Drug Monograph: Amoxicillin

1. Description

Class: Amoxicillin is a broad-spectrum, semi-synthetic antibiotic belonging to the **aminopenicillin** family of beta-lactams.

Mechanism of Action:

Amoxicillin acts by inhibiting the biosynthesis of the bacterial cell wall. It binds irreversibly to specific Penicillin-Binding Proteins (PBPs) located inside the bacterial cell wall. This binding inhibits the final transpeptidation step of peptidoglycan synthesis, which weakens the cell wall and leads to cell lysis (rupture) and bacterial death.

Indications:

It is commonly prescribed for infections caused by susceptible isolates of Streptococcus, Enterococcus, and Haemophilus species, including:

- Acute otitis media (middle ear infection)
- Streptococcal pharyngitis (strep throat)
- Community-acquired pneumonia (CAP)
- Skin and soft tissue infections
- Urinary tract infections

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2. Recommended Dosage

Note: Dosages listed are general guidelines. Actual prescriptions depend on severity, renal function, and local resistance patterns.

Adults

Infection Severity	**Recommended Dose**	**Frequency**
Mild to Moderate	500 mg	Every 12 hours
	OR 250 mg	Every 8 hours
Severe	875 mg	Every 12 hours

	OR 500 mg	Every 8 hours
H. pylori Infection	1,000 mg (part of triple therapy)	Twice daily

Children (Aged > 3 months, < 40 kg)

Infection Severity	Recommended Dose	Frequency
Mild to Moderate	25 mg/kg/day	Divided every 12 hours
	OR 20 mg/kg/day	Divided every 8 hours
Severe	45 mg/kg/day	Divided every 12 hours
	OR 40 mg/kg/day	Divided every 8 hours
Acute Otitis Media	80 to 90 mg/kg/day	Divided every 12 hours

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3. Contraindications and Side Effects

Contraindications

- **Hypersensitivity:** History of severe allergic reaction (e.g., anaphylaxis, Stevens-Johnson syndrome) to amoxicillin, other penicillins, or cephalosporins.
- **Infectious Mononucleosis:** Patients with mono (EBV infection) who take amoxicillin have a high risk (>90%) of developing a characteristic maculopapular rash.

Side Effects

- **Common:**
    - Diarrhea / Loose stools
    - Nausea and vomiting
    - Skin rash (morbilliform)
- **Serious (Rare):**
    - **Anaphylaxis:** Difficulty breathing, swelling of face/throat.

- **Clostridioides difficile-associated diarrhea:** Severe, watery diarrhea caused by gut flora disruption.
- **Hepatotoxicity:** Rare instances of liver injury (more common with Amoxicillin-Clavulanate).

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4. Clinical Trial Study Results

Study: *Efficacy of Pharmacokinetically Enhanced Amoxicillin-Clavulanate in Community-Acquired Pneumonia (CAP)*

Reference: File TM, et al. *Antimicrobial Agents and Chemotherapy*. 2004.

Objective:

To compare the clinical efficacy of a pharmacokinetically enhanced high-dose formulation (2,000 mg/125 mg) versus the standard dose (875 mg/125 mg) in adults with Community-Acquired Pneumonia.

Methodology:

- **Design:** Randomized, double-blind, non-inferiority trial.
- **Participants:** 633 adults with confirmed bacterial CAP.
- **Regimen:**
  - **Group A:** Amoxicillin/Clavulanate 2,000 mg / 125 mg twice daily for 7 days.
  - **Group B:** Amoxicillin/Clavulanate 875 mg / 125 mg twice daily for 7 days.

Results:

- **Clinical Success Rate:**
  - High Dose Group (2,000 mg): **90.3%**
  - Standard Dose Group (875 mg): **87.6%**
- **Bacteriological Success:**
  - High Dose Group: **86.6%**
  - Standard Dose Group: **78.4%**

Conclusion:

The high-dose pharmacokinetically enhanced formulation was as clinically effective as the standard dose for treating community-acquired pneumonia and was well-tolerated, with no significant increase in adverse events despite the higher amoxicillin load.