Co-Amoxiclav

Augmentin® ES

600mg/ 42.9mg per 5mL Powder for Suspension

PRODUCT DESCRIPTION

Co-amoxiclav *(Augmentin® ES)* 600mg/42.9mg per 5mL Powder for Suspension: Bottles of Off-white powder with a characteristic strawberry odour, which, when reconstituted in water at time of dispensing, yields an off-white suspension. Each 5mL of reconstituted suspension contains 600mg amoxicillin and 42.9mg clavulanic acid.

The amoxicillin is present as amoxicillin trihydrate and the clavulanic acid is present as potassium clavulanate in a ratio of 14:1.

PHARMACOLOGIC PROPERTIES

Pharmacodynamics

Amoxicillin is a semisynthetic antibiotic with a broad spectrum of bactericidal activity against many gram-positive and gram-negative microorganisms. Amoxicillin is, however, susceptible to degradation by β-lactamases and, therefore, the spectrum of activity does not include organisms which produce these enzymes. Clavulanic acid is a β-lactam, structurally related to the penicillins, which possesses the ability to inactivate a wide range of β-lactamase enzymes commonly found in microorganisms resistant to penicillins and cephalosporins. In particular, it has good activity against the clinically important plasmid mediated β-lactamases frequently responsible for transferred drug resistance.

The clavulanate component in Co-amoxiclav *(Augmentin® ES)* protects amoxicillin from degradation by β-lactamase enzymes and effectively extends the antibiotic spectrum of amoxicillin to include many bacteria normally resistant to amoxicillin and other β-lactam antibiotics. Thus, Co-amoxiclav *(Augmentin® ES)* possesses the distinctive properties of a broad-spectrum antibiotic and a β-lactamase inhibitor.

In the list below, organisms are categorised according to their *in vitro* susceptibility to Co-amoxiclav *(Augmentin®)*.

In vitro* susceptibility of micro-organisms to Co-amoxiclav *(Augmentin®) Where clinical efficacy of Co-amoxiclav *(Augmentin®)* has been demonstrated in clinical trials this is indicated with an asterisk (*). Organisms that do not produce beta-lactamase are identified (with †). If an isolate is susceptible to amoxicillin, it can be considered susceptible to Co-amoxiclav *(Augmentin®)*.
Commonly susceptible species
Gram-positive aerobes: *Bacillius anthracis* *Enterococcus faecalis* *Listeria monocytogenes* *Nocardia asteroides* *Streptococcus pneumoniae**† *Streptococcus pyogenes**† *Streptococcus agalactiae**† Viridans group streptococcus† *Streptococcus* spp. (other β-hemolytic) *† *Staphylococcus aureus* (methicillin susceptible)* *Staphylococcus saprophyticus* (methicillin susceptible) Coagulase negative staphylococcus (methicillin susceptible)
Gram-negative aerobes: *Bordetella pertussis* *Haemophilus influenzae** *Haemophilus parainfluenzae* *Helicobacter pylori* *Moraxella catarrhalis** *Neisseria gonorrhoeae* *Pasteurella multocida* *Vibrio cholerae*
Other: *Borrelia burgdorferi* *Leptospira ictterohaemorrhagiae* *Treponema pallidum*
Gram positive anaerobes: *Clostridium* spp. *Peptococcus niger* *Peptostreptococcus magnus* *Peptostreptococcus micros* *Peptostreptococcus* spp.

Gram-negative anaerobes: *Bacteroides fragilis* *Bacteroides* spp. *Capnocytophaga* spp. *Eikenella corrodens* *Fusobacterium nucleatum* *Fusobacterium* spp. *Porphyromonas* spp. *Prevotella* spp.
Species for which acquired resistance may be a problem
Gram-negative aerobes: *Escherichia coli** *Klebsiella oxytoca* *Klebsiella pneumoniae** *Klebsiella* spp. *Proteus mirabilis* *Proteus vulgaris* *Proteus* spp. *Salmonella* spp. *Shigella* spp.
Gram-positive aerobes: *Corynebacterium* spp. *Enterococcus faecium*
Inherently resistant organisms
Gram-negative aerobes: *Acinetobacter* spp. *Citrobacter freundii* *Enterobacter* spp. *Hafnia alvei* *Legionella pneumophila* *Morganella morganii* *Providencia* spp. *Pseudomonas* spp. *Serratia* spp. *Stenotrophomas maltophilia* *Yersinia enterolitica*
Others: *Chlamydia pneumoniae* *Chlamydia psittaci* *Chlamydia* spp. *Coxiella burnetti* *Mycoplasma* spp.

Pharmacokinetics

Pharmacokinetic parameters are given below for Co-amoxiclav *(Augmentin® ES)* administered at 45mg/kg every 12 hours to paediatric patients

Formulation	**C max (mg/L)**	**T max (hours)**	**AUC (mg.h/L)**	**T ½ (hours)**
Co-amoxiclav	***Amoxicillin***			
(Augmentin® ES)	15.7	2.0	59.8	1.4
600/42.9 mg/5ml	**Clavulanate**			
Dosed at 45 mg/kg amoxicillin 12-hourly	1.7	1.1	4.0	1.1

The pharmacokinetics of the two components of Co-amoxiclav *(Augmentin® ES)* are closely matched. Both clavulanate and amoxicillin have low levels of serum binding; about 70% remains free in the serum.

Pre-clinical Safety Data

No further information of relevance.

INDICATIONS

Co-amoxiclav *(Augmentin®)* should be used in accordance with local official antibiotic-prescribing guidelines and local susceptibility data.

Co-amoxiclav *(Augmentin® ES)* is indicated for the short-term treatment of bacterial infections in paediatric patients at the following sites when caused by Co-amoxiclav *(Augmentin®)* -susceptible organisms:

Upper respiratory tract infections (including ENT) e.g.

recurrent or persistent acute otitis media due to *Streptococcus pneumoniae* (penicillin minimum inhibitory concentration (MIC) less than or equal to 4μg/ml), *Haemophilus influenzae*[#] and *Moraxella catarrhalis*[#]. Such

patients are often characterised by antibiotic exposure for acute otitis media within the preceding 3 months, and are either aged ≤2 years or attend daycare.

tonsillo-pharyngitis and sinusitis, typically caused by *Streptococcus pneumoniae, Haemophilus influenzae*[#], *Moraxella catarrhalis*[#] and *Streptococcus pyogenes.*

Lower respiratory tract infections e.g. lobar and bronchopneumonia typically caused by *Streptococcus pneumoniae, Haemophilus influenzae*[#] and *Moraxella catarrhalis*[#].

Skin and soft tissue infections typically caused by *Staphylococcus aureus*[#] *and Streptococcus pyogenes.*

Other Co-amoxiclav *(Augmentin®)* formulations are indicated for short-term treatment of bacterial infections at the following sites when caused by Co-amoxiclav *(Augmentin®)* -susceptible organisms:

Upper respiratory tract infections (including ENT) e.g. recurrent tonsillitis, sinusitis, otitis media typically caused by *Streptococcus pneumoniae, Haemophilus influenzae*[#], *Moraxella catarrhalis*[#] and *Streptococcus pyogenes.*

Lower respiratory tract infections e.g. acute exacerbations of chronic bronchitis, lobar and bronchopneumonia typically caused by *Streptococcus pneumoniae, Haemophilus influenzae*[#] and *Moraxella catarrhalis*[#].

Genito-urinary tract infections e.g. cystitis, urethritis, pyelonephritis, female genital infections typically caused by *Enterobacteriaceae*[#] (mainly *Escherichia coli*[#]) *Staphylococcus saprophyticus* and *Enterococcus* species, and gonorrohoea caused by *Neisseria gonorrhoeae*[#]

Skin and soft tissue infections typically caused by *Staphylococcus aureus*[#], *Streptococcus pyogenes* and *Bacteroides* species[#].

[#]Some members of these species of bacteria produce beta-lactamase, rendering them insensitive to amoxicillin alone (see *Pharmacological Properties, Pharmacodynamics* for further information).
Susceptibility to Co-amoxiclav *(Augmentin®)* will vary with geography and time. Local susceptibility data should be consulted where available, and microbiological sampling and susceptibility testing performed where necessary.

DOSAGE AND ADMINISTRATION

Paediatric patients 3 months and older:
The recommended dose for Co-amoxiclav *(Augmentin® ES)* is 90/6.4mg/kg/day in 2 divided doses at 12-hourly intervals for 10 days (see chart below). There is no experience in paediatric patients weighing > 40kg, or in adults. There are no clinical data on Co-amoxiclav *(Augmentin® ES)* in children under 3 months of age.

Body Weight (kg)	Volume of Co-amoxiclav *(Augmentin® ES)* providing 90/6.4 mg/kg/day
8	3.0 ml twice daily
12	4.5 ml twice daily
16	6.0 ml twice daily
20	7.5 ml twice daily
24	9.0 ml twice daily
28	10.5 ml twice daily
32	12.0 ml twice daily
36	13.5 ml twice daily

Co-amoxiclav *(Augmentin® ES)* does not contain the same amount of clavulanate (as the potassium salt) as any of the other Co-amoxiclav *(Augmentin®)* suspensions. Co-amoxiclav *(Augmentin® ES)* contains 42.9 mg of clavulanic acid per 5 ml whereas Co-amoxiclav *(Augmentin®)* 200 mg/5 ml suspension contains 28.5 mg of clavulanic acid per 5 ml and the 400 mg/5 ml suspension contains 57 mg of clavulanic acid per 5 ml. Therefore, Co-amoxiclav *(Augmentin®)* 200 mg/5 ml and 400 mg/5 ml suspensions should *not* be substituted for Co-amoxiclav *(Augmentin® ES),* as they are not interchangeable.

Hepatic Impairment

Dose with caution; monitor hepatic function at regular intervals.
There are insufficient data on which to base a dosage recommendation.

Renal Impairment

There are no dosing recommendations for Co-amoxiclav *(Augmentin® ES)* in patients with renal impairment.

Method of Administration

To minimise the potential for gastrointestinal intolerance, Co-amoxiclav *(Augmentin® ES)* should be taken at the start of a meal. The absorption of Co-amoxiclav *(Augmentin®)* is optimised when taken at the start of a meal.
Treatment should not be extended beyond 14 days without review.
Therapy can be started parenterally and continued with an oral preparation.
SHAKE ORAL SUSPENSION WELL BEFORE USING.

CONTRAINDICATIONS

Co-amoxiclav *(Augmentin® ES)* is contra-indicated in patients with a history of hypersensitivity to beta-lactams, e.g. penicillins and cephalosporins.
Co-amoxiclav *(Augmentin® ES)* is contra-indicated in patients with a previous history of Co-amoxiclav *(Augmentin®)* - associated jaundice/hepatic dysfunction.

WARNINGS AND PRECAUTIONS

Before initiating therapy with Co-amoxiclav *(Augmentin® ES)*, careful enquiry should be made concerning previous hypersensitivity reactions to penicillins, cephalosporins, or other allergens.
Serious and occasionally fatal hypersensitivity (anaphylactoid) reactions have been reported in patients on penicillin therapy. These reactions are more likely to occur in individuals with a history of penicillin hypersensitivity. If an allergic reaction occurs, Co-amoxiclav *(Augmentin® ES)* therapy should be discontinued and appropriate alternative therapy instituted. Serious anaphylactoid reactions require immediate emergency treatment with adrenaline. Oxygen, intravenous steroids and airway management, including intubation may also be required.
Co-amoxiclav *(Augmentin® ES)* 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.
Prolonged use may also occasionally result in overgrowth of non-susceptible organisms.
Pseudomembranous colitis has been reported with the use of antibiotics and may range in severity from mild to life-threatening. Therefore, it is important to consider its diagnosis in patients who develop diarrhoea during or after antibiotic use. If prolonged or significant diarrhoea occurs or the patient experiences abdominal cramps, treatment should be discontinued immediately and the patient investigated further.
In general Co-amoxiclav *(Augmentin® ES)* is well tolerated and possesses the characteristic low toxicity of the penicillin group of antibiotics. Periodic assessment of organ system functions, including renal, hepatic and haematopoietic function is advisable during prolonged therapy.
Abnormal prolongation of prothrombin time (increased INR) has been reported rarely in patients receiving Co-amoxiclav *(Augmentin®)* 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.
Co-amoxiclav *(Augmentin® ES)* should be used with caution in patients with evidence of hepatic dysfunction.
In patients with renal impairment, dosage of Co-amoxiclav *(Augmentin®)* should be adjusted according to the degree of impairment. No dosing recommendations can be made for Co-amoxiclav *(Augmentin® ES)* in renally impaired patients (see *Dosage and Administration*).

In patients with reduced urine output, crystalluria 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 *(see Overdose).*

Co-amoxiclav *(Augmentin® ES)* contains aspartame (each 5 ml of suspension contains 7 mg of phenylalanine) and so should be used with caution in patients with phenylketonuria.

Effects on Ability to Drive and Use Machines

Adverse effects on the ability to operate machinery have not been observed.

DRUG INTERACTIONS

Concomitant use of probenecid is not recommended. Probenecid decreases the renal tubular secretion of amoxicillin.
Concomitant use with Co-amoxiclav *(Augmentin® ES)* may result in increased and prolonged blood levels of amoxicillin but not of clavulanate.
Concomitant use of allopurinol during treatment with amoxicillin can increase the likelihood of allergic skin reactions. There are no data on the concomitant use of Co-amoxiclav *(Augmentin® ES)* and allopurinol.
In common with other antibiotics, Co-amoxiclav *(Augmentin®)* may affect the gut flora, leading to lower oestrogen reabsorption and reduced efficacy of combined oral contraceptives.
In the literature there are rare 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 Co-amoxiclav *(Augmentin®)*.
In patients receiving mycophenolate mofetil, reduction in pre-dose concentration of the active metabolite mycophenolic acid of approximately 50% has been reported following commencement of oral amoxicillin plus clavulanic acid. The change in pre-dose level may not accurately represent changes in overall MPA exposure.

PREGNANCY AND LACTATION

Use in Pregnancy
Reproduction studies in animals (mice and rats at doses up to 10 times the human dose) with orally and parenterally administered Co-amoxiclav *(Augmentin®)* have shown no teratogenic effects. In a single study in women with pre-term, premature rupture of the foetal membrane (pPROM), it was reported that prophylactic treatment with Co-amoxiclav *(Augmentin®)* may be associated with an increased risk of necrotising enterocolitis in neonates. As with all medicines, use should be avoided in pregnancy, unless considered essential by the physician.
Use in Lactation
Co-amoxiclav *(Augmentin® ES)* may be administered during the period of lactation. With the exception of the risk of sensitization, associated with the excretion of trace quantities in breast milk, there are no known detrimental effects for the breast-fed infant.

ADVERSE EFFECTS

Data from large clinical trials were used to determine the frequency of very common to rare undesirable effects. The frequencies assigned to all other undesirable effects (i.e., those occurring at <1/10,000) were mainly determined using post-marketing data and refer to a reporting rate rather than a true frequency.
The following convention has been used for the classification of frequency :-

very common >1/10
common >1/100 and <1/10
uncommon >1/1000 and <1/100
rare >1/10,000 and <1/1000
very rare <1/10,000.

Infections and infestations
Common Mucocutaneous candidiasis
Blood and lymphatic system disorders
Rare Reversible leucopenia (including neutropenia) and thrombocytopenia
Very rare Reversible agranulocytosis and haemolytic anaemia. Prolongation of bleeding time and prothrombin time
Immune system disorders
Very Rare Angioneurotic oedema, anaphylaxis, serum sickness-like syndrome, hypersensitivity vasculitis
Nervous system disorders
Uncommon Dizziness, headache
Very Rare Reversible hyperactivity and convulsions. Convulsions may occur in patients with impaired renal function or in those receiving high doses.
Gastrointestinal disorders
Common Diarrhoea, nausea, vomiting
Nausea is more often associated with higher oral dosages. If gastrointestinal reactions are evident, they may be reduced by taking Co-amoxiclav *(Augmentin®)* at the start of a meal.
Uncommon Indigestion
Very Rare Antibiotic-associated colitis (including pseudomembranous colitis and haemorrhagic colitis – *see Warnings and Precautions*).
Black hairy tongue.
Superficial tooth discolouration has been reported very rarely in children. Good oral hygiene may help to prevent tooth discolouration as it can usually be removed by brushing.

Hepatobiliary disorders
Uncommon A moderate rise in AST and/or ALT has been noted in patients treated with beta-lactam class antibiotics, but the significance of these findings is unknown
Very Rare Hepatitis and cholestatic jaundice. These events have been noted with other penicillins and cephalosporins.

Hepatic events have been reported predominantly in males and elderly patients and may be associated with prolonged treatment. These events have been very rarely reported in children.

Signs and symptoms usually occur during or shortly after treatment but in some cases may not become apparent until several weeks after treatment has ceased. These are usually reversible. Hepatic events may be severe and in extremely

rare circumstances, deaths have been reported. These have almost always occurred in patients with serious underlying disease or taking concomitant medications known to have the potential for hepatic effects.

Skin and subcutaneous tissue disorders

Uncommon	Skin rash, pruritus, urticaria
Rare	Erythema multiforme
Very Rare	Stevens-Johnson syndrome, toxic epidermal necrolysis, bullous exfoliative-dermatitis, acute generalised exanthemous pustulosis (AGEP)

If any hypersensitivity dermatitis reaction occurs, treatment should be discontinued.

Renal and urinary disorders

Very rare	Interstitial nephritis, crystalluria (see *Overdose*)

OVERDOSAGE AND TREATMENT

Gastrointestinal symptoms and disturbance of the fluid and electrolyte balances may be evident. Gastrointestinal symptoms may be treated symptomatically, with attention to the water/electrolyte balance.
Amoxicillin crystalluria, in some cases leading to renal failure, has been observed (see *Warnings and Precautions*)
Co-amoxiclav *(Augmentin® ES)* can be removed from the circulation by haemodialysis.

A prospective study of 51 paediatric patients at a poison control centre suggested that overdosages of less than 250 mg/kg of amoxicillin are not associated with significant clinical symptoms and do not require gastric emptying.

STORAGE CONDITIONS

The powder for oral suspension should be stored in a well sealed container, at temperatures not exceeding 30°C. Keep dry. Reconstituted suspensions should be stored in a refrigerator (2-8°C) and used within 10 days.

INSTRUCTIONS FOR USE AND HANDLING

At time of dispensing, the dry powder should be reconstituted to form an oral suspension, as detailed below:
• Check cap seal is intact before use.
• Invert and shake bottle to loosen powder.
• Fill the bottle with water to just below the mark on bottle label.
Invert and shake well, then top up with water to the mark. Invert and shake again.
• Shake well before taking each dose.

Each teaspoonful (5mL) will contain 600 mg amoxicillin as the trihydrate and 42.9 mg of clavulanate as the potassium salt.

AVAILABILITY

Co-amoxiclav *(Augmentin®) ES* 600mg/42.9mg per 5mL Powder for Suspension: Bottles of 50mL and 100mL

CAUTION

Foods, Drugs, Devices and Cosmetics Act prohibits dispensing without prescription.
Keep all medicines out of reach of children.

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