# COMBINED VERSUS MONO ANTIBIOTIC TREATMENT IN CHILDREN WITH COMMUNITY-ACQUIRED PNEUMONIA

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The aim of the study was to compare combined (2 different group antibiotics) treatment with mono antibiotic treatment in children in-hospital with a verified diagnosis of severe community-acquired pneumonia. The study is retrospective. The analysis of 98 case histories of patients who were admitted in ARMCCH (Andijan, Uzbekistan), from 2021 to 2022 was made. As antibiotics were used Ceftriaxone sulbactam, ampicillin, meropenem, merkacin and other analogs of cephalosporins.

**Keywords:** Ceftriaxone sulbactam, pneumonia, children, treatment, efficacy.

# СРАВНЕНИЕ КОМБИНИРОВАННОЙ АНТИБИОТИКО-ТЕРАПИИ С МОНО-ТЕРАПИЕЙ У ДЕТЕЙ С ВНЕБОЛЬНИЧНОЙ ПНЕВМОНИЕЙ

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Цель исследования — сравнить комбинированное (2-х разных группы антибиотиков) лечение с моно-терапией у стационарных детей с подтвержденным диагнозом «тяжелая внебольничная пневмония». Исследование является ретроспективным. Проведен анализ 98 историй болезни пациентов, поступивших в АРМПДК (Андижан, Узбекистан) с 2021 по 2022 годы. В качестве антибиотиков использовались цефтриаксон сульбактам, ампициллин, меропенем, меркацин и другие аналоги цефалоспоринов.

**Ключевые слова:** цефтриаксон сульбактам, пневмония, дети, лечение, эффективность.

**Background:** Community-acquired Pneumonia (CAP) is an infection of the lung parenchyma that is acquired outside of hospital, [1] involved approximately 150 million new cases annually, among children younger than 5 years old worldwide [2-4]. CAP is caused by bacteria such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis* or viruses such as influenza virus [5, 6]. The

susceptibilities of *Streptococcus pneumoniae*, *Haemophilus influenzae* and methicillin-resistant *Staphylococcus aureus* to β-lactam/β-lactamase inhibitors were reported as 99.5%, 59.3–78.0% and 7.7–20.2%, and the susceptibilities of these species to third-generation cephalosporins were reported as 96.8, 100 % [5]. Ceftriaxone (CTRX) and ampicillin/sulbactam (ABPC/SBT) are recommended by various guidelines for pneumonia in a number of countries as the first-line antibiotics for CAP [4-8]. According to the International and National Guidelines III generation cephalosporins are the drugs used as starting empirical treatment of uncomplicated severe community-acquired pneumonia in children regardless of age. Ceftriaxone is a drug that has a wide spectrum of antimicrobial activity, low toxicity, and it is easy to dose and economically available. [9, 10]

**Methods:** The diagnostic criteria for CAP are defined as radiological findings of a new and/or progressive infiltrate(s) and two or more of the following symptoms: cough, sputum or change of sputum character (increased volume and/or purulence), dyspnea, pleuritic chest pain, tachycardia, documented axillary body temperature ≥ 37.5 °C within the past 24 h, rigors and/or chills, general malaise, abnormal breathing sounds, auscultatory findings consistent with the lung infiltrate on chest examination, and white blood cell (WBC) count < $10*10^9$/ml. Severity of pneumonia was determined according to the pneumonia severity index (PSI) [11]. Exclusion criteria: suspected aspiration pneumonia or hospital-acquired pneumonia; hospitalization within 60 days of symptom onset; active lung cancer (cases other than completely resected ones); terminal illness; immunocompromising disease (human immunodeficiency virus infection, active hematologic malignancies, neutropenia and congenital immunodeficiency) or receipt of immunosuppressive therapy (use of ≥10 mg of prednisolone-equivalents, and/or immunosuppressants); pregnant or breastfeeding; known allergy to the indicated antibiotics; or presence of other infiltrative diseases such as organizing pneumonia, radiation pneumonitis, drug-induced pneumonia, obstructive pneumonia, tuberculosis or fungal infection, and empyema.

Monotherapy was appointed 67 (68.3%) children, in combination with other antibiotics (meropenem, ampicillin, amikacin, gentamycin etc) it was used in 31 children. Patients were treated using intravenous CTRX/SBT at 50-70 mg/kg every 12 h for 5–14 days, until their body temperature was < 37 °C for 48 h with clinical stability, and improvements were seen in terms of dyspnea, sputum, or C-reactive protein (CRP) levels. When a patient showed a recurrence of fever > 37.5°C after initial improvement of fever, the same antibiotic therapy was continued for 4 days from the first day of recurrence. To evaluate the effects of treatment, clinical findings, chest radiography findings, and laboratory test results were collected before, during, and at end of treatment (EOT; days 7–14). The late response to treatment was evaluated at end of study (EOS; days 14-28)

**Results:** We had 98 patients with mean age 1.9 year old. We collected laboratory results (Hb level, glucose value, protein and Ca levels), and mean hospital stay was 8.02 days with maximum range 34 days. We calculated hospital days of these group patients. Mean length of control (combined antibiotic) group in hospital was 11.10 days where it was equal to 6.60 days in secondary group (p value <0.001). Tab. 1 Main parameters of both group patients.

**Descriptive Statistics**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| hospital days | 98 | 3 | 34 | 8.02 | 4.613 |
| Hb level g/l | 97 | 60 | 100 | 80.21 | 7.464 |
| glucose mmol/l | 79 | 1 | 13 | 5.35 | 2.260 |
| protein g/l | 97 | 32 | 81 | 51.68 | 9.463 |
| Ca mmol/l | 97 | .7 | 2.4 | 1.504 | .2167 |
| age in years | 98 | .1 | 14.0 | 1.900 | 2.5415 |
| Valid N (listwise) | 79 | | | | |

Tab 2. Mean comparison of hospital days of two groups.

| | CefSLB use | N | Mean | Std. Deviation | Std. Error Mean | P value |
|---|---|---|---|---|---|---|
| hospital days | with mono | 67 | 6.60 | 2.594 | .317 | <0.001 |
| | combined | 31 | 11.10 | 6.300 | 1.132 | <0.001 |

**Conclusion.** Monotherapy has showed more efficacy than combined antibiotic treatment and it decreased hospital stay although. It may be helpful for reducing mortality and morbidity of Community-acquired pneumonia among children.

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