Disease State Reviews for Pharmacy Technicians

Bugs and Drugs 101: A Review of Infectious Diseases for Technicians

Nicole Costa, PharmD
September 15, 2012

*The speaker has no actual or potential conflict of interest in relation to this activity.

Learning Objectives

• Identify common bacterial infections that occur in the acute care setting.
• Discuss appropriate antibiotic therapy regimens for treating infections using evidence-based recommendations.
• Discuss the technician’s role in assessing the appropriateness of antibiotic use within an acute care setting.

Urinary Tract Infections (UTI)$^{1,2}$

• Usually young females
• Symptoms:
  – Urgency
  – Frequency
  – Painful urination
  – No fever
  – Normal white blood cell count
• E. coli is the most common bacteria
• Treatment options include SMX/TMP or ciprofloxacin

Complicated Urinary Tract Infections$^3$

• Can occur in:
  – Men
  – Pregnant women
  – Patients from a hospital/nursing home
  – People who use catheters
• Symptoms:
  – Fever
  – Elevated white blood cell count
  – Altered mental status
• Treatment options include ciprofloxacin, ceftriaxone, or piperacillin/tazobactam

Pyelonephritis$^2$

• Upper UTI involving kidneys
• More serious infection
• Symptoms:
  – Fever/chills
  – Flank/abdominal pain
  – Nausea/vomiting
• Need to treat with IV antibiotics until symptoms improve
  – Ciprofloxacin, ceftriaxone, pip/tazo

Case Study

• GB is a 76 year old female who resides in a nursing home. She is admitted to the hospital with a temperature of 102, altered mental status, nausea, and left flank pain.
• GB most likely has which of the following conditions:
  A) uncomplicated UTI
  B) complicated UTI
  C) pyelonephritis
Cellulitis\textsuperscript{4,5}

- Bacterial infection of the outer skin levels as well as the deeper fat layers
- Symptons:
  - Redness
  - Warm feeling skin
  - Inflammation
  - Pain
- \textit{Staph aureus} is the most common bacteria
- Treatment options:
  - Cephalexin (not MRSA), clindamycin, SMX/TMP, doxycycline

Diabetic Foot Infections\textsuperscript{6}

- Decreased blood flow to the feet
  - \textless{} less oxygen
  - Ideal for bacteria that survive without oxygen
- Infections are caused by multiple different bacteria
- Treat with broad spectrum antibiotics
- Treatment options:
  - Piperacillin/tazobactam
  - Clindamycin + levofloxacain
- Can progress to osteomyelitis (infection of bone) if left untreated

Case Study

- AR is a 17 year old male who wrestles on his high school team. He noticed what looked like a spider bite on his arm 1 week ago, and now his whole forearm is red, swollen, and painful. He goes to his doctor and is diagnosed with cellulitis.
- Which bacteria is most likely the cause of AR's infection?
  A) \textit{E.coli}  B) \textit{Pseudomonas}
  C) \textit{Klebsiella}  D) \textit{MRSA}

Pharyngitis (“strep throat”)\textsuperscript{7}

- Inflammation of the throat
- Symptoms:
  - Fever
  - Swollen lymph glands
  - White exudate on tonsils
  - Sore throat/difficulty swallowing
- Less than 30\% caused by the bacteria \textit{Streptococcus pyogenes}
- Most commonly caused by viruses

Sinusitis\textsuperscript{8}

- Inflammation of the sinuses
- May be caused by infection, allergy, or autoimmune disease
- Symptoms:
  - Nasal congestion and discharge
  - Loss of smell
  - Pressure-like pain/facial tenderness
- Most cases are caused by viruses
- If symptoms last > 10 days, may be bacterial
  - Amoxicillin is the drug of choice

Acute Bronchitis\textsuperscript{9}

- Inflammation of the lungs
- Symptoms:
  - Cough
  - Shortness of breath
  - Sputum (phlegm)
- Usually caused by a virus
- Typically not treated with antibiotics
**Chronic Obstructive Pulmonary Disease (COPD)**  
- Airflow limitation that is not fully reversible (chronic bronchitis)  
- Primarily caused by cigarette smoking  
- COPD exacerbation symptoms:  
  - Change in baseline cough, shortness of breath, or sputum production  
- Treat with antibiotics depending on severity of exacerbation  
  - Azithromycin, amoxicillin/clavulanate, levofloxacin

**Pneumonia (PNA)**  
- Inflammatory condition of the lung  
- Can be caused by bacteria, viruses, fungi, or parasites  
  - *Strep pneumo* causes up to 50% of community-acquired PNA  
- Symptoms:  
  - Cough/chest pain  
  - Fever  
  - Difficulty breathing  
- Community-acquired  
  - Levofloxacin or azithromycin (ceftriaxone in hospital)  
- Hospital-acquired  
  - Pip/tazo + azithromycin or levofloxacin

**Case Study**  
- PR is a 57 year old male who has been smoking 2 packs of cigarettes per day for the past 40 years. He normally has a dry cough and shortness of breath on exertion. PR decides to go to the doctor because he has been coughing more with a lot of sputum and can barely breathe even when he is resting.  
- PR is most likely suffering from:  
  A) Acute bronchitis  
  B) COPD exacerbation  
  C) Pneumonia  
  D) Pharyngitis

**Pseudomembranous Colitis**  
- Caused by the bacteria *Clostridium difficile*  
  - Commonly known as C. diff  
- Usually a side effect of being on antibiotics  
- Symptoms:  
  - Watery diarrhea > 3 times per day  
  - Abdominal cramping  
  - Blood in stool in severe infections  
- Treatments include metronidazole or oral vancomycin

**Case Study**  
- LM is a 48 year old female who has been taking clindamycin for 1 week to treat a cellulitis infection. She develops abdominal cramping and is having diarrhea up to 7 times per day. She is diagnosed with C. diff colitis.  
- An appropriate antibiotic for the treatment of LM’s C. diff infection is:  
  A) Levofoxacin  
  B) Metronidazole  
  C) Cephalexin  
  D) Amoxicillin

**Technician’s Role**  
- Clinical technicians can be a huge asset to pharmacists in the acute care setting  
- Assist in data collection  
  - Temperature  
  - White blood cell count  
  - Culture monitoring  
  - Appropriate dosing  
  - Changing from IV to oral antibiotics
References


Catch Your Breath: Catch Up on the Latest in Asthma Education

Jennifer Arnoldi, PharmD, BCPS
ICHP Annual Meeting
September 15, 2012

I have no conflicts of interest to disclose.

Outline

• Objectives
• Asthma review
• Asthma treatment
• Asthma action plan
• Summary
• Questions

Introduction

• 23 million Americans live with asthma
• Asthma’s annual toll
  – 10.6 million doctor’s appointments
  – 1.7 million trips to the emergency room
  – 10.1 million missed work days
  – 12.8 million missed school days
  – 444,000 hospitalizations
  – 3,613 deaths

Objectives

• List at least three triggers that could lead to an asthma attack.
• List the common asthma medications.
• Describe the phases of an asthma action plan.

Asthma

• Chronic inflammatory airway disorder
• Patient complaints
  – Wheezing and breathlessness
  – Cough
  – Chest tightness
    • Especially at night or early morning

Characteristics of Asthma

• Symptoms are reversible with proper treatment
• Symptoms can be triggered
  – Allergens
  – Irritants
  – Cold air
  – Certain medications


Inhaled Medications for Asthma

- Steroids
  - Examples: fluticasone, budesonide, mometasone
  - Reduce swelling / inflammation in the airways
- Beta-agonists
  - Example: albuterol and levalbuterol
  - Open up airways
- Anticholinergics
  - Example: ipratropium and tiotropium
  - Relax airways and decrease secretions

Why Did Some Inhalers Change?

- Chlorofluorocarbons (CFCs)
  - Chemical to propel medication from the inhaler
  - Now banned for environmental reasons
  - Inhalers changed to use HFAs (hydrofluoroalkanes)
- Combivent® (albuterol and ipratropium)
  - Still contains CFC
  - Will be phased out by the end of 2013 and replaced with Combivent Respinmat®

Types of Inhalers

<table>
<thead>
<tr>
<th>Metered Dose Inhalers (MDI)</th>
<th>Dry Powder Inhalers (DPI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usually “L” shaped</td>
<td>Usually disk or tube shaped</td>
</tr>
<tr>
<td>Chemical propels medication from canister</td>
<td>Inhaler contains powder that patient forcibly inhales into lungs</td>
</tr>
<tr>
<td>Patients need good “inhaler technique”</td>
<td>Some require insertion of capsule</td>
</tr>
<tr>
<td>Long, slow breath</td>
<td>Quick &amp; forceful breath</td>
</tr>
<tr>
<td>May be used with spacer devices</td>
<td>No spacer is needed</td>
</tr>
<tr>
<td>Must be “primed” before first use or if not used for a few days</td>
<td>Does not require priming</td>
</tr>
<tr>
<td>Must be shaken well before using</td>
<td>Does not require shaking</td>
</tr>
<tr>
<td>Mouthpiece should be cleaned with water</td>
<td>May clean mouthpiece with dry tissue</td>
</tr>
</tbody>
</table>

Peak Flow

- Peak flow meter device measures how well the patient’s lungs are working
- Helpful for:
  - Monitoring day-to-day breathing changes
  - Tracking asthma control
  - Recognizing a flare-up
  - Deciding when to call the doctor or go to the emergency department

Using a Peak Flow Meter

- Patient blows a fast, hard breath into the mouthpiece
- Patient records the score shown on the meter
- Repeat twice
- Best of three scores is ‘peak flow rate’
- Can be done daily for a few weeks to find ‘personal best’

Asthma Action Plan

- Treatment plan based on patient’s symptoms or peak flow measurements
- Categories
  - Green
  - Yellow
  - Red
- Treatment recommendations based on category
Green Zone
• Patient is not having symptoms
• Patient can do usual activities
• Patient should take regular medications as prescribed

Yellow Zone
• Patient is having symptoms or waking up at night due to asthma
  – Asthma symptoms may limit patient’s ability to do some activities
• Patient needs to use quick-relief medicine

Red Zone
• Patient is very symptomatic
• Patient may have progressed to this stage from the Yellow Zone
• Patient needs to use high doses of quick-relief medicine and call his/her doctor or go to the hospital

References

Questions
1. Which of the following asthma medications is a beta-agonist?
   a. Albuterol
   b. Fluticasone
   c. Tiotropium
   d. Budesonide
Post Test Question 2

2. True or False. All patients with asthma have the same triggers for an asthma attack.
   a. True
   b. False
Disease State Reviews for Pharmacy Technicians

The Sweet Life: Recognizing the Signs and Symptoms of Diabetes and the Common Challenges of Diabetes Management

Ryan Birk
PharmD Candidate 2013
Southern Illinois University Edwardsville School of Pharmacy

Conflict of Interest Declaration

• The speaker has no conflicts to disclose.

Objectives

• Recognize common signs and symptoms of diabetes
• Describe the differences in insulin onset and duration
• Define common challenges for diabetes patients

Future of Diabetes Mellitus

• Currently 25.8 million individuals have diabetes (8.3% of the U.S. population)
• Estimated 7.0 million individuals are undiagnosed
• $174 billion in total cost for diabetes care each year

County-level Estimates of Diagnosed Diabetes among Adults aged ≥ 20 years: United States 2009

Prevalence

Defining Diabetes Mellitus

- Diabetes mellitus is a group of metabolic disorders of fat, carbohydrate, and protein metabolism that results from a **defect in insulin secretion**, **insulin action (sensitivity)**, or both.

Types of Diabetes

- **Type 1 diabetes**
  - Patients do not produce insulin
- **Type 2 diabetes**
  - Patients do not produce enough insulin or the cells ignore insulin (cell sensitivity)

### Type 1 vs. Type 2 Diabetes

<table>
<thead>
<tr>
<th></th>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of patients</td>
<td>5%–10%</td>
<td>&gt;90%</td>
</tr>
<tr>
<td>Typical age at onset</td>
<td>&lt;30 yr</td>
<td>&gt;40 yr</td>
</tr>
<tr>
<td>Typical presentation at diagnosis</td>
<td>Acute symptoms; markedly elevated blood glucose</td>
<td>May not be diagnosed until complications appear</td>
</tr>
<tr>
<td>Obesity</td>
<td>Uncommon</td>
<td>Very common</td>
</tr>
<tr>
<td>Treatment</td>
<td>Insulin</td>
<td>Lifestyle changes and pharmacotherapy</td>
</tr>
<tr>
<td>Diabetic ketoacidosis</td>
<td>Often present</td>
<td>Rare</td>
</tr>
</tbody>
</table>

Common Signs and Symptoms

- Frequent urination
- Uncontrolled thirst
- Extreme hunger
- Blurred vision or drowsiness
- Frequent infections

Which is a sign or symptom of diabetes?

1. Decreased blood pressure
2. Increased blood pressure
3. Night time urinations
4. Does not finish meals

Insulin Therapy
What is Insulin?

• A hormone produced by the pancreas
• Central to regulating metabolism in the body
  – Signals the liver, muscle, and fat tissues to take up glucose from the blood

How to Classify Insulin

• Difference types of insulin:
  – Rapid-acting
  – Regular or Short-acting
  – Intermediate-acting
  – Long-acting
• Each insulin has 3 characteristics:
  – Onset
  – Peak time
  – Duration

How to Classify Insulin

<table>
<thead>
<tr>
<th>Insulin Type</th>
<th>Generic Names</th>
<th>Brand Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid-acting</td>
<td>lispro, aspart, glulisine</td>
<td>Humalog, Novolog, Apidra</td>
</tr>
<tr>
<td>Regular or Short-acting</td>
<td>regular (R)</td>
<td>Humulin R, Novolin R</td>
</tr>
<tr>
<td>Intermediate-acting</td>
<td>NPH (N), detemir</td>
<td>Humulin N, Novolin N, Levemir</td>
</tr>
<tr>
<td>Long-acting</td>
<td>glargine</td>
<td>Lantus</td>
</tr>
</tbody>
</table>

Differences in Insulin

<table>
<thead>
<tr>
<th>Insulin Type</th>
<th>Onset</th>
<th>Peak time</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid-acting</td>
<td>5 minutes</td>
<td>1 hour</td>
<td>2 to 4 hours</td>
</tr>
<tr>
<td>Regular or Short-acting</td>
<td>30 minutes</td>
<td>2 to 3 hours</td>
<td>3 to 6 hours</td>
</tr>
<tr>
<td>Intermediate-acting</td>
<td>2 to 4 hours</td>
<td>4 to 12 hours</td>
<td>12 to 18 hours</td>
</tr>
<tr>
<td>Long-acting</td>
<td>6 to 10 hours</td>
<td>Theoretically</td>
<td>20 to 24 hours</td>
</tr>
</tbody>
</table>

What is the onset of regular (R) insulin after administering it to a patient?

1. 5 minutes
2. 30 minutes
3. 60 minutes
4. 90 minutes
Common Challenges for Patients with Diabetes

- Microvascular
  - Eye Complications
  - Kidney Complications
  - Nerve Damage (Neuropathy)
- Macrovascular
  - Weight gain
    - Typically increases when started on insulin
  - Foot Complications
  - Heart and Brain Complications

Common Challenges for Patients with Diabetes

- Emergency Complication
  - Ketoacidosis
    - Body starts burning fat for energy instead of glucose
    - Possible cause is failure to treat high blood glucose
    - Serous condition that can lead to coma or even death
    - Treatment:
      - Intravenous regular insulin
      - Lower Blood Glucose (Hypoglycemia)
    - Treatment:
      - Glucagon injection

Which of the conditions below is an emergency complication/challenge?

1. Nerve damage
2. Weight gain
3. Foot Complications
4. Ketoacidosis

Questions?

References