Therapeutic areas – Part 3

Respiratory

Module 4 Topic 6_1

Respiratory Disorders

Cough

- Sudden, forceful expulsion of air from the lungs
- Purpose - to clear material from the airways and to protect the lungs
- Types - dry (unproductive) or productive
- Common causes
  - For **acute cough**
    - An upper respiratory infection (URI), including acute bronchitis
    - Postnasal drip (drainage of secretions from the nose down the throat, or pharynx)
    - Pneumonia

Respiratory Disorders

Cough (contd)

- Causes for **chronic cough**
  - Chronic bronchitis
  - Gastroesophageal reflux (GERD)
  - Tuberculosis
  - Lung cancer
- Treatment of Cough
  - Treat the underlying disorder e.g. infections
  - Cough suppressants - antitussives e.g. dextromethorphan
  - Expectorants e.g. guaifenesin
  - Decongestants e.g. phenylephrine for cough caused by postnasal drip

Respiratory Disorders

Acute Bronchitis

- Inflammation of the trachea and the airways (bronchi)
- Usually caused by viral infections
- Treatments, such as antipyretics and antitussives are used for symptom relief; Antibiotics are usually not needed
- **Bacterial bronchitis** occasionally follows a viral upper respiratory infection; treated with azithromycin or clarithromycin

Respiratory Disorders

Asthma

- Condition in which the airways narrow (bronchoconstriction) in response to certain stimuli (triggers)
- Cells lining the bronchi have receptors
  - Beta-adrenergic receptors respond to epinephrine and relax the muscles, thereby widening (dilating) the airways and increasing airflow.
  - Cholinergic receptors respond to acetylcholine and make the muscles contract, thereby narrowing the airways and decreasing airflow

Respiratory Disorders

Asthma (contd)

- Asthma triggers
  - Allergens e.g. dust mites, secretions from cockroaches, feathers and animal dander
  - Infections e.g. colds, bronchitis
  - Irritants e.g. smoke from tobacco, fumes, cold air; and stomach acid
  - Exercise (called exercise-induced asthma)
  - Stress and anxiety
  - Aspirin and nonsteroidal anti-inflammatory drugs (NSAIDs)
- Status asthmaticus - severe, intense, prolonged airway narrowing that is resistant to treatment

Respiratory Disorders

Asthma (contd)

- **Treatment**
  - Bronchodilators e.g. salbutamol
  - Corticosteroids
  - Methylxanthines e.g. theophylline
- **Prevention**
  - Leukotriene Modifiers e.g. montelukast
  - Mast Cell Stabilizers e.g. sodium cromoglycate

Respiratory Disorders

Pneumonia

- Acute inflammation of the lungs due to infection
- Types
  - Community-acquired
  - Hospital-acquired (including ventilator-acquired and postoperative pneumonia)
  - Occurring in immunocompromised patients, including patients with HIV infection
  - Aspiration pneumonia

Respiratory Disorders

Pneumonia (contd)

- **Community-acquired pneumonia**
  - Bacterial causes - S. pneumoniae, H. influenzae, C. pneumoniae, and M. pneumoniae
  - Viral causes - respiratory syncytial virus (RSV), adenovirus, influenza viruses, metapneumovirus, parainfluenza viruses, and coronavirus (SARS)
- **Treatment**
  - Antibiotics
  - Antivirals
  - Supportive measures

Respiratory Disorders

- **Community-acquired pneumonia** (contd)
  - Antibiotics
    - For children - Amoxicillin or amoxicillin / clavulanate, azithromycin or clarithromycin; ceftriaxone or cefotaxime; vancomycin or clindamycin for MRSA
    - For adults - azithromycin or clarithromycin; cefpodoxime or cefuroxime; ceftriaxone or cefotaxime IV; fluroquinolone; anti-pseudomonal agents (imipenem, cefepime, piperacillin-tazobactam)
  - Antivirals e.g. ribavirin for RSV pneumonia, aciclovir for chicken pox pneumonia, and _?
  - Supportive care
    - Supportive care includes fluids, antipyretics, analgesics, and, for patients with hypoxemia, oxygen

Respiratory Disorders

Hospital-Acquired Pneumonia

- Risk factors
  - Endotracheal intubation with mechanical ventilation
  - High gastric pH due to stress ulcer prophylaxis or therapy
  - Previous antibiotic treatment
  - age > 70, abdominal or thoracic surgery
- Caused by - *Pseudomonas aeruginosa, Staphylococcus aureus, including methicillin-resistant S. aureus (MRSA); enteric gram-negative bacteria (Enterobacter spp, Klebsiella pneumoniae, Escherichia coli); Streptococcus pneumoniae, and Haemophilus influenzae*

Respiratory Disorders

Hospital-Acquired Pneumonia (contd)

- Treatment
  - Empiric therapy
    - Piperacillin/tazobactam
    - Cefepime or ceftazidime
    - Levofloxacin
    - Imipenem or Meropenem
    - Amikacin or gentamicin or tobramycin
    - Vancomycin or linezolid (for MRSA)
  - In patients who are at high risk for mortality or who have risk factors for antibiotic-resistant organisms -triple therapy using 2 drugs with activity against Pseudomonas and 1 drug with activity against MRSA

Respiratory Disorders

Pneumonia in Immunocompromised Patients

Immune System Defect	Therapy Associated With Disorders	Likely Pathogens
Neutropenia	Acute leukemia, aplastic anemia, cancer chemotherapy	NGram-negative bacteria Staphylococcus aureus Aspergillussp Candidasp
T-cell deficiency or dysfunction	Hodgkin lymphoma, cancer chemotherapy, corticosteroid therapy	Mycobacteria Viruses (eg, herpes simplex virus, cytomegalovirus) Strongyloides sp Opportunistic fungi (eg, Aspergillus, Mucor, Cryptococcus spp) Nocardia sp Toxoplasmasp
	AIDS	**Pneumocystis jirovecii** **Toxoplasmasp** **Cytomegalovirus** **Herpes simplex virus** **Opportunistic fungi (eg, Aspergillus, Mucor, Cryptococcus spp)** **Mycobacteria**

Respiratory Disorders

Pneumonia in Immunocompromised Patients (contd)

Immune System Defect	Therapy Associated With Disorders	Likely Pathogens
B-cell deficiency or dysfunction	Multiple myeloma, agammaglobulinemia	S. pneumoniae H. influenzae Neisseria meningitidis
	Hypogammaglobulinemia	P. jirovecii Cytomegalovirus S. pneumoniae H. influenzae

Respiratory Disorders

Pneumonia in Immunocompromised Patients (contd)

- Treatment
  - Generally, broad-spectrum antibiotics that are effective against gram-negative bacilli, *Staphylococcus aureus*, and anaerobes
  - If no improvement with 5 days of antibiotic therapy, antifungal therapy is added empirically