

## SUMMARY OF PRODUCT CHARACTERISTICS

### 1 NAME OF THE MEDICINAL PRODUCT

Amoxicillin 125 mg/5 ml Oral Suspension Sugar Free

Amoxicillin 250 mg/5 ml Oral Suspension Sugar Free

### 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

When reconstituted, every 5 ml of oral suspension contains amoxicillin trihydrate equivalent to 125 mg amoxicillin (25 mg per ml).

When reconstituted, every 5 ml of oral suspension contains amoxicillin trihydrate equivalent to 250 mg amoxicillin (50 mg per ml)

Excipient with known effect: Also contains Sorbitol (E420).

For the full list of excipients, see section 6.1

### 3 PHARMACEUTICAL FORM

Powder for oral suspension

Pale-yellow free flowing powder

### 4 CLINICAL PARTICULARS

#### 4.1 Therapeutic indications

Amoxicillin is indicated for the treatment of the following infections in adults and children (see sections 4.2, 4.4 and 5.1):

- Acute bacterial sinusitis
- Acute otitis media
- Acute streptococcal tonsillitis and pharyngitis
- Acute exacerbations of chronic bronchitis
- Community acquired pneumonia
- Acute cystitis
- Asymptomatic bacteriuria in pregnancy
- Acute pyelonephritis
- Typhoid and paratyphoid fever
- Dental abscess with spreading cellulitis
- Prosthetic joint infections
- *Helicobacter pylori* eradication
- Lyme disease

Amoxicillin is also indicated for the prophylaxis of endocarditis.

Consideration should be given to official guidance on the appropriate use of antibacterial agents.

## 4.2 Posology and method of administration

### Posology

The dose of Amoxicillin that is selected to treat an individual infection should take into account:

- The expected pathogens and their likely susceptibility to antibacterial agents (see section 4.4)
- The severity and the site of the infection
- The age, weight and renal function of the patient; as shown below

The duration of therapy should be determined by the type of infection and the response of the patient, and should generally be as short as possible. Some infections require longer periods of treatment (see section 4.4 regarding prolonged therapy).

### **Adults and children ≥40 kg**

| Indication*                                     | Dose*  |
|---|--|
| Acute bacterial sinusitis                       | 250 mg to 500 mg every 8 hours or 750 mg to 1 g every 12 hours |
| Asymptomatic bacteriuria in pregnancy           |  |
| Acute pyelonephritis                            |  |
| Dental abscess with spreading cellulitis        |  |
| Acute cystitis                                  |  |
|   | For severe infections 750 mg to 1 g every 8 hours              |
|   | Acute cystitis may be treated with 3 g twice daily for one day |
| Acute otitis media                              | 500 mg every 8 hours, 750 mg to 1 g every 12 hours             |
| Acute streptococcal tonsillitis and pharyngitis |  |
| Acute exacerbations of chronic bronchitis       |  |
|   | For severe infections 750 mg to 1 g every 8 hours for 10 days  |
| Community acquired pneumonia                    | 500 mg to 1 g every 8 hours                                    |
| Typhoid and paratyphoid fever                   | 500 mg to 2 g every 8 hours                                    |
| Prosthetic joint infections                     | 500 mg to 1 g every 8 hours                                    |
| Prophylaxis of endocarditis                     | 2 g orally, single dose 30 to 60 minutes before procedure      |

|   |  |
|---|--|
| <i>Helicobacter pylori</i> eradication  | 750 mg to 1 g twice daily in combination with a proton pump inhibitor (e.g. omeprazole, lansoprazole) and another antibiotic (e.g. clarithromycin, metronidazole) for 7 days   |
| Lyme disease (see section 4.4)  | Early stage: 500 mg to 1 g every 8 hours up to a maximum of 4 g/day in divided doses for 14 days (10 to 21 days)<br><br>Late stage (systemic involvement): 500 mg to 2 g every 8 hours up to a maximum of 6 g/day in divided doses for |
| *Consideration should be given to the official treatment guidelines for each indication |  |

### **Children < 40kg**

Children may be treated with Amoxicillin capsules, dispersible tablets suspensions or sachets.

Amoxicillin Paediatric Suspension is recommended for children under six months of age.

Children weighing 40 kg or more should be prescribed the adult dosage.

### *Recommended doses:*

| Indication <sup>+</sup>                         | Dose <sup>+</sup>  |
|---|--|
| Acute bacterial sinusitis                       | 20 to 90 mg/kg/day in divided doses*                           |
| Acute otitis media                              |  |
| Community acquired pneumonia                    |  |
| Acute cystitis                                  |  |
| Acute pyelonephritis                            |  |
| Dental abscess with spreading cellulitis        | 40 to 90 mg/kg/day in divided doses*                           |
| Acute streptococcal tonsillitis and pharyngitis |  |
| Typhoid and paratyphoid fever                   | 100 mg/kg/day in three divided doses                           |
| Prophylaxis of endocarditis                     | 50 mg/kg orally, single dose 30 to 60 minutes before procedure |

|  |  |
|--|--|
| Lyme disease (see section 4.4)   | <p>Early stage: 25 to 50 mg/kg/day in three divided doses for 10 to 21 days</p> <p>Late stage (systemic involvement): 100 mg/kg/day in three divided doses for 10 to 30 days</p> |
| <p>+ Consideration should be given to the official treatment guidelines for each indication.</p> <p>*Twice daily dosing regimens should only be considered when the dose is in the</p> |  |

### **Elderly**

No dose adjustment is considered necessary.

### **Renal impairment**

| GFR (ml/min)  | Adults and children $\geq 40$ kg | Children $< 40$ kg <sup>#</sup>                         |
|---|----------------------------------|---|
| <b>greater than 30</b>  | no adjustment necessary          | no adjustment necessary                                 |
| <b>10 to 30</b>   | maximum 500 mg twice daily       | 15 mg/kg given twice daily (maximum 500 mg twice daily) |
| <b>less than 10</b>   | maximum 500 mg/day.              | 15 mg/kg given as a single daily                        |
| <sup>#</sup> In the majority of cases, parenteral therapy is preferred. |                                  |   |

### *In patients receiving haemodialysis*

Amoxicillin may be removed from the circulation by haemodialysis.

|                                       | <b>Haemodialysis</b>   |
|---------------------------------------|--|
| <b>Adults and children over 40 kg</b> | <p>500 mg every 24 h</p> <p>Prior to haemodialysis one additional dose of 500 mg should be administered. In order to restore circulating drug levels, another dose of 500 mg should be administered after haemodialysis.</p>   |
| <b>Children under 40 kg</b>           | <p>15 mg/kg/day given as a single daily dose (maximum 500 mg).</p> <p>Prior to haemodialysis one additional dose of 15 mg/kg should be administered. In order to restore circulating drug levels, another dose of 15 mg/kg should be administered after haemodialysis.</p> |

*In patients receiving peritoneal dialysis*

Amoxicillin maximum 500 mg/day.

### **Hepatic impairment**

Dose with caution and monitor hepatic function at regular intervals (see sections 4.4 and 4.8).

#### **Method of administration:**

Amoxicillin is for oral use.

Absorption of Amoxicillin is unimpaired by food.

Therapy can be started parenterally according to the dosing recommendations of the intravenous formulation and continued with an oral preparation.

## **4.3 Contraindications**

- Hypersensitivity to the active substance, to any of the penicillins or to any of the excipients listed in section 6.1.
- History of a severe immediate hypersensitivity reaction (e.g. anaphylaxis) to another beta-lactam agent (e.g. a cephalosporin, carbapenem or monobactam).

## **4.4 Special warnings and precautions for use**

### **Hypersensitivity reactions**

Before initiating therapy with amoxicillin, careful enquiry should be made concerning previous hypersensitivity reactions to penicillins, cephalosporins or other beta-lactam agents (see sections 4.3 and 4.8).

Serious and occasionally fatal hypersensitivity reactions (including anaphylactoid and severe cutaneous adverse reactions) have been reported in patients on penicillin therapy. Hypersensitivity reactions can also progress to Kounis syndrome, a serious allergic reaction that can result in myocardial infarction. Presenting symptoms of such reactions can include chest pain occurring in association with an allergic reaction to amoxicillin (see section 4.8). These reactions are more likely to occur in individuals with a history of penicillin hypersensitivity and in atopic individuals. If an allergic reaction occurs, amoxicillin therapy must be discontinued and appropriate alternative therapy instituted.

Drug-induced enterocolitis syndrome (DIES) has been reported mainly in children receiving amoxicillin (see section 4.8). DIES is an allergic reaction with the leading symptom of protracted vomiting (1-4 hours after drug intake) in the absence of allergic skin or respiratory symptoms. Further symptoms could comprise abdominal pain, diarrhoea, hypotension or leucocytosis with neutrophilia. There have been

severe cases including progression to shock.

#### Non-susceptible microorganisms

Amoxicillin is not suitable for the treatment of some types of infection unless the pathogen is already documented and known to be susceptible or there is a very high likelihood that the pathogen would be suitable for treatment with amoxicillin (see section 5.1). This particularly applies when considering the treatment of patients with urinary tract infections and severe infections of the ear, nose and throat.

#### Convulsions

Convulsions may occur in patients with impaired renal function or in those receiving high doses or in patients with predisposing factors (e.g. history of seizures, treated epilepsy or meningeal disorders (see section 4.8).

#### Renal impairment

In patients with renal impairment, the dose should be adjusted according to the degree of impairment (see section 4.2).

#### Skin reactions

The occurrence at the treatment initiation of a feverish generalised erythema associated with pustula may be a symptom of acute generalised exanthemous pustulosis (AGEP, see section 4.8). This reaction requires amoxicillin discontinuation and contra-indicates any subsequent administration.

Amoxicillin should be avoided if infectious mononucleosis is suspected since the occurrence of a morbilliform rash has been associated with this condition following the use of amoxicillin.

#### Jarisch-Herxheimer reaction

The Jarisch-Herxheimer reaction has been seen following amoxicillin treatment of Lyme disease (see section 4.8). It results directly from the bactericidal activity of amoxicillin on the causative bacteria of Lyme disease, the spirochaete *Borrelia burgdorferi*. Patients should be reassured that this is a common and usually self-limiting consequence of antibiotic treatment of Lyme disease.

#### Overgrowth of non-susceptible microorganisms

Prolonged use may occasionally result in overgrowth of non-susceptible organisms. Antibiotic-associated colitis has been reported with nearly all antibacterial agents and may range in severity from mild to life threatening (see section 4.8). Therefore, it is important to consider this diagnosis in patients who present with diarrhoea during, or subsequent to, the administration of any

antibiotics. Should antibiotic-associated colitis occur, amoxicillin should immediately be discontinued, a physician consulted and an appropriate therapy initiated. Anti-peristaltic medicinal products are contra-indicated in this situation.

#### Prolonged therapy

Periodic assessment of organ system functions; including renal, hepatic and haematopoietic function is advisable during prolonged therapy. Elevated liver enzymes and changes in blood counts have been reported (see section 4.8).

#### Anticoagulants

Prolongation of prothrombin time has been reported rarely in patients receiving amoxicillin. Appropriate monitoring should be undertaken when anticoagulants are prescribed concomitantly. Adjustments in the dose of oral anticoagulants may be necessary to maintain the desired level of anticoagulation (see sections 4.5 and 4.8).

#### Crystalluria

In patients with reduced urine output, crystalluria (including acute renal injury) has been observed very rarely, predominantly with parenteral therapy. During the administration of high doses of amoxicillin, it is advisable to maintain adequate fluid intake and urinary output in order to reduce the possibility of amoxicillin crystalluria. In patients with bladder catheters, a regular check of patency should be maintained (see sections 4.8 and 4.9).

#### Interference with diagnostic tests

Elevated serum and urinary levels of amoxicillin are likely to affect certain laboratory tests. Due to the high urinary concentrations of amoxicillin, false positive readings are common with chemical methods.

It is recommended that when testing for the presence of glucose in urine during amoxicillin treatment, enzymatic glucose oxidase methods should be used.

The presence of amoxicillin may distort assay results for oestriol in pregnant women.

### **Important information regarding the ingredients of this medicine**

This medicine contains Sorbitol. Patients with hereditary fructose intolerance (HFI) should not be given this medicinal product.

Sodium benzoate: This medicine contains 4.82 mg sodium benzoate in each 5 ml which is equivalent to 0.964 mg per ml.

Sodium benzoate may increase jaundice (yellowing of the skin and eyes) in newborn babies (up to 4 weeks old).

This medicine contains less than 1 mmol sodium (23 mg) per 5ml, that is to say essentially 'sodium-free'.

#### **4.5 Interaction with other medicinal products and other forms of interaction**

##### Probenecid

Concomitant use of probenecid is not recommended. Probenecid decreases the renal tubular secretion of amoxicillin. Concomitant use of probenecid may result in increased and prolonged blood levels of amoxicillin.

##### Allopurinol

Concurrent administration of allopurinol during treatment with amoxicillin can increase the likelihood of allergic skin reactions.

##### Tetracyclines

Tetracyclines and other bacteriostatic drugs may interfere with the bactericidal effects of amoxicillin.

##### Oral anticoagulants

Oral anticoagulants and penicillin antibiotics have been widely used in practice without reports of interaction. However, in the literature there are cases of increased international normalised ratio in patients maintained on acenocoumarol or warfarin and prescribed a course of amoxicillin. If co-administration is necessary, the prothrombin time or international normalised ratio should be carefully monitored with the addition or withdrawal of amoxicillin. Moreover, adjustments in the dose of oral anticoagulants may be necessary (see sections 4.4 and 4.8).

##### Methotrexate

Penicillins may reduce the excretion of methotrexate causing a potential increase in toxicity.

#### **4.6 Fertility, pregnancy and lactation**

##### Pregnancy

Animal studies do not indicate direct or indirect harmful effects with respect to reproductive toxicity. Limited data on the use of amoxicillin during pregnancy in humans do not indicate an increased risk of congenital malformations. Amoxicillin may be used in pregnancy when the potential benefits outweigh the potential risks associated with treatment.

Breast-feeding

Amoxicillin is excreted into breast milk in small quantities with the possible risk of sensitisation. Consequently, diarrhoea and fungus infection of the mucous membranes are possible in the breast-fed infant, so that breast-feeding might have to be discontinued. Amoxicillin should only be used during breast-feeding after benefit/risk assessment by the physician in charge.

Fertility

There are no data on the effects of amoxicillin on fertility in humans. Reproductive studies in animals have shown no effects on fertility.

**4.7 Effects on ability to drive and use machines**

No studies on the effects on the ability to drive and use machines have been performed. However, undesirable effects may occur (e.g. allergic reactions, dizziness, convulsions), which may influence the ability to drive and use machines (see section 4.8).

**4.8 Undesirable effects**

The most commonly reported adverse drug reactions (ADRs) are diarrhoea, nausea and skin rash.

The ADRs derived from clinical studies and post-marketing surveillance with amoxicillin, presented by MedDRA System Organ Class are listed below.

The following terminologies have been used in order to classify the occurrence of undesirable effects.

|             |   |
|-------------|---|
| Very common | $\geq 1/10$                                   |
| Common      | $\geq 1/100$ to $< 1/10$                      |
| Uncommon    | $\geq 1/1,000$ to $< 1/100$                   |
| Rare        | $\geq 1/10,000$ to $< 1/1,000$                |
| Very rare   | $< 1/10,000$                                  |
| Not known   | (cannot be estimated from the available data) |

| <b><u>Infections and infestations</u></b>          |                           |
|--|---------------------------|
| Very rare  | Mucocutaneous candidiasis |
| <b><u>Blood and lymphatic system disorders</u></b> |                           |

|  |   |
|--|---|
| Very rare  | Reversible leucopenia (including severe neutropenia or agranulocytosis), reversible thrombocytopenia and haemolytic anaemia.<br><br>Prolongation of bleeding time and prothrombin time (see section 4.4). |
| <b><u>Immune system disorders</u></b>                |   |
| Very rare  | Severe allergic reactions, including angioneurotic oedema, anaphylaxis, serum sickness and hypersensitivity vasculitis (see section 4.4).   |
| Not known  | Jarisch-Herxheimer reaction (see section 4.4).  |
| <b><u>Nervous system disorders</u></b>               |   |
| Very rare  | Hyperkinesia, dizziness and convulsions (see section 4.4).  |
| Not known  | Aseptic meningitis  |
| <b><u>Cardiac disorders</u></b>                      |   |
| Very rare  | Kounis Syndrome (see section 4.4)   |
| <b><u>Gastrointestinal disorders</u></b>             |   |
| <i>Clinical Trial Data</i>                           |   |
| *Common  | Diarrhoea and nausea  |
| *Uncommon  | Vomiting  |
| <i>Post-marketing Data</i>                           |   |
| Very rare  | Antibiotic associated colitis (including pseudomembranous colitis and haemorrhagic colitis see section 4.4).<br>Black hairy tongue<br>Superficial tooth discolouration                                    |
| Not known  | Drug-induced enterocolitis syndrome   |
| <b><u>Hepatobiliary disorders</u></b>                |   |
| Very rare  | Hepatitis and cholestatic jaundice. A moderate rise in AST and/or ALT.  |
| <b><u>Skin and subcutaneous tissue disorders</u></b> |   |
| <i>Clinical Trial Data</i>                           |   |
| *Common  | Skin rash   |
| *Uncommon  | Urticaria and pruritus  |
| <i>Post-marketing Data</i>                           |   |

|  |   |
|--|---|
| Very rare  | Skin reactions such as erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, bullous and exfoliative dermatitis and acute generalised exanthematous pustulosis (AGEP) (see section 4.4) and drug reaction with eosinophilia and systemic symptoms (DRESS). |
| Not known  | Linear IgA disease  |
| <b><u>Renal and urinary tract disorders</u></b>  |   |
| Very rare:   | Interstitial nephritis  |
| Not known  | Crystalluria (including acute renal injury)   |
| <p>* The incidence of these AEs was derived from clinical studies involving a total of approximately 6,000 adult and paediatric patients taking amoxicillin.</p> <p># Superficial tooth discolouration has been reported in children. Good oral hygiene may help to prevent tooth discolouration as it can usually be removed by brushing.</p> |   |

#### Reporting of Suspected Adverse Reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the Yellow Card Scheme Website:

[www.mhra.gov.uk/yellowcard](http://www.mhra.gov.uk/yellowcard) or search for MHRA Yellow Card in the Google Play or Apple App Store.

## **4.9 Overdose**

### Symptoms and signs of overdose

Gastrointestinal symptoms (such as nausea, vomiting and diarrhoea) and disturbance of the fluid and electrolyte balances may be evident. Amoxicillin crystalluria, in some cases leading to renal failure, has been observed (see section 4.4). Convulsions may occur in patients with impaired renal function or in those receiving high doses (see sections 4.4 and 4.8).

### Treatment of intoxication

Gastrointestinal symptoms may be treated symptomatically, with attention to the water/electrolyte balance.

Amoxicillin can be removed from the circulation by haemodialysis.

## **5 PHARMACOLOGICAL PROPERTIES**

## 5.1 Pharmacodynamic properties

*ATC Code:* J01C A04

*Pharmacotherapeutic group:* Penicillin with extended spectrum

### Mechanism of action

Amoxicillin is a semisynthetic penicillin (beta-lactam antibiotic) that inhibits one or more enzymes (often referred to as penicillin-binding proteins, PBPs) in the biosynthetic pathway of bacterial peptidoglycan, which is an integral structural component of the bacterial cell wall. Inhibition of peptidoglycan synthesis leads to weakening of the cell wall, which is usually followed by cell lysis and death.

Amoxicillin is susceptible to degradation by beta-lactamases produced by resistant bacteria and therefore the spectrum of activity of amoxicillin alone does not include organisms which produce these enzymes.

### Pharmacokinetic/pharmacodynamic relationship

The time above the minimum inhibitory concentration (T>MIC) is considered to be the major determinant of efficacy for amoxicillin.

### Mechanisms of resistance

The main mechanisms of resistance to amoxicillin are:

- Inactivation by bacterial beta-lactamases.
- Alteration of PBPs, which reduce the affinity of the antibacterial agent for the target.

Impermeability of bacteria or efflux pump mechanisms may cause or contribute to bacterial resistance, particularly in Gram-negative bacteria.

### Breakpoints

MIC breakpoints for amoxicillin are those of the European Committee on Antimicrobial Susceptibility Testing (EUCAST) version 11.0.

| Organism  | Susceptibility Breakpoints (µg/ml) |                         |
|---|------------------------------------|-------------------------|
|   | Susceptible                        | Resistant               |
| <i>Haemophilus influenzae</i> <sup>1</sup>                          | ≤ 0.001                            | > 2                     |
| <i>Moraxella catarrhalis</i>  | Note <sup>2</sup>                  | Note <sup>2</sup>       |
| <i>Staphylococcus spp.</i>  | Note <sup>3, 4, 5</sup>            | Note <sup>3, 4, 5</sup> |
| <i>Enterococcus spp.</i> <sup>6</sup>                               | ≤4 <sup>7</sup>                    | >8 <sup>7</sup>         |
| Streptococcus groups A, B, C, G (indications other than meningitis) | Note <sup>8</sup>                  | Note <sup>8</sup>       |

|  |        |        |
|--|--------|--------|
| <i>Streptococcus pneumoniae</i> <sup>9</sup>                                       | ≤0.5   | >1     |
| Enterobacterales <sup>10</sup>   | ≤ 8    | > 8    |
| Gram-negative Anaerobes <sup>11</sup>  | ≤ 0.5  | >2     |
| Gram-positive Anaerobes <sup>11</sup><br>(except <i>Clostridioides difficile</i> ) | ≤ 4    | >8     |
| Non-species related<br>breakpoints   | ≤ 2    | >8     |
| Viridans group streptococci  | ≤0.5   | >2     |
| <i>Pasteurella multocida</i>   | ≤1     | >1     |
| <i>Helicobacter pylori</i>   | ≤0.125 | >0.125 |
| <i>Neisseria meningitidis</i><br>(indications other than<br>meningitis)            | ≤0.125 | >1     |

<sup>1</sup> Beta-lactamase positive isolates can be reported resistant to ampicillin, amoxicillin and piperacillin without inhibitors. Tests based on a chromogenic cephalosporin can be used to detect the beta-lactamase.

<sup>2</sup> Most *M. catarrhalis* produce beta-lactamase, although beta-lactamase production is slow and may give weak results with in vitro tests. Beta-lactamase producers should be reported resistant to penicillins and aminopenicillins without inhibitors.

<sup>3</sup> Most *S. aureus* are penicillinase producers and some are methicillin resistant. Either mechanism renders them resistant to benzylpenicillin, phenoxymethylpenicillin, ampicillin, amoxicillin, piperacillin and ticarcillin. Isolates that test susceptible to benzylpenicillin and ceftiofur can be reported susceptible to all penicillins. Isolates that test resistant to benzylpenicillin but susceptible to ceftiofur are susceptible to β-lactam β-lactamase inhibitor combinations, the isoxazolylpenicillins (oxacillin, cloxacillin, dicloxacillin and flucloxacillin) and nafcillin. For agents given orally, care to achieve sufficient exposure at the site of the infection should be exercised. Isolates that test resistant to ceftiofur are resistant to all penicillins.

<sup>4</sup> Most coagulase-negative staphylococci are penicillinase producers and some are methicillin resistant. Either mechanism renders them resistant to benzylpenicillin, phenoxymethylpenicillin, ampicillin, amoxicillin, piperacillin and ticarcillin. No currently available method can reliably detect penicillinase production in coagulase-negative staphylococci but methicillin resistance can be detected with ceftiofur as described.

<sup>5</sup> Ampicillin susceptible *S. saprophyticus* are mecA-negative and susceptible to ampicillin, amoxicillin and piperacillin (without or with a beta-lactamase inhibitor).

<sup>6</sup> Aminopenicillin breakpoints in enterococci are based on intravenous administration. For oral administration the breakpoints are relevant for urinary tract infections only.

<sup>7</sup> Susceptibility to ampicillin, amoxicillin and piperacillin (with and without beta-lactamase inhibitor) can be inferred from ampicillin. Ampicillin resistance is uncommon in *E. faecalis* (confirm with MIC) but common in *E. faecium*.

<sup>8</sup> The susceptibility of streptococcus groups A, B, C and G to penicillins is inferred from the benzylpenicillin susceptibility (indications other than meningitis) with the exception of phenoxymethylpenicillin and isoxazolympenicillins for streptococcus group B.

<sup>9</sup> The oxacillin 1 µg disk screen test or a benzylpenicillin MIC test shall be used to exclude beta-lactam resistance mechanisms. When the screen is negative (oxacillin inhibition zone  $\geq 20$  mm, or benzylpenicillin MIC  $\leq 0.06$  mg/l) all beta-lactam agents for which clinical breakpoints are available, can be reported susceptible without further testing, except for cefaclor, which if reported, should be reported as “susceptible, increased exposure” (I). When the screen is positive (inhibition zone  $< 20$  mm, or benzylpenicillin MIC  $> 0.06$  mg/l), refer to EUCAST flow chart.

<sup>10</sup> Aminopenicillin breakpoints in Enterobacterales are based on intravenous administration. For oral administration the breakpoints are relevant for urinary tract infections only. Breakpoints for other infections are under review.

<sup>11</sup> Susceptibility to ampicillin, amoxicillin, piperacillin and ticarcillin can be inferred from susceptibility to benzylpenicillin.

The prevalence of resistance may vary geographically and with time for selected species, and local information on resistance is desirable, particularly when treating severe infections. As necessary, expert advice should be sought when the local prevalence of resistance is such that the utility of the agent in at least some types of infections is questionable.

| <b><i>In vitro</i> susceptibility of micro-organisms to Amoxicillin</b>  |
|--|
| <b><u>Commonly Susceptible Species</u></b>   |
| <u>Gram-positive aerobes:</u><br><i>Enterococcus faecalis</i><br>Beta-hemolytic streptococci (Groups A, B, C and G)<br><i>Listeria monocytogenes</i> |
| <b><u>Species for which acquired resistance may be a problem</u></b>   |

|  |
|--|
| <u>Gram-negative aerobes:</u><br><i>Escherichia coli</i><br><i>Haemophilus influenzae</i><br><i>Helicobacter pylori</i><br><i>Proteus mirabilis</i><br><i>Salmonella typhi</i><br><i>Salmonella paratyphi</i><br><i>Pasteurella multocida</i>                            |
| <u>Gram-positive aerobes:</u><br>Coagulase negative staphylococcus<br><i>Staphylococcus aureus</i> <sup>£</sup><br><i>Streptococcus pneumoniae</i><br>Viridans group streptococcus   |
| <u>Gram-positive anaerobes:</u><br><i>Clostridium</i> spp.   |
| <u>Gram-negative anaerobes:</u><br><i>Fusobacterium</i> spp.   |
| <u>Other:</u><br><i>Borrelia burgdorferi</i>   |
| <b><u>Inherently resistant organisms†</u></b>  |
| <u>Gram-positive aerobes:</u><br><i>Enterococcus faecium</i> <sup>†</sup>  |
| <u>Gram-negative aerobes:</u><br><i>Acinetobacter</i> spp.<br><i>Enterobacter</i> spp.<br><i>Klebsiella</i> spp.<br><i>Pseudomonas</i> spp.  |
| <u>Gram-negative anaerobes:</u><br><i>Bacteroides</i> spp. (many strains of <i>Bacteroides fragilis</i> are resistant).  |
| <u>Others:</u><br><i>Chlamydia</i> spp.<br><i>Mycoplasma</i> spp.<br><i>Legionella</i> spp.  |
| † Natural intermediate susceptibility in the absence of acquired mechanism of resistance.<br>£ Almost all <i>S. aureus</i> are resistant to amoxicillin due to production of penicillinase. In addition, all methicillin-resistant strains are resistant to amoxicillin. |

## 5.2 Pharmacokinetic properties

### Absorption

Amoxicillin fully dissociates in aqueous solution at physiological pH. It is rapidly and well absorbed by the oral route of administration. Following oral administration, amoxicillin is approximately 70% bioavailable. The time to peak plasma concentration ( $T_{max}$ ) is approximately one hour.

The pharmacokinetic results for a study, in which an amoxicillin dose of 250 mg three times daily was administered in the fasting state to groups of healthy volunteers are presented below.

| $C_{max}$            | $T_{max}^*$   | AUC <sub>(0-24h)</sub> | $T_{1/2}$       |
|----------------------|---------------|------------------------|-----------------|
| ( $\mu\text{g/ml}$ ) | (h)           | ( $\mu\text{g.h/ml}$ ) | (h)             |
| $3.3 \pm 1.12$       | 1.5 (1.0-2.0) | $26.7 \pm 4.56$        | $1.36 \pm 0.56$ |
| *Median (range)      |               |                        |                 |

In the range 250 to 3000 mg the bioavailability is linear in proportion to dose (measured as  $C_{max}$  and AUC). The absorption is not influenced by simultaneous food intake.

Haemodialysis can be used for elimination of amoxicillin.

### Distribution

About 18% of total plasma amoxicillin is bound to protein and the apparent volume of distribution is around 0.3 to 0.4 l/kg.

Following intravenous administration, amoxicillin has been found in gall bladder, abdominal tissue, skin, fat, muscle tissues, synovial and peritoneal fluids, bile and pus. Amoxicillin does not adequately distribute into the cerebrospinal fluid.

From animal studies there is no evidence for significant tissue retention of drug-derived material. Amoxicillin, like most penicillins, can be detected in breast milk (see section 4.6).

Amoxicillin has been shown to cross the placental barrier (see section 4.6).

### Biotransformation

Amoxicillin is partly excreted in the urine as the inactive penicilloic acid in quantities equivalent to up to 10 to 25% of the initial dose.

### Elimination

The major route of elimination for amoxicillin is via the kidney.

Amoxicillin has a mean elimination half-life of approximately one hour and a mean total clearance of approximately 25 l/hour in healthy subjects. Approximately 60 to 70% of the amoxicillin is excreted unchanged in urine during the first 6 hours after administration of a single 250 mg or 500 mg dose of amoxicillin. Various studies have found the urinary excretion to be 50-85% for amoxicillin over a 24 hour period.

Concomitant use of probenecid delays amoxicillin excretion (see section 4.5).

**Age**

The elimination half-life of amoxicillin is similar for children aged around 3 months to 2 years and older children and adults. For very young children (including preterm newborns) in the first week of life the interval of administration should not exceed twice daily administration due to immaturity of the renal pathway of elimination. 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.

**Gender**

Following oral administration of amoxicillin/ to healthy males and female subjects, gender has no significant impact on the pharmacokinetics of amoxicillin.

**Renal impairment**

The total serum clearance of amoxicillin decreases proportionately with decreasing renal function (see sections 4.2 and 4.4).

**Hepatic impairment**

Hepatically impaired patients should be dosed with caution and hepatic function monitored at regular intervals.

**5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on studies of safety pharmacology, repeated dose toxicity, genotoxicity and toxicity to reproduction and development.

Carcinogenicity studies have not been conducted with amoxicillin.

**6 PHARMACEUTICAL PARTICULARS****6.1 List of excipients**

Sodium Benzoate  
Disodium Edetate  
Sodium Citrate  
Citric Acid Anhydrous  
Colloidal Anhydrous Silica  
Sorbitol (E420)  
Saccharin Sodium  
Banana Flavour (containing Gum Arabic, Amyl Acetate, Amyl and Ethyl Butyrates, Eugenol, Acetaldehyde, Citral, Ethyl Heptanoate, Amyl Valerianate, Allyl Heptanoate and Orange Oil)  
Quinoline Yellow (E104)

Xantham Gum

**6.2 Incompatibilities**

None known

**6.3 Shelf life**

Shelf life (prior to reconstitution) - 3 years

In-use shelf life (after reconstitution) - 7 days after reconstitution.

**6.4 Special precautions for storage**

Do not store above 25°C. Keep the bottle tightly closed. Store in the original packaging.

Once dispensed, Amoxicillin Suspension should be used within 7 days.

**6.5 Nature and contents of container**

150 ml high density polyethylene bottle with expanded polyethylene tamper evident cap in pack size of 100 ml.

**6.6 Special precautions for disposal**

Not applicable

**7 MARKETING AUTHORISATION HOLDER**

Bristol Laboratories Ltd  
Unit 3, Canalside,  
Northbridge Road,  
Berkhamsted,  
Hertfordshire HP4 1EG  
United Kingdom

**8 MARKETING AUTHORISATION NUMBER(S)**

PL 17907/0044

PL 17907/0045

**9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

20/07/2004

**10 DATE OF REVISION OF THE TEXT**

10/05/2023