AMOXICILLIN- amoxicillin powder, for suspension
Teva Pharmaceuticals USA Inc

HIGHLIGHTS OF PRESCRIBING INFORMATION
These highlights do not include all the information needed to use AMOXICILLIN FOR ORAL SUSPENSION safely and effectively. See full prescribing information for AMOXICILLIN FOR ORAL SUSPENSION.

AMOXICILLIN for oral suspension, for oral use

Initial U.S. Approval: 1974

RECENT MAJOR CHANGES

Indications and Usage, Gonorrhea (1.5) Removed 9/2015
Dosage and Administration, Gonorrhea (2.1) Removed 9/2015

INDICATIONS AND USAGE

Amoxicillin for Oral Suspension is a penicillin-class antibacterial indicated for treatment of infections due to susceptible strains of designated microorganisms.

- Infections of the ear, nose, throat, genitourinary tract, skin and skin structure, and lower respiratory tract. (1.1 to 1.4)
- In combination for treatment of *H. pylori* infection and duodenal ulcer disease. (1.5)

To reduce the development of drug-resistant bacteria and maintain the effectiveness of Amoxicillin for Oral Suspension and other antibacterial drugs, Amoxicillin for Oral Suspension should be used only to treat infections that are proven or strongly suspected to be caused by bacteria. (1.6)

DOSAGE AND ADMINISTRATION

- In adults, 750 to 1750 mg/day in divided doses every 8 to 12 hours. In Pediatric Patients > 3 Months of Age, 20 to 45 mg/kg/day in divided doses every 8 to 12 hours. Refer to full prescribing information for specific dosing regimens. (2.1, 2.2, 2.3)
- The upper dose for neonates and infants ≤ 3 months is 30 mg/kg/day divided every 12 hours. (2.2)
- Dosing for *H. pylori* Infection: Triple therapy: 1 gram Amoxicillin for Oral Suspension, 500 mg clarithromycin, and 30 mg lansoprazole, all given twice daily (every 12 hours) for 14 days. Dual therapy: 1 gram Amoxicillin for Oral Suspension and 30 mg lansoprazole, each given three times daily (every 8 hours) for 14 days. (2.3)
- Reduce the dose in patients with severe renal impairment (GFR < 30 mL/min). (2.4)

DOSAGE FORMS AND STRENGTHS

- Powder for Oral Suspension: 200 mg/5 mL, 400 mg/5 mL, (3)

CONTRAINDICATIONS

- History of a serious hypersensitivity reaction (e.g., anaphylaxis or Stevens-Johnson syndrome) to amoxicillin or to other beta-lactams (e.g., penicillins or cephalosporins) (4)

WARNINGS AND PRECAUTIONS

- Anaphylactic reactions: Serious and occasionally fatal anaphylactic reactions have been reported in patients on penicillin therapy. Serious anaphylactic reactions require immediate emergency treatment with supportive measures. (5.1)
- *Clostridium difficile* Associated Diarrhea (ranging from mild diarrhea to fatal colitis): Evaluate if diarrhea occurs. (5.2)

ADVERSE REACTIONS

The most common adverse reactions (> 1%) observed in clinical trials of amoxicillin capsules, tablets or oral suspension were diarrhea, rash, vomiting, and nausea. (6.1)
To report SUSPECTED ADVERSE REACTIONS, contact TEVA USA, PHARMACOVIGILANCE at 1-866-832-8537 or drug.safety@tevapharm.com; or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS

- Probenicid decreases renal tubular secretion of amoxicillin which may result in increased blood levels of amoxicillin. (7.1)

- Concomitant use of amoxicillin and oral anticoagulants may increase the prolongation of prothrombin time. (7.2)
- Coadministration with allopurinol increases the risk of rash. (7.3)
- Amoxicillin may reduce the efficacy of oral contraceptives. (7.4)

USE IN SPECIFIC POPULATIONS

- Pediatric: Modify dose in patients 12 weeks or younger (≤ 3 months). (8.4)

See 17 for PATIENT COUNSELING INFORMATION.

Revised: 3/2016

FULL PRESCRIBING INFORMATION: CONTENTS*

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FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE

1.1 Infections of the Ear, Nose, and Throat

Amoxicillin for Oral Suspension is indicated in the treatment of infections due to susceptible (ONLY β-lactamase–negative) isolates of *Streptococcus* species (α- and β-hemolytic isolates only), *Streptococcus pneumoniae*, *Staphylococcus* spp., or *Haemophilus influenzae*.

1.2 Infections of the Genitourinary Tract

Amoxicillin for Oral Suspension is indicated in the treatment of infections due to susceptible (ONLY β-lactamase–negative) isolates of *Escherichia coli*, *Proteus mirabilis*, or *Enterococcus faecalis*.

1.3 Infections of the Skin and Skin Structure

Amoxicillin for Oral Suspension is indicated in the treatment of infections due to susceptible (ONLY β-lactamase–negative) isolates of *Streptococcus* spp. (α- and β-hemolytic isolates only), *Staphylococcus* spp., or *E. coli*.

1.4 Infections of the Lower Respiratory Tract

Amoxicillin for Oral Suspension is indicated in the treatment of infections due to susceptible (ONLY β-lactamase–negative) isolates of *Streptococcus* spp. (α- and β-hemolytic isolates only), *S. pneumoniae*, *Staphylococcus* spp., or *H. influenzae*.

1.5 Helicobacter pylori Infection

Triple therapy for *Helicobacter pylori* with clarithromycin and lansoprazole:

Amoxicillin for Oral Suspension, in combination with clarithromycin plus lansoprazole as triple therapy, is indicated for the treatment of patients with *H. pylori* infection and duodenal ulcer disease (active or 1-year history of a duodenal ulcer) to eradicate *H. pylori*. Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence.

Dual therapy for *H. pylori* with lansoprazole:

Amoxicillin for Oral Suspension, in combination with lansoprazole delayed-release capsules as dual

therapy, is indicated for the treatment of patients with *H. pylori* infection and duodenal ulcer disease (active or 1-year history of a duodenal ulcer) **who are either allergic or intolerant to clarithromycin or in whom resistance to clarithromycin is known or suspected**. (See the clarithromycin package insert, MICROBIOLOGY.) Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence.

1.6 Usage

To reduce the development of drug-resistant bacteria and maintain the effectiveness of Amoxicillin for Oral Suspension and other antibacterial drugs, Amoxicillin for Oral Suspension should be used only to treat infections that are proven or strongly suspected to be caused by bacteria. When culture and susceptibility information are available, they should be considered in selecting or modifying antibacterial therapy. In the absence of such data, local epidemiology and susceptibility patterns may contribute to the empiric selection of therapy.

2 DOSAGE AND ADMINISTRATION

2.1 Dosing for Adult and Pediatric Patients > 3 Months of Age

Treatment should be continued for a minimum of 48 to 72 hours beyond the time that the patient becomes asymptomatic or evidence of bacterial eradication has been obtained. It is recommended that there be at least 10 days' treatment for any infection caused by *Streptococcus pyogenes* to prevent the occurrence of acute rheumatic fever. In some infections, therapy may be required for several weeks. It may be necessary to continue clinical and/or bacteriological follow-up for several months after cessation of therapy.

Table 1. Dosing Recommendations for Adult and Pediatric Patients > 3 Months of Age

Infection	**Severity***	**Usual Adult Dose**	**Usual Dose for Children > 3 Months†**
Ear/Nose/Throat Skin/Skin Structure Genitourinary Tract	Mild/Moderate	500 mg every 12 hours or 250 mg every 8 hours	25 mg/kg/day in divided doses every 12 hours **or** 20 mg/kg/day in divided doses every 8 hours
	Severe	875 mg every 12 hours or 500 mg every 8 hours	45 mg/kg/day in divided doses every 12 hours **or** 40 mg/kg/day in divided doses every 8 hours
Lower Respiratory Tract	Mild/Moderate or Severe	875 mg every 12 hours or 500 mg every 8 hours	45 mg/kg/day in divided doses every 12 hours **or** 40 mg/kg/day in divided doses every 8 hours

* Dosing for infections caused by bacteria that are intermediate in their susceptibility to amoxicillin should follow the recommendations for severe infections.

† The children's dosage is intended for individuals whose weight is less than 40 kg. Children weighing 40 kg or more should be dosed according to the adult recommendations.

2.2 Dosing in Neonates and Infants Aged ≤ 12 Weeks (≤ 3 Months)

Treatment should be continued for a minimum of 48 to 72 hours beyond the time that the patient becomes asymptomatic or evidence of bacterial eradication has been obtained. It is recommended that there be at

least 10 days' treatment for any infection caused by *Streptococcus pyogenes* to prevent the occurrence of acute rheumatic fever. Due to incompletely developed renal function affecting elimination of amoxicillin in this age group, the recommended upper dose of Amoxicillin for Oral Suspension is 30 mg/kg/day divided every 12 hours. There are currently no dosing recommendations for pediatric patients with impaired renal function.

2.3 Dosing for *H. pylori* Infection

Triple Therapy: The recommended adult oral dose is 1 gram Amoxicillin for Oral Suspension, 500 mg clarithromycin, and 30 mg lansoprazole, all given twice daily (every 12 hours) for 14 days.

Dual Therapy: The recommended adult oral dose is 1 gram Amoxicillin for Oral Suspension and 30 mg lansoprazole, each given three times daily (every 8 hours) for 14 days.

Please refer to clarithromycin and lansoprazole full prescribing information.

2.4 Dosing in Renal Impairment

- Patients with impaired renal function do not generally require a reduction in dose unless the impairment is severe.
- Severely impaired patients with a glomerular filtration rate of < 30 mL/min should not receive a 875 mg dose.
- Patients with a glomerular filtration rate of 10 to 30 mL/min should receive 500 mg or 250 mg every 12 hours, depending on the severity of the infection.
- Patients with a glomerular filtration rate less than 10 mL/min should receive 500 mg or 250 mg every 24 hours, depending on severity of the infection.
- Hemodialysis patients should receive 500 mg or 250 mg every 24 hours, depending on severity of the infection. They should receive an additional dose both during and at the end of dialysis.

2.5 Directions for Mixing Oral Suspension

Tap bottle until all powder flows freely. Add approximately 1/3 of the total amount of water for reconstitution (see **Table 2**) and shake vigorously to wet powder. Add remainder of the water and again shake vigorously.

Table 2. Amount of Water for Mixing Oral Suspension

Strength	**Bottle Size**	**Amount of Water Required for Reconstitution**
Oral Suspension 200 mg/5 mL	50 mL	39 mL
	75 mL	57 mL
	100 mL	75 mL
Each teaspoonful (5 mL) will contain 200 mg amoxicillin.		
Oral Suspension 400 mg/5 mL	50 mL	35 mL
	75 mL	51 mL
	100 mL	67 mL
Each teaspoonful (5 mL) will contain 400 mg amoxicillin.		

After reconstitution, the required amount of suspension should be placed directly on the child's tongue for swallowing. Alternate means of administration are to add the required amount of suspension to formula, milk, fruit juice, water, ginger ale, or cold drinks. These preparations should then be taken immediately.

NOTE: SHAKE ORAL SUSPENSION WELL BEFORE USING. Keep bottle tightly closed. Any

unused portion of the reconstituted suspension must be discarded after 14 days. Refrigeration is preferable, but not required.

3 DOSAGE FORMS AND STRENGTHS

Each 5 mL of reconstituted pink, fruit gum flavored suspension contains 200 mg amoxicillin as the trihydrate.

Each 5 mL of reconstituted pink, fruit gum flavored suspension contains 400 mg amoxicillin as the trihydrate.

4 CONTRAINDICATIONS

Amoxicillin for oral suspension is contraindicated in patients who have experienced a serious hypersensitivity reaction (e.g., anaphylaxis or Stevens-Johnson syndrome) to amoxicillin or to other β-lactam antibiotics (e.g., penicillins and cephalosporins).

5 WARNINGS AND PRECAUTIONS

5.1 Anaphylactic Reactions

Serious and occasionally fatal hypersensitivity (anaphylactic) reactions have been reported in patients on penicillin therapy including amoxicillin. Although anaphylaxis is more frequent following parenteral therapy, it has occurred in patients on oral penicillins. These reactions are more likely to occur in individuals with a history of penicillin hypersensitivity and/or a history of sensitivity to multiple allergens. There have been reports of individuals with a history of penicillin hypersensitivity who have experienced severe reactions when treated with cephalosporins. Before initiating therapy with amoxicillin, careful inquiry should be made regarding previous hypersensitivity reactions to penicillins, cephalosporins, or other allergens. If an allergic reaction occurs, amoxicillin should be discontinued and appropriate therapy instituted.

5.2 *Clostridium difficile* Associated Diarrhea

Clostridium difficile associated diarrhea (CDAD) has been reported with use of nearly all antibacterial agents, including amoxicillin, and may range in severity from mild diarrhea to fatal colitis. Treatment with antibacterial agents alters the normal flora of the colon leading to overgrowth of *C. difficile*.

C. difficile produces toxins A and B which contribute to the development of CDAD. Hypertoxin-producing strains of *C. difficile* cause increased morbidity and mortality, as these infections can be refractory to antimicrobial therapy and may require colectomy. CDAD must be considered in all patients who present with diarrhea following antibacterial use. Careful medical history is necessary since CDAD has been reported to occur over 2 months after the administration of antibacterial agents.

If CDAD is suspected or confirmed, ongoing antibiotic use not directed against *C. difficile* may need to be discontinued. Appropriate fluid and electrolyte management, protein supplementation, antibiotic treatment of *C. difficile*, and surgical evaluation should be instituted as clinically indicated.

5.3 Development of Drug-Resistant Bacteria

Prescribing amoxicillin in the absence of a proven or strongly suspected bacterial infection is unlikely to provide benefit to the patient and increases the risk of the development of drug-resistant bacteria.

5.4 Use in Patients With Mononucleosis

A high percentage of patients with mononucleosis who receive amoxicillin develop an erythematous skin rash. Thus amoxicillin should not be administered to patients with mononucleosis.

6 ADVERSE REACTIONS

The following are discussed in more detail in other sections of the labeling:

- Anaphylactic reactions [*see Warnings and Precautions (5.1)*]
- CDAD [*see Warnings and Precautions (5.2)*]

6.1 Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The most common adverse reactions (> 1%) observed in clinical trials of amoxicillin capsules, tablets or oral suspension were diarrhea, rash, vomiting, and nausea.

Triple Therapy*:* The most frequently reported adverse events for patients who received triple therapy (amoxicillin/clarithromycin/lansoprazole) were diarrhea (7%), headache (6%), and taste perversion (5%).

Dual Therapy*:* The most frequently reported adverse events for patients who received double therapy amoxicillin/lansoprazole were diarrhea (8%) and headache (7%). For more information on adverse reactions with clarithromycin or lansoprazole, refer to the Adverse Reactions section of their package inserts.

6.2 Postmarketing or Other Experience

In addition to adverse events reported from clinical trials, the following events have been identified during postmarketing use of penicillins. Because they are reported voluntarily from a population of unknown size, estimates of frequency cannot be made. These events have been chosen for inclusion due to a combination of their seriousness, frequency of reporting, or potential causal connection to amoxicillin.

- **Infections and Infestations:** Mucocutaneous candidiasis.
- **Gastrointestinal:** Black hairy tongue, and hemorrhagic/pseudomembranous colitis. Onset of pseudomembranous colitis symptoms may occur during or after antibacterial treatment [*see Warnings and Precautions (5.2)*].
- **Hypersensitivity Reactions:** Anaphylaxis [*see Warnings and Precautions (5.1)*]. Serum sickness–like reactions, erythematous maculopapular rashes, erythema multiforme, Stevens-Johnson syndrome, exfoliative dermatitis, toxic epidermal necrolysis, acute generalized exanthematous pustulosis, hypersensitivity vasculitis, and urticaria have been reported.
- **Liver:** A moderate rise in AST and/or ALT has been noted, but the significance of this finding is unknown. Hepatic dysfunction including cholestatic jaundice, hepatic cholestasis and acute cytolytic hepatitis have been reported.
- **Renal:** Crystalluria has been reported [*see Overdosage (10)*].
- **Hemic and Lymphatic Systems:** Anemia, including hemolytic anemia, thrombocytopenia, thrombocytopenic purpura, eosinophilia, leukopenia, and agranulocytosis have been reported. These reactions are usually reversible on discontinuation of therapy and are believed to be hypersensitivity phenomena.
- **Central Nervous System:** Reversible hyperactivity, agitation, anxiety, insomnia, confusion, convulsions, behavioral changes, and/or dizziness have been reported.
- **Miscellaneous:** Tooth discoloration (brown, yellow, or gray staining) has been reported. Most reports occurred in pediatric patients. Discoloration was reduced or eliminated with brushing or dental cleaning in most cases.

7 DRUG INTERACTIONS

7.1 Probenecid

Probenecid decreases the renal tubular secretion of amoxicillin. Concurrent use of amoxicillin and probenecid may result in increased and prolonged blood levels of amoxicillin.

7.2 Oral Anticoagulants

Abnormal prolongation of prothrombin time (increased international normalized ratio [INR]) has been reported in patients receiving amoxicillin and oral anticoagulants. Appropriate monitoring should be undertaken when anticoagulants are prescribed concurrently. Adjustments in the dose of oral anticoagulants may be necessary to maintain the desired level of anticoagulation.

7.3 Allopurinol

The concurrent administration of allopurinol and amoxicillin increases the incidence of rashes in patients receiving both drugs as compared to patients receiving amoxicillin alone. It is not known whether this potentiation of amoxicillin rashes is due to allopurinol or the hyperuricemia present in these patients.

7.4 Oral Contraceptives

Amoxicillin may affect the gut flora, leading to lower estrogen reabsorption and reduced efficacy of combined oral estrogen/progesterone contraceptives.

7.5 Other Antibacterials

Chloramphenicol, macrolides, sulfonamides, and tetracyclines may interfere with the bactericidal effects of penicillin. This has been demonstrated *in vitro*; however, the clinical significance of this interaction is not well documented.

7.6 Effects on Laboratory Tests

High urine concentrations of ampicillin may result in false-positive reactions when testing for the presence of glucose in urine using CLINITEST®, Benedict's Solution, or Fehling's Solution. Since this effect may also occur with amoxicillin, it is recommended that glucose tests based on enzymatic glucose oxidase reactions (such as CLINISTIX®) be used.

Following administration of ampicillin or amoxicillin to pregnant women, a transient decrease in plasma concentration of total conjugated estriol, estriol-glucuronide, conjugated estrone, and estradiol has been noted.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Teratogenic Effects

<u>Pregnancy Category B</u>

Reproduction studies have been performed in mice and rats at doses up to 2000 mg/kg (3 and 6 times the 3 g human dose, based on body surface area). There was no evidence of harm to the fetus due to amoxicillin. There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, amoxicillin should be used during pregnancy only if clearly needed.

8.2 Labor and Delivery

Oral ampicillin is poorly absorbed during labor. It is not known whether use of amoxicillin in humans during labor or delivery has immediate or delayed adverse effects on the fetus, prolongs the duration of labor, or increases the likelihood of the necessity for an obstetrical intervention.

8.3 Nursing Mothers

Penicillins have been shown to be excreted in human milk. Amoxicillin use by nursing mothers may lead to sensitization of infants. Caution should be exercised when amoxicillin is administered to a nursing woman.

8.4 Pediatric Use

Because of incompletely developed renal function in neonates and young infants, the elimination of amoxicillin may be delayed. Dosing of amoxicillin should be modified in pediatric patients 12 weeks or younger (≤ 3 months) [*see Dosage and Administration (2.2)*].

8.5 Geriatric Use

An analysis of clinical studies of amoxicillin was conducted to determine whether subjects aged 65 and over respond differently from younger subjects. These analyses have not identified differences in responses between the elderly and younger patients, but a greater sensitivity of some older individuals cannot be ruled out.

This drug is known to be substantially excreted by the kidney, and the risk of toxic reactions to this drug may be greater in patients with impaired renal function. Because elderly patients are more likely to have decreased renal function, care should be taken in dose selection, and it may be useful to monitor renal function.

8.6 Dosing in Renal Impairment

Amoxicillin is primarily eliminated by the kidney and dosage adjustment is usually required in patients with severe renal impairment (GFR < 30 mL/min). See Dosing in Renal Impairment (2.4) for specific recommendations in patients with renal impairment.

10 OVERDOSAGE

In case of overdosage, discontinue medication, treat symptomatically, and institute supportive measures as required. A prospective study of 51 pediatric patients at a poison-control center suggested that overdosages of less than 250 mg/kg of amoxicillin are not associated with significant clinical symptoms.

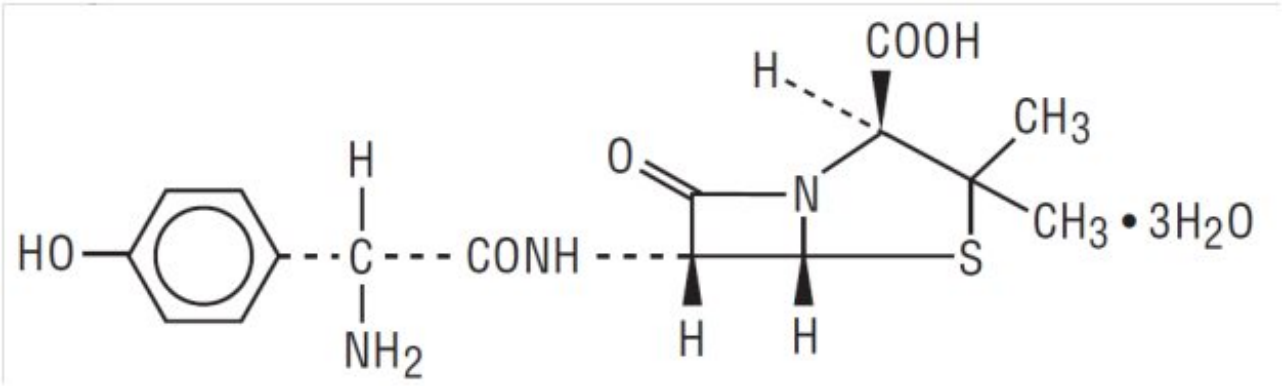
Interstitial nephritis resulting in oliguric renal failure has been reported in a small number of patients after overdosage with amoxicillin[1].

Crystalluria, in some cases leading to renal failure, has also been reported after amoxicillin overdosage in adult and pediatric patients. In case of overdosage, adequate fluid intake and diuresis should be maintained to reduce the risk of amoxicillin crystalluria.

Renal impairment appears to be reversible with cessation of drug administration. High blood levels may occur more readily in patients with impaired renal function because of decreased renal clearance of amoxicillin. Amoxicillin may be removed from circulation by hemodialysis.

11 DESCRIPTION

Amoxicillin, USP is a semisynthetic antibiotic, an analog of ampicillin, with a broad spectrum of bactericidal activity against many gram-positive and gram-negative microorganisms. Chemically, it is (2*S*,5*R*,6*R*)-6-[(*R*)-(-)-2-amino-2-(*p*-hydroxyphenyl)acetamido]-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylic acid trihydrate. It may be represented structurally as:



$C_{16}H_{19}N_3O_5S{\bullet}3H_2O$ M.W. 419.45

Each 5 mL of reconstituted suspension for oral administration contains 200 mg or 400 mg amoxicillin, USP as the trihydrate. Each 5 mL of the 200 mg reconstituted suspension for oral administration contains 0.09 mEq (2.11 mg) of sodium; each 5 mL of the 400 mg reconstituted suspension for oral administration contains 0.12 mEq (2.69 mg) of sodium.

Amoxicillin for Oral Suspension USP, 200 mg/5 mL and 400 mg/5 mL are fruit gum flavored suspensions. Inactive ingredients: colloidal silicon dioxide, FD&C Red #40, fruit granulated sugar, natural and artificial fruit gum flavor, sodium benzoate, sodium citrate, spray dried mask flavor, and xanthan gum.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

Amoxicillin is an antibacterial drug [*see Microbiology (12.4)*].

12.3 Pharmacokinetics

Absorption

Amoxicillin is stable in the presence of gastric acid and is rapidly absorbed after oral administration. The effect of food on the absorption of amoxicillin from the tablets and suspension of amoxicillin has been partially investigated; 400 mg and 875 mg formulations have been studied only when administered at the start of a light meal.

Orally administered doses of 250 mg and 500 mg amoxicillin capsules result in average peak blood levels 1 to 2 hours after administration in the range of 3.5 mcg/mL to 5 mcg/mL and 5.5 mcg/mL to 7.5 mcg/mL, respectively.

Mean amoxicillin pharmacokinetic parameters from an open, two-part, single-dose crossover bioequivalence study in 27 adults comparing 875 mg of amoxicillin with 875 mg of amoxicillin/clavulanate potassium showed that the 875 mg amoxicillin tablet produces an $AUC_{0 \text{ to } \infty}$ of 35.4 ± 8.1 mcg•hr/mL and a C_{max} of 13.8 ± 4.1 mcg/mL. Dosing was at the start of a light meal following an overnight fast.

Orally administered doses of amoxicillin suspension, 125 mg/5 mL and 250 mg/5 mL, result in average peak blood levels 1 to 2 hours after administration in the range of 1.5 mcg/mL to 3 mcg/mL and 3.5 mcg/mL to 5 mcg/mL, respectively.

Oral administration of single doses of 400 mg chewable tablets and 400 mg/5 mL suspension of amoxicillin to 24 adult volunteers yielded comparable pharmacokinetic data:

Table 3: Mean Pharmacokinetic Parameters of Amoxicillin (400 mg Chewable Tablets and 400 mg/5 mL Suspension) in Healthy Adults

Dose*	**$AUC_{0\ to\ \infty}$ (mcg•hr/mL)**	**C_{max} (mcg/mL)†**
Amoxicillin	Amoxicillin (±S.D.)	Amoxicillin (±S.D.)
400 mg (5 mL of suspension)	17.1 (3.1)	5.92 (1.62)
400 mg (1 chewable tablet)	17.9 (2.4)	5.18 (1.64)

* Administered at the start of a light meal.

† Mean values of 24 normal volunteers. Peak concentrations occurred approximately 1 hour after the dose.

Distribution

Amoxicillin diffuses readily into most body tissues and fluids, with the exception of brain and spinal fluid, except when meninges are inflamed. In blood serum, amoxicillin is approximately 20% protein-bound. Following a 1 gram dose and utilizing a special skin window technique to determine levels of the antibiotic, it was noted that therapeutic levels were found in the interstitial fluid.

Metabolism and Excretion

The half-life of amoxicillin is 61.3 minutes. Approximately 60% of an orally administered dose of amoxicillin is excreted in the urine within 6 to 8 hours. Detectable serum levels are observed up to 8 hours after an orally administered dose of amoxicillin. Since most of the amoxicillin is excreted unchanged in the urine, its excretion can be delayed by concurrent administration of probenecid [see DRUG INTERACTIONS *(7.1)*].

12.4 Microbiology

Mechanism of Action

Amoxicillin is similar to penicillin in its bactericidal action against susceptible bacteria during the stage of active multiplication. It acts through the inhibition of cell wall biosynthesis that leads to the death of the bacteria.

Mechanism of Resistance

Resistance to amoxicillin is mediated primarily through enzymes called beta-lactamases that cleave the beta-lactam ring of amoxicillin, rendering it inactive.

Amoxicillin has been shown to be active against most isolates of the bacteria listed below, both *in vitro* and in clinical infections as described in the INDICATIONS AND USAGE section.

Gram-Positive Bacteria

Enterococcus faecalis

Staphylococcus spp.

Streptococcus pneumoniae

Streptococcus spp. (alpha and beta-hemolytic)

Gram-Negative Bacteria

Escherichia coli

Haemophilus influenzae

Helicobacter pylori

Proteus mirabilis

Susceptibility Test Methods

When available, the clinical microbiology laboratory should provide cumulative *in vitro* susceptibility

test results for antimicrobial drugs used in local hospitals and practice areas to the physician as periodic reports that describe the susceptibility profile of nosocomial and community-acquired pathogens. These reports should aid the physician in selecting the most effective antimicrobial.

Dilution Techniques

Quantitative methods are used to determine antimicrobial minimum inhibitory concentrations (MICs). These MICs provide estimates of the susceptibility of bacteria to antimicrobial compounds. The MICs should be determined using a standardized test method -(broth or agar)[2,4]. The MIC values should be interpreted according to the criteria in **Table 4**.

Diffusion Techniques

Quantitative methods that require measurement of zone diameters can also provide reproducible estimates of the susceptibility of bacteria to antimicrobial compounds[3,4]. The zone size should be determined using a standardized test method[3].

Susceptibility to amoxicillin of *Enterococcus* spp., Enterobacteriaceae, and *H. influenzae*, may be inferred by testing ampicillin[4]. Susceptibility to amoxicillin of *Staphylococcus* spp., and beta-hemolytic *Streptococcus* spp., may be inferred by testing penicillin[4]. The majority of isolates of *Enterococcus* spp. that are resistant to ampicillin or amoxicillin produce a TEM-type beta-lactamase. A beta-lactamase test can provide a rapid means of determining resistance to ampicillin and amoxicillin[4].

Susceptibility to amoxicillin of *Streptococcus pneumoniae* (non-meningitis isolates) may be inferred by testing penicillin or oxacillin[4]. The interpretive criteria for *S. pneumoniae* to amoxicillin are provided in **Table 4**[4].

Table 4. Susceptibility Interpretive Criteria for Amoxicillin

	Minimum Inhibitory Concentration (mcg/mL)			**Disk Diffusion (Zone Diameter in mm)**		
	Susceptible	**Intermediate**	**Resistant**	**Susceptible**	**Intermediate**	**Resistant**
Streptococcus pneumoniae (non-meningitis isolates)*	≤ 2	4	≥ 8	-	-	-

* *S. pneumoniae* should be tested using a 1 mcg oxacillin disk. Isolates with oxacillin zone sizes of ≥ 20 mm are susceptible to amoxicillin. An amoxicillin MIC should be determined on isolates of *S. pneumoniae* with oxacillin zone sizes of ≤ 19 mm[4].

A report of “Susceptible” indicates the antimicrobial is likely to inhibit growth of the pathogen if the antimicrobial

compound reaches a concentration at the infection site necessary to inhibit growth of the pathogen. A report of

“Intermediate” indicates that the result should be considered equivocal, and, if the microorganism is not fully

susceptible to alternative, clinically feasible drugs, the test should be repeated. This category implies possible clinical

applicability in body sites where the drug is physiologically concentrated. This category also provides a buffer zone

that prevents small uncontrolled technical factors from causing major discrepancies in interpretation. A report of

“Resistant” indicates the antimicrobial is not likely to inhibit growth of the pathogen if the antimicrobial compound

reaches the concentration usually achievable at the infection site; other therapy should be selected.

Susceptibility Testing for *Helicobacter pylori*

Amoxicillin *in vitro* susceptibility testing methods for determining minimum inhibitory concentrations (MICs) and zone sizes have not been standardized, validated, or approved for testing *H. pylori*. Specimens for *H. pylori* and clarithromycin susceptibility test results should be obtained on isolates from patients who fail triple therapy. If clarithromycin resistance is found, a non-clarithromycin-containing regimen should be used.

Quality Control

Standardized susceptibility test procedures [2,3,4] require use of laboratory controls to monitor and ensure the accuracy and precision of the supplies and reagents used in the assay, and the techniques of the individuals performing the test control. Standard amoxicillin powder should provide the following range of MIC values provided in **Table 5**[4]. For the diffusion technique the criteria provided in **Table 5** should be achieved.

Table 5. Acceptable Quality Control Ranges for Amoxicillin*

Quality Control Microorganism	Minimum Inhibitory Concentrations (mcg/mL)	Disc Diffusion Zone Diameter (mm)
Streptococcus pneumoniae ATCC† 49619	0.03 to 0.12	----
Klebsiella pneumoniae ATCC 700603	>128	----

* QC limits for testing *E. coli* 35218 when tested on Haemophilus Test Medium (HTM) are ≥ 256 mcg/mL for amoxicillin; testing amoxicillin may help to determine if the isolate has maintained its ability to produce beta-lactamase[4].

† ATCC = American Type Culture Collection

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Long-term studies in animals have not been performed to evaluate carcinogenic potential. Studies to detect mutagenic potential of amoxicillin alone have not been conducted; however, the following information is available from tests on a 4:1 mixture of amoxicillin and potassium clavulanate. Amoxicillin and potassium clavulanate was non-mutagenic in the Ames bacterial mutation assay, and the yeast gene conversion assay. Amoxicillin and potassium clavulanate was weakly positive in the mouse lymphoma assay, but the trend toward increased mutation frequencies in this assay occurred at doses that were also associated with decreased cell survival. Amoxicillin and potassium clavulanate was negative in the mouse micronucleus test and in the dominant lethal assay in mice. Potassium clavulanate alone was tested in the Ames bacterial mutation assay and in the mouse micronucleus test, and was negative in each of these assays. In a multi-generation reproduction study in rats, no impairment of fertility or other adverse reproductive effects were seen at doses up to 500 mg/kg (approximately 2 times the 3 g human dose based on body surface area).

14 CLINICAL STUDIES

14.1 *H. pylori* Eradication to Reduce the Risk of Duodenal Ulcer Recurrence

Randomized, double-blind clinical studies performed in the United States in patients with *H. pylori* and duodenal ulcer disease (defined as an active ulcer or history of an ulcer within 1 year) evaluated the efficacy of lansoprazole in combination with amoxicillin capsules and clarithromycin tablets as triple 14 day therapy, or in combination with amoxicillin capsules as dual 14 day therapy, for the eradication of *H. pylori*. Based on the results of these studies, the safety and efficacy of 2 different eradication

regimens were established: **Triple Therapy:** Amoxicillin 1 gram twice daily/clarithromycin 500 mg twice daily/lansoprazole 30 mg twice daily (see **Table 6**). **Dual Therapy:** Amoxicillin 1 gram three times daily/lansoprazole 30 mg three times daily (see **Table 7**). All treatments were for 14 days. *H. pylori* eradication was defined as 2 negative tests (culture and histology) at 4 to 6 weeks following the end of treatment. Triple therapy was shown to be more effective than all possible dual therapy combinations. Dual therapy was shown to be more effective than both monotherapies. Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence.

Table 6. H. pylori Eradication Rates When Amoxicillin is Administered as Part of a Triple Therapy Regimen

Study	**Triple Therapy**	**Triple Therapy**
	Evaluable Analysis* **[95% Confidence Interval]** **(number of patients)**	**Intent-to-Treat Analysis†** **[95% Confidence Interval]** **(number of patients)**
Study 1	92 [80 to 97.7] (n = 48)	86 [73.3 to 93.5] (n = 55)
Study 2	86 [75.7 to 93.6] (n = 66)	83 [72 to 90.8] (n = 70)

* This analysis was based on evaluable patients with confirmed duodenal ulcer (active or within 1 year) and *H. pylori* infection at baseline defined as at least 2 of 3 positive endoscopic tests from CLOtest®, histology, and/or culture. Patients were included in the analysis if they completed the study. Additionally, if patients dropped out of the study due to an adverse event related to the study drug, they were included in the analysis as failures of therapy.

† Patients were included in the analysis if they had documented *H. pylori* infection at baseline as defined above and had a confirmed duodenal ulcer (active or within 1 year). All dropouts were included as failures of therapy.

Table 7. H. pylori Eradication Rates When Amoxicillin is Administered as Part of a Dual Therapy Regimen

Study	**Dual Therapy**	**Dual Therapy**
	Evaluable Analysis* **[95% Confidence Interval]** **(number of patients)**	**Intent-to-Treat Analysis†** **[95% Confidence Interval]** **(number of patients)**
Study 1	77 [62.5 to 87.2] (n = 51)	70 [56.8 to 81.2] (n = 60)
Study 2	66 [51.9 to 77.5] (n = 58)	61 [48.5 to 72.9] (n = 67)

* This analysis was based on evaluable patients with confirmed duodenal ulcer (active or within 1 year) and *H. pylori* infection at baseline defined as at least 2 of 3 positive endoscopic tests from CLOtest®, histology, and/or culture. Patients were included in the analysis if they completed the study. Additionally, if patients dropped out of the study due to an adverse event related to the study drug, they were included in the analysis as failures of therapy.

† Patients were included in the analysis if they had documented *H. pylori* infection at baseline as defined above and had a confirmed duodenal ulcer (active or within 1 year). All dropouts were included as failures of therapy.

15 REFERENCES

1. Swanson-Biearman B, Dean BS, Lopez G, Krenzelok EP. The effects of penicillin and cephalosporin ingestions in children less than six years of age. Vet Hum Toxicol. 1988; 30: 66-

67.
2. Clinical and Laboratory Standards Institute (CLSI). *Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically; Approved Standard –Tenth Edition*. CLSI document M07-A10, Clinical and Laboratory Standards Institute, 950 West Valley Road, Suite 2500, Wayne, Pennsylvania 19087, USA, 2015.
3. Clinical and Laboratory Standards Institute (CLSI). *Performance Standards for Antimicrobial Disk Diffusion Susceptibility Tests; Approved Standard–Twelfth Edition.* CLSI document M02-A12, Clinical and Laboratory Standards Institute, 950 West Valley Road, Suite 2500, Wayne, Pennsylvania 19087, USA, 2015.
4. Clinical and Laboratory Standards Institute (CLSI). *Performance Standards for Antimicrobial Susceptibility Testing; Twenty-fifth Informational Supplement*, CLSI document M100-S25. CLSI document M100-S25, Clinical and Laboratory Standards Institute, 950 West Valley Road, Suite 2500, Wayne, Pennsylvania 19087, USA, 2015.

16 HOW SUPPLIED/STORAGE AND HANDLING

Amoxicillin for Oral Suspension USP is supplied as follows:

Each 5 mL of reconstituted pink, fruit gum flavored suspension contains 200 mg amoxicillin as the trihydrate. It is available in bottles of 50 mL (NDC 0093-4160-76), 75 mL (NDC 0093-4160-78), and 100 mL (NDC 0093-4160-73).

Each 5 mL of reconstituted pink, fruit gum flavored suspension contains 400 mg amoxicillin as the trihydrate. It is available in bottles of 50 mL (NDC 0093-4161-76), 75 mL (NDC 0093-4161-78), and 100 mL (NDC 0093-4161-73).

Store dry powder at 20° to 25°C (68° to 77°F) [See USP Controlled Room Temperature].

Dispense in a tight, light-resistant container as defined in the USP, with a child-resistant closure (as required).

KEEP THIS AND ALL MEDICATIONS OUT OF THE REACH OF CHILDREN.

17 PATIENT COUNSELING INFORMATION

Information for Patients

- Patients should be advised that amoxicillin for oral suspension may be taken every 8 hours or every 12 hours, depending on the dose prescribed.
- Patients should be counseled that antibacterial drugs, including amoxicillin for oral suspension, should only be used to treat bacterial infections. They do not treat viral infections (e.g., the common cold). When amoxicillin for oral suspension is prescribed to treat a bacterial infection, patients should be told that although it is common to feel better early in the course of therapy, the medication should be taken exactly as directed. Skipping doses or not completing the full course of therapy may: (1) decrease the effectiveness of the immediate treatment, and (2) increase the likelihood that bacteria will develop resistance and will not be treatable by amoxicillin for oral suspension or other antibacterial drugs in the future.
- Patients should be counseled that diarrhea is a common problem caused by antibiotics, and it usually ends when the antibiotic is discontinued. Sometimes after starting treatment with antibiotics, patients can develop watery and bloody stools (with or without stomach cramps and fever) even as late as 2 or more months after having taken their last dose of the antibiotic. If this occurs, patients should contact their physician as soon as possible.
- Patients should be aware that amoxicillin for oral suspension contains a penicillin class drug product that can cause allergic reactions in some individuals.

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Manufactured In Canada By:

TEVA CANADA LIMITED

Toronto, Canada M1B 2K9

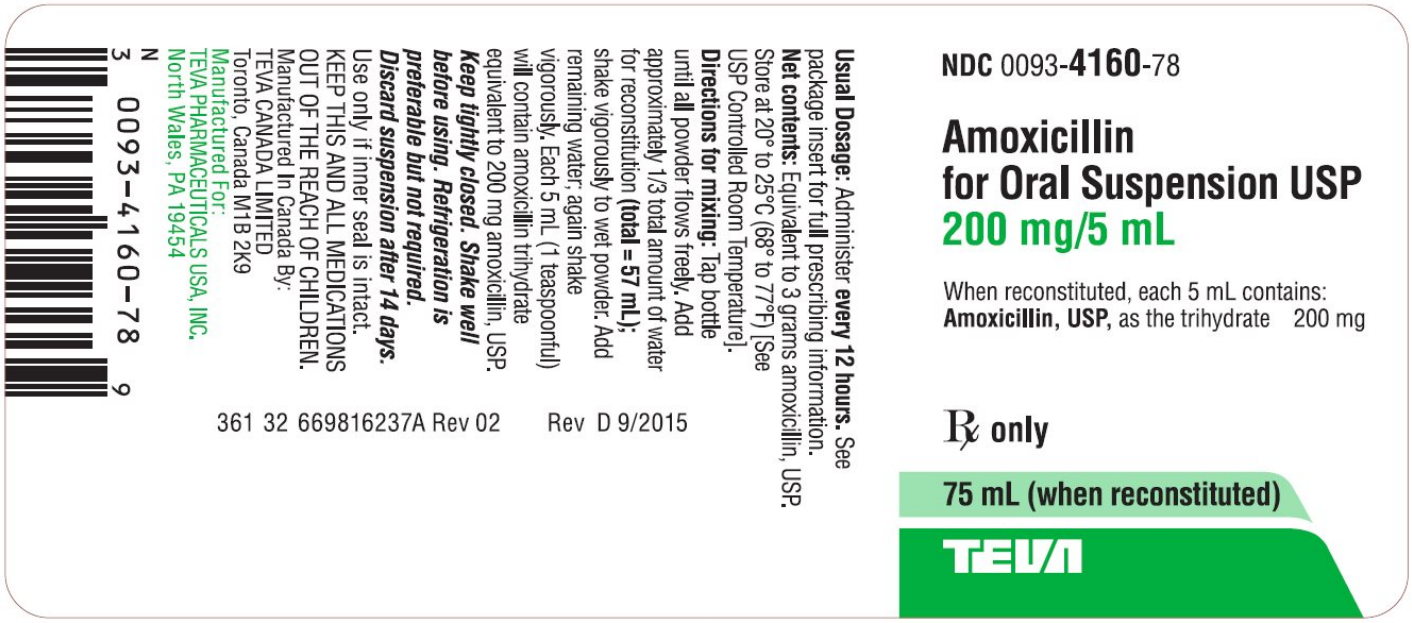
Manufactured For:

TEVA PHARMACEUTICALS USA, INC.

North Wales, PA 19454

Rev. I 12/2015

Package/Label Display Panel



Amoxicillin for Oral Suspension USP 200 mg/5 mL 75 mL Label Text

NDC 0093-**4160**-78

Amoxicillin

for Oral Suspension USP

200 mg/5 mL

When reconstituted, each 5 mL contains:

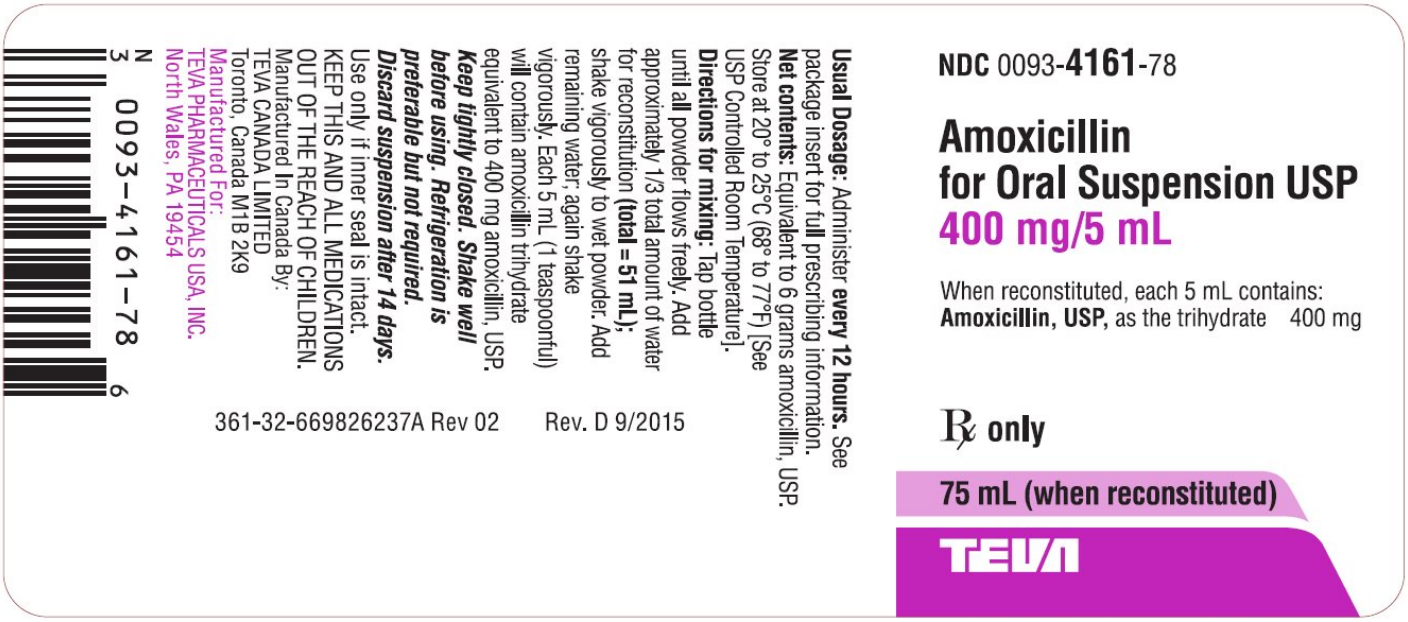
Amoxicillin, USP, as the trihydrate 200 mg

Rx only

75 mL (when reconstituted)

TEVA

Package/Label Display Panel



Amoxicillin for Oral Suspension USP 400 mg/5 mL 75 mL Label Text

NDC 0093-**4161**-78

Amoxicillin

for Oral Suspension USP

400 mg/5 mL

When reconstituted, each 5 mL contains:

Amoxicillin, USP, as the trihydrate 400 mg

Rx only

75 mL (when reconstituted)

TEVA

AMOXICILLIN

amoxicillin powder, for suspension

Product Information			
Product Type	HUMAN PRESCRIPTION DRUG	**Item Code (Source)**	NDC:0093-4160
Route of Administration	ORAL		

Active Ingredient/Active Moiety		
Ingredient Name	**Basis of Strength**	**Strength**
AMOXICILLIN (UNII: 804826J2HU) (AMOXICILLIN ANHYDROUS - UNII:9EM05410Q9)	AMOXICILLIN ANHYDROUS	200 mg in 5 mL

Inactive Ingredients	
Ingredient Name	**Strength**
SILICON DIOXIDE (UNII: ETJ7Z6XBU4)	

FD&C RED NO. 40 (UNII: WZB9127XOA)	
SUCROSE (UNII: C151H8M554)	
SODIUM BENZOATE (UNII: OJ245FE5EU)	
SODIUM CITRATE, UNSPECIFIED FORM (UNII: 1Q73Q2JULR)	
XANTHAN GUM (UNII: TTV12P4NEE)	

Product Characteristics

Color	PINK	**Score**	
Shape		**Size**	
Flavor	FRUIT (fruit gum)	**Imprint Code**	
Contains			

Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:0093-4160-76	50 mL in 1 BOTTLE; Type 0: Not a Combination Product	07/01/2003	
2	NDC:0093-4160-78	75 mL in 1 BOTTLE; Type 0: Not a Combination Product	07/01/2003	
3	NDC:0093-4160-73	100 mL in 1 BOTTLE; Type 0: Not a Combination Product	04/02/2003	

Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA065119	04/02/2003	

AMOXICILLIN

amoxicillin powder, for suspension

Product Information

Product Type	HUMAN PRESCRIPTION DRUG	**Item Code (Source)**	NDC:0093-4161
Route of Administration	ORAL		

Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
AMOXICILLIN (UNII: 804826J2HU) (AMOXICILLIN ANHYDROUS - UNII:9EM05410Q9)	AMOXICILLIN ANHYDROUS	400 mg in 5 mL

Inactive Ingredients

Ingredient Name	Strength
SILICON DIOXIDE (UNII: ETJ7Z6XBU4)	
FD&C RED NO. 40 (UNII: WZB9127XOA)	
SUCROSE (UNII: C151H8M554)	
SODIUM BENZOATE (UNII: OJ245FE5EU)	
SODIUM CITRATE, UNSPECIFIED FORM (UNII: 1Q73Q2JULR)	

XANTHAN GUM (UNII: TTV12P4NEE)	

Product Characteristics

Color	PINK	**Score**	
Shape		**Size**	
Flavor	FRUIT (fruit gum)	**Imprint Code**	
Contains			

Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:0093-4161-76	50 mL in 1 BOTTLE; Type 0: Not a Combination Product	07/01/2003	
2	NDC:0093-4161-78	75 mL in 1 BOTTLE; Type 0: Not a Combination Product	07/01/2003	
3	NDC:0093-4161-73	100 mL in 1 BOTTLE; Type 0: Not a Combination Product	02/26/2003	

Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA065119	02/26/2003	

Labeler - Teva Pharmaceuticals USA Inc (001627975)

Revised: 3/2016 Teva Pharmaceuticals USA Inc