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[4,5]

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

Diabetic Foot Infections[6]

- Decreased blood flow to the feet
  - →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 + levofloxacin
- Can progress to osteomyelitis (infection of bone) if left untreated

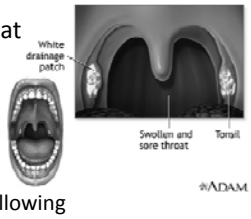
Case Study

- 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) *E.coli* B) *Pseudomonas*
C) *Klebsiella* D) MRSA

Pharyngitis ("strep throat")[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 *Streptococcus pyogenes*
- Most commonly caused by viruses



Sinusitis[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[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)[10]

- 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)[11]

- 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 breath even when he is resting.
- PR is most likely suffering from:

A) Acute bronchitis B) COPD exacerbation
C) Pneumonia D) Pharyngitis

Pseudomembranous Colitis[12]

- 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) Levofloxacin 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

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Questions?

Disease State Reviews for Pharmacy Technicians

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

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.

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

National Asthma Control Initiative Action Guide. (NIH Publication 10-7542). Bethesda, MD: September 2010. U.S. Department of Health and Human Services. National Institutes of Health. National Heart, Lung, and Blood Institute.

Asthma

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

Kelly HW and Sorkness CA. Asthma. In: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM, eds. *Pharmacotherapy: A Pathophysiologic Approach*. 8th ed. New York, NY: McGraw-Hill; 2011:439-470.

Characteristics of Asthma

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

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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

PL Technician Training Tutorial, Dispensing Inhalers. Pharmacist's Letter 2012; 28(2):280230

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 Respimat®

PL Technician Training Tutorial, Dispensing Inhalers. Pharmacist's Letter 2012; 28(2):280230

Types of Inhalers

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

Tips for Correct Use of Inhalers. Pharmacist's Letter 2008; 24(4):240406

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

Kelly HW and Sorkness CA. Asthma. In: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM, eds. *Pharmacotherapy: A Pathophysiologic Approach.* 8th ed. New York, NY: McGraw-Hill; 2011:439-470.

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'

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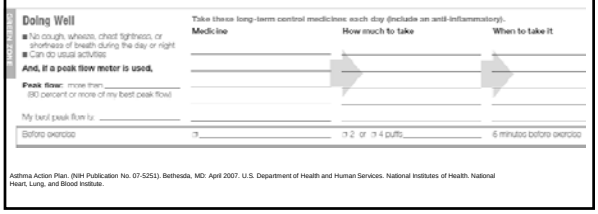
Asthma Action Plan

- Treatment plan based on patient's symptoms or peak flow measurements
- Categories
  - Green
  - Yellow
  - Red
- Treatment recommendations based on category

Asthma Action Plan. (NIH Publication No. 07-5251). Bethesda, MD: April 2007. U.S. Department of Health and Human Services. National Institutes of Health. National Heart, Lung, and Blood Institute.

Green Zone

- Patient is not having symptoms
- Patient can do usual activities
- Patient should take regular medications as prescribed


Doing Well
■ No cough, wheeze, chest tightness, or shortness of breath during the day or night
■ Can do usual activities
And, if a peak flow meter is used,
Peak flow: more than _____
(80 percent or more of my best peak flow)
My best peak flow is: _____
Take these long-term control medicines each day (include an anti-inflammatory).
Medicine | How much to take | When to take it
Before exercise | ☐ _____ | ☐ 2 or ☐ 4 puffs | 6 minutes before exercise
Asthma Action Plan. (NIH Publication No. 07-5251). Bethesda, MD: April 2007. U.S. Department of Health and Human Services. National Institutes of Health. National Heart, Lung, and Blood Institute.

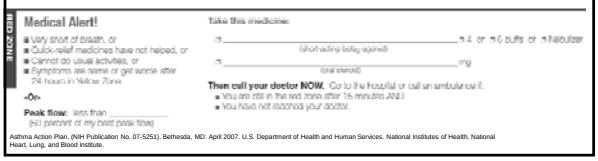
Yellow Zone

- 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


Asthma Is Getting Worse
■ Cough, wheeze, chest tightness, or shortness of breath, or
■ Waking at night due to asthma, or
■ Can do some, but not all, usual activities
-Or-
Peak flow: _____ to _____
(50 to 79 percent of my best peak flow)
Take
Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.
_____ ☐ 2 or ☐ 4 puffs, every 20 minutes for up to 1 hour
(short-acting beta2-agonist) ☐ Nebulizer, once
Stay
If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:
☐ Continue monitoring to be sure you stay in the green zone.
-Or-
If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:
☐ Take _____ ☐ 2 or ☐ 4 puffs or ☐ Nebulizer
(short-acting beta2-agonist)
☐ Add _____ mg per day for _____ (3–10) days
(oral steroid)
☐ Call the doctor ☐ before/ ☐ within _____ hours after taking the oral steroid.
Asthma Action Plan. (NIH Publication No. 07-5251). Bethesda, MD: April 2007. U.S. Department of Health and Human Services. National Institutes of Health. National Heart, Lung, and Blood Institute.

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


Medical Alert!
■ Very short of breath, or
■ Quick-relief medicines have not helped, or
■ Cannot do usual activities, or
■ Symptoms are same or get worse after 24 hours in Yellow Zone
-Or-
Peak flow: less than _____
(50 percent of my best peak flow)
Take this medicine:
☐ _____ ☐ 4 or ☐ 6 puffs or ☐ Nebulizer
(short-acting beta2-agonist)
☐ _____ mg
(oral steroid)
Then call your doctor NOW. Go to the hospital or call an ambulance if:
■ You are still in the red zone after 15 minutes AND
■ You have not reached your doctor.
Asthma Action Plan. (NIH Publication No. 07-5251). Bethesda, MD: April 2007. U.S. Department of Health and Human Services. National Institutes of Health. National Heart, Lung, and Blood Institute.

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Questions

Post Test Question

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.

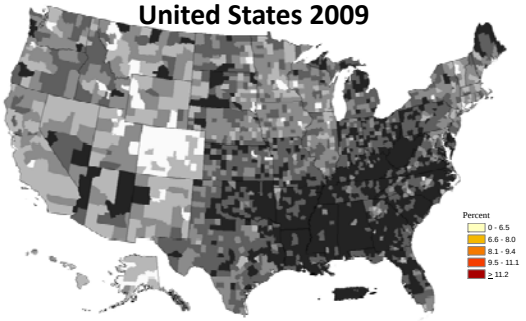
Objectives

- 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

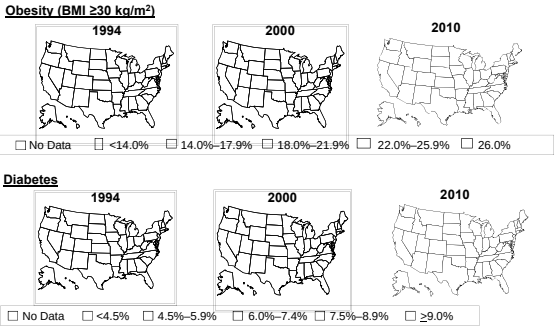
- Currently 25.8 million individuals have diabetes (8.3 % of the U.S. population)
- Estimated 7.0 million individuals are undiagnosed
- $174 billion in total cost for diabetes care each year

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



Centers for Disease Control and Prevention: National Diabetes Surveillance System. Available online at: http://apps.nccd.cdc.gov/DDTSTRS/default.aspx. Retrieved 8/17/2012.

Prevalence



CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at http://www.cdc.gov/diabetes/statistics

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

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

9

Common Signs and Symptoms

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

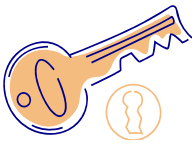
Which is a sign or symptom of diabetes?

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

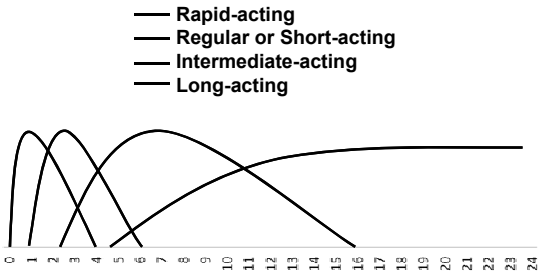
How to Classify Insulin

Insulin Type	Generic Names	Brand Names
Rapid-acting	lispro, aspart, glulisine	Humalog, Novolog, Apidra
Regular or Short-acting	regular (R)	Humulin R, Novolin R
Intermediate-acting	NPH (N), detemir	Humulin N, Novolin N, Levemir
Long-acting	glargine	Lantus

Differences in Insulin

Insulin Type	Onset	Peak time	Duration
Rapid-acting	5 minutes	1 hour	2 to 4 hours
Regular or Short-acting	30 minutes	2 to 3 hours	3 to 6 hours
Intermediate-acting	2 to 4 hours	4 to 12 hours	12 to 18 hours
Long-acting	6 to 10 hours	Theoretically should not peak	20 to 24 hours

Differences in Insulin



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?

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