FACTORS CONTRIBUTING TO ACUTE AND CHRONIC ASTHMA

MSRC

AIR COURSE 2017
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Definitions:
--A lever pressed by the finger to discharge a firearm
--The name of Roy Roger’s horse
--To set off, initiate
--An event that precipitates other events
--Agent/factor contributes to severity
--Exacerbates symptoms
--Additive in nature
--Variable sensitivity
--Step-wise levels of control
--Found in home, school, outdoors, etc.
CATEGORIES

Allergens
Irritants
Weather
Colds/Flu
Exercise
Other
60% of People with Asthma Have Allergic Asthma
Immune system overreacts to foreign substance (protein) that enters the body

- Inhaled, swallowed, touched or injected
- Anything causing an allergic reaction

Immediate Response: sneezing, itching, watery eyes
Late response: bronchoconstriction and inflammation
ASTHMA PATHOLOGY

Normal Airway → Rapid Bronchospasm → Late Asthmatic Response → Subacute/Chronic Inflammation

Inhaled trigger → Mast Cells

- histamine
- leukotrienes
- chemotactic factors

Recruitment and activation of inflammatory cells

Neural & vascular effects

cytokines
ALLERGENS

- DANDER
- URINE
- FECES
- SALIVA
ALLERGENS

PET CONTROL

- If you don’t have one, don’t buy one
- Keep out of bedroom
- Limit in main living areas
- Use vacuum cleaner with HEPA filter (AND DOUBLE-THICKNESS BAGS)
- HEPA filter on furnace
- Bathe pet every week
- Allergen can remain 6 months
#1 Indoor Allergen

- Perennial with seasonal increases in summer and fall
- Allergen in fecal pellets & dead bodies
- Most exposure occurs when in intimate contact with them
• Encase pillows, mattress and box springs in allergen-impermeable covers
• Wash bed linens weekly ≥130° water
• Reduce clutter
• Clean and dust weekly
• Eliminate stuffed animals/toys
Other Areas:

- Reduce indoor humidity <40%
- Use humidifiers/vaporizers with caution
- Minimize upholstered furniture
- Replace blinds with shades or curtains
- Clean and dust weekly
- If necessary, remove carpeting & other upholstery
ALLERGENS

COCKROACHES

- SALIVA
- FECES
- SKIN SHEDDING
- DEAD BODIES
--Block entrances – caulk/seal cracks
--Dry them out – reduce humidity
--Keep food in plastic containers
--Do not leave garbage exposed
--Use poison bait, gel or traps
--If necessary, use professional exterminator
--Can also be irritant – sometimes toxic
--Indoor – aspergillus and penicillium
--Outdoor – alternaria and cladosporium
--Perennial with seasonal variation
--Grows best at higher temps and humidity
--Particle sizes range from small to very large
--Repair leaks – clean moldy surfaces
--Reduce indoor humidity to < 50%
--Avoid carpeting on cement floors
--Use bathroom and kitchen exhaust fans
--Avoid handling wet leaves, compost piles, wet newspapers, garden debris or soil
--Professional mold testing may be indicated
Allergens

--Coarse powder contained in seed plants
--Allergy to pollen called hayfever
--Spring - oak, birch, elm, maple, hickory and early grasses (uncut)
--Late Summer/Fall – Ragweed (not Goldenrod)
--Limit exposure – stay indoors/close windows
--Use air conditioning, if possible
--Monitor pollen count
--Use antihistamines or other allergy meds
--Bathe – wash hands, face and hair after being outside
--Allergy Shots – if sx is not controlled
ALLERGENS

FOODS

THE BIG 8”

EGGS                   COW’S MILK
PEANUTS                TREE NUTS
SOY                     WHEAT
FISH                    SHRIMP/SHELLFISH
Plus # 9 = Sesame
PRESERVATIVES IN: (SULFITES)
-- Dried Fruits/Vegetables
-- Packages Potatoes
-- Wine and Beer
-- Bottled Lime and Lemon Juice
-- Pickled Foods
--Can trigger coughing and wheezing

--Other symptoms: flushing, hives, itching, swelling or rapid pulse

--Can be life-threatening - anaphylaxis
CROSS-REACTIVITY

Birch: Apple, carrot, walnut, potato, spinach, wheat, peanut, honey (many others)
Grass: Potato, melon, tomato, watermelon, orange, cherry, peanut, celery
Ragweed: Melon, honey, banana, sunflower seeds
Latex: Avocado, potato, banana, chestnut, tomato, kiwi, herbs, carrot
<table>
<thead>
<tr>
<th>If Allergic to:</th>
<th>Risk of Reaction to at Least One:</th>
<th>Risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A legume* peanut</td>
<td>Other legumes peas, lentils, beans</td>
<td>5%</td>
</tr>
<tr>
<td>A tree nut walnut</td>
<td>Other tree nuts brazil, cashew, hazelnut</td>
<td>37%</td>
</tr>
<tr>
<td>A fish* salmon</td>
<td>Other fish swordfish, sole</td>
<td>50%</td>
</tr>
<tr>
<td>A shellfish shrimp</td>
<td>Other shellfish crab, lobster</td>
<td>75%</td>
</tr>
<tr>
<td>A grain* wheat</td>
<td>Other grains barley, rye</td>
<td>20%</td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Beef hamburger</td>
<td>10%</td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Goat's milk goat</td>
<td>92%</td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Mare's milk horse</td>
<td>4%</td>
</tr>
<tr>
<td>Pollen birch ragweed</td>
<td>Fruits/vegetables apple, peach, honeydew</td>
<td>55%</td>
</tr>
<tr>
<td>Peach*</td>
<td>Other Rosaceae plum, apple, cherry</td>
<td>55%</td>
</tr>
<tr>
<td>Melon* cantaloupe</td>
<td>Other fruits avocado, watermelon, banana</td>
<td>92%</td>
</tr>
<tr>
<td>Latex*</td>
<td>Fruits kiwi, banana</td>
<td>35%</td>
</tr>
<tr>
<td>Fruits</td>
<td>Latex latex glove</td>
<td>11%</td>
</tr>
</tbody>
</table>
IRRITANTS
--Inhaled substances that produce inflammation and bronchospasm

--Irritate nose, mouth and airway

--Non-allergic (no immune response)

--No IgE involvement
UNIVERSAL IRRITANT

• ACTIVE (PRIMARY)
  Direct Assault on Lungs

• PASSIVE (SECONDARY)
  Environmental Tobacco Smoke (ETS)
IRRITANTS

--Profound irritation of upper airway
--Increased lower respiratory tract infections
--Increased asthma exacerbations/symptoms
--Decreased effectiveness of ICS
--Can lead to development of asthma in pre-school age children
IRRITANTS

TOBACCO CONTROL

--DO NOT SMOKE
--Educate about negative health effects
--Won’t Quit? Think of others:
  --Smoke outdoors
  --Use “smoking jacket”
  --Wash hands after smoking
  --No smoking in car
  --800-QUIT-NOW
OTHER SOURCES OF SMOKE:

--Fireplaces – Wood-burning Stoves
--Candles -- Incense
--Barbeque Grills
--Camp Fires
--Industrial Pollutants
--Leaf and Grass Fires
--Perfumes
--Cleaning Products
--Air Fresheners
--Bug Sprays – Sun Screens
--Pesticides/Chemicals
--Scented Detergents – Dryer Sheets
--Diesel/Airplane Fumes
WEATHER

FALL
- Sudden cold fronts
- Fluctuating Temps

SPRING
- Day-to-Day Variability
- April Showers

WINTER
- Cold Air
- Freezing Temps

SUMMER
- Heat/Humidity
- Ozone Action Day

WIND
THUNDERSTORMS:
--Winds blow in large amounts of allergens
--Ozone – known trigger – is created

BAROMETRIC PRESSURE:
--”Change of Weather”
--??Temp fluctuations with increased BP??
WEATHER

EFFECT ON POLLUTION:
--”Inversion”
– weather system where air sits still
--Concentrates all airborne pollutants

HEAT/SUNLIGHT + POLLUTANTS
= GROUND-LEVEL OZONE
Rising Temps and rising carbon dioxide concentrations lead to earlier & longer allergy seasons, earlier & more flowering, and more pollen.

Changes in climate make air pollution worse, leading to increases in asthma cases and worse symptoms.
WEATHER “CONTROL”

--Monitor daily local forecasts
--Monitor pollen/particulate count – Smog Index
--Limit exertion in cold, dry air
--Wear scarf or mask in very cold weather
--Pollen Season:
  --Stay indoors – especially if windy
  --Keep windows closed
RESPIRATORY INFECTIONS
RESPIRATORY INFECTIONS

--Rhinovirus – “common cold”
(over 200 viruses)

--RSV– lower tract
(respiratory syncytial virus)

--Influenza Virus

--Bronchitis
RESPIRATORY INFECTIONS

MECHANISMS:
--May cause epithelial damage/airway inflammation
--Virus potentiates allergic response by increasing the release of inflammatory mediators
--Increase airway hyper-responsiveness - may last for weeks
INFECTION CONTROL

--Hand Washing -- #1 defense
--Proper Nutrition and Rest
--Annual Influenza Vaccine
--Keep hands away from face
--Avoid those with active respiratory infection
--Use antibiotics, only IF appropriate
INFECTION CONTROL

Cover your Cough

cough or sneeze into your upper sleeve, not your hands.
THE “ITISES”

--Allergic Rhinitis

--Sinusitis
ALLERGIC RHINITIS

--Inflammation of tissue lining inside nose
--Provoked by allergens
--Seasonal – grasses, weeds, trees
--Year-Round – molds, dust mites, dander
--Symptoms – sneezing, runny or itchy nose and or congestion
and ASTHMA

--Nasal inflammation contributes to lower airway hyper-responsiveness ➔ asthma sx

--Increase sensitivity to triggers

--Treatment of upper respiratory tract integral part of asthma management

--Treatment: nasal irrigation, anti-histamines and decongestants, inhaled nasal steroids
SINUSITIS

--Inflammation of one or more of the sinuses that drain into the nose

--Inflammation blocks sinus opening – mucus accumulates and bacteria multiply

--Acute – lasts few days or weeks
--Chronic – lasts more than two months

--Symptoms – pain in forehead or around eyes, yellow/green mucus, sore throat
and ASTHMA

--50% of asthmatics get sinusitis
--Cause more severe asthma symptoms
--Cause more severe flareups
--Cause disturbed sleep
--Treatment: may need antibiotic
--Trigger for 80-90% of asthmatics

--Hyper-responsive reaction to:
  --rapid breathing/hyperventilation
  --loss of heat/water in airways

--Causes bronchospasm ➔ symptoms
NOTE:

KNOW DIFFERENCE BETWEEN EXERCISE-INDUCED BRONCHOSPASM AND EXERCISE AS A TRIGGER (sometimes referred to as Exercised-Induced Asthma)
CONTRIBUTING FACTORS:

--Poor level of asthma control
--Cold air, low humidity, pollutants
--Duration, type and intensity
--Poor physical shape
--Inhaled allergens
--Respiratory Infections
--Emotional stress/fatigue
EXERCISE “CONTROLS”

--Pre-medicate, as prescribed
--Restrict if symptoms are present or have viral infection
--Adequate warm-up – cool down
--Breathe through nose – if possible
--If weather cold, exercise indoors or wear mask
OTHER TRIGGERS

--Emotions
--Stress
--GERD
--Aspirin
--Beta Blockers
Laughing, crying, anger, excitement

Lead to changes in breathing patterns

- hyperventilation
- hypocapnia
- airway narrowing

Tightness in chest, shortness of breath

In Children, emotion signals nervous system to act in way that leads to attack
--May cause asthma to kick into overdrive
  ➔ SOB, wheezing, coughing
  ➔ Anxiousness -- frightened
  ➔ increases stress
  ➔ more symptoms

--Can impair immune system

--May make asthma more difficult to manage
--Recognize stress as a trigger
--Manage lifestyle to reduce stress
--Learn stress management techniques
--Counseling, when appropriate
--Not all stress is avoidable
GASTROESOPHAGEAL REFLUX DISEASE

--Backward flow of stomach acids into esophagus
  --upper ➔ sour taste
  --lower ➔ heartburn (burning sensation)

--Acid flow causes injury to lining of throat, airways and lungs ➔ persistent cough

--Acid flow triggers a nerve reflex causing airways to narrow (constrict) to prevent acid from entering ➔ shortness of breath
WHEN TO LOOK FOR GERD:

--Asthma diagnosed in adulthood

--Asthma symptoms worse after a meal or exercise, at night or after lying down

--Asthma doesn’t respond to standard treatments

--In Infants – recurrent vomiting, coughing, breathing problems or failure to thrive
LIFESTYLE CHANGES:

--Eat meals 3-4 hours before lying down
--Eat smaller meals with moderate portions
--Maintain a healthy weight
--Limit fatty foods, chocolate, peppermint, coffee, tea, colas and alcohol (relax sphincter)
--Avoid tomatoes & citrus fruits/juices (increase acid)
--Stop smoking (relaxes sphincter)
ASPIRIN SENSITIVITY

--Affects 3-5% - develops in adulthood
--Can cause sudden, severe attack
-- Produces excess leukotrienes
  ➔ bronchial tubes contract
  ➔ wheezing and shortness of breath
--Found in conjunction with nasal polyps -- TRIAD
--Avoid ASA and non-steroid anti-inflammatory medications (NSAID’s) – orally, topically or optically
Aspirin:
--Ascription
--Empirin
--Bufferin
--Ecotrin

NSAID's
--Ibuprofen
--Aleve
--Nuprin
--Actron
--Orudis KT

Contain Aspirin:
--Doan’s
--Excedrin
--Aquaprin
--Alka Seltzer Plus
--Bayer Children’s Cold Tablet
--St, Joseph Cold Tablet for Children
--Stanback Headache Power
--Cama Arthritis Pain Reliever
--Vanquish

--Don’t forget prescription medications – Percodan, Anaprox, Naprosyn
Used to treat hypertension, migraines, glaucoma, angina, heart disease.

- Old - Non-Selective
  - block beta receptors 1 (heart) and 2 (lungs)
  - cause bronchoconstriction

- New - Cardio-Selective Beta Blockers
  - Can block either beta receptor 1 or 2
--ACE Inhibitors – can induce cough “asthma equivalent” respiratory activity

--Exogenous hormones
   --increase wheeze in young women
   --decrease symptoms
   --increase risk of developing asthma
OTHER

“OTHER”
--Higher risk of developing problems
--Good control pre-op is imperative
--May require oral steroids – pre-op, intra-op and post-op

--Risks of General Anesthesia
  --Altered diaphragmatic function
  --Impaired ability to cough
  --Decreased mucociliary function
  --Placement of ET tube – irritant – trigger bronchospasm
--Question: Asthma to Obesity? Or Obesity to Asthma?

--Theory: Excess weight compresses airways making them smaller and more reactive to triggers

--Increases risk of GERD – triggers asthma

--Pro-inflammatory state may contribute to lung inflammation and asthma

--Require more drugs, more symptomatic -- increased risk of ER visits
VOCAL CORD DYSFUNCTION

--Paradoxic adduction (abnormal closing) of cords
   ➔ airway obstruction
   ➔ dyspnea/shortness of breath
   ➔ wheezing inspiratory/expiratory

--No anatomic abnormality

--Disorder is functional

--Exact cause not clearly evident

--Confirm diagnosis with laryngoscopy – “glottic chink”
VOCAL CORD DYSFUNCTION

Laryngoscopy figures

Anterior

Vocal cords

Posterior glottic chink

Posterior

Figure C
Vocal cords during normal inspiration

Figure D
Vocal cords in a symptomatic VCD patient. Note: presence of a posterior glottic chink
OTHER

VOCAL CORD DYSFUNCTION

CAUSES:

-- GERD/laryngopharyngeal reflux
-- Upper airway inflammation (i.e. rhinitis)
-- Strenuous exercise
-- Post nasal drip
-- Exposure to irritant fumes/strong odors
-- Environmental allergens and/or pollutants
-- Psychogenic causes – emotional stress
OTHER

VOCAL CORD DYSFUNCTION

SYMPTOMS – Mimics asthma
--dyspnea
--throat tightness
--anxiety
--wheezing
--choking
--inspiratory stridor
--dysphonia/hoarseness
--respiratory distress
TREATMENT:
--Identify and treat the cause
--relaxation techniques
--deep breathing exercises
--speech therapy
--consider psychotherapy
WORK-RELATED ASTHMA

Asthma caused by exposure to an agent encountered in work (or school) environment

Timing of symptoms:
--Improvement during vacations or days off
--Worsen as work week progresses
WORK-RELATED ASTHMA
Definitions:
--A lever pressed by the finger to discharge a firearm
--The name of Roy Roger’s horse
--To set off, initiate
--An event that precipitates other events
Questions? Comments?

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