3.5: Penicillins

Now that we have reviewed antimicrobial basics, administration considerations, and the nursing process when administering antimicrobials, we will take a closer look at specific antimicrobial classes and administration considerations, therapeutic effects, adverse effects, and specific teaching needed for each class of antimicrobials. Each of the following sections of this chapter is based on a class or subclass of anti-infective medications. Each section discusses the mechanism of action, specific administration considerations, and common patient teaching for this class/subclass of medication. Each section is then followed by a medication table with a common generic medication and its specific administration considerations, therapeutic effects, and side effects/adverse effects for this medication.

Penicillins

Penicillin was the first antibiotic discovered and its detection came as a bit of an accident. In 1928, Alexander Fleming, a professor of bacteriology at St. Mary’s Hospital in London, discovered penicillin accidentally growing in a petri dish in his lab. The penicillin was the result of mold juice that had grown there inadvertently. Fleming noted that this “mold juice” inhibited the growth of Staphylococcus bacteria that was previously growing in the petri dish. Subsequently, the first antibiotic discovery was made.[1]

**Indications:** Penicillins are prescribed to treat a variety of infectious processes such as Streptococcal infections, Pneumococcal infections, and Staphylococcal infections. Penicillins may be administered orally, IV, or intramuscularly.

**Mechanism of Action:** Penicillins are bactericidal and kill bacteria by interfering with the synthesis of proteins needed in their cellular walls.[2] When the bacterial cell wall is impaired, the cell is rapidly broken down and destroyed.

**Specific Administration Considerations:** In addition to general antimicrobial administration considerations, it is
important to monitor patients who receive penicillins for signs of superinfections such as C-diff or yeast infections. There is also a cross-sensitivity for patients allergic to cephalosporins. It is important to remember that patients who are prescribed high doses of penicillin may experience significant coagulation abnormalities. Other notable drug interactions include the use of diuretic therapy with penicillin. Penicillin contains a significant amount of potassium. Patients receiving potassium-sparing diuretics or supplementation should be monitored for signs of hyperkalemia. Penicillin is best absorbed on an empty stomach; however, many patients may experience GI upset and subsequently take the medication with food.

**Patient Teaching & Education:** The patient should notify the health care provider (HCP) if fever or diarrhea develops, especially if the stool contains blood, pus, or mucus. Advise the patient not to treat diarrhea without advice from HCP. If GI upset occurs, the patient may take the medication with meals but should avoid taking with citrus-based products, which can impede absorption. Additionally, patients should be instructed to chew oral chewable tablets thoroughly before swallowing. The patient should report a rash or any signs of superinfection (black, furry overgrowth on tongue; vaginal itching or discharge; loose or foul-smelling stool).

Patients should be instructed to take medication around the clock and to finish the drug completely as directed. Doses should be spaced evenly to achieve the desired therapeutic effect. Additionally, patients should receive instruction to not share medication and that any sharing of medications may be dangerous. Patients with a history of rheumatic heart disease or valve replacement should receive instruction regarding the importance of using antimicrobial prophylaxis before invasive medical or dental procedures. Female patients taking oral contraceptives should use an alternative form of contraception during therapy with amoxicillin and until next period. Patients should notify their HCP if symptoms do not improve.

Now let’s take a closer look at the penicillin medication grid in Table 3.5. Medication grids are intended to assist students to learn key points about each medication. Basic information related to a common generic medication in this class is outlined, including administration considerations, therapeutic effects, and side effects/adverse effects. **Prototype**/generic medications listed in the medication grid are also hyperlinked directly to a free resource from the United States National Library of Medicine called Daily Med. Because information about medication is constantly changing, nurses should always consult evidence-based resources to review current recommendations before administering specific medication. On the home page of Daily Med, enter the drug name in the search bar to read more about the medication.

<table>
<thead>
<tr>
<th>Class/Subclass</th>
<th>Prototype-Generic</th>
<th>Administration Considerations</th>
<th>Therapeutic Effects</th>
<th>Side/Adverse Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>penicillin V (PO)</td>
<td>Check for allergies to penicillin or cephalosporins</td>
<td>Monitor for systemic signs of infection: -WBCs</td>
<td>Common: nausea, vomiting, epigastric distress, diarrhea, and black hairy tongue</td>
</tr>
<tr>
<td></td>
<td>penicillin G (IV)</td>
<td>Obtain culture, if ordered, before</td>
<td></td>
<td>Monitor for C-diff, candidiasis, and hyperkalemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hypersensitivity: Rash (maculopapular to</td>
<td></td>
</tr>
</tbody>
</table>

https://med.libretexts.org/Bookshelves/Nursing/Nursing_Pharmacology_(OpenRN)/03%3A_Antimicrobials/3.05%3A_Penicillins

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**Critical Thinking Activity 3.5a**

Using the above grid information, consider the following clinical scenario question:

Mr. Jones was admitted to the medical surgical floor with a Pneumococcal respiratory infection and prescribed penicillin V 500 mg PO every 6 hours. You bring the patient his 0800 medications, which include his penicillin. The patient has just finished his breakfast that included orange juice. Would you proceed with the penicillin administration at this time? Why or why not?

Note: Answers to the Critical Thinking activities can be found in the “Answer Key” sections at the end of the book.

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