Investigator:
A multi-center, randomized, double-blind, placebo-controlled, parallel study of the safety and effectiveness of an asthma metered dose Inhaler administered as 3.5 mg QID or 7 mg BID in the treatment of children with asthma exacerbated by ragweed pollen (1994)

Principal Investigator
Double-blind, placebo-controlled, parallel-group evaluation of an asthma powder medication comparing delivery via two asthma inhaler devices in asthmatic children aged 4-11 years (1993)

Principal Investigator:
A randomized, multicenter, double-blind, placebo-controlled group, comparative study of an inhaled asthma medication four times daily versus placebo administered via metered dose Inhaler in the treatment of children with asthma which is exacerbated by ragweed pollen (1992)

Principal Investigator:
Verification of in-home monitoring for suspected obstructive sleep disturbances in children (1992)

Principal Investigator:
Assessment of the validity and reproducibility of a portable home monitoring device in allergic rhinitis patients (1992)

Principal Investigator:
A randomized, double-blind, placebo controlled, parallel group comparison study of a single dose of a long-acting inhaled asthma medication versus a short-acting inhaled asthma medication in adolescents and adults with exercise-Induced bronchospasm (1991-1992)

Principal Investigator:

Principal Investigator:  
Iontophoretic application of multiple allergens into the skin (1990)

Principal Investigator:  
Iontophoretic application of allergens into the skin (1989-1990)

Principal Investigator:  
A multicenter, double-blind, group comparative study of the safety and effectiveness of a nasal solution in addition to an antihistamine in the treatment of ragweed-Induced seasonal allergic rhinitis in patients age 12 through 65 years (1990)

Principal Investigator:  

SPEAKER’S BUREAUS with Problem based Learning:

For the past 31 years I have been on the Speaker’s Bureau for various pharmaceutical companies including Merck, Genentech, Novartis, Glaxo Smith Kline, MEDA, Alcon, Dey & AstraZeneca. I have led over fifty conferences per year (many were for CME) on allergies, asthma and food allergies & anaphylaxis for the past fifteen years. Many have been by PROBLEM-BASED LEARNING (PBL), also known as interactive case discussions. Most of these conferences have been in small groups of between five to fifteen participants. Most have been comprised of primary care physicians (pediatricians, internists and family physicians), nurse practitioners, physician assistants, nurses, pharmacists or pharmacy doctoral students and even specialist groups of allergists and pulmonologists. Moreover, I have been in charge of setting up the PBL faculty and cases to be presented in several national conferences in the last few years mainly involving specialists. I have given over 1000 CME presentations all over the US and world.

Teaching other specialists to become skilled facilitators in Problem-based learning:

I have trained over 300 specialists in how to become “skilled facilitators” of Problem-based learning (PBL) workshops/seminars. Some were done for Pharmaceutical companies’ speaker bureaus for promotional talks and others were done for CME projects for both live face to face meetings and on web conferences. Specialists who have been taught to become skilled PBL facilitators include 1) allergists and pulmonologists for asthma and rhinitis cases, 2) pulmonologists for COPD cases, 3) cardiologists for chest pain cases,
4) psychiatrists for major depression and bipolar disease cases, 5) neurologists and rheumatologists for fibromyalgia cases and 6) an orthodontist for cases requiring braces.

I was the speaker/facilitator at a 4 hr CME workshop at the AAAAI annual meeting in March 2012 to train a select group of allergists from all over the world how to become skilled PBL facilitators so that they would propose more PBL sessions at future annual meetings of the AAAAI.

I have taught 5 groups of 12 (60) psychiatrists to become skilled PBL facilitators in 3 all days PBL training sessions for Astrazeneca Pharmaceuticals in 2009.

Utilized my copyrighted workbook in Dec. 2005 to teach 10 internist/cardioologists how to become skilled PBL facilitators in a 5 hr CME course in Madison, WI, funded by a $30,000 grant from Astrazeneca pharmaceuticals. The group will be giving PBL talks on hypercholesterolemia all over Wisconsin in 2006.

Utilized my copyrighted workbook in June 2005 to teach 10 internist/pulmonologists how to become skilled PBL facilitators in a 5 hr CME course in Madison, WI, funded by a $30,000 grant from sanofi-aventis pharmaceuticals. The group is doing PBL talks on COPD and acute exacerbations of chronic bronchitis all over Wisconsin.
Don A. Bukstein, MD

LEARNING OBJECTIVES:

“Disease and drug interactions in sleep disordered breathing and asthma/AR”

1. State the epidemiology the bidirectional epidemiologic relationship between the asthma and sleep disordered breathing.
2. Describe the proposed mechanisms linking asthma and sleep disordered breathing and how asthma medications may affect sleep.
SLEEP MEDICATIONS IN SDB AND ASTHMA

DON A. BUKSTEIN, MD
State the epidemiology the bidirectional epidemiologic relationship between the asthma and sleep disordered breathing.

Describe the proposed mechanisms linking asthma and sleep disordered breathing and how asthma medications may affect sleep.

Apply evidence to personalize management of pediatric and adult patients with both conditions.
Comparison of normal and asthmatic circadian rhythms in peak expiratory flow rate

M R HETZEL AND T J H CLARK

From the Brompton Hospital, London

Normal subject = 8%

Asthmatic subjects = 50%
Nocturnal bronchial narrowing depends on the timing of the patient’s sleep.
Mechanisms of nocturnal asthma

Probable:

Circadian features
Sleep state

Possible:

Airways cooling
Supine posture
Allergic Factors
Gastroesophageal reflux
Snoring or Sleep Apnea
Morbidity in nocturnal asthma: sleep quality and daytime cognitive performance

M F Fitzpatrick, H Engleman, K F Whyte, I J Deary, C M Shapiro, N J Douglas

<table>
<thead>
<tr>
<th>Sleep variables: median differences for mean values for the normal (N) and asthmatic (A) subjects with 95% confidence limits</th>
<th>Median difference</th>
<th>(95% \text{ CL} )</th>
<th>(p^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
<td><strong>N–A</strong></td>
<td><strong>95% CL</strong></td>
<td><strong>(p^*)</strong></td>
</tr>
<tr>
<td>Sleep efficiency index (%)</td>
<td>7</td>
<td>1, 15</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Sleep onset latency (min)</td>
<td>-19</td>
<td>-10, -30</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Time spent awake at night (min)</td>
<td>-35</td>
<td>-8, -74</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Time awake after sleep onset (min)</td>
<td>-10</td>
<td>-57, 21</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Duration (min) of sleep:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>-6</td>
<td>-23, 5</td>
<td>NS</td>
</tr>
<tr>
<td>Stage 2</td>
<td>-1</td>
<td>-20, 26</td>
<td>NS</td>
</tr>
<tr>
<td>Stage 3</td>
<td>2</td>
<td>-15, 10</td>
<td>NS</td>
</tr>
<tr>
<td>Stage 4</td>
<td>30</td>
<td>-4, 58</td>
<td>NS</td>
</tr>
<tr>
<td>REM</td>
<td>2</td>
<td>-15, 43</td>
<td>NS</td>
</tr>
<tr>
<td>MSLT (mean, min)</td>
<td>-5</td>
<td>-7, 3</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Subjective data:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No of nocturnal wakenings</td>
<td>-0.9</td>
<td>0.2, 1.9</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Sleep quality score</strong></td>
<td>-1.2</td>
<td>-0.1, -2.3</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

*Wilcoxon signed ranks test. MSLT—multiple sleep latency test.*
Sleep Disturbances and Asthma Control: A Real Life Study

F. Braido¹, I. Baiardini¹, V. Ghiglione¹, O. Fassio², A. Bordo¹, S. Cauglia¹ and G.W. Canonica¹
The level of asthma control results to be inversely correlated to the presence of sleep disturbances.

Patients with good control report less frequent and less severe sleep disturbances compared to uncontrolled subjects.

A significant percentage of subjects (11-20%) having achieved total control of asthma still report sleep disturbances, that contribute to increase the impact of the disease and to impair quality of life.
Obstructive Sleep Apnea Syndrome and Asthma: What Are the Links?

Michel Alkhalil, M.D.; Edward Schulman, M.D.; Joanne Getsy, M.D.
Increased incidence of asthma in overweight and obese subjects

Obesity and Asthma

Aim: To determine whether a high OSA risk is associated to not well-controlled asthma

Sleep Disorders Questionnaire (SA-SDQ)
Asthma Control Questionnaire. (ACQ)
Multivariate Logistic Regression Models of Not-Well-Controlled Asthma on High OSA Risk, with Adjustment for Factors Known To Worsen Asthma Control

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Adjusted for Demographics#</th>
<th>OR (95% CI)</th>
<th>P Value</th>
<th>Adjusted for Demographics and Obesity</th>
<th>OR (95% CI)</th>
<th>P Value</th>
<th>Adjusted for Demographics, Obesity, and GERD</th>
<th>OR (95% CI)</th>
<th>P Value</th>
<th>Adjusted for Demographics, Obesity, GERD, and Nasal Diseases</th>
<th>OR (95% CI)</th>
<th>P Value</th>
<th>Adjusted for Demographics, Obesity, GERD, and Nasal Diseases, and Psychiatric Disease</th>
<th>OR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High OSA risk</td>
<td></td>
<td>3.92 (2.27-6.76)</td>
<td>&lt;.0001</td>
<td>3.29 (1.82-5.95)</td>
<td>&lt;.0001</td>
<td>3.11 (1.71-5.68)</td>
<td>.0002</td>
<td>3.01 (1.62-5.60)</td>
<td>.0005</td>
<td>2.87 (1.54-5.3)</td>
<td>.0009</td>
<td>2.13 (1.09-2.54)</td>
<td>.23</td>
<td>1.90 (1.07-3.39)</td>
<td>.0258</td>
</tr>
<tr>
<td>Obesity</td>
<td></td>
<td>1.52 (0.57-2.65)</td>
<td>.15</td>
<td>1.38 (0.78-2.43)</td>
<td>.27</td>
<td>1.38 (0.77-2.46)</td>
<td>.27</td>
<td>1.38 (0.77-2.46)</td>
<td>.27</td>
<td>1.38 (0.77-2.46)</td>
<td>.27</td>
<td>1.38 (0.77-2.46)</td>
<td>.27</td>
<td>1.38 (0.77-2.46)</td>
<td>.27</td>
</tr>
<tr>
<td>GERD</td>
<td></td>
<td>...</td>
<td>...</td>
<td>2.87 (1.67-4.94)</td>
<td>.0001</td>
<td>3.20 (1.52-5.55)</td>
<td>&lt;.0001</td>
<td>3.00 (1.70-5.31)</td>
<td>.0002</td>
<td>3.00 (1.70-5.31)</td>
<td>.0002</td>
<td>3.00 (1.70-5.31)</td>
<td>.0002</td>
<td>3.00 (1.70-5.31)</td>
<td>.0002</td>
</tr>
<tr>
<td>Nasal diseases</td>
<td></td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>0.33 (0.12-0.86)</td>
<td>.02</td>
<td>0.38 (0.14-1.02)</td>
<td>.05</td>
<td>0.38 (0.14-1.02)</td>
<td>.05</td>
<td>0.38 (0.14-1.02)</td>
<td>.05</td>
</tr>
<tr>
<td>Rhinitis</td>
<td></td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>0.56 (0.29-1.07)</td>
<td>.05</td>
<td>0.55 (0.22-1.06)</td>
<td>.08</td>
<td>0.55 (0.22-1.06)</td>
<td>.08</td>
<td>0.55 (0.22-1.06)</td>
<td>.08</td>
</tr>
<tr>
<td>Sinusitis</td>
<td></td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>2.28 (1.04-5.01)</td>
<td>.04</td>
<td>2.37 (1.08-5.24)</td>
<td>.03</td>
<td>2.37 (1.08-5.24)</td>
<td>.03</td>
<td>2.37 (1.08-5.24)</td>
<td>.03</td>
</tr>
<tr>
<td>Nasal polyps</td>
<td></td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
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<tr>
<td>Psychiatric disease</td>
<td></td>
<td>...</td>
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<td>...</td>
</tr>
</tbody>
</table>

OSA is a potential contributor to overall asthma control on a much larger scale and independent of the other known contributors to asthma control.
Risk factors of frequent exacerbations in difficult-to-treat asthma


Ongoing allergen exposure
Specific IgE to HDM, UniCAP ≥3 and living in HDM-rich environment
Specific IgE to any pet while having the same pet at home

Food allergens
UniCAP food mix ≥2

Drugs
Present use of salicylates, NSAIDs, β-blockers or ACE inhibitors

Occupational (low molecular weight) sensitizers
Increased symptoms at work and exposure to known sensitiser, currently or in past

Severe chronic sinus disease
Indication for nasal sinus surgery by ENT specialist

Gastro-oesophageal reflux
Pathological reflux at 24-h pH measurement#
Symptomatic improvement after a trial of proton-pump inhibitors

Recurrent (bacterial) respiratory infections
Requirement of ≥3 antibiotic courses in last 2 yrs

Relative immune deficiency
Pathologically decreased levels of IgG subclasses, IgA subclasses or IgM†

Hyperthyroidism
Pathologically increased level of free thyroxin (FT4 >24 pmol L⁻¹) in peripheral blood³

Obstructive sleep apnoea syndrome
Documented abnormality at polysomnography or history of snoring with apnoeas >10 s

Hormonal influences
History of increased symptoms premenstrually, during pregnancy or at menopause

Psychological dysfunctioning
General Health Questionnaire-12 score ≥6*

Poor inhaler technique
>2 errors out of 8 essential elements of proper medication inhalation*

OR 3.4
United Airways Disease

Allergic Rhinitis

Allergen Challenge

Loss of Filter ability

Post nasal drip

Cytokine

Viral infection

Eosinophil

ICAM-1

VCAM-1

Bone marrow

Stem cell

nose-bronchial reflex

Allergen bronchial challenge

Bachilial Asthma

Eosinophil

IL-5

Basophil

Mast cell degranulation
## Multiple Pro-Inflammatory Factors in Allergic Rhinitis Affect Sleep and Symptoms

<table>
<thead>
<tr>
<th>Mediator</th>
<th>Effect on Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histamine</td>
<td>Balance between wakefulness and sleep, arousal; ↑ nasal obstruction, rhinorrhea, &amp; pruritus</td>
</tr>
<tr>
<td>CysLT</td>
<td>↑ Slow-wave sleep, ↑ Sleep-disordered breathing; ↑ Nasal obstruction, rhinorrhea</td>
</tr>
<tr>
<td>IL-1</td>
<td>↑ Latency to REM and ↓ REM duration</td>
</tr>
<tr>
<td>IL-4</td>
<td>↑ Sleep apnea; ↑ Nasal obstruction &amp; rhinorrhea</td>
</tr>
<tr>
<td>IL-10</td>
<td>↑ Latency to REM, arousal; ↑ Nasal obstruction</td>
</tr>
</tbody>
</table>

Prospective Clinical Studies Reporting the Impact of Treatment With CPAP on Asthma Outcome in Patients With Concomitant OSAS

<table>
<thead>
<tr>
<th>Source</th>
<th>Patient sex, M/F, No.</th>
<th>Age, mean (SD), y</th>
<th>Duration of CPAP, mo (SD)</th>
<th>BMI, mean (SD)</th>
<th>AHI, mean (SD)</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chan et al, 1988</td>
<td>8/1</td>
<td>51.67 (10.2)</td>
<td>0.5</td>
<td>29.44 (3.50)</td>
<td>24.44 (18.71)</td>
<td>0.05 Clinical improvements in OSAS and asthma symptoms. Marked improvement in prebronchodilator and postbronchodilator mean PEFR of all 9 patients.</td>
</tr>
<tr>
<td>Group A</td>
<td>10/0</td>
<td>43.8 (14.3)</td>
<td>4–6</td>
<td>31.1 (4.6)</td>
<td>51 (13)</td>
<td>5 (8) Clinical improvement in nocturnal asthma.</td>
</tr>
<tr>
<td>Group B</td>
<td>5/0</td>
<td>17 (2.5)</td>
<td>4–6</td>
<td>25 (3)</td>
<td>8 (9)</td>
<td>1 (0.3) Clinical improvement in nocturnal asthma attacks even with those who underwent upper airway surgery rather than CPAP. Improvement in asthma quality of life that was greater in obese patients and in patients with high AHI at baseline.</td>
</tr>
<tr>
<td>Lafond et al, 2007</td>
<td>11/9</td>
<td>49 (9)</td>
<td>1.5</td>
<td>37 (9)</td>
<td>48 (24)</td>
<td>2.6 (2.5) Asthma nighttime symptoms were improved significantly after CPAP treatment.</td>
</tr>
<tr>
<td>Ciftci et al, 2005</td>
<td>7/9</td>
<td>45.94 (7.69)</td>
<td>8</td>
<td>34.38 (6.08)</td>
<td>44.25 (50.82)</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>8/7</td>
<td>51 (11)</td>
<td>17 (8)</td>
<td>39 (7)</td>
<td>47 (27)</td>
<td>PaO\textsubscript{2} increased and P\textsubscript{aco}{2} decreased in the asthma and COPD groups but did not change in the NOAD group. Impairment of lung function and increased bronchial responsiveness were noted only in patients with OSAS and normal initial lung function and not in those with asthma or COPD.</td>
</tr>
<tr>
<td>COPD</td>
<td>9/4</td>
<td>56 (14)</td>
<td>17 (8)</td>
<td>37 (8)</td>
<td>35 (26)</td>
<td></td>
</tr>
<tr>
<td>NOAD</td>
<td>16/6</td>
<td>56 (12)</td>
<td>17 (8)</td>
<td>35 (9)</td>
<td>53 (42)</td>
<td></td>
</tr>
</tbody>
</table>
Inclusion criteria:

1) asthmatic patients who had nighttime symptoms in spite of the optimal medication according to Global Initiative for Asthma (GINA) guidelines

2) At least one nocturnal awakening or early morning awakening caused by asthmatic symptoms (cough, wheeze, chest tightness, and breathlessness)

3) habitual snoring
in some patients with nocturnal asthma, OSAS may be responsible disease for nocturnal symptoms.

In this condition, CPAP improves nocturnal symptoms without amelioration in PFT abnormalities.
Impact of CPAP on asthmatic patients with obstructive sleep apnoea

C. Lafond*, F. Sériès# and C. Lemièrè*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-CPAP</th>
<th>Post-CPAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1 % pred</td>
<td>62.2 ± 13.6</td>
<td>80.4 ± 13.6</td>
</tr>
<tr>
<td>FEV1/FVC %</td>
<td>77.3 ± 8.3</td>
<td>76.3 ± 10.1</td>
</tr>
<tr>
<td>PC20 mg·mL⁻¹</td>
<td>2.2 (1.3–3.5)</td>
<td>2.5 (1.4–4.5)</td>
</tr>
<tr>
<td>AHI</td>
<td>48.1 ± 23.6</td>
<td>2.6 ± 2.5***</td>
</tr>
<tr>
<td>QOLAs</td>
<td>5.0 ± 1.2</td>
<td>5.8 ± 0.9***</td>
</tr>
<tr>
<td>QOLAp</td>
<td>4.1 ± 1.4</td>
<td>6.0 ± 1.0***</td>
</tr>
</tbody>
</table>

Before CPAP | After 6 weeks of CPAP

Asthma quality of life

*Corresponding author. **Deceased. ***P < 0.001.
Beneficial effects of continuous positive airway pressure (CPAP) in patients with asthma and obstructive sleep apnea (OSA) syndrome.

- Increases mean airway pressure
- Recruits underventilated alveoli
- Increases minute ventilation,
- Decreases airways resistance
- Stabilizes upper airways
- Prevents peripheral airways closure
- Increases end-expiratory lung volume
- Increases expiratory muscle function
- Reduces respiratory rate and dyspnea
- Suppresses OSAS induce vagal stimulation
- Prevents OSAS induced increased intrathoracic pressure
Beneficial effects of continuous positive airway pressure (CPAP) in patients with asthma and obstructive sleep apnea (OSA) syndrome.
Epidemiology

## Barriers to Diagnosis & Treatment

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Public Awareness</td>
<td>Many individuals do not recognize symptoms and severity of the condition.</td>
</tr>
<tr>
<td>Primary Care Physician Education</td>
<td>Front-line caregivers do not routinely ask about duration and quality of sleep or screen patients for OSA.</td>
</tr>
<tr>
<td>Diagnosis and Treatment Costs</td>
<td>While usually covered by payors for qualified patients, costs average $2,105 per year for testing, appointments, treatment devices and surgery if necessary.</td>
</tr>
<tr>
<td>Employer and Payor Investment for Chronic Care Management</td>
<td>Economic stakeholders are still developing cost models that financially reward managing chronic conditions in order to lessen longer-term risk for acute events</td>
</tr>
</tbody>
</table>
Costs Associated with OSA in United States in 2015

$162.0 B

Annual per patient diagnosis and treatment costs are 67% less than leaving patients undiagnosed.

Diagnosed/Treated
5.9 M People, $12.4B

Undiagnosed/Untreated
23.5 M People, $149.6B

## Cost Burden of OSA in the Undiagnosed vs. Diagnosis & Treatment Costs

<table>
<thead>
<tr>
<th></th>
<th>Undiagnosed</th>
<th>Diagnosed</th>
</tr>
</thead>
<tbody>
<tr>
<td># People with OSA</td>
<td>23,500,000</td>
<td>5,900,000</td>
</tr>
<tr>
<td>Cost of Undiagnosed OSA ($US Bil)</td>
<td></td>
<td>Cost of Diagnosed OSA ($US Bil)</td>
</tr>
<tr>
<td>Comorbidities &amp; Mental Health</td>
<td>$30.0</td>
<td>Diagnosis, Testing and Follow Up</td>
</tr>
<tr>
<td>Motor Vehicle Accidents</td>
<td>$26.2</td>
<td>Non-surgical Treatment</td>
</tr>
<tr>
<td>Workplace Accidents</td>
<td>$6.5</td>
<td>Surgical Treatment</td>
</tr>
<tr>
<td>Lost Productivity</td>
<td>$86.9</td>
<td></td>
</tr>
<tr>
<td><strong>Total Costs ($US Bil)</strong></td>
<td><strong>$149.6</strong></td>
<td><strong>$12.4</strong></td>
</tr>
<tr>
<td>Cost per Person</td>
<td><strong>$6,336</strong></td>
<td><strong>$2,105</strong></td>
</tr>
</tbody>
</table>

Source: ¹Primary research with experts, secondary clinical research, U.S. Census (2014), Peppard "Increased Prevalence of Sleep-disordered Breathing in Adults." American Journal of Epidemiology (2013), Frost & Sullivan Patient Survey,
Diagnosing and Treating All 29.4M Americans with OSA Could Save $100.1 Billion

<table>
<thead>
<tr>
<th></th>
<th>Undiagnosed</th>
<th>Diagnosed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Healthcare Costs</strong></td>
<td>$119.6B</td>
<td>$12.4B</td>
</tr>
<tr>
<td><strong>Non-Healthcare Costs</strong></td>
<td>$30.0B</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$162.0B</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Cost per Person</strong></td>
<td>$5,511</td>
<td>$0</td>
</tr>
</tbody>
</table>

Future: Where No OSA Patients Are Undiagnosed

<table>
<thead>
<tr>
<th></th>
<th>Undiagnosed</th>
<th>Diagnosed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Healthcare Costs</strong></td>
<td>$61.9B</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Non-Healthcare Costs</strong></td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$61.9B</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Cost per Person</strong></td>
<td>$2,105</td>
<td>$0</td>
</tr>
</tbody>
</table>

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Sources of Cost for Undiagnosed OSA

Comorbidities & Mental Health
- Hypertension: $5.4 B
- Heart Disease: $6.7 B
- Diabetes: $6.4 B
- Asthma/Breathing Disorders: $2.6 B
- Insomnia: $2.1 B
- Depression/Anxiety/Mental Health: $7.1 B
Total: $30.0 B

Includes cost of healthcare services, medication, and quality of life.

Motor Vehicle Accidents
- Commercial: $19.1 B
- Non-Commercial: $7.1 B
Total: $26.2 B

Includes medical costs, emergency services, property damage, lost productivity, and monetized quality adjusted life years (QALYs) incurred by company, insurer, victims, government and others.

Workplace Accidents
- Fatal: $6.9 B
- Non-Fatal: $199 M
Total: $26.8 B

Includes fatal and non-fatal accidents. Includes medical costs and lost productivity.

Lost Productivity
- Productivity: $83.1 B
- Absenteeism: $3.8 B
Total: $86.9 B

Includes cost of healthcare services, medication, and quality of life.
Three Sources of Cost for Diagnosed/Treated OSA

Diagnosed OSA

- In-Lab PSG: $212.3 M
- Home Sleep Testing: $16.7 M
- CPAP Titration: $102.7 M
- Clinic Visits: $486.2 M

Non-Surgical Treatment

- Upper Airway Surgery
  - UPPP: $593.8 M
  - Maxillomandibular/Genioglossus/Hyoid Advancement: $333.3 M
  - Temperature-controlled RF Tongue Base Reduction: $48 M
  - Nasal Reconstruction/Polyp Removal:
    - Nasal Reconstruction: $129 M
  - Palatal Lift:
    - Palatal Lift: $4.1 B
    - Hypoglossal Nerve Stimulation: $215 M
  - Oral Appliances: $1.1 M
  - PAP Consumables: $3.0 B
  - CPAP Machine: $3.1 B
  - CPAP Titration: $4.5 M

Surgical Treatment

- Bariatric Surgery: $4.9 M
- Tonsillectomy/Adenoidectomy: $4.5 M
- Pillar Procedure: $4.1 B
- Sclerotherapy: $215 M
- Tracheotomy for OSA: $129 M
- Hypoglossal Nerve Stimulation: $4.5 M
- CPAP Machine: $3.1 B
- CPAP Titration: $4.5 M
- Oral Appliances: $3.0 B
- PAP Consumables: $3.0 B
- CPAP Machine: $3.1 B
- CPAP Titration: $4.5 M
- Oral Appliances: $3.0 B
- PAP Consumables: $3.0 B

Total Cost: $12.4 B
Comorbidities & Mental Health

Economic Cost\(^1\): $30 B

- Diabetes, stroke, heart disease, and hypertension have direct costs associated with medical expenses, hospital inpatient visits, medication use and mortality rates.
- Mental health can be more subjective including cognitive function, quality of life, mood, depression, energy levels, substance abuse and interpersonal relationships.

Source: \(^1\)Primary research with experts, secondary clinical research, U.S. Census (2014), Peppard "Increased Prevalence of Sleep-disordered Breathing in Adults." American Journal of Epidemiology (2013), Frost & Sullivan Patient Survey
Motor Vehicle Accidents

- According to AAA\textsuperscript{2}, drowsy driving causes nearly 29% or 328,000 crashes each year
  - 109,000 injuries & 6,400 fatalities
- Commercial drivers treated on CPAP had a 73% reduction in preventable driving accidents.

Annual cost savings for trucking company\textsuperscript{3}:
  - 1,000 employees: $47.8M
  - 11,000 employees: $8.1B

**Economic Cost\textsuperscript{1}**: $26.2 B

There was an increase in accident rates on days following Daylight Saving Time, “Sleepy Monday”, when just 40 minutes of sleep was lost. This resulted in:
- A 5.7% spike in workplace injury rates
- A 67.6% increase in days of work lost due to sustained injuries

Treatment cost savings include:
- Reduced lost wages and absenteeism
- Lower associated medical expenses
- Better quality of life

Source:
2 Barnes "Changing to Daylight Saving Time Cuts Into Sleep and Increases Workplace Injuries." (2009)
Lost Productivity

Economic Cost¹: $86.9 B

- Reduced sleep can result in: Absenteeism, underperformance, behavioral problems, “cyberloafing”, poor decision making, decreased productivity, and the degree of likelihood that an individual will help a fellow colleague.
- Treatment cost savings can result in not only economic productivity, but also improved workplace behavior.

Source:
Benefits of Treatment: The “Triple Aim”

Beyond economics and cost savings, imagine what the U.S. would be like if all 29.4 million people with OSA received treatment...

**Payors/Employers**
- Reduces costs long-term
- Increases productivity
- Lowers accident rates and liability costs

**Patients**
- Improves health and life expectancy
- Increases productivity
- Increases quality of life
- Improves relationships

**Providers**
- Aligns with population health incentives
- Improved outcomes increases profit in a value-based healthcare system
- Lowers healthcare utilization and reduces admissions
What Does the Patient Experience Tell Us that OSA Treatment Can Deliver?

*Results of a Recent Survey of 506 Americans Treating their OSA*
Profile of Respondents

506 U.S. adults (18+ yrs old) being treated for OSA responded to an online survey

**Gender**
- Male: 52%
- Female: 48%

**Age**
- 18 - 29 years: 3%
- 30 - 49 years: 15%
- 50 - 69 years: 56%
- 70 - 89 years: 26%

**Household Income**
- $61,250 per year (Mean)

**Age Diagnosed with Sleep Apnea**
- 53 years old (Mean)

**Age Beginning Treatment for Sleep Apnea**
- 53 years old (Mean)
Profile of Respondents

Geographic Location

- West: 24%
- Midwest: 27%
- South: 33%
- North East: 16%

Occupational Status

- Employed: 50%
- Homemaker: 2%
- Disabled/ Unable to work: 4%
- Retired: 4%
- Unemployed: 12%

Base: n=506
Q2. What is the state you currently live in?
Diagnosis and Treatment

What type of healthcare provider initially warned you about the risk of sleep apnea? (n=506)

- Sleep Specialist: 30%
- Pulmonologist: 28%
- Cardiologist: 15%
- Endocrinologist: 12%
- Ear Nose Throat (ENT): 6%
- Other: 4%

What caused you to raise the issue of your risk of sleep apnea with your healthcare provider? (n=61)

- Excessive Drowsiness: 56%
- Poor Quality of Life: 34%
- Work Performance: 16%
- Friend/relative has sleep apnea: 26%
- Snoring/Disturbing bed partner: 70%
- Encouragement from bed partner: 34%
- Automotive Accident: 2%
- Learned about sleep apnea in reading/watching programs: 20%

(Percentages under 3% not shown for transparency.)
Diagnosis and Treatment

What type of doctor diagnosed you with sleep apnea? (n=506)

- Sleep Specialist: 21%
- GP/ Internist: 10%
- Endocrinologist: 3%
- Ear Nose Throat (ENT): 64%
- Pulmonologist: 10%
- Cardiologist: 10%
- Neurologist: 17%
- Other: 14%

(Percentages under 3% not shown for transparency).

Time between initial warning about sleep apnea risk and diagnosis following a sleep study (n=506)

- 0 Months: 20%
- 1 Month: 39%
- 2 Months: 17%
- 3 Months: 14%
- 4 or more months: 10%
OSA Severity Assessment
Before and after sleep apnea treatment

**Physician Assessment Upon Diagnosis**

- **When diagnosed**
  - 16% Mild (AHI: 5-14)
  - 43% Moderate (AHI: 15-29)
  - 41% Severe (AHI: 30+)

- **Average Hours of sleep (per 24 hrs)**
  - 5.5 Hrs (mean)

**Physician Assessment During Treatment**

- **During treatment**
  - 62% Mild (AHI: 5-14)
  - 30% Moderate (AHI: 15-29)
  - 8% Severe (AHI: 30+)

- **Average Hours of sleep (per 24 hrs)**
  - 7.2 Hrs (mean)

Base: n=506
Q6a/c. When you were initially diagnosed/ Now that you are being treated, how does your physician describe your sleep apnea?
Q6b/d. When you were initially diagnosed with sleep apnea but before treatment, on average how many hours of sleep did you get in a 24 hour period? How many do you get now that you are being treated?
What treatment did you begin upon diagnosis of sleep apnea? (n=506)

What treatment(s) are you using today? (n=506)

- CPAP (or PAP/AutoPAP/BiPAP)
- Oral Appliances
- Surgery for weight loss (within the year)
- Non-Surgical Weight Loss
- Other
- None

In an average night, for how many hours of sleep do you wear your CPAP/Oral Appliance.
For how many years have you been using the following treatments?

- CPAP
  - 6.3 Hours (Mean)
  - 7.4 years (Mean)

- Oral Appliance
  - 5.6 Hours (Mean)
  - 3.7 years (Mean)
Impact of OSA Treatment on Sleep Quality
76% reported the quality of their sleep as ‘good’/ ‘very good’ after treatment (vs. 7% before treatment). While all user groups indicate improvement, long-term users have the most positive impact after treatment (85%).

On a scale of 1 meaning ‘very bad’ to 5 meaning ‘Very good’, how would you rate the quality of your sleep before and after treatment for sleep apnea? (Percentages under 3% not shown for transparency).
Quality of Sleep Across Comorbidities Before and after sleep apnea treatment

A high proportion of respondents with comorbidities declare their sleep quality as ‘good’/ ‘very good’ after treatment. The biggest difference is among High Blood Pressure patients (79% vs 8% before treatment) and the smallest among Insomnia patients (65% vs. 8% before treatment.)

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes (n=122)</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>33%</td>
<td>42%</td>
</tr>
<tr>
<td></td>
<td>42%</td>
<td>25%</td>
</tr>
<tr>
<td>High Blood Pressure (n=302)</td>
<td>5%</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>36%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>40%</td>
<td>17%</td>
</tr>
<tr>
<td>Depression/ Mental Health (n=186)</td>
<td>13%</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td>34%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>46%</td>
<td>25%</td>
</tr>
<tr>
<td>Heart Disease (n=66)</td>
<td>9%</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td>9%</td>
<td>47%</td>
</tr>
<tr>
<td></td>
<td>32%</td>
<td>21%</td>
</tr>
<tr>
<td>Asthma/ Breathing Problems (n=129)</td>
<td>7%</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>33%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>44%</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Insomnia (n=146)</td>
<td>5%</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>8%</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td>30%</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td>54%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Quality of Sleep – No Comorbidities
Before and after sleep apnea treatment – By years of treatment

Respondents with no existing comorbidities are most satisfied with the quality of their sleep after treatment (89% - ‘good/very good’ after treatment vs. 7% before) with long term users driving the satisfaction at 94%.

<table>
<thead>
<tr>
<th>No existing medical condition (n=71)</th>
<th>New User (under 5 years) (n=23)</th>
<th>Mid-Term User (5 – 10 years) (n=31)</th>
<th>Long-Term User (Over 10 years) (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>6%</td>
<td>44%</td>
<td>6%</td>
<td>19%</td>
</tr>
<tr>
<td>20%</td>
<td>45%</td>
<td>34%</td>
<td>35%</td>
</tr>
<tr>
<td>34%</td>
<td>45%</td>
<td>39%</td>
<td>35%</td>
</tr>
<tr>
<td>39%</td>
<td>10%</td>
<td>39%</td>
<td>39%</td>
</tr>
</tbody>
</table>

Base: n=71
On a scale of 1 meaning ‘very bad’ to 5 meaning ‘Very good’, how would you rate the quality of your sleep before and after treatment for sleep apnea?
Quality of Life and Productivity Benefits vs. Willingness to Invest in Treatment
Improving Sleep Quality Improves Quality of Life

Improvement in Sleep Quality

- Improvement in the quality of relationship with the bed partner is indirectly affected through quality of life and patience improvements, which impact mood and ultimately, the quality of relationship.

Perceived Benefit of Treatment

- By directly impacting quality of life, other aspects, like patience, mood, and relationship quality are indirectly affected.

Improvement in Patience

Improvement in Quality of Life

Improvement in Mood

Improvement in Relationship with Bed Partner

High Influence
Moderate Influence
Low Influence

Quality of life, mood, and patience are mutually interrelated.
Productivity and Absenteeism
Before and after sleep apnea treatment

Hours fully awake, productive and contributing at your job:

- **Before Treatment**
  - 6.9 Hrs (Mean)

- **After Treatment**
  - +1.2 Hrs of Productivity
  - 8.1 Hrs (Mean)

Days absent from work due to illness, disability, medical visits or feeling too tired to work?

- **Before Treatment**
  - 6.3 Days (Mean)

- **After Treatment**
  - 4.5 Days (Mean)
  - 40% fewer absences

Base: n=354
Factors Influencing Amount Patients are Willing to Pay for Treatment

- Perceived Benefit of Treatment
- Employment of Patient
- Total Household Income

The diagram was derived using statistical linear regressions.
Q15. What is the maximum amount you would be willing to pay out of your own pocket each month to treat your sleep apnea?

Mean: $51 per month or $612 per year

37% are not willing to pay

When you consider how much money you have spent treating your sleep apnea, do you feel like that investment was worth the benefits you received?

Base: (n=506)

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Impact of Treatment on Patients with Comorbidities
## Existing Medical Conditions

<table>
<thead>
<tr>
<th>Medical Condition</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension ( n=288 )</td>
<td>60%</td>
</tr>
<tr>
<td>Diabetes ( n=111 )</td>
<td>24%</td>
</tr>
<tr>
<td>Asthma and Other Breathing Problems ( COPD, Emphysema, etc. ) ( n=122 )</td>
<td>25%</td>
</tr>
<tr>
<td>Insomnia ( n=134 )</td>
<td>29%</td>
</tr>
<tr>
<td>Depression, Anxiety or Other Mental Health Problems ( n=176 )</td>
<td>37%</td>
</tr>
<tr>
<td>Heart Disease ( n=54 )</td>
<td>13%</td>
</tr>
<tr>
<td>None of the above ( n=70 )</td>
<td>14%</td>
</tr>
</tbody>
</table>
Sleep Quality in Patients with Hypertension Before and after sleep apnea treatment

**Sleep Quality** (n=302)

- **New User (under 5 years) (n=114)**
  - Before: 5% 7% 22% 34% 32%
  - After: 27% 40% 22% 8% 3%

- **Mid-Term User (5 – 10 years) (n=109)**
  - Before: 4% 14% 42% 40%
  - After: 39% 46% 13%

- **Long-Term User (Over 10 years) (n=79)**
  - Before: 3% 5% 9% 30% 53%
  - After: 35% 49% 14%

On a scale of 1 meaning ‘very bad’ to 5 meaning ‘Very good’, how would you rate the quality of your sleep before and after treatment for sleep apnea?
Hypertension Severity
Before and after sleep apnea treatment

Hypertension seriousness before and after treatment of OSA

Base: n=288 (Percentages under 3% are not shown for transparency).

Hospital visits for Hypertension

Before

Mean: 1.5 Times

Since Treatment

Mean: 0.8 Times
Blood Pressure Improvement and Medication Usage Before and after sleep apnea treatment

**Change in Blood Pressure following OSA treatment**

- **19%** Significantly improved
- **22%** Slightly improved
- **48%** No Change

**Change in Blood Pressure following 1 year of OSA treatment**

- **8%** Slightly Decreased (1%-49% lower dose)
- **9%** Significantly Decreased (50%+ lower dose)
- **1%** Significantly Increased (50%+ higher dose)

**Change in Medication usage**

- **4%** Began medication after treatment started
- **3%** Have never taken medication
- **65%** No Change
- **3%** Stopped taking medication after change

Do not remember: **11%**

*Base: n=288*
Sleep Quality in Patients with Heart Disease
Before and after sleep apnea treatment – By years of treatment

Base: n=66

On a scale of 1 meaning ‘very bad’ to 5 meaning ‘Very good’, how would you rate the quality of your sleep before and after treatment for sleep apnea?
# Heart Disease Severity

**Before and after sleep apnea treatment**

<table>
<thead>
<tr>
<th>Heart Disease seriousness before and after OSA treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>7%</td>
</tr>
</tbody>
</table>

Base: $n=54$ (Percentages under 3% are not shown for transparency).

# Heart disease related hospital visits

**Before**

- Mean: 2.4 Times
- 30%: 20%
- 24%: 17%
- 9%: 13%
- 7%: 11%

**Since Treatment**

- Mean: 2.2 Times
- 46%: 13%
- 20%: 7%
- 11%: 6%
- 13%: 4%

Base: $n=54$ (Percentages under 3% are not shown for transparency).
Heart Disease Improvement and Medication Usage Before and after sleep apnea treatment

### Change in Heart Disease Following OSA Treatment

- Significantly improved: 30%
- Slightly improved: 26%
- No Change: 37%
- Slightly worsened: 4%
- Significantly worsened: 2%

### Change in Heart Disease Medication Usage After 1 year of OSA Treatment

- Decreased (1%-49% lower dose): 6%
- Decreased (50%+ lower dose): 9%
- Increased (50%+ higher dose): 4%
- Increased (1%-49% higher dose): 6%

### Medication Usage Changes

- Began medication after treatment started: 4%
- Have never taken medication: 17%
- No Change: 54%
- Stopped taking medication after change: 2%

Base: n=54
Quality of Sleep in Patients with Diabetes
Before and after sleep apnea treatment – By years of treatment

**Sleep Quality** (n=122)

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>New User (under 5 years) (n=41)</td>
<td>5% 27% 39% 27%</td>
<td>24% 37% 32% 7%</td>
</tr>
<tr>
<td>Mid-Term User (5 – 10 years) (n=50)</td>
<td>20% 36% 44%</td>
<td>34% 42% 24%</td>
</tr>
<tr>
<td>Long-Term User (over 10 years) (n=31)</td>
<td>3% 6% 13% 19% 58%</td>
<td>32% 48% 16% 3%</td>
</tr>
</tbody>
</table>

Base: n=122

On a scale of 1 meaning ‘very bad’ to 5 meaning ‘Very good’, how would you rate the quality of your sleep before and after treatment for sleep apnea?
Diabetes Severity
Before and after sleep apnea treatment

### Diabetes seriousness before and after OSA treatment

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Not Serious</td>
<td>17%</td>
<td>26%</td>
</tr>
<tr>
<td>2</td>
<td>24%</td>
<td>35%</td>
</tr>
<tr>
<td>3</td>
<td>38%</td>
<td>28%</td>
</tr>
<tr>
<td>4</td>
<td>17%</td>
<td>4%</td>
</tr>
<tr>
<td>5 - Life Threatening</td>
<td>4%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Base: n=111 (Percentages under 3% are not shown for transparency).

### Diabetes related hospital visits before and 1 year after OSA treatment

**Before**
- Mean: 2.8 Times
- Zero: 69%
- Once: 9%
- Twice: 4%
- Three times: 9%
- Four or more times: 6%

**Since Treatment**
- Mean: 1.5 Times
- Zero: 81%
- Once: 6%
- Twice: 6%
- Three times: 4%
- Four or more times: 6%
Diabetes Improvement and Medication Usage Before and after sleep apnea treatment

Change in hemoglobin A1C test score following OSA treatment

- **Significantly improved:** 8%
- **Slightly improved:** 23%
- **No Change:** 42%
- **Slightly worsened:** 3%
- **Significantly worsened:** 0%

Base: n=111

Change in diabetes medication usage 1 year after OSA treatment

- **Decreased (1%-49% lower dose):** 5%
- **Decreased (50%+ lower dose):** 3%
- **Increased (50%+ higher dose):** 8%
- **Increased (1%-49% higher dose):** 13%

**Additional categories:**
- Began medication after treatment started: 5%
- Have never taken medication: 5%
- No Change: 60%
- Stopped taking medication after change: 3%

Do not remember: 23%
Quality of Sleep in Patients with Asthma/Breathing Problems
Before and after sleep apnea treatment – By years of treatment

Sleep Quality (n=129)

New User (under 5 years) (n=44)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Very bad</td>
<td>5%</td>
<td>9%</td>
</tr>
<tr>
<td>2</td>
<td>9%</td>
<td>20%</td>
</tr>
<tr>
<td>3</td>
<td>20%</td>
<td>32%</td>
</tr>
<tr>
<td>4</td>
<td>32%</td>
<td>34%</td>
</tr>
<tr>
<td>5 - Very good</td>
<td>34%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Mid-Term User (5 – 10 years) (n=49)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Very bad</td>
<td>6%</td>
<td>12%</td>
</tr>
<tr>
<td>2</td>
<td>12%</td>
<td>41%</td>
</tr>
<tr>
<td>3</td>
<td>41%</td>
<td>41%</td>
</tr>
<tr>
<td>4</td>
<td>41%</td>
<td>22%</td>
</tr>
<tr>
<td>5 - Very good</td>
<td>22%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Long-Term User (over 10 years) (n=36)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Very bad</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>2</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>3</td>
<td>6%</td>
<td>25%</td>
</tr>
<tr>
<td>4</td>
<td>25%</td>
<td>61%</td>
</tr>
<tr>
<td>5 - Very good</td>
<td>61%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Base: n=129
On a scale of 1 meaning ‘very bad’ to 5 meaning ‘Very good’, how would you rate the quality of your sleep before and after treatment for sleep apnea?
Asthma/Breathing Problems Severity Before and after sleep apnea treatment

Asthma or other Breathing Problems related hospital visits before and 1 year after OSA treatment

**Before**
- Zero: 57%
- Once: 12%
- Twice: 9%
- Three times: 13%
- Four or more times: 11%

**Since Treatment**
- Zero: 57%
- Once: 13%
- Twice: 9%
- Three times: 12%
- Four or more times: 9%

Mean: 2.2 Times
Mean: 1.9 Times

Base: n=122 (Percentages under 3% are not shown for transparency).
Asthma/Breathing Problems Improvement and Medication Usage Before and after sleep apnea treatment

Change in breathing function following OSA treatment

- **24%** Significantly improved
- **30%** Slightly improved
- **38%** No Change
- **4%** Slightly worsened
- **2%** Significantly worsened

Change in medication usage for asthma or other breathing problems after 1 year of OSA treatment

- **9%** Decreased (1%–49% lower dose)
- **9%** Decreased (50%+ lower dose)
- **7%** Increased (1%–49% higher dose)
- **6%** Increased (50%+ higher dose)

- **2%** Began medication after treatment started
- **3%** Have never taken medication
- **58%** No Change
- **6%** Stopped taking medication after change

Base: n=122
Quality of Sleep in Patients with Insomnia Before and after sleep apnea treatment – By Years of Treatment

<table>
<thead>
<tr>
<th>Sleep Quality (n=146)</th>
<th>New User (under 5 years)(n=65)</th>
<th>Mid-Term User (5 – 10 years) (n=47)</th>
<th>Long-Term User (over 10 years) (n=34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>5% 8% 30% 54%</td>
<td>6% 12% 31% 51%</td>
<td>4% 4% 34% 55%</td>
<td>6% 6% 6% 24% 59%</td>
</tr>
<tr>
<td></td>
<td>22% 45% 22% 11%</td>
<td>23% 36% 38%</td>
<td>21% 50% 26% 3%</td>
</tr>
<tr>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>5 - Very good</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1 - Very bad</td>
</tr>
</tbody>
</table>

Base: n=146
On a scale of 1 meaning 'very bad' to 5 meaning 'Very good', how would you rate the quality of your sleep before and after treatment for sleep apnea?
Insomnia Severity Before and after sleep apnea treatment

Base: n=134 (Percentages under 3% are not shown for transparency).

Insomnia seriousness before and after OSA treatment

Healthcare provider visits before and after OSA treatment

Mean: 4.3 Times

Mean: 3.3 Times

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Insomnia Improvement and Medication Usage Before and after sleep apnea treatment

Change in insomnia symptoms and frequency following OSA treatment

- **Significantly improved**: 45%
- **Slightly improved**: 28%
- **No Change**: 22%
- **Slightly worsened**: 1%
- **Significantly worsened**: 0%

Change in insomnia medication usage 1 year following OSA treatment

- **Decreased (1%-49% lower dose)**: 6%
- **Decreased (50%+ lower dose)**: 6%
- **Increased (1%-49% higher dose)**: 7%
- **Increased (50%+ higher dose)**: 0%

Began medication after treatment started: 3%

Have never taken medication: 38%

No Change: 29%

Stopped taking medication after change: 11%

Base: n=134
Quality of Sleep in Patients with Depression/Mental Health Problems
Before and after sleep apnea treatment – By years of treatment

Sleep Quality \( (n=186) \)

- New User (under 5 years) \( (n=78) \)
  - Before: 4% 4% 19% 32% 41%
  - After: 29% 37% 26% 6%

- Mid-Term User (5-10 years) \( (n=58) \)
  - Before: 3% 7% 39% 50%
  - After: 22% 47% 29%

- Long-Term User (over 10 years) \( (n=50) \)
  - Before: 6% 10% 32% 50%
  - After: 24% 56% 18%

Base: \( n=186 \)

On a scale of 1 meaning ‘very bad’ to 5 meaning ‘Very good’, how would you rate the quality of your sleep before and after treatment for sleep apnea?
Depression, Anxiety or Other Mental Health Problems Severity
Before and after sleep apnea treatment

Depression, Anxiety or Other Mental Health problems seriousness before and after OSA treatment

Depression, Anxiety/Mental Health problems healthcare providers visits before and 1 year after OSA treatment

Before: Mean: 18.2 Times

Since Treatment: Mean: 14.8 Times

Base: n=176 (Percentages under 3% are not shown for transparency).
Depression, Anxiety or Other Mental Health Problems Improvement and Medication Usage Before and after sleep apnea treatment

Days without feelings of depression, anxiety/mental health problems before and after treatment of OSA

- **23%** signifi cantly improved
- **26%** slightly improved
- **38%** no change
- **1%** slightly worsened
- **2%** significantly worsened

Base: n=176

Change in Depression, Anxiety/ Mental Health problems medication usage after 1 year of OSA treatment

- **9%** decreased (1%-49% lower dose)
- **7%** decreased (50%+ lower dose)
- **6%** increased (50%+ higher dose)
- **10%** increased (1%-49% higher dose)

- **2%** began medication after treatment started
- **6%** have never taken medication
- **58%** no change
- **4%** stopped taking medication after change
Mental Health Attributes
Before and after sleep apnea treatment

**Quality of Life**

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>9%</td>
<td>37%</td>
</tr>
<tr>
<td>17%</td>
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</tbody>
</table>

**Relationship with Bed Partner**

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>12%</td>
<td>22%</td>
</tr>
<tr>
<td>13%</td>
<td></td>
</tr>
</tbody>
</table>

**Quality of Mood**

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>19%</td>
<td>36%</td>
</tr>
<tr>
<td>12%</td>
<td></td>
</tr>
</tbody>
</table>

**Degree of Patience**

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>18%</td>
<td>34%</td>
</tr>
<tr>
<td>12%</td>
<td></td>
</tr>
</tbody>
</table>

Base: n=506

On a scale of 1 meaning ‘very bad’ to 5 meaning ‘Very good’, how would you rate <attribute> before your treatment for sleep apnea and today?

(Percentages under 3% not shown for transparency).
Substance Abuse and Weight Before and after sleep apnea treatment

Q62-Q67. Before treatment how many cigarettes/ alcoholic drinks/ sleeping pills did you smoke/ drink/ take on average per week? And how many since treatment?

Then (Per week)
- Alcoholic Drinks: 2.9
- Cigarettes: 22.3
- Sleeping Pills: 1.

Mean Score

Vs

Now (Per week)
- Alcoholic Drinks: 2
- Cigarettes: 8.
- Sleeping Pills: 1.

Mean Score

Q68. Weight Gain/ Loss (since beginning of treatment)
- Gained: 16%
- Lost 1-10 pounds: 10%
- Lost 11-20 pounds: 12%
- Gained 1-10 pounds: 16%
- Gained 20 pounds or more: 9%
- No Change: 30%

Lost

Gained
Summary of Findings
OSA Treatment Economic Analysis

- Annual per patient diagnosis and treatment costs are 67% less than leaving patients undiagnosed

- Diagnosing and treating all 29.4M Americans with OSA could save $100.1 billion

- Biggest opportunity cost involves lost workplace productivity
Diagnosis and Treatment of OSA – The Patient Perspective

- **Physician specialists** most common provider warning about OSA risk
- **Only 30-40%** began discussions about OSA with PCP
- **70%** received OSA diagnosis <2 months after initial risk identification
- **PAP therapy** most common treatment
- Over time, **PAP use may drop** in favor of weight loss and sleep positioning
- However, weight loss **not emphasized**
OSA Treatment Benefits – The Patient Perspective

- Respondents gained an additional 1.7 hours of sleep after treatment
- 11x increase reporting sleep as “good” or “very good” following treatment with a long-term persistence effect beyond initial adoption
- The percentage of respondents stating their quality of life was “good/very good” tripled (26% vs. 76%) following treatment
- Satisfaction with bed partner relationship, mood and patience doubled
- Use of alcohol, cigarettes, and sleeping aids substantially declined post-treatment
- Productive work time grew 17% after treatment
- Work absences declined 40% after treatment
Treating OSA Saves Patients Money

Home
• Decrease in **direct medical costs and co-pays:**
  o 3% of OSA patients with hypertension able to stop and another 17% decrease medication
  o Diabetics with treated OSA report nearly half (2.8 vs. 1.5) the annual hospital visits
• **Reducing use of depressives and stimulants** to manage symptoms:
  o 31% fewer alcoholic drinks = $187.20 savings per year ($4 per drink)
  o 62% fewer cigarettes = $197.70 savings per year ($0.28 per cigarette)
  o 21% fewer sleeping pills = $31.20 savings per year ($2 per pill)
• Reducing cost of **auto accidents and higher insurance premiums**

Workplace
• **1.8 days fewer workplace absences per year = $363.46 new earnings per year for hourly workers**
• 1.2 hours of **increased productivity** per day = Equivalent to **$4,274.25 more value** per employee and contributing to promotions, bonuses, and greater job stability for patients

Out-of-Pocket Patient Spending on OSA

• 78% said OSA treatment a good investment relative to what they spent out-of-pocket

• Respondents willing to spend an average of $612 per year on OSA treatment

• ~1/3 unwilling to spend ANYTHING for OSA treatment despite benefits

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OSA Treatment Has a Major Impact on Comorbidities

After one year, patients surveyed state OSA treatment delivers…

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>Improvement Details</th>
</tr>
</thead>
</table>
| **Hypertension**                   | • 41% report blood pressure improvement  
• 17% report decrease in medication usage |
| **Diabetes**                       | • 31% report improved HbA1c  
• 14x increase in “good quality” sleep                                           |
| **Asthma & Breathing Conditions**  | • 54% report improved respiratory function  
• 70% increase in patients reporting symptoms as mild  
• 8x increase in “good quality” sleep                                              |
## OSA Treatment Has a Major Impact on Comorbidities

<table>
<thead>
<tr>
<th>After one year, patients surveyed state OSA treatment delivers…</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insomnia</strong></td>
</tr>
<tr>
<td>• 7x increase in good quality sleep</td>
</tr>
<tr>
<td>• Decline from 54% to 1% reporting “very bad” quality sleep</td>
</tr>
<tr>
<td><strong>Depression, Anxiety and Mental Health</strong></td>
</tr>
<tr>
<td>• 12x increase in “good quality” sleep</td>
</tr>
<tr>
<td>• 4x reduction in reported life threatening mental health condition</td>
</tr>
<tr>
<td>• 49% report improved mental health</td>
</tr>
<tr>
<td><strong>Heart Disease</strong></td>
</tr>
<tr>
<td>• 56% report reduced heart disease risk</td>
</tr>
<tr>
<td>• 5x decrease in self-reported life-threatening heart disease</td>
</tr>
<tr>
<td>• Decline from 50% to 3% reporting “very bad” quality sleep</td>
</tr>
<tr>
<td>• Increase from 0% to 26% reporting “very good” quality sleep</td>
</tr>
</tbody>
</table>
CONTROL ASTHMA NOW!
STRATEGIES TO IMPROVE ASTHMA CONTROL related to sleep, depression and anxiety a PBL session

After participating in this activity, participant should be able to:

1. Explain the differences in managing asthma based on disease severity or based on disease control and medication safety with respect to anxiety, depression and sleep disruption.
2. Describe the assessment measures of asthma control and medication safety that should be accomplished during the periodic visit for asthma by asthma educator.
3. Initiate appropriate step-up and step-down management strategies to maintain asthma control utilizing the NHLBI guidelines and recent data on potential side effects of oral and inhaled corticosteroids and other asthma meds as related to sleep, and depression.
4. Discuss the use of shared decision making to improve outcomes with respect to sleep, depression and anxiety.

Case: Lauren uncontrolled persistent asthma

DR BUKSTEIN I am Dr Bukstein, I am an Allergist and Immunologist at the Dean Clinic in Madison, WI. I have with me Ruth a PA asthma educator, our new resident working with us today. We will be seeing and evaluating Lauren in a few min. Lauren is an obese 24-year-old who presents with a long history of mild intermittent asthma. She recently began a running program in order to get in shape and lose weight, but complains now of chest tightness and cough while exercising. Her symptoms begin about 15 minutes into the jog, but stop after she rests for a time. Ruth, our nurse practitioner and asthma educator who are administering the ACT questionnaire currently see Lauren. What additional information do we need?

Ruth: Well, we need to know what is Lauren’s past medical history, review of systems, social history, environmental history and family history?

DR B. She has mild allergic rhinitis in the spring for which she takes OTC antihistamine. She has only been seen in the emergency room once or twice for coughing thought to be from viral infection. Her regular medication also includes over-the-counter cold medication. She recalls that oral steroids have been given in the ER in the distant past and a primary care provider has prescribed her an albuterol inhaler for cough. She is now using her albuterol inhaler prior to exercise without much success. Now she is having SOB daily and is very
Lauren lived with her parents until about 19 years of age and they both smoked in the home. Possible other triggers besides exercise are damp areas, moldy areas and cleaning agents.

Ruth: What differential diagnosis are we considering for Lauren?

DR B I think the differential diagnosis of course should include exercise asthma. Her history thus far is suggestive of mild intermittent asthma according to those guidelines based on the National Asthma Education program. In this case, it is quite obvious that she has exercise-induced asthma and she is not responding to pretreatment with albuterol. She also seems depressed and very anxious.

Ruth: Now, how do we further assess Lauren? The new NIH guidelines mention assessing asthma severity; they also mention assessing asthma control. What’s the difference? What other comorbidities does she have?

DR B The key elements in the 2007 guidelines Ruth are assessment and monitoring. We have to establish severity of her asthma, establish whether her asthma is controlled, and what the responsiveness to current/previous treatment has been. We should only assess asthma severity when initiating therapy; control is based on monitoring and adjustment of therapy. Finally we have to assess adherence and Psychological factors that may influence her asthma control.

NHLBI defines three level of control “well controlled, not well controlled, and very poorly controlled”. Well-controlled asthma is characterized with:

- Infrequent (to none) chronic and troublesome symptoms (e.g., coughing or breathlessness in the daytime, in the night, or after exertion)
- Infrequent use (<2 days a week) of SABA for quick relief of symptom
- (Near) “Normal” pulmonary function
- 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 including shared decision-making...

Let’s look at how we establish level of control for Lauren. Asthma control should take into account to two domains, impairment and risk. Likelihood of asthma exacerbation, decline in lung function and risk of adverse effects form pharmacotherapy is the risk domain. We assess those mainly by looking at how many exacerbations that patient have had. For Lauren, it would be

- Frequency and severity of any exacerbation that brought him for acute care into their doctor’s ER or Urgent Care (infrequent)
- Whether he is using oral corticosteroid bursts, every oral corticosteroid burst is an exacerbation (infrequent)
- And decline in lung function, here, we can use certain biomarkers, the most prevalent used exhaled nitric oxide, to help us with control and adherence assessment

Now, let’s look at impairment, which include symptom frequency, frequency of rescue medication, lung function, the degree to which asthma affects normal activities and treatment meets expectations. Her symptoms frequency is less than twice a week, except when she is exercising every day. Her ACT test today is 16, but 14 during periods of
time when she is exercising daily. Lauren’s exercise asthma is poorly controlled. She also has a positive two question depression screen.

Ruth: You have mentioned the ACT several times and depression screen several times-how important are these tests and why do you do them every visit?

DR B. The ACT is a questionnaire specifically designed and validated to measure asthma control. The nurse generally administers it before the physician sees the patient. There are in fact several questionnaires that have been developed and validated for assessing asthma control: The ACT, the ACQ, and the ATAQ. The ACT is five brief questions: In the past four weeks how much of the time did your asthma keep you from getting as much work done at work, school, or home? In the past four weeks, how often have you had shortness of breath? During the past four weeks, how often did asthma symptoms wake you up at night or early in the morning? During the past four weeks, how often have you used your rescue inhaler? How would you rate your asthma control over the last four weeks? ACT score >20 indicate well controlled, ACT score between 16 and 19 indicates not well controlled, less than 14 indicate very poorly controlled. Different scales exist for ATAQ and ACQ but they serve the same purpose.

The depression screen is the FP depression screen that if positive leads to the PHQ-9

Ruth: Looking at her medical history, why is it important to look for comorbid conditions, or trigger for asthma? What about her sleep could that is a factor?

DR B. There are some comorbidities that are associated with asthma. If these comorbidities are not well controlled, then asthma will be even more difficult to control. These comorbidities are upper airway obstruction, gastroesophageal reflux, obesity, obstructive sleep apnea and other sleep disorders, depression, smoking, even second hand smoking, chronic obstructive lung disease can often get confused for asthma in smokers. If you are a smoker or overweight, your asthma medications, especially inhaled corticosteroids, will not work as well. You always have to be especially aware that vocal cord dysfunction can often be confused with exercise induced asthma. Additional evaluation for vocal cord dysfunction will be undertaken if she does not respond well to asthma therapy.

Let’s look at Lauren: there are no obvious signs of sinusitis or gastroesophageal reflux. She does have symptoms suggesting of allergic rhinitis, and her parents were smokers. She has had slight wheezing in the past and certainly her history is compatible with asthma. We gave her a sleep questionnaire and she has significant sleep problems-both with initiation of sleep and disruptions of sleep.

Ruth: How do you recommend to manage this patients? Her Depression? Her sleep Problems/ Her lifestyle problems with weight?

DR B Remember the 4 components of asthma management,

- make sure we do an adequate assessment and monitoring
- control environmental factors and comorbid condition
- establish an educational partnership including shared decision making
- Pharmacotherapy

No matter how much we properly assess, and recommend treatment, it will only be effective if patient comprehend and are willing to participate in their care. We have to provide asthma education encouraging patient self-management. There must be a partnership between our
patients and us. For Lauren, it is really important for us to understand how much exercise she really wants to do on an ongoing basis and look for a therapy that can allow this, we also need to make sure that we educate her about her asthma, the role of medications and make sure she has the skills and ability to take her medications properly, and to monitor and recognize her symptoms and understand how to use her action plan.

Ruth: All right, so what pharmacotherapy would you suggest? Does she need any?
DR B: You are raising a good point Ruth: Lauren takes albuterol inhaler, and one aspect of her management we have not talked about is her adherence to the medication. Does she take the inhaler properly? Does she take it every time before exercising? We really cannot determine this at this point in time but we will make sure to check her inhaler technique before she leaves the office today. Does she have VCD and do we need to evaluate her for possible VCD?

Lauren is uncontrolled despite the use of albuterol prior to exercise; therefore, we need to step up therapy until we achieve control. We classify drugs as quick relievers, which are bronchodilators and long-term controllers, which are anti-inflammatory. The quick reliever drug is used for treatment to relax muscles around the airway and long-term control or prevention reduces inflammation.

Now for Lauren, what we want is a medication that is going to control her symptoms during and after exercising. Many physicians may prescribe daily-inhaled steroid, and this would be an acceptable choice. Another acceptable choice would be a trial with a daily LTRA for 4 to 6 weeks. LTRA are alternate therapy to inhaled ICS in step 2 management. An LTRA would help better control her allergic symptoms when they occur in the spring and fall and certainly will be helpful in managing her exercise induced asthma. There are multiple studies to show that LTRA on a daily basis can prevent exercised induced asthma. I would instruct her to take her LTRA daily and albuterol prior to exercise. NHLBI guidelines also include cromones or theophylline for management in step 2, but the first is not used often these days because of inconvenience and inferior efficacy, and the second requires blood monitoring. We gave Lauren the option of a daily low dose ICS or a LTRA, and because of convenience and likelihood of beneficial effect on her allergic rhinitis, she choose and LTRA.

Ruth: “How can we follow this patient over time, won’t her asthma change from week-to-week?”
DR B: You are very correct. There are studies to show that during one year, 43% of over 27,000 patients met greater than 1 of the following criteria for uncontrolled asthma, greater than 4 short-acting beta-agonist, one oral corticosteroid script or one asthma-related ED visit. Each quarter during years 2 and 3, 53% over 19,000 of the controlled patients from year one met these criteria. So you can see that a patient’s asthma control will definitely fluctuate over time.

Ruth: When do we need to see Lauren again?
DR B: We are going to reassess Lauren in about a month, see how she responds to the LTRA. We will do the focused asthma visit in follow up. We will assess control by frequency of symptoms, frequency of rescue bronchodilators, frequency of night and morning symptoms, activity, work limitations, patient assessment and we will do a pulmonary function test. We’ll
question her about her quality of life, expectation regarding her asthma and her asthma management; we'll look side effect to therapy. Overall, we want to develop a partnership with Lauren, develop an open communication. We want her to understand how to use her inhaler, we’ll go through the process every time, and we’ll teach her how to recognize her symptoms so she can manage them.

1 month later:

Dr B. Hello Ruth, your remember Lauren with exercise induced asthma and uncontrolled persistent asthma? I just saw Lauren today. She is doing well, taking her daily LTRA and albuterol. Her parents still smoke around her, but no other smoke exposure, and it is limited, as she does not live at home anymore. She is still having some runny, stuffy nose and her ACT today has improved: it is 24, and 19 during and after exercise. Overall this has been a good improvement and we will continue this regimen. Still, if Lauren exhibits s poor control with more than one exacerbation in a year, we will add ICS to her regimen,

We will see her again in one month, and then every 6-month if she continues to do well. Periodically, we’ll want to assess her psychological status, her adherence to treatment, make sure she has an action plan and follows it, make sure our diagnosis is correct and that we are monitoring all comorbidities and complications. We need to keep in mind that her appreciation of her asthma symptoms may be quite low, and there still be may some ongoing chronic problems that she may not appreciate. If she is well controlled, we are going to try and step-down on her therapy and use less therapy. Should we decide to step down, we’ll need to see Lauren every 3 months during the process to follow her closely.
Don A. Bukstein, M.D.

Allergy/Immunology, Pediatric Pulmonary Disease
Director of Allergy & Asthma Research
Dean Medical Center
Madison, Wisconsin USA

Current Appointments
Don A. Bukstein, M.D., is a board-certified Allergist/Immunologist, Pediatric Pulmonologist, and Director of Allergy and Asthma Research at Dean Health System, Inc. in Madison, Wisconsin. He holds hospital staff appointments at St. Marys Hospital Medical Center, Meriter Hospital, and the University of Wisconsin Hospital in Madison. Dr. Bukstein is also an Clinical Professor in the Department of Pediatrics and Family Practice at the University of Wisconsin-Madison. He worked as a pediatric intensive care physician for 17 years at St. Marys Hospital Medical Center. He is also a fellow of: American Academy of Allergy, Asthma & Immunology; American College of Allergy, Asthma & Immunology; and American Thoracic Society.

Educational Background
Dr. Bukstein received his B.A. in English Literature from Tulane University in New Orleans, Louisiana, and his medical degree cum laude from the University of Missouri-Columbia. He completed his internship and residency in Pediatrics at Children’s Medical Center of Dallas, University of Texas Southwestern Medical School. He also completed fellowships in Allergy/Immunology at National Jewish Hospital, and in Pediatric Pulmonary Medicine at the University of Colorado.
Publishments/Presentations
Dr. Bukstein is considered a national expert in the use of clinical outcomes in managed care. He has had over 100 articles published in such peer-reviewed journals as The American Journal of Managed Care, Allergy, Pediatrics, and Journal of Clinical Outcomes Management. He also gives approximately 50 presentations a year regarding Pediatric Pulmonary disease, Apnea, allergic disease, asthma, and quality of life/health outcomes.

Clinical Research Study Investigator
Dr. Bukstein has experience as a principal investigator in more than 50 clinical research trials focusing on allergic disease, apnea, asthma, outcomes research, and sinusitis. He has conducted research sponsored by grants from the National Institute of Health (NIH) and NIAID. He has also been the recipient of clinical medical school grants from Merck & Co., Inc.

Consultant/CME
Dr. Bukstein has served as a consultant, participated in physician education programs, served on asthma advisory boards and has been a member of speaker bureaus under sponsorship of: American Lung Association; American Thoracic Society; American College of Chest Physicians; American Academy of Allergy, Asthma & Immunology; American College of Allergy, Asthma & Immunology; AstraZeneca Pharmaceuticals; GlaxoSmithKline; Merck & Co., Inc.; Genentech; Novartis; Schering-Plough; and Aventis Pharmaceuticals.
Educational Activities

Co-founder of Dean/St. Mary’s Free Asthma Clinic community project

Longest serving member on the Committee for the Underserved ACAI, ATS, AAAI

Co-Founder of Getting Better LLC a research group investigating the use of wellness programming in Chronic disease.

I have completed over 10 community service asthma education programs within the Madison Metropolitan School District. These programs have been funded through educational grants totaling over $100,000.

State CME committee member (8 years)
National ACCME committee member (7 years)
State Medical Society Board Member for 5 years
Academy of Allergy and the College of Allergy CME committee for 5 years
State Medical Society MORP outcomes research (I was one of only two
Wisconsin MD’s to serve on two MORP projects involving Adult and
Pediatric Asthma Study Groups. In this capacity, I developed the Asthma
Tool Kit.)
State Medical Society member of the Executive Committee and Investigator for the
National Health Institute grant of the WARN project
Consultant to State Medical Society on outcomes research, disease management, and evidence-based guidelines
Helped develop “Clinical Practice Fact Sheets for Respiratory Illness” for the State Medical Society’s WARN project
Member of several task forces sponsored by the State Medical Society
Recipient of Wisconsin State medical Society grant for improving education of patients with regard to Lifestyle changes-current grant through 2013
Smoking, nicotine replacement, smokeless tobacco, and hookahs

Maureen George PhD RN AE-C FAAN
Columbia University School of Nursing
mg3656@cumc.columbia.edu
Objectives

- Describe the physiologic damage caused by smoking
- Discuss the dangers of second- and third-hand smoke
- Recognize nicotine addiction
- Identify the advantages of quitting
- Compare and contrast nicotine replacement therapies (NRT) and the health effects of e-cigarettes and hookah
Figure 2.1 Adult* per capita cigarette consumption and major smoking and health events, United States, 1900–2012

- 1964 Surgeon General’s report on smoking and health
- Broadcast ad ban
- Nonsmokers’ rights movement begins
- Federal cigarette tax doubles
- Confluence of evidence linking smoking and cancer
- U.S. entry into WWI
- Great Depression begins
- Fairness Doctrine messages on broadcast media
- Cigarette price drop
- FDA proposed rule
- Master Settlement Agreement
- Nicotine medications available over-the-counter
- Synar Amendment enacted
- 2006 Surgeon General’s report on secondhand smoke (an update)
- 1966 Surgeon General’s report on secondhand smoke
- Federal $0.62 tax increase
15.1% of American adults are current smokers

- By Gender
  - Nearly 17 of every 100 adult men (16.7%)
  - More than 13 of every 100 adult women (13.6%)

- By Race/Ethnicity
  - Nearly 22 of every 100 non-Hispanic American Indians/Alaska Natives (21.9%)
  - Nearly 17 of every 100 non-Hispanic Blacks (16.7%)
  - More than 16 of every 100 non-Hispanic Whites (16.6%)
  - More than 10 of every 100 Hispanics (10.1%)
  - 7 of every 100 non-Hispanic Asians* (7.0%)

CDC 2015
Cigarettes contain more than just tobacco
Smoking’s effect on the body
Deaths due to tobacco

- Lung cancer (34%)
- Heart disease (29%)
- Lung disease (29%)
- Digestive diseases (3%)
- Lower respiratory infections (2%)
- Diabetes mellitus (2%)
- Tuberculosis (1%)
Why do people smoke?

Everyone believes that smoking is unhealthy, so why do people still smoke?

- They deny that they are at risk
  - ‘My Uncle Joe smoked 2 packs a day and was never sick a day in his life’

- They are unrealistic about their ability to quit before they suffer a disease or get addicted

- Their friends and families smoke

- Young girls smoke because nicotine is a legal and accessible appetite suppressant
Signs of a smoking addiction (and not a habit)

- Smokes within 30 minutes of waking up
- Smokes more than a pack a day
- Sneaks cigarettes
- Smokes even when ill
- Spends lots of time thinking about smoking
- Craves cigarettes with other behaviors (after meals)
- Needs more cigarettes over time to achieve same effects
- Focuses on useful effects (calms nerves; help focus)
- Has withdrawal symptoms when not allowed to smoke
- Smokes despite knowing health hazards
Characteristics of male smokers

- May have more nicotine dependence
- Smoke more for nicotine reinforcement
- Benefit more from having a support person during their cessation attempts
Characteristics of female smokers

- Smoke fewer cigarettes per day
- Smoke more as a social behavior
- Are more responsive to behavioral interventions for cessation
- Are more likely to use tobacco as an appetite suppressant
Menthol cigarettes

- 75 percent of all African American smokers smoke menthol cigarettes as compared to 23 percent of White smokers
  - Both incidence and death rates for lung cancer are higher among African American men, partly because of differences in smoking behavior
  - Although African-American men begin smoking at a later age and smoke fewer cigarettes per day than white men, on average, they tend to smoke cigarettes more intensively and are more likely to smoke mentholated cigarettes
Menthol cigarettes

If you smoke menthol cigarettes...

- You tend to smoke cigarettes more intensively (because of the cooling sensation)
  - Inhale more deeply
  - Hold the smoke inside longer than smokers of non-mentholated cigarettes

- This inhalation pattern may cause greater harm to the smoker’s health
Second hand smoke causes

- More asthma
- More asthma attacks
- More passive smokers getting cancer, heart and lung disease
What to do about second-hand smoke?

- Never smoke in the house
- Never smoke in the car
- Don’t allow smokers to smoke in your house or car
What is third-hand smoke?

- Infants and children can ingest or absorb the toxins through their skin.
What to do about third-hand smoke?

- Never smoke in the house
- Never smoke in the car
- Don’t allow smokers to smoke in your house or car
- Wear different clothes when smoking and change them before holding children
Factors associated with successful quitting

- Past attempts
- A plan to stay clear of temptations
- Cigarette reduction is more successful than going ‘cold turkey’
- Older age and finances/insurance that covers nicotine replacement therapy (NRT) and cessation programs
- Having a support person
Planning to quit

- Is it a habit or is it an addiction?
- Identify smoking triggers
- Make a plan and set a quit date

CHOICE IS YOURS
But DON'T BE LATE
Benefits of quitting

- 20 Minutes after quitting your heart rate drops
- 12 hours after quitting carbon monoxide levels in your blood drop to normal
- 2 weeks to 3 months after quitting your heart attack risk begins to drop and lung function begins to improve
- 1 to 9 months after quitting your coughing and shortness of breath decrease
- 1 year after quitting your added risk of coronary heart disease is half that of a smoker’s
- 5 to 15 years after quitting your stroke risk is reduced to that of a nonsmoker
- 15 years after quitting your risk of coronary heart disease is back to that of a nonsmoker’s
Nicotine Replacement Therapy

NRT available over-the-counter
- Transdermal patch
- Nicotine gum
- Nicotine lozenge

NRT available by prescription
- Nicotine inhaler
- Nicotine nasal spray

Prescription drugs
- Varenicline (Chantix)
- Bupropion HCL (Zyban)

See AAFP handout for dosing
E-cigarettes
E-cigarettes

Inside of Electronic Cigarette

LED blu  Smart Chip Controller  Lithium Ion Battery  Cartridge

The vapor is created by

Atomizer heats the eliquid  Heating Vapor Cell  Flavor liquid or eliquid  Silicone Tip
FDA concerns about e-cigs

- Can increase nicotine addiction among young people and may lead kids to try other tobacco products
- Products may contain as many as 38 ingredients known to be toxic
- Clinical studies about the safety and efficacy of these products for their intended use have not been submitted to FDA
  - No way of knowing
  - whether e-cigarettes are safe for their intended use
  - about what types or concentrations of potentially harmful chemicals or what dose of nicotine they are inhaling when they use these products
Hookah smoking

- Tobacco or flavored tobacco
- Has many of the same health risks as cigarette smoking
- Shared mouthpiece leads to other health issues
Hookah smoking

- Use among US high school seniors 17% of boys and 15% of girls used a hookah in the past year
- Use among US college students 22% to 40%
- Charcoal used to heat the tobacco can produce high levels of carbon monoxide, metals and cancer-causing chemicals
- Even after it has passed through water, the smoke from a hookah has high levels of toxins

Because of the way a hookah is used, smokers may absorb more of the toxic substances also found in cigarette smoke than cigarette smokers do

- An hour-long hookah smoking session involves 200 puffs, while smoking an average cigarette involves 20 puffs
- The amount of smoke inhaled during a typical hookah session is about 90,000 ml, compared with 500–600 ml inhaled when smoking a cigarette
Nontobacco Hookah Products

- Some sweetened and flavored nontobacco products are sold
  - Herbal shisha
- Labels and ads claim taste without the harmful effects of tobacco
- Studies show that the smoke contains carbon monoxide and other toxic agents
COLUMBIA UNIVERSITY– SCHOOL OF NURSING
Curriculum Vitae

MAUREEN GEORGE, PHD, RN, AE-C, FAAN

January 2016

BUSINESS ADDRESS
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HOME ADDRESS
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Wyncote PA 19095
M: 215-260-0345

EDUCATION
PhD 2003 University of Pennsylvania School of Nursing, Philadelphia, PA Nursing
MSN 1986 University of Pennsylvania School of Nursing, Philadelphia, PA Nursing
(Pulmonary Clinical Nurse Specialist)
BS 1982 York College of Pennsylvania, York, PA Nursing

POSTGRADUATE TRAINING & FELLOWSHIP APPOINTMENTS
2011-2015 University of Pennsylvania, Philadelphia, PA Senior Fellow Center for Health Behavior Research
2004-2006 Johns Hopkins University School of Medicine, Baltimore, MD NCCAM (1F32AT0020-01) Sponsor Dr. Cynthia Rand
2006 Office of Behavioral and Social Science Research, Warrenton, VA Fellow, Summer Institute on RCTs Involving Behavioral Interventions
2005 Johns Hopkins Bloomberg School of Public Heath Summer Institute of Epidemiology and Biostatistics, Graduate Training Program in Clinical Investigation

PROFESSIONAL EXPERIENCE
ACADEMIC POSITIONS
2015- Associate Professor, Columbia University School of Nursing
2008-2015 Assistant Professor, University of Pennsylvania School of Nursing
2006-2008 Assistant Professor, Johns Hopkins University School of Nursing

CLINICAL & ADMINISTRATIVE POSITIONS
2011-2015 Faculty Advisor, United Community Clinics, student run free primary care clinic
1989-2006 Coordinator, Comprehensive Asthma and Allergy Care Program, University of Pennsylvania Health System, Philadelphia, PA.
1986-1989 Pulmonary Clinical Nurse Specialist, Hospital of the University of Pennsylvania, Philadelphia, PA.

CERTIFICATION/LICENSURE
Specialty certification
2002-present Asthma Educator-Certified, National Asthma Educator Certification Board
1988-2003 Medical-Surgical Clinical Nurse Specialist, American Nurses’ Association Certification
1985-1988 Medical-Surgical Nursing, American Nurses Association Certification

Licensure1982-present PA (RN-254312-L)

HONORS/AWARDS/ MEMBERSHIPS IN HONORARY SOCIETIES
2016 Allied Health Professionals Recognition Award, American Academy of Asthma Allergy and Immunology
2015 The Christine Wagner President’s Lecture Keynote, Association of Asthma Educators
2013 Lifestyle Champion, AmeriHealth Caritas
2013 Department of Family and Community Health Award for Exemplary Teaching, University of Pennsylvania
2013 Exemplary Teaching Award, Department of Family and Community Health, University of Pennsylvania
2012 Dean’s Innovation Award; 2nd Place, University of Pennsylvania
2011 Dean’s Award for Undergraduate Scholarly Mentoring, University of Pennsylvania
2010 American Academy of Nursing Fellow
2010 Outstanding Member Award, Association of Asthma Educators
2006 Educator-of-the-Year Award, Association of Asthma Educators
2003 MHDP Visiting Expert [Scholar], Ministry of Health SINGAPORE
2001 Scholarly Achievement Recognition, University of Pennsylvania Health System
2001 Outstanding Leadership Award, SEPA American Lung Association
1982-Present Sigma Theta Tau, XI Chapter
1978-1982 Dean’s List; Cum Laude, Departmental Honors, York College of Pennsylvania

RESEARCH

Doctoral Dissertation

RESEARCH GRANTS

Grants Pending/Under Review
Using the Electronic Health Record to improve communication between Community Health Workers and the Primary Healthcare Team to enhance asthma and COPD management (CaMPR Pilot Awards 3/1/16-5/31/16), Category: IG. Effort: 0%. Source: Irving Institute for Clinical and Translational Research. Total Direct Costs: $15,000. George (PI)
Precision in Symptom Self-Management (PriSSM) Center (1P30NR016587-01, 7/1/2016-6/30/21) Category: FG. Effort: 20%. Source: NINR T (P30), National Institutes of Health. Bakken (contact), Hickey (Co PIs). Role: Co-I. First Year Direct Costs: $350,000 (Identical for all the following years)
Goal: The goal of the Precision in Symptom Self-Management (PriSSM) Center is to advance the science of symptom self-management for Latinos through a social ecological lens that takes into account variability in individual, interpersonal, organizational, and environmental factors across the life course.
WICER Precision Medicine Transdisciplinary Collaborative Center (TCC) for Advancing Health Equity (U54 NIMHD, 4/1/16-3/31/21). Category: FG. Effort: 20%. Source: NIMHD Transdisciplinary Collaborative Centers for Health Disparities Research Focused on Precision Medicine (U54), National Institutes of Health. Total Direct Costs: $1,640,555. Bakken & Luchsinger (Co PIs). Role: Co-I

Past/Present Funded Research Grants
Health Promotion for Women and Girls in Chalkidiki, Greece. M. S. Sommers and M. George, Co –Principal Investigator. 2012 - 2013 U.S. Department of State ($10,000)
Beliefs associated with adherence to antiretroviral medications post prison release among HIV-positive individuals (06/01/12 – 06/30/13; extended to 10/31/2013) Category. O. % Effort: Co-investigator. Source: (University of Pennsylvania Clinical and Translational Science Awards CEAR Core Grant Award. Total Direct Costs: $10,000. Lisa Lewis, Roberta Herceg-Baron & Kathie Nixon (Co-PIs)
AAFA In-Home: A Comprehensive In-Home Assessment and Education Program for Young Children (CDC-RFA-EH10-1007). Category FG. Effort: Consultant 9/1/11-8/31/12. Source: Asthma and Indoor and Outdoor Air Quality Education Program FOA# CDC-RFA-EH10-1007. 1UE1EH0000764. Charlotte Collins (PI)

Geriatric Education Center of Greater Philadelphia-Health equity and literacy (5-D31HP08808-02-00, 7/1/08-6/30/10). Category: FG. % Effort: 5%. Source Health Resources and Services Administration Total Direct Costs: $371,749.00. Forceia (PI)


Stress and vision fluctuations in retinitis pigmentosa. (7/1/2007-2008). Category: PG. % Effort: 5%. Source: National Institutes of Nursing Research (National Institutes of Health)/Johns Hopkins University School of Nursing Center Grant (Center for Collaborative Intervention Research). Total Direct Costs: $20,000. George (PI)


Complementary medicine/adherence in minorities with asthma (1F31AT1149-01, 7/1/2002-2004). Category: FG. % Effort: 100%. Source: National Center for Complementary and Alternative Medicine, National Institutes of Health. Total Direct Costs: $61,932. George (PI)


Disease management for adults with asthma in Medicaid HMOs: A clinical and economic analysis (RO1-HS10044-01, 1999-2000).Category: R01. % Effort 50%.Source: Agency for Health Care Policy and Research. Leonard Davis Institute (PI)


Research Projects

West Philadelphia Asthma Mixed Methods Project. (2012-2014). School of Nursing, Center for Health Behavior Research, Clinical and Translational Science Awards (Community Engagement and Research Core), Mixed Methods Research Laboratory, and the Cartographic Modeling Lab. Overall goals: To conduct a demonstration project with asthma to provide an example to UPenn researchers on how existing community data can be combined with qualitative data to identify patterns of health indicators. Role: Co-PI (with K. Glanz and F. Barg)

PUBLICATIONS

Journal Articles: Research, Peer Reviewed (all data-based; underline indicates mentee)


George, M., Topaz, M., Rand, C., Sommers, M.S., Glanz, K., Pantalon, M.V., Mao, J., & Shea, J. (2014). Inhaled corticosteroid beliefs, complementary and alternative medicine and uncontrolled asthma in urban minority adults Journal of Allergy and Clinical Immunology, 134, 1252–59. doi: 17.10.1016/j.jaci.2014.07.044


Townsend, K., Corry, J.M., Quigley, B., & George, M. (2012). A feasibility study of Q-sort to determine recall of skin test results and...


**Journal Articles: Clinical, Peer Reviewed (underline indicates mentee)**


Atopic Dermatitis
Treatment and Management

Karen L. Gregory, DNP, APRN, CNS, RRT, AE-C, FAARC

Oklahoma Allergy and Asthma Clinic

Georgetown University
Disclosures

- MEDA – speaker
- Monaghan Medical Corporation – speaker
- Novartis – speaker
Objective

1. Discuss the pathophysiology of atopic dermatitis.

2. Describe skin barrier dysfunction.

1. Describe general concepts of an appropriate medical treatment regimen for atopic dermatitis.
Atopic Dermatitis (AD)

- Most common inflammatory skin disease in the industrialized world
- Common chronic and pruritic inflammatory skin disorder with multiple etiologies
- Affects 25% of children and 2% to 3% of adults
- Presents in early childhood, with 60% of patients presenting within the first year of life and 90% present by 5 years of age

Atopic Dermatitis: Pathophysiology
Atopic Dermatitis: Pathophysiology

Results from:

- Dysfunction of skin barrier
- Dysregulation of the immune system
- Environmental triggers

- Complex interaction between various susceptibility genes, host environments, infectious agents, defects in skin barrier function, and immunologic responses

- Activation of T lymphocytes, dendritic cells (DCs), macrophages, keratinocytes, mast cells, and eosinophils are characteristic of AD skin inflammatory responses
Skin Barrier Dysfunction

- Characterized by abnormal skin architecture, reduced skin barrier integrity, and increased transepidermal water loss

- The epidermal differentiation complex (EDC) on chromosome 1q21 contains genes for multiple components of epidermal barrier function

- Tight Junction Defects

- Reduced levels of SC lipids (ceramides)
Skin Barrier Dysfunction

• Relative defect in the innate immunity because they express lower levels of antimicrobials in the inflamed skin

• Chronic heavy colonization of *Staphylococcus aureus* in 90% of patients with AD¹

• Increased transepidermal water loss in both lesional and nonlesional skin

Patients are predisposed to early infection and allergic sensitization!

Clinical Phenotypes of Atopic Dermatitis (AD)

- Onset in infancy, outgrown in childhood
- Onset in infancy, persistent severe eczema
- Adolescent-adult onset, mild-to-moderate eczema or persistent severe eczema
- Increased IgE levels with food or aeroallergen sensitization
- Non-IgE mediated
- AD with *Staphylococcus aureus* infection/colonization
- AD with history of disseminated viral infections (eg, eczema herpeticum)

Classification of Skin Lesions

- **Acute:** Intensely pruritic erythematous papules and vesicles overlying erythematous skin associated with extensive excoriations and erosions accompanied by serous exudate
- **Subacute:** Erythema, excoriation, and scaling
- **Chronic:** Thickened plaques of skin, accentuated skin markings (lichenification), fibrotic papules

Possible coexistence of all 3 types of lesions in chronic atopic dermatitis
Primary Risk Factors

• Family history of atopy

• Loss-of-function mutations in the filaggrin (FLG) gene, involved in the skin barrier function
Clinical Manifestation

• Dry skin
• Severe pruritus
• Clinical presentation is highly variable, depending upon the age and disease activity
• Lichenification chronic scratching
• Fissuring may develop over time
• Lesions in different stages may be present at the same time

Clinical Manifestations

• **Infants (0-2 years)**
  - Dry, red, scaly or vesicular rash, typically spares diaper area

• **Childhood (2 years to puberty)**
  - Dry, red rash, more lichenification

• **Adolescence/adulthood**
  - Dry, more localized lichenification and excoriations
Medical History Must Address

• Age of onset
• Family history
• Psychosocial impact
• Frequency of skin infections
• Frequency of days off school/work/activities
• Sleep disruptions
Atopic Dermatitis: Diagnostic Criteria

• Pruritus
• Typical morphology and distribution:
  • flexural lichenification or linearity in adults
  • facial and extensor involvement in infants and children
• Chronic or chronically relapsing dermatitis
• Personal or family history of atopy
Atopic Dermatitis: Contributing Factors

- Non-adherence with conventional therapy
- Secondary infection
- Reduced humidity (radiant-heated homes)
- Hypersensitivity reactions to topical treatments
- Exposure to triggers of disease flares:
  - Irritants – soaps and detergents
  - Contact allergens
  - Food allergens
  - Inhalant allergens
Atopic Dermatitis: Treatment

Treatment options must address skin barrier repair, barrier protection, or inflammatory or immunomodulatory components

- Moisturizers - emollient therapy
- Control pruritus
- Topical corticosteroids
- Non pharmacological
Topical Corticosteroids (TCS)

- Mainstay of treatment in AD
- Typically introduced after failure of lesions to respond to good skin care and regular use of moisturizers
- Therapeutic ladder → increasing the intensity of management for more severe or refractory disease
- Lowest potency corticosteroids that are most effective should be used
Topical Corticosteroids (TCS)

Topical corticosteroids are recommended for AD-affected individuals who have failed to respond to good skin care and regular use of emollients alone.

Considering factors:

- risk vs benefit
- patient age
- location on the body for symptoms
- degree of xerosis
- patient preference
- cost of medication
- insurance formulary
Topical Corticosteroids

• Mechanism of Action:
  • Act upon T lymphocytes, monocytes, macrophages, and dendritic cells
  • Interfere with the antigen processing and suppressing release of proinflammatory cytokines

• Decrease acute and chronic symptoms of AD

• Used for active inflammatory disease and prevention of relapses
Potential Adverse Effects: Topical Corticosteroids
Cutaneous/local effects

- Atrophic changes
- Easy bruising
- Increased fragility
- Purpura
- Stellate pseudoscars
- Steroid atrophy
- Striae
- Telangiectasis
- Ulceration
- Infections
- Aggravation of cutaneous infection
- Secondary infections
# Potencies of Topical Corticosteroids

<table>
<thead>
<tr>
<th>Class</th>
<th>Drug</th>
<th>Dosage form</th>
<th>Strength (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Very high potency</td>
<td>Augmented betamethasone dipropionate</td>
<td>Ointment</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Clobetasol propionate</td>
<td>Cream, foam, ointment</td>
<td>0.05</td>
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<tr>
<td></td>
<td>Diflorasone diacetate</td>
<td>Ointment</td>
<td>0.05</td>
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<tr>
<td></td>
<td>Halobetasol propionate</td>
<td>Cream, ointment</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Augmented betamethasone dipropionate</td>
<td>Ointment</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Clobetasol propionate</td>
<td>Cream</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Diflorasone diacetate</td>
<td>Ointment</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Halobetasol propionate</td>
<td>Cream, ointment</td>
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<tr>
<td></td>
<td>Amcinonide</td>
<td>Cream, lotion, ointment</td>
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<tr>
<td></td>
<td>Augmented betamethasone dipropionate</td>
<td>Cream</td>
<td>0.05</td>
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<tr>
<td></td>
<td>Betamethasone dipropionate</td>
<td>Cream, foam ointment</td>
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<tr>
<td></td>
<td>Desoximetasone</td>
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<td>Desoximetasone</td>
<td>Gel</td>
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<td></td>
<td>Diflorasone diacetate</td>
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<td>0.05</td>
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<tr>
<td></td>
<td>Fluocinonide Cream,</td>
<td>Gel, ointment, solution</td>
<td>0.05</td>
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<tr>
<td></td>
<td>Halcinoide</td>
<td>Cream, Ointment</td>
<td>0.1</td>
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<tr>
<td></td>
<td>Mometasone furoate</td>
<td>Ointment</td>
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<tr>
<td></td>
<td>Triamcinolone acetonide</td>
<td>Cream, ointment</td>
<td>0.5</td>
</tr>
<tr>
<td>II. High potency</td>
<td>Betamethasone valerate</td>
<td>Cream, foam, lotion, ointment</td>
<td>0.1</td>
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<tr>
<td></td>
<td>Clocortolone pivalate</td>
<td>Cream</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Desoximetasone Cream 0.05</td>
<td>Cream</td>
<td>0.05</td>
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<tr>
<td></td>
<td>Fluocinolone acetonide</td>
<td>Cream</td>
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<tr>
<td></td>
<td>Flurandrenolide</td>
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<tr>
<td></td>
<td>Fluticasone propionate</td>
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<td>Fluticasone propionate Ointment 0.005</td>
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<td>Mometasone furoate</td>
<td>Ointment</td>
<td>0.005</td>
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<tr>
<td></td>
<td>Triamcinolone acetonide</td>
<td>Cream</td>
<td>0.1</td>
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<tr>
<td>III-IV. Medium potency</td>
<td>Betamethasone valerate</td>
<td>Cream, foam, lotion, ointment</td>
<td>0.1</td>
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<td>Clocortolone pivalate</td>
<td>Cream</td>
<td>0.1</td>
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<tr>
<td></td>
<td>Desoximetasone Cream 0.05</td>
<td>Cream</td>
<td>0.05</td>
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<tr>
<td></td>
<td>Fluocinolone acetonide</td>
<td>Cream</td>
<td>0.05</td>
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<tr>
<td></td>
<td>Fluticasone propionate</td>
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<td></td>
<td>Fluticasone propionate Ointment 0.005</td>
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<tr>
<td></td>
<td>Mometasone furoate</td>
<td>Cream</td>
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</tr>
<tr>
<td></td>
<td>Triamcinolone acetonide</td>
<td>Cream</td>
<td>0.1</td>
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</tbody>
</table>
## Potencies of Topical Corticosteroids (cont)

<table>
<thead>
<tr>
<th>Class</th>
<th>Drug</th>
<th>Dosage form</th>
<th>Strength (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. Lower-medium potency</td>
<td>Hydrocortisone butyrate Cream</td>
<td>Cream, ointment, solution</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Hydrocortisone probutate</td>
<td>Cream</td>
<td>0.1</td>
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<tr>
<td></td>
<td>Hydrocortisone valerate</td>
<td>Cream, ointment</td>
<td>0.2</td>
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<tr>
<td></td>
<td>Prednicarbate</td>
<td>Cream</td>
<td>0.1</td>
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<tr>
<td>VI. Low potency</td>
<td>Alclometasone dipropionate</td>
<td>Cream, ointment</td>
<td>0.05</td>
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<tr>
<td></td>
<td>Desonide</td>
<td>Cream, gel, foam, ointment</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Fluocinolone acetonide</td>
<td>Cream, solution</td>
<td>0.01</td>
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<tr>
<td>VII. Lowest potency</td>
<td>Dexamethasone</td>
<td>Cream</td>
<td>0.01</td>
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<tr>
<td></td>
<td>Hydrocortisone</td>
<td>Cream, lotion, ointment, solution</td>
<td>0.25, 0.5, 1</td>
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<tr>
<td></td>
<td>Hydrocortisone acetate</td>
<td>Cream, ointment</td>
<td>0.5-1</td>
</tr>
<tr>
<td></td>
<td>Hydrocortisone</td>
<td>Cream</td>
<td>1, 2.5</td>
</tr>
</tbody>
</table>
Topical Calcineurin Inhibitors (TCI)

Mechanism of Action:
• Macrolactams with immunosuppressive characteristics.
• Inhibiting the activation of T lymphocytes which decreases the release of the various proinflammatory cytokines.
• Inhibit mast cell and neutrophil activation and release of inflammatory mediators.

Pharmacokinetics: absorption through the skin into circulation is minimal due to a large molecular size of the drug.
Highest absorption is observed in the initial stage of AD treatment when the inflammatory process is most advanced.
Topical Calcineurin Inhibitors (TCI)

- Second-line therapy in patients who have failed to respond adequately to other topical prescription treatments or when those treatments are not advisable.

- For short-term and non-continuous chronic treatment.

- In non-immunocompromised aged ≥ 2 years.

- Tacrolimus 0.03% ointment indicated for moderate to severe AD.

- Pimecrolimus 1% cream treatment of mild to moderate AD.
Adverse Effects: Topical Calcineurin Inhibitors (TCI)

• Local reactions of stinging and burning
• No specific monitoring for systemic side effects is recommended for patients with AD at this time
• A systematic review concluded that TCS overall have a good safety profile

Boxed Warning: TCI

Rare cases of malignancy (skin cancer and lymphoma) have been reported in patients treated with these agents, although a causal relationship has not been established.

This warning was added in response to widespread off label use in children younger than 2 years, and based on a theoretical risk from the use of high-dose oral calcineurin inhibitor therapy in patients post transplantation and from animal studies with exposures 25- to nearly 50-fold the maximum recommended human dose.

Management of Atopic Dermatitis: Antibiotic Therapy

- Up to 90% of patients with moderate to severe AD are colonized with Staphylococcus
- Clinical features that suggest secondary bacterial infection include:
  - crusting, oozing, bright erythema, folliculitis, extensive disease and/or asymmetric distribution
- Consider swabbing for MRSA
- Treat secondary skin infection if present
Treatment

**Dupixent** inhibit the inflammatory response that plays a role in the development of atopic dermatitis

- monoclonal antibody
- targeted immune system drug that inactivates two inflammatory compounds called interleukin 4 or IL-4, and IL-13.
Treatment

Crisaborole topical ointment, 2%, a novel non-steroidal topical anti-inflammatory PDE-4 inhibitor

Lead product development candidate for the potential treatment of mild-to-moderate atopic dermatitis and psoriasis.

• Investigational non-steroidal topical anti-inflammatory PDE-4 inhibitor in development for the potential treatment of mild-to-moderate atopic dermatitis
• Crisaborole inhibits PDE-4 in target cells, which reduces the production of pro-inflammatory cytokines thought to cause the signs and symptoms of atopic dermatitis
Atopic Dermatitis: Treatment Considerations

• Systemic corticosteroids may be considered in severe cases that cannot be controlled with appropriate skin care and topical therapy

• Topical antimicrobial preparations are not generally recommended in the treatment of AD
Atopic Dermatitis: Treatment Considerations

• The use of topical antihistamines for the treatment of patients with atopic dermatitis is not recommended because of the risk of absorption and of contact dermatitis.

• In patients with moderate to severe AD and clinical signs of secondary bacterial infection, bleach baths and intranasal mupirocin may be recommended to reduce disease severity.¹

Atopic Dermatitis: Management

The optimal management of atopic dermatitis requires:

- Elimination of exacerbating factors
- Restoration of the skin barrier function
- Hydration of the skin
- Pharmacologic treatment of skin inflammation
- Patient education
Atopic Dermatitis: Management

Primary focus:

1. Limit itching
2. Repair the skin
3. Decrease inflammation
Atopic Dermatitis: Management

**Hallmark**

→ Defects in the epidermal barrier function
→ Cutaneous inflammation

**Acute eczema:**

erythema, papules, vesicles, exudation of fluid and crusting

**Chronic eczema:**

erythema, with dry, thickened, and scaly skin
# Eczema Action Plan

**Doctor:**

A simple way to remember what medications & creams to use for your/your child’s skin:

1. **Green** means **Go**. Use preventative measures.
2. **Yellow** means **Caution**. Use lower strength medications.
3. **Red** means **Flaring**. Use higher strength medications and get help from the doctor.

---

### Green = Go — Regular Daily Care

- **Bathe** with lukewarm water, 5-10 minutes. Avoid scrubbing and rubbing the skin as this can cause flare-ups.
- Use **mild soap**, if any, such as **Dove** for sensitive skin, **Cetaphil cleanser**, or **Axe** for dry skin. If not too dirty, use soap only on hands, feet, armpits, and genital area, not all over.
- Apply moisturizer **(at least 2 times a day)** (even if no bath is taken) and after every bath. After the bath, pat dry and apply the moisturizer **RIGHT AWAY**, within 3 minutes, all over the body.
- Keep **fingernails** short, and avoid irritating clothing such as wool or other scratchy fabrics.

---

### Yellow = Caution — Mild Symptoms of Rash and Itching = Use Lower Strength Medications

- Continue **Regular Daily Care** (Green Zone) as Above.
- To the red, itchy, rashy areas on the **BODY** apply **(2 times per day BEFORE you apply moisturizer)**
- To the red, itchy, rashy areas on the **FACE** apply **(2 times per day BEFORE you apply moisturizer)**
- If the **scalp** is affected, apply **(1-2 times per day)**
- For **night-time itching** take **tsp/cc/pills** **before bed**
- For **day-time itching** take **tsp/cc/pills** **in the morning**
- If using **Yellow Zone** medications regularly (for more than 1-2 weeks,) you need to see a doctor every few months.

---

### Red = Flaring — Severe Symptoms of Rash and Itching = Use Higher Strength Medications

- Continue **Regular Daily Care** (Green Zone) as above and **Yellow zone** medications for mild rash.
- To the red, itchy, rashy areas on the **BODY** apply **(2 times per day BEFORE you apply moisturizer)**
- To the red, itchy, rashy areas on the **FACE** apply **(2 times per day BEFORE you apply moisturizer)**
- If the **scalp** is affected, apply **(1-2 times per day)**
- For **night-time itching** take **tsp/cc/pills** **before bed**
- For **day-time itching** take **tsp/cc/pills** **in the morning**
- **Other:** Take **tsp/cc/pills** **times per day for days/weeks**
- **Call or see a doctor** if the above treatments are not working, severe itching continues, there is fever, or pus bumps are present. You can see your primary medical provider, an urgent care doctor, or your skin doctor.
- If using **Red Zone** medications regularly (for more than 1-2 weeks,) you need to see a doctor at least every 2-4 months.
Atopic Dermatitis: Emollients

- **Emollient therapy**
  - Recommended as first-line treatment
  - Improves skin barrier function & retention of water
  - Multiple emollients have been shown to improve skin barrier function
  - Consistent and liberal use
  - May help reduce the need for topical corticosteroid use
  - Formulated as creams and ointments
Atopic Dermatitis: Emollients

• Guidelines recommend consistent and liberal use of emollients and skin protectants for prevention and maintenance of the epidermal skin barrier\(^1\)

• Emollients may reduce the need for topical corticosteroid use.

• Emollient and skin protectants soften the texture of skin and relieve pruritus.

Controlling Pruritus

**Oral antihistamines**
- Relieves pruritus
- Sedating antihistamines may be more effective for itching

**Wet dressings**
- Soothes and hydrates the skin, reduces itching and redness, loosens crusted areas, and prevents skin injury from scratching
Non-pharmacological

- Soak and seal
- Colloidal oatmeal → skin protectant
- Non soap-based cleansers
- Mild synthetic detergents
- Cool environment
- Clothing should be soft next to the skin. Cotton is comfortable and can be layered in cold weather.
- Wool products should be avoided
Atopic Dermatitis

- Bathing daily in warm water (not hot) for 10-15 minutes.
- Use a gentle cleansing bar or wash.
- Avoid scrubbing your skin with a washcloth.
- Gently pat excess water away and immediately apply the recommended medicine or moisturizer to damp skin within 3 minutes.

→ Help hydrate and cleanse the skin
→ Assist in the debridement of infected skin
→ Improve the penetration of topical therapies
Wet Wrap Therapy

Wet wrap therapy is a therapeutic intervention for moderate-to-severe AD

Soak and Seal

Wet-wraps work by a variety of mechanisms:

→ cooling the skin by evaporation → diminish itch
→ increased moisturization and softening of the skin
→ enhancing the penetration of medications
→ mechanical barrier against scratching
Sleep Disruption

- Optimization of sleep hygiene:
  - Consistent schedule for sleep
  - Consistent bedtime routine
  - Avoidance of screen time
- Covering of skin to reduce skin damage due to nighttime scratching
- Wet dressings as necessary
- Cotton pajamas with long pants and sleeves cover hands and feet
- Consideration of sedating antihistamines
Treatment: Benefits of Patient Education

Poor adherence to therapy is a major reason for treatment failure in patients with atopic dermatitis

• Improves self-care regimen
• Improves disease control
• Prevents and decreases the degree and frequency
• Modifies the overall disease course
• Possibly slows the atopic march
• Prevents chronic or relapsing
Highlights
Atopic Dermatitis “the itch that rashes”

• Control the itch
• Proper skin care to include skin hydration and moisturizers
• Antiseptic measures - bleach baths
• Trigger avoidance
• Appropriate medical treatment regimen
• Action Plan that includes acute treatment for eczematous flares
CASE: Emma

HPI:
Lilly is a 10 month-old girl who presents to clinic with her mother complaining of a pruritic rash. Symptoms initially presented around 5 or 6 month old and has progressively worsened. When she eats egg her symptoms worsen. Her mother treats symptoms of rash with vaseline, which is not helpful. Emma’s mother reports Lilly is bathed daily using a homemade fragrant soap. Emma’s mother uses baby lotion to moisturize Emma’s skin once daily most everyday.
CASE: Emma

HPI:
Emma is a 10 month-old girl who presents to clinic with her mother complaining of a pruritic rash. Symptoms initially presented around 2 to 3 month old and has progressively worsened. Dairy tend to cause her symptoms worsen. Her mother treats symptoms of rash with vaseline, which is not helpful. Emma’s mother reports Lilly is bathed daily using a homemade fragrant soap. Emma’s mother uses baby lotion to moisturize Emma’s skin once daily most everyday.
Case: Emma

- **PMH:** Patient was born via spontaneous vaginal delivery with no complications. She was diagnosed with RSV at 6 months old. She has a recent diagnosis of mild persistent asthma diagnosed at 6 months old. No history of otitis media. No hospitalizations or surgeries. Immunization are not current.

- **Medications:**
  1. Benadryl 12.5 mg/5ml 1.5 ml once daily prn
  2. Albuterol 0.083% nebulized every 4 to 6 hours prn

- **Allergies:** none

- **Family history:**
  - Mother has asthma and allergic rhinitis
  - Father has allergic rhinitis
  - No siblings
  - Maternal grandmother: asthma, allergic rhinitis
  - Maternal grandfather: deceased, lung cancer, age 59
  - Paternal grandmother: DM, HTN
  - Paternal grandfather: allergic rhinitis
  - Paternal grandfather: deceased, lung cancer, age 59
Case: Emma

- **Social history:** Lives with her parents. Father smokes cigarettes outdoors most of the time. The family has one dog indoors. No recent travel outside the US.

- **ROS:**
  - Constitutional: No fever, chills, irritability secondary to pruritus, no weight loss
  - Skin: as per HPI rash face, arms, ankles, behind the knees, ho history of urticaria
  - HEENT: no apparent pain, no trauma, no ocular symptoms, no hearing loss, occasional rhinorrhea and nasal congestion, no sore throat
  - Respiratory: occasional cough and wheeze with URI
  - GI: no vomiting, diarrhea, no constipation
  - Musculoskeletal: no limitations
Case: Emma

What concerns do you have about Emma at this point?
Case: Emma

Physical Examination

• General appearance: alert, well developed, well nourished, interacting appropriately

• Skin: dry with eczematous lesions antecubital fossae, neck, wrists, and ankles, dorsum of the feet and hands, lichenification, erythematous plaques popliteal area bilaterally

• HEENT: normocephalic, fontanels normal, tympanic membrane pearly gray bilaterally, PERRLA, clear conjunctive; slight clear rhinorrhea, no nasal congestion, no palor, no erythematous nasal turbinates, oropharynx clear, soft palate intact

• Neck: supple without adenopathy

• Heart: rhythm is regular rate and rhythm, no murmurs

• Respiratory: clear bilaterally all segments

• Musculoskeletal: no limitations with ROM
Case: Emma

What is your diagnosis?
Case: Emma

• What recommendations will you provide Emma’s mother?

• What medical treatment regimen are you going to prescribe for Emma?

• What nonpharmaological interventions are your going to prescribe for Emma?
### Eczema Action Plan

**Doctor:**

A simple way to remember what medications & creams to use for your/your child’s skin:

1. **Green** means **Go**. Use preventative measures.
2. **Yellow** means **Caution**. Use lower strength medications.
3. **Red** means **Flaring**. Use higher strength medications and get help from the doctor.

#### Green = Go — Regular Daily Care

- **Bathe** with lukewarm water, 5-10 minutes. Avoid scrubbing and rubbing the skin as this can cause flares.
- Use mild soap, if any, such as **Dove** for sensitive skin, **Cetaphil** cleanser, or **Aveeno** for dry skin. If not too dirty, use soap only on hands, feet, armpits, and genital area only, not all over.
- Apply moisturizer ________ at least 2 times a day (even if no bath is taken) and after every bath. After the bath, pat dry and apply the moisturizer **RIGHT AWAY**, within 3 minutes, all over the body.
- Keep fingernails short, and avoid irritating clothing such as wool or other scratchy fabrics.

#### Yellow = Caution — Mild Symptoms of Rash and Itching = Use Lower Strength Medications

- Continue Regular Daily Care **(Green Zone)** as Above
- To the red, itchy, rashy areas on the **BODY** apply _____________ 2 times per day **BEFORE** you apply moisturizer
- To the red, itchy, rashy areas on the **FACE** apply _____________ 2 times per day **BEFORE** you apply moisturizer
- If the **scalp** is affected, apply _____________ 1-2 times per day
- For **night-time** itching take ________ tsp/cc/pills of _____________ before bed
- For **day-time** itching take ________ tsp/cc/pills of _____________ in the morning
- If using **Yellow zone** medications regularly (for more than 1-2 weeks,) you need to see a doctor every few months.

#### Red = Flaring — Severe Symptoms of Rash and Itching = Use Higher Strength Medications

- Continue Regular Daily Care **(Green Zone)** as above and **Yellow zone** medications for mild rash
- To the red, itchy, rashy areas on the **BODY** apply _____________ 2 times per day **BEFORE** you apply moisturizer
- To the red, itchy, rashy areas on the **FACE** apply _____________ 2 times per day **BEFORE** you apply moisturizer
- If the **scalp** is affected, apply _____________ 1-2 times per day
- For **night-time** itching take ________ tsp/cc/pills of _____________ before bed
- For **day-time** itching take ________ tsp/cc/pills of _____________ in the morning
- **Other**: Take ________ tsp/cc/pills of _____________ times per day for ____ days/weeks
- **Call or see a doctor**, if the above treatments are not working, severe itching continues, there is fever, or pus bumps are present. You can see your primary medical provider, an urgent care doctor, or your skin doctor.
- If using **Red Zone** medications regularly (for more than 1-2 weeks,) you need to see a doctor at the least every 2-4 months.
Case: Emma
Very important to hydrate!
Other Clinical Considerations for Emma?

THE ATOPIC MARCH
Thank you!

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Edmond, Oklahoma 73013
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405-922-1197 (cell)

Curriculum Vitae

Professional Experience

December, 2011 to present
Georgetown University
School of Nursing and Allied Health
37th and O Street
N.W., Washington D.C. 2005
Job title: Assistant Professor

September, 2007 to present
Oklahoma Allergy and Asthma Clinic
750 NE 13th
Oklahoma City, OK 73104
Job title: Doctor of Nursing Practice
Clinical Nurse Specialist/
Advanced Practice Register Nurse, Board Certified
Pulmonary Disease Management Specialist
Certified Asthma Educator

September, 2006 to 2009
University of Oklahoma, Oklahoma City, OK 73117
College of Nursing
Job title: Instructor

March, 2006 to August, 2007
Children’s Medical Center of Dallas, Dallas, Texas
Allergy, Asthma, and Immunology Clinic
1935 Medical District Drive
Dallas, TX 75235
Job title: Advanced Practice Registered Nurse, Board Certified
Clinical Nurse Specialist
Certified Asthma Educator
September, 1999 to March, 2006, Oklahoma City, OK
Oklahoma Allergy and Asthma Clinic
750 NE 13th
Oklahoma City, OK 73104
Job title: Clinical Nurse Specialist/Advanced Practice Register Nurse, Board Certified
Pulmonary Disease Management Specialist
Registered Respiratory Therapist
Certified Asthma Educator

March, 1997 to September, 1999:
AirWise Asthma Clinic, LLC
3434 NW 56th Street
Oklahoma City, OK 73112
Job title: Co-owner, Pulmonary Disease Management Specialist/Asthma Educator, Respiratory Care Practitioner and Registered Nurse

March, 1985 to March, 1997:
Mercy Health Center
4300 McAuley Blvd
Oklahoma City, OK 7312
Job title: Pulmonary Rehabilitation Coordinator
Asthma Services Coordinator
Asthma Educator
Respiratory Care Practitioner

January, 1986 to September, 1987 (part-time)
Abbey Foster Home Care, Oklahoma City, OK
Oklahoma City, Oklahoma
Job title: Clinical Respiratory Therapist

Education

Rose State College, Midwest City, Oklahoma,
Associate in Applied Science, Respiratory Therapy, August, 1985

University of Central Oklahoma, Edmond, Oklahoma
Continuing education and undergraduate studies

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma
Bachelor of Science Nursing, May, 1999

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma
Masters of Science in Nursing, August, 2003
Clinical Nurse Specialist
Advanced Practice Nursing: Nurse Practitioner/Clinical Nurse Specialist
Core Practicum September, 1999 to August, 2002

University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma, Clinical Practice for Patient Management and Prescription of Medication, 2004.

Chatham University, Pittsburgh, Pennsylvania, Doctorate of Nursing Practice, August, 2011.

**License and Certification**

Advanced Practice Registered Nurse – Board Certified, Clinical Nurse Specialist, American Nursing Credentialing Center

Prescriptive Authority, US Department of Justice, Drug Enforcement Administration, Washington, DC

Registered Respiratory Therapist, National Board of Respiratory Care

Respiratory Care Practitioner, Oklahoma State Board of Medical Licensure

Advanced Practice Registered Nurse/ Acute Care Clinical Nurse Specialist, Prescriptive Authority, Oklahoma Board of Nursing

Advanced Practice Registered Nurse/Clinical Nurse Specialist Acute Care, Prescriptive Authority, Board of Nurse Examiners for the State of Texas

Advanced Practice Registered Nurse/Clinical Nurse Specialist Acute Care, Board of Nursing Washington DC

Asthma Educator Certification, National Asthma Educator Certification Board 2002 to 2009, 2009-2016, 2016-2021

Basic Life Support, CPR Instructor, American Heart Association (1984 to Present)

**Professional Organizations and Activities**

American Academy of Allergy, Asthma and Immunology, 2005 to present
American Academy of Allergy, Asthma and Immunology, 2015 to present Allied Health Education Committee
American Academy, Allergy Asthma and Immunology, Allergic Skin Diseases, August, 2015 to present
American Academy, Allergy Asthma and Immunology, Continue Medical Education and Maintenance of Certification Committee, August, 2016 to present
American Association for Respiratory Care liaison for the American Association of Critical Care Nurses, 2009 to 2012
American College of Allergy, Asthma and Immunology, 2000 to present
American Lung Association of Oklahoma, volunteer 1984 to present
American Red Cross, volunteer 1999 to present
Association of Asthma Educators, 2000 to present
Board of Medical Licensure and Supervision State of Oklahoma Respiratory Care Practitioner Advisory Committee, 2003-2006
Medical Reserve Corp, 2008 to present
Ministries of Jesus, Advanced Practice Nurse, Pulmonary Clinic, 2003 to present
National Asthma Education Certification Board, test item writer, 2005 to 2007
Oklahoma Association of Cardiovascular and Pulmonary Rehabilitation President, 1995 to 1997
Oklahoma Asthma Initiative, 1997 to present, Medical Chair, 2010 to 2012
Phi Theta Kappa 1984 to 1986
Sigma Theta Tau International, 2002 to present
Rose State College, Respiratory Therapy, Clinical Advisory Board, Midwest City, Oklahoma. 2008 to present
University of Central Oklahoma, College of Nursing, Edmond, Oklahoma, Advisory Board, November, 2012 to present
**Academic Council**

American Association for Respiratory Care, Chronic Obstructive Pulmonary Disease Education Course, Faculty, 2005 to present.
American Association for Respiratory Care, Asthma Educators Certification P Preparatory Course, Faculty, 2007 to present.
Association of Asthma Educators, Asthma Educators Certification Review Course, 2004 to present.
Chatham University, Doctor of Nursing Practice preceptor, December, 2016 to present
Rose State College, Adjunct Faculty, 1986 to 2006, 2007 to present.

**Research Interest and Projects**

Patient Quality of Life Study for patients with asthma and allergic disease, 1999 to 2002
Oklahoma Allergy and Asthma Clinic, Asthma Disease Management Outcome Study, 2002-2004
Camp Second Wind, extensive educational day camp for children with asthma
Asthma Management Workshops for rural healthcare professionals, 2002-2005
Development of patient education, literature and booklets 2002-2005
Developing asthma educating modules for asthma educators (Association of Asthma Educators) 2004-2010
Asthma and Traffic Density research project, Dallas, Texas, 2006-2007
Asthma Disparity in Rural Health Care, 2010 to present
Achieving Asthma Control in Pediatric Asthma, Medicaid population, 2010 to present

**Awards**

Outstanding Clinical Practice Award, University of Oklahoma, 2003
Outstanding Professional Service Award, University of Oklahoma, 2003
Excellence in Nursing Practice Award, Sigma Theta Tau, Beta Delta Chapter, 2005
Outstanding Asthma Educator of the Year 2012-2013, Association of Asthma Educators

**Journal Reviewer**

2010-2014 *Journal of Asthma and Allergy Educators*
2015 to present – *Pediatric Allergy, Immunology and Pulmonology*
Presentations (2006 to present)

February, 2006, Association of Asthma Educators Review Course, San Francisco, California
August, 2006 Association of Asthma Educators, AdvancedSpirometry, Atlanta, Georgia.
October, 2006, Asthma Management, Oklahoma Asthma Initiative, American Lung Association of Oklahoma, Midwest City, Oklahoma.
July, 2007, Association of Asthma Educators, Pregnancy and Asthma, St. Louis, Missouri.
August, 2007, Advance Practice Services Annual Conference, Children’s Medical Center of Dallas, Advances in Pediatric Asthma, Dallas, Texas.
March, 2008, Asthma Management, Genetech, Oklahoma City, Oklahoma.
June, 2008, Oklahoma School Nurses Institute, Asthma at School, Edmond, Oklahoma.
July, 2008, Association of Asthma Educators, Novel Approaches to Adult Learning in Patients with Asthma, San Mateo, California.
December, 2008, American Association for Respiratory Care, Asthma Educators Certification Review Course, Anaheim, California.
February, 2009, Advanced Practice Nurse Pharmacology Workshop, Management and Treatment of Asthma: Guideline Update and Implications for IgE Mediated Therapy, University of Oklahoma, College of Nursing, Oklahoma City, Oklahoma.
April, 2009, Oklahoma Association of Clinical Nurse Specialist, Asthma Management Using Evidenced Based Practice, Oklahoma City, Oklahoma.
May, 2009, American Association for Respiratory Care Chronic Obstruction Pulmonary Disease Education Course, Miami, Florida.
June, 2009, Management and Treatment of Asthma: Guideline Update and Implication for IgE Mediated Therapy, Lula, Mississippi.
June, 2009, Management and Treatment of Asthma: Guideline Update and Implication for IgE Mediated Therapy, Oklahoma City, Oklahoma.

July, 2009, Novel Approaches to Adult Asthma Education, Asthma teleconference, Centers of Disease Control.

August, 2009, Managing Food Allergy and the Pediatric Patient, New Orleans, Louisiana., Association of Asthma Educators.

August, 2009, Food Allergy and Anaphylaxis, New Orleans, Louisiana, Association of Asthma Educators.


October, 2010, Anatomy of an Asthma Action Plan, Tulsa, Oklahoma Oklahoma Society for Respiratory Care

December, 2010 Asthma Self Management Program, American Association for Respiratory Care, Las Vegas, Nevada.


March, 2012 Vitamin D and Asthma, American Academy of Asthma, Allergy, and Immunology Annual Conference, Orlando, Florida.

March, 2012, Asthma Management, American College of Asthma, Allergy, and Immunology Annual Conference, Orlando, Florida.

April, 2012, Asthma Management, Francis Tuttle Vo-Tech Center, Oklahoma City, Oklahoma.


for Respiratory Care Conference, Rochester, New York.

February, 2013 Vitamin D and Asthma Update, American Academy of
Asthma, Allergy and Immunology Annual Conference, San Antonio,
Texas.

February, 2013 Anaphylaxis: Advance Proficiency in Clinical Practice, San
Antonio, Texas.

April, 2013 Patient Education- Can You Hear Me Know? Wellstar, Atlanta,
Georgia.

May, 2013 Overview of Asthma in the Pediatric Population, Advance Practice
Nurses of Oklahoma, Oklahoma City, Oklahoma.

August, 2013 Association of Asthma Educators National Conference,
Anaphylaxis: Advance Proficiency in Clinical Practice.

November, 2013 New York State Respiratory Convention, Vitamin D and
Asthma: What is the connection?

February, 2014, Asthma Update 2014: Advancing Clinical Management 34th
Annual Respiratory Conference, Seven Springs, Pennsylvania.

February, 2014, Differentiating Asthma from COPD: Why is This So Hard?
American Academy of Allergy, Asthma, and Immunology Conference, San
Diego, California.

March, 2014, Atopic Dermatitis: Advancing Proficiency in Management,
American Academy of Allergy, Asthma, and Immunology Conference, San
Diego, California.

March, 2014 Anaphylaxis: Advancing Proficiency in Recognition, Management
and Risk Reduction. American Academy of Allergy, Asthma, and
Immunology Conference, San Diego, California.

October, 2014, The Affordable Care Act: Good, Bad, or Indifferent. 2014 Doctor
of Nursing Practice Conference, Nashville, Tennessee.

February, 2015. Atopic dermatitis, beyond the surface: From filaggrin to foods
American Academy of Allergy, Asthma, and Immunology Conference, San
Diego, Texas.

American Academy of Allergy, Asthma, and Immunology Conference, San
Diego, Texas.

University of Oklahoma College of Nursing 2015 Pharmacology
Conference, Oklahoma City, Oklahoma.

March, 2015. Pulmonary exacerbation management. 2015 Pulmonary Education
Conference. American Association for Respiratory Care. Washington
DC.

Education Conference. American Association for Respiratory Care. Washington
DC.

Pennsylvania Respiratory Conference, Pittsburgh, Pennsylvania.

May, 2015. Enhancing the immune system to prevent infections in patients with
September, 2015. Vitamin D and Asthma: What is the Connection? Rainbow Respiratory Conference, Rainbow Babies & Children's Hospital, Cleveland, Ohio.
March, 2016. The link between vitamin D and the treatment of asthma. American Academy of Allergy, Asthma and Immunology, Los Angeles, California.
September, 2016 Patient Education: Can You Hear Me Now? Massachusetts Society for Respiratory Care, Cape Code, Massachusetts
November, 2016 Interesting Dermatological Cases in an Allergy Practice, American College of Allergy Asthma and Immunology, San Francisco, California
November, 2016 Severe Refractory Asthma, Monaghan Respiratory Conference, Cleveland, Ohio
November, 2016 Effective Patient Education in Patient-Centric Care, Monaghan Respiratory Conference, Cleveland, Ohio.
March, 2017 Silencing Chronic Cough in the Adult and Child: Diagnosis, Treatment and Prevention, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia
March, 2017 Shifting Paradigm: Focus on Prevention of Asthma Development and Exacerbation: A Team Approach – Meet the Challenge: Reduce Exacerbation and Achieve Control, Treatment and Prevention, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia
March, 2017 Narrative Interviewing to Improve Asthma Management Strategies Strategies to Cultivate Self-Management Skills, American Academy of Allergy Asthma and Immunology, Atlanta, Georgia
Poster Presentation

September, 2011 Achieving Asthma Control in Pediatric Patients, Doctor of Nursing Practice Annual Conference, New Orleans, Louisiana.
February, 2013, Pediatric Asthma, Sigma Theta Tau International, Beta Delta Chapter-at-Large Conference, Oklahoma City, Oklahoma.
April 27, 2015, Affordable Care Act: Ready, Set, Go. National Organization of Nurse Practitioner Faculty, Baltimore, Maryland.

Book – Chapter


Publications


Complementary and Alternative Methods for Asthma and Allergic Rhinitis

What Patients Are Using, Why They’re Using CAM and Could (Should) You Do Anything About It?

MAUREEN GEORGE PHD, RN, AE-C, FAAN
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COLUMBIA UNIVERSITY SCHOOL OF NURSING NEW YORK, NY
MG3656@CUMC.COLUMBIA.EDU
CONFLICT OF INTEREST

• Speaker, Ad Board Teva
OBJECTIVES

• Compare and contrast what is meant by complementary, alternative and integrative medicine

• Describe trends in CAM use for asthma and the most common types of CAM used for asthma and allergic rhinitis (AR)

• Identify resources for taking a CAM history

• Develop strategies for supporting CAM use within a patient-centered model of care

• Use evidence-based resources to evaluate safety and effectiveness of CAM modalities
WHAT'S IN A NAME?

complementary alternative integrative
DEFINITIONS

• **Complementary medicine**
  • Unconventional non-prescription practices with evidence basis are used with conventional medical approaches

• **Alternative medicine**
  • Unconventional non-prescription practices with or without evidence basis used in place of conventional medical approaches

• **Integrative medicine (IM)**
  • Healing-oriented care that “puts the patient at the center and addresses the full range of physical, emotional, mental, social, spiritual and environmental influences that affect a person's health.”
  • Purposeful coordination of conventional and complementary approaches together
HEALTH CARE OPTIONS

80% of the world’s health care is “alternative”

20% is biomedical
HIERARCHY OF RESORT

PREVALENCE OF CAM USE
Any CAM use in last year

- Healthy: 12.1%
- One condition: 15.5%
- 2+ conditions: 17.4%
- Respiratory: 64.7%
- Eczema: 62.2%
- Allergies: 64.1%
- Pain: 59.9%
- GI: 65.2%
Use of Complementary Health Approaches in the U.S.
National Health Interview Survey (NHIS)

10 most common complementary health approaches among adults—2012

- Natural Products* 17.7%
- Deep Breathing 10.9%
- Yoga, Tai Chi, or Qi Gong 10.1%
- Chiropractic or Osteopathic Manipulation 8.4%
- Meditation 8.0%
- Massage 6.9%
- Special Diets 3.0%
- Homeopathy 2.2%
- Progressive Relaxation 2.1%
- Guided Imagery 1.7%

*Dietary supplements other than vitamins and minerals.

# 2012 National Health Interview Survey

## Use of Complementary Health Approaches in the U.S.
**National Health Interview Survey (NHIS)**

### 10 Most Common Complementary Health Approaches among Children—2012

<table>
<thead>
<tr>
<th>Approach</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Products*</td>
<td>4.9%</td>
</tr>
<tr>
<td>Chiropractic or Osteopathic Manipulation</td>
<td>3.3%</td>
</tr>
<tr>
<td>Yoga, Tai Chi, or Qi Gong</td>
<td>3.2%</td>
</tr>
<tr>
<td>Deep Breathing</td>
<td>2.7%</td>
</tr>
<tr>
<td>Homeopathy</td>
<td>1.8%</td>
</tr>
<tr>
<td>Meditation</td>
<td>1.6%</td>
</tr>
<tr>
<td>Special Diets</td>
<td>0.7%</td>
</tr>
<tr>
<td>Massage</td>
<td>0.7%</td>
</tr>
<tr>
<td>Guided Imagery</td>
<td>0.4%</td>
</tr>
<tr>
<td>Movement Therapies</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

*Dietary supplements other than vitamins and minerals.

NHIS 2012 NATURAL PRODUCT USE
18% OF ADULTS AND 5% OF CHILDREN USED 1 OR MORE

<table>
<thead>
<tr>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Click on any product below for details" /></td>
<td><img src="image" alt="Click on any product below for details" /></td>
</tr>
<tr>
<td>7.8% Fish oil/Omega-3 fatty acids</td>
<td>1.1% Fish oil/Omega-3 fatty acids</td>
</tr>
<tr>
<td>2.6% Glucosamine and/or chondroitin</td>
<td>0.7% Melatonin</td>
</tr>
<tr>
<td>1.6% Probiotics/Prebiotics</td>
<td>0.5% Probiotics/Prebiotics</td>
</tr>
<tr>
<td>1.3% Melatonin</td>
<td>0.4% Echinacea</td>
</tr>
<tr>
<td>1.3% Coenzyme Q10</td>
<td>0.1% Glucosamine and/or chondroitin</td>
</tr>
<tr>
<td>0.9% Echinacea</td>
<td>0.1% Combination herb pill</td>
</tr>
<tr>
<td>0.8% Cranberry (pills, capsules)</td>
<td>0.1% Cranberry (pills, capsules)</td>
</tr>
<tr>
<td>0.8% Garlic supplements</td>
<td>0.1% Garlic supplements</td>
</tr>
<tr>
<td>0.7% Ginseng</td>
<td>0.1% Ginseng</td>
</tr>
<tr>
<td>0.7% Ginkgo biloba</td>
<td>0.1% Ginkgo biloba</td>
</tr>
</tbody>
</table>
## 2012 NHIS MIND-BODY THERAPIES

<table>
<thead>
<tr>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click on any practice below for details</td>
<td>Click on any practice below for details</td>
</tr>
<tr>
<td>9.5% Yoga</td>
<td>3.3% Chiropractic or Osteopathic Manipulation</td>
</tr>
<tr>
<td>8.4% Chiropractic or Osteopathic Manipulation</td>
<td>3.1% Yoga</td>
</tr>
<tr>
<td>8.0% Meditation</td>
<td>1.6% Meditation</td>
</tr>
<tr>
<td>6.9% Massage Therapy</td>
<td>0.7% Massage Therapy</td>
</tr>
</tbody>
</table>
2012 NATIONAL HEALTH INTERVIEW SURVEY

Out-of-Pocket Spending on Physician Visits vs. Complementary Practitioner Visits

- Physician Visits*: $49.6 billion
- Complementary Practitioner Visits: $14.7 billion

Out-of-Pocket Spending on Prescription Drugs vs. Natural Products

- Prescription Drugs*: $54.1 billion
- Natural Products: $12.8 billion
Out-of-Pocket Spending on Complementary Health Approaches: Adults vs. Children

**Adults $28.3 billion**

- Self-care approaches: $2.2 billion (7.7%)
- Practitioner visits: $14.1 billion (49.9%)
- Natural product supplements: $12.0 billion (42.4%)

**Children $1.9 billion**

- Self-care approaches: $0.5 billion (25.0%)
- Practitioner visits: $0.6 billion (31.9%)
- Natural product supplements: $0.8 billion (43.1%)
## 2012 National Health Interview Survey

### Income and Out-of-Pocket Spending on Complementary Health Approaches

<table>
<thead>
<tr>
<th>Family Income</th>
<th>Average Spending on Complementary Health Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0–$24,999</td>
<td>$435</td>
</tr>
<tr>
<td>$25,000–$49,999</td>
<td>$448</td>
</tr>
<tr>
<td>$50,000–$99,999</td>
<td>$505</td>
</tr>
<tr>
<td>At or above $100,000</td>
<td>$590</td>
</tr>
</tbody>
</table>
Use of Complementary Health Approaches in the U.S.
National Health Interview Survey (NHIS)

7.8% of U.S. adults (18.8 million) used
**fish oil/omega 3/DHA, EPA fatty acids**

1.1% of U.S. children (664,000) used
**fish oil/omega 3/DHA, EPA fatty acids**
FISH OIL/OMEGA-3 FATTY ACIDS

• Omega-3 fatty acids are a group of polyunsaturated fatty acids found in fatty fish & vegetable oils; available as dietary supplements

• Omega-3 supplements (primarily fish oil supplements) have been studied for preventing or treating allergies, asthma

• No conclusions can be drawn about whether omega-3s are helpful for these conditions based on currently available evidence

https://nccih.nih.gov/health/omega3
FISH OIL/OMEGA-3 FATTY ACIDS

• Moderate evidence for the health benefits of eating seafood

• Omega-3 fatty acid supplements usually do not have negative side effects
  • When side effects do occur, they typically consist of minor GI symptoms

• It is uncertain whether people with fish or shellfish allergies can safely consume fish oil supplements.

• Fish liver oils (which are not the same as fish oils) contain vitamins A and D; these vitamins can be toxic in high doses

• Omega-3 supplements may interact NSAIDS and blood thinners

https://nccih.nih.gov/health/omega3
PROBIOTICS, PREBIOTICS & SYNBIOTICS

• Probiotics are live microorganisms (e.g., bacteria) that are either the same as or similar to microorganisms found naturally in the human body

• Prebiotics are dietary substances that favor the growth of beneficial bacteria over harmful ones

• Synbiotics are products that combine probiotics and prebiotics

• Probiotics have been studied for preventing or treating AD, AR
PROBIOTICS

• Probiotics have good safety record
  • Side effects usually mild digestive sx

• Most of safety data comes from
  • Lactobacillus and Bifidobacterium

• Concerns raised about quality
  • Some products contain smaller numbers of live microorganisms than listed
  • Some products contain bacterial strains other than those listed

PROBIOTICS IN PREGNANCY & BREASTFEEDING

- 159 pregnant women with a family history of atopic disease (AD)
  - *Lactobacillus* GG capsules or a placebo for 2–4 weeks before their expected delivery date
  - Mothers who chose to breast-feed continued to receive *Lactobacillus* GG or placebo for 6 months
- 50% reduction in AD in the *Lactobacillus* GG group in first 2 years
- *Lactobacillus* GG group had significantly lower rates of AD 4 years after birth

PROBIOTICS & AD

• 27 infants with AD randomized to Lactobacillus GG, Bifidobacterium lactis Bb12 or placebo
  • Infants given probiotic supplemented formulas had significantly improved AD

• 31 infants with AD eliminated cow’s milk and received either Lactobacillus GG or a placebo supplemented formulas
  • Infants given Lactobacillus GG supplemented formula had significantly improved AD

• Study of Bifidobacterium animalis Bb12
  • Reduced the severity of AD

• A combination of freeze-dried Lactobacillus rhamnosus and Lactobacillus reuteri reduced AD sx in children ages 1 to 13 years of age

ARE PROBIOTICS EFFECTIVE?

• Likely effective
  • To prevent diarrhea caused by infections or antibiotics

• Possibly effective
  • AD

2012 NATIONAL HEALTH INTERVIEW SURVEY

Use of Complementary Health Approaches in the U.S.
National Health Interview Survey (NHIS)

0.9% of U.S. adults (2.3 million) used **echinacea**

- 7.8% Fish oil
- 2.8% Glucosamine and/or chondroitin
- 1.6% Probiotics
- 1.3% Melatonin
- 1.3% Coenzyme Q10
- 0.9% Echinacea
- 0.8% Cranberry (pills or capsules)
- 0.8% Garlic supplements
- 0.7% Ginseng
- 0.7% Ginkgo biloba

Use of Complementary Health Approaches in the U.S.
National Health Interview Survey (NHIS)

0.4% of U.S. children (205,000) used **echinacea**

- 1.1% Fish oil
- 0.7% Melatonin
- 0.5% Probiotics
- 0.4% Echinacea
- 0.1% Garlic supplements
- 0.1% Combination herb pills
- 0.1% Ginseng
- 0.1% Glucosamine and/or chondroitin
- 0.1% Cranberry (pills or capsules)
ECHINACEA

• Oral preparations of Echinacea used to treat URIs and other infections

• Topical Echinacea used for skin problems

• When taken by mouth, Echinacea usually does not cause side effects

• Some allergic reactions occur, e.g., rashes, asthma exacerbations, and anaphylaxis

• Echinacea is in the daisy family which includes ragweed
ASIAN GINSENG

- Presumed MOA is immune response stimulant
- Short-term use in recommended amounts appears to be safe
  - Some experts recommend against its use by infants, children, and women who are pregnant or breastfeeding
  - Some evidence suggests that it might affect blood sugar and blood pressure
  - Questions have been raised about its long-term safety
  - There’s currently no conclusive evidence supporting any health benefits

https://nccih.nih.gov/health/asianginseng/atalglance.htm#hed2
HYPERVENTILATION-DECREASING BREATHING TECHNIQUES - ADULTS

HTTPS://EFFECTIVEHEALTHCARE.AHRQ.GOV/EHC/PRODUCTS/222/1252/CER71BREATHINGEXERCISES_EXECUTIVESUMMARY_20120905.PDF
DRUG-HERB INTERACTIONS IN ASTHMA

- ephedra
  - component of *ma huang* can have a synergistic cardiovascular effect when used with albuterol

- licorice
  - from the glycyrrhiza root can prolong the half-life of cortisone, potentiating systemic steroid effects
OTHER RISKS FOR CAM AND ASTHMA

RISKY HOME OR TRADITIONAL REMEDIES

• Turpentine and Vicks Vaporub ingestion
• Smokehouses

RISKY BEHAVIORS

• Delays in initiating repetitive albuterol dosing
• Substitution of CAM for SABA and ICS
• Lower rates of Rx adherence
• Lower rates of apt keeping
Some studies of butterbur root or leaf extracts suggest that it may be helpful for AR

- Butterbur has not been proven to be helpful for AD or asthma

Products must be processed to remove PAs and labeled or certified as PA-free

Several studies, including a few studies of children and adolescents, have reported that short-term use of PA-free butterbur products are safe and well tolerated

- Butterbur is in the daisy family which includes ragweed

https://nccih.nih.gov/health/butterbur#hed1
GRAPE SEED EXTRACT

• Contains an antioxidant; MOA presumed to be anti-inflammatory

• Well tolerated when taken in moderate amounts for up to 14 weeks

• Single RCT did not demonstrate effect in AR
Quercetin is a plant pigment (flavonoid) found in red wine, onions, green tea, apples, berries, Ginkgo biloba, St. John's wort.

Quercetin has antioxidant and anti-inflammatory effects.

1 pre-post open-label trial of combination food supplement in 23 adults with AR; 14 basic science papers in PubMed.
CAM AND AR AND NAR

- Capsaicin is known for desensitizing peptidergic sensory C-fibers and reducing nasal hyperreactivity

- RCT of 42 patients with AR and nonallergic rhinitis (NAR), intranasal capsaicin and eucalyptol BID for 2 weeks compared with placebo
  - There was a statistically greater reduction in total nasal symptom score
  - Treatment with capsaicin was associated with no significant local adverse effects


- Capsaicin appears to have beneficial effects on overall nasal symptoms up to 36 weeks after treatment, based on a few, small studies (low-quality evidence)

  Cochrane Database Syst Rev. 2015 Jul
**COMMON SENSE RECOMMENDATIONS**

- Healthy lifestyles
  - Diet
  - Exercise
- Nasal saline
  - 1-2 cup of warm distilled, sterile, or boiled H2O. Add 1/4 to 1/2 teaspoon of non-iodized salt and a pinch of baking soda
  - Lean forward over sink (45-degree angle). Tilt head so one nostril is pointed down. Don't tilt head back
  - Place the spout of a neti pot or the tip of a syringe or squeeze bottle just inside your nose
  - Keeping mouth open, squeeze the bulb syringe or bottle, or tilt the pot to pour water into nostril
  - Allow H2O to run through nasal passages and drain out other nostril and/or mouth
  - Gently blow nose and repeat
WHY PATIENTS ARE USING CAM THERAPIES

• Worldview favors natural approaches
• Marker for dissatisfaction with conventional care
  • philosophical or cultural differences
  • unresolved fear, disappointment
  • cost
TAking a cam History

Ask any time that a heath history is taken
# IM INTAKE FORMS

## The Integrative Medicine Overview Checklist (Patient Administered)

<table>
<thead>
<tr>
<th>Mind &amp; Body Practices</th>
<th>How often?</th>
<th>Natural Products &amp; Biologically-Based Therapies</th>
<th>How often?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupressure</td>
<td></td>
<td>Botanicals</td>
<td></td>
</tr>
<tr>
<td>Acupuncture</td>
<td></td>
<td>Dietary Supplements</td>
<td></td>
</tr>
<tr>
<td>Alexander technique</td>
<td></td>
<td>Herbs &amp; herbal products</td>
<td></td>
</tr>
<tr>
<td>Apitherapy</td>
<td></td>
<td>Minerals</td>
<td></td>
</tr>
<tr>
<td>Aquatic therapy</td>
<td></td>
<td>Probiotics</td>
<td></td>
</tr>
<tr>
<td>Aromatherapy</td>
<td></td>
<td>Special Diets</td>
<td></td>
</tr>
<tr>
<td>Art therapy</td>
<td></td>
<td>Vitamins</td>
<td></td>
</tr>
<tr>
<td>Biofeedback</td>
<td></td>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Breathing exercises</td>
<td></td>
<td>Other Complementary Health Approaches</td>
<td></td>
</tr>
<tr>
<td>Buteyko</td>
<td></td>
<td>Ayurveda</td>
<td></td>
</tr>
<tr>
<td>Chiropractic manipulation</td>
<td></td>
<td>Homeopathy</td>
<td></td>
</tr>
<tr>
<td>Crystals</td>
<td></td>
<td>Hot/cold balance</td>
<td></td>
</tr>
<tr>
<td>Cupping therapy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Name:**

**Date of Birth:**

**Allergies:**
## IM INTAKE FORMS

<table>
<thead>
<tr>
<th>Integrative Medicine Index of Natural Products (Patient Administered)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
</tr>
<tr>
<td>Allergies:</td>
</tr>
<tr>
<td>☐ Acai*</td>
</tr>
<tr>
<td>☐ Alfalfa*</td>
</tr>
<tr>
<td>☐ Aloe</td>
</tr>
<tr>
<td>☐ Aloe vera</td>
</tr>
<tr>
<td>☐ Aristolochic acids</td>
</tr>
<tr>
<td>☐ Asian ginseng</td>
</tr>
<tr>
<td>☐ Astragalus</td>
</tr>
<tr>
<td>☐ Bacillus coagulans</td>
</tr>
<tr>
<td>☐ Belladonna</td>
</tr>
<tr>
<td>☐ Bifidobacteria</td>
</tr>
<tr>
<td>☐ Bilberry*</td>
</tr>
<tr>
<td>☐ Biotin</td>
</tr>
<tr>
<td>☐ Bitter orange</td>
</tr>
<tr>
<td>☐ Black cohosh</td>
</tr>
<tr>
<td>☐ Black psyllium</td>
</tr>
<tr>
<td>☐ Black tea*</td>
</tr>
<tr>
<td>☐ Bladderwrack</td>
</tr>
<tr>
<td>☐ Blessed thistle</td>
</tr>
<tr>
<td>☐ Blond psyllium</td>
</tr>
<tr>
<td>☐ Blueberry*</td>
</tr>
</tbody>
</table>
IM INTAKE FORMS

Integrative Medicine Cultural Health History-taking Aid (Clinician Administered)

<table>
<thead>
<tr>
<th>Name:</th>
<th>Date of Birth:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergies:</td>
<td></td>
</tr>
</tbody>
</table>

*To determine if symptoms or conditions have a non-biomedical explanatory model, ask open-ended questions. A non-biomedical model of care means that the patient has an alternative (non-medical) explanation for their symptoms, their condition or their preferred treatments or healers. For example, a rash associated with eczema may be seen as a supernatural mark caused by bad spirits that must be cast-out by a shaman.*

**Illness Representation**
- How do you explain your current illness or symptoms?
- What do you think is the cause of your current illness or symptoms?
- Why do you think that you’re ill (or have symptoms) now?

**Treatment Preferences**
- What are the ways that your current illness or symptoms would be treated by members of your community?
- Who are the people in your community who would provide advice or treatment for your current illness or symptoms?
- What do you do to stay healthy?
- Is there anything that you should (or should not) eat, drink or do because of your current illness or
IM AND PATIENT CENTERED CARE

• Patient-centered care is “respectful of and responsive to individual patient preferences, needs and values and ensuring that patient values guide all clinical decisions”
IOMS CROSSING THE QUALITY CHASM AND IM

• Care Is Based on Continuous Healing Relationships
  • Patient Satisfaction
  • Touch, time, and talk
• Care Is Customized According to Patient Needs and Values
  • Accept
  • Accommodate non-medical worldviews
• The Patient Is the Source of Control
  • Negotiate
  • Shared decision-making

• Knowledge Is Shared and Information Flows Freely
  • Interpersonal communication and patient education
• Decision Making Is Based on Evidence
  • Presenting the “truth” is not enough
• Safety
  • Getting to “no”
• Needs Are Anticipated
  • “Personalized” medicine
RESOURCES

• Natural medicines database

• NCCIH
  • https://nccih.nih.gov/

• Medline Plus
  • https://medlineplus.gov/
BUSINESS ADDRESS
Columbia University School of Nursing
Room 331 617 West 168th Street New York, NY 10032
Mailing Address 630 West 168th Street New York, NY 10032
E: mg3656@columbia.edu
P: 212-305-1175

HOME ADDRESS
822 Pardee Lane
Wyncote PA 19095
M: 215-260-0345

EDUCATION
PhD 2003 University of Pennsylvania School of Nursing, Philadelphia, PA Nursing
MSN 1986 University of Pennsylvania School of Nursing, Philadelphia, PA (Pulmonary Clinical Nurse Specialist) Nursing
BS 1982 York College of Pennsylvania, York, PA Nursing

POSTGRADUATE TRAINING & FELLOWSHIP APPOINTMENTS
2011-2015 University of Pennsylvania, Philadelphia, PA Senior Fellow Center for Health Behavior Research
2004-2006 Johns Hopkins University School of Medicine, Baltimore, MD NCCAM (1F32AT0020-01) Sponsor Dr. Cynthia Rand
2006 Office of Behavioral and Social Science Research, Warrenton, VA Fellow, Summer Institute on RCTs Involving Behavioral Interventions
2005 Johns Hopkins Bloomberg School of Public Health Summer Institute of Epidemiology and Biostatistics, Graduate Training Program in Clinical Investigation

PROFESSIONAL EXPERIENCE

ACADEMIC POSITIONS
2015- Associate Professor, Columbia University School of Nursing
2008-2015 Assistant Professor, University of Pennsylvania School of Nursing
2006-2008 Assistant Professor, Johns Hopkins University School of Nursing

CLINICAL & ADMINISTRATIVE POSITIONS
2011-2015 Faculty Advisor, United Community Clinics, student run free primary care clinic
1989-2006 Coordinator, Comprehensive Asthma and Allergy Care Program, University of Pennsylvania Health System, Philadelphia, PA
1986-1989 Pulmonary Clinical Nurse Specialist, Hospital of the University of Pennsylvania, Philadelphia, PA. Adult Cystic Fibrosis Transition Program
(Tracheostomy Team
1982-1986 Staff Nurse and Charge Nurse, Hospital of the University of Pennsylvania, Philadelphia, PA Medical Telemetry Unit,

CERTIFICATION/LICENSE
Specialty certification
2002-present Asthma Educator-Certified, National Asthma Educator Certification Board
1988-2003 Medical-Surgical Clinical Nurse Specialist, American Nurses’ Association Certification
1985-1988 Medical-Surgical Nursing, American Nurses Association Certification

Licensure 1982-present PA (RN-254312-L)

HONORS/AWARDS/ MEMBERSHIPS IN HONORARY SOCIETIES
2016 Allied Health Professionals Recognition Award, American Academy of Asthma Allergy and Immunology
2015 The Christine Wagner President’s Lecture Keynote, Association of Asthma Educators
2013 Lifestyle Champion, AmeriHealth Caritas
2013 Department of Family and Community Health Award for Exemplary Teaching, University of Pennsylvania
2013  Exemplary Teaching Award, Department of Family and Community Health, University of Pennsylvania
2012  Dean’s Innovation Award; 2nd Place, University of Pennsylvania
2011  Dean’s Award for Undergraduate Scholarly Mentoring, University of Pennsylvania
2010  American Academy of Nursing Fellow
2010  Outstanding Member Award, Association of Asthma Educators
2006  Educator-of-the-Year Award, Association of Asthma Educators
2003  MHDV Visiting Expert [Scholar], Ministry of Health SINGAPORE
2001  Scholarly Achievement Recognition, University of Pennsylvania Health System
2001  Outstanding Leadership Award, SEPA American Lung Association
1982-Present  Sigma Theta Tau, XI Chapter
1978-1982  Dean’s List; Cum Laude, Departmental Honors, York College of Pennsylvania

RESEARCH

Doctoral Dissertation


RESEARCH GRANTS

Grants Pending/Under Review


Using the Electronic Health Record to improve communication between Community Health Workers and the Primary Healthcare Team to enhance asthma and COPD management (CaMPR Pilot Awards 3/1/16-5/31/16). Category: IG. Effort: 0%. Source: Irving Institute for Clinical and Translational Research. Total Direct Costs: $15,000. George (PI).

Precision in Symptom Self-Management (PriSSM) Center (1P30NR016587-01, 7/1/2016-6/30/21) Category: FG. Effort: 20%. Source: NINR T (P30), National Institutes of Health. Bakken (contact), Hickey (Co PIs). Role: Co-I. First Year Direct Costs: $350,000 (Identical for all the following years)

Goal: The goal of the Precision in Symptom Self-Management (PriSSM) Center is to advance the science of symptom self-management for Latinos through a social ecological lens that takes into account variability in individual, interpersonal, organizational, and environmental factors across the life course.

WICER Precision Medicine Transdisciplinary Collaborative Center (TCC) for Advancing Health Equity (U54 NIMHD, 4/1/16-3/31/21). Category: PG. % Effort: 0. Source: American Thoracic Society. Total Direct Costs: $20,865. George & Hernandez (Co-PI)


Health Promotion for Women and Girls in Chalkidiki, Greece. M. S. Sommers and M. George, Co -Principal Investigator.2012 - 2013 U.S. Department of State ($10,000)

Past/Present Funded Research Grants


Health Promotion for Women and Girls in Chalkidiki, Greece. M. S. Sommers and M. George, Co-Principal Investigator 2012 - 2013 U.S. Department of State ($10,000)

Beliefs associated with adherence to antiretroviral medications post prison release among HIV-positive individuals (06/01/12 - 06/30/13; extended to 10/31/2013) Category. O. % Effort: Co-investigator. Source: University of Pennsylvania Clinical and Translational Science Awards CEAR Core Grant Award. Total Direct Costs: $10,000. Lisa Lewis, Roberta Herceg-Baron & Kathie Nixon (Co-PIs)

AAFA In-Home: A Comprehensive In-Home Assessment and Education Program for Young Children (CDC-RFA-EH10-1007). Category FG. Effort: Consultant 9/1/11-8/31/12. Source: Asthma and Indoor and Outdoor Air Quality Education Program FOA# CDC-RFA-EH10-1007. 1UE1EH0000764. Charlotte Collins (PI)

Geriatric Education Center of Greater Philadelphia-Health equity and literacy (5-D31HP08808-02-00, 7/1/08-6/30/10). Category: FG. % Effort: 5%. Source Health Resources and Services Administration Total Direct Costs: $371,749.00. Forceia (PI)


Stress and vision fluctuations in retinitis pigmentosa. (7/1/2007-2008). Category: PG. % Effort: 5%. Source: National Institutes of Nursing Research (National Institutes of Health)/Johns Hopkins University School of Nursing Center Grant (Center for Collaborative Intervention Research). Total Direct Costs: $20,000. George (PI)


Complementary medicine/adherence in minorities with asthma (1F31AT1149-01, 7/1/2002-2004). Category: FG. % Effort: 100%. Source: National Center for Complementary and Alternative Medicine, National Institutes of Health. Total Direct Costs: $61,932. George (PI)


Disease management for adults with asthma in Medicaid HMOs: A clinical and economic analysis (RO1-HS10044-01, 1999-2000). Category: R01. % Effort 50%. Source: Agency for Health Care Policy and Research. Leonard Davis Institute (PI)


Research Projects

West Philadelphia Asthma Mixed Methods Project. (2012-2014). School of Nursing, Center for Health Behavior Research, Clinical and Translational Science Awards (Community Engagement and Research Core), Mixed Methods Research Laboratory, and the Cartograhical Modeling Lab. Overall goals: To conduct a demonstration project with asthma to provide an example to UPenn researchers on how existing community data can be combined with qualitative data to identify patterns of health indicators. Role: Co-PI (with K. Glanz and F. Barg)

Publications

Journal Articles: Research, Peer Reviewed (all data-based; underline indicates mentee)


Keddem, S., Barg, F., Glanz K. Jackson, T, Green, S. George, M. (2015). Mapping the urban asthma experience: using qualitative GIS to understand contextual factors influencing asthma control. Social Science & Medicine, 140, 9-17. doi:10.1016/j.socscimed.2015.06.039


George, M., Topaz, M., Rand, C., Sommers, M.S., Glanz, K., Pantalon, M.V., Mao, J., & Shea, J. (2014). Inhaled corticosteroid beliefs, complementary and alternative medicine and uncontrolled asthma in urban minority adults Journal of Allergy and Clinical Immunology, 134, 1252–59. doi: 17.1016/j.jaci.2014.07.044


Townsend, K., Corry, J.M., Quigley, B., & George, M. (2012). A feasibility study of Q-sort to determine recall of skin test results and


Journal Articles: Clinical, Peer Reviewed (underline indicates mentee)
