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## CHOICE OF ANTIBIOTIC IN THE TREATMENT OF COMMUNITY- ACCOMBINED PNEUMONIA IN CHILDREN IN HOSPITAL CONDITIONS ВИБІР АНТИБІОТИКА В ЛІКУВАННІ ПОЗАЛІКАРНЯНОЇ ПНЕВМОНІЇ У ДІТЕЙ В УМОВАХ СТАЦІОНАРУ

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**Background.** Currently, the difficulty with the choice of antimicrobial drugs arises in the treatment pneumonia in the hospital. The misuse of antibiotics is one of the reasons for the rapid growth of antibiotic resistance. The article provides data on preferences of hospital doctors in the choice of antibiotics in the treatment of pneumonia and the level of resistance of the leading pathogen *St. pneumoniae* to the most commonly used antibiotics. The recognition of amoxicillin as the drug of first choice in the treatment of pneumonia and the restriction of the use of cephalosporins has been demonstrated. At the same time, the use of cephalosporin's was recognized as irrational. Differences in the choice of indications for prescribing amoxicillin/clavulanate and cephalosporins are emphasized. Attention is drawn to the need to increase the knowledge of doctors on the rational and safe use of antibiotics and to ensure control over their use.

**Objective.** Providing physicians with up-to-date information on choice of antibiotics for the treatment of community-acquired pneumonia in children.

**Methods.** The study involved 40 children, aged 3 months – 5 years old with with community-acquired pneumonia. 20 children received protected aminopenicillins, 20 children received cephalosporins. The dynamics of the course of pneumonia was studied. The indicators of the number of leccocytes, neutrophils, and the rate of erythrocyte sedimentation were taken into account. The state of the radiograph of the lungs was taken into account.

**Results.** In recent years, there has been a rapid spread of antibiotic resistant microbes strains of *St. pneumoniae*, there has been a negative trend in the level indicatorpathogen sensitivity to cephalosporins. One of the reasons for the growing sustainability is a dubious practice antibiotics for the treatment of respiratory diseases by primary care physicians. Continued strong growth in resilience the main causative agents of community-acquired pneumonia in children and analysis of mistakes made by doctors in prescription of antibiotics, were the reason for the introduction rational use adjustment antimicrobial agents. For correct choice of antibiotics, a new structure of choice is proposed antibiotics, the sequence of their applications. First choice drug for treatment of severe pneumonia is recognized as amoxicillin-protected clavulonic acid. Recognized irrational application cephalosporins.

**Conclusions.** In recent years, there has been a rapid spread of antibiotic resistant microbes strains of *St. pneumoniae*, there has been a negative trend in the level of sensitivity of the pathogen to cephalosporins For correct choice of antibiotics, reduction use cephalosporins proposed a new structure of choice antibiotics. substantiated their sequence applications First choice drug for Amoxicillin is recognized as a treatment for mild pneumonia

**Keywords:** community-acquired pneumonia; antibiotics; inpatient treatment.

### Introduction

Despite the availability of clinical guidelines for the diagnosis and treatment of



community-acquired pneumonia, the main child management and hospital antimicrobial regimens continue to be a major challenge. An analysis of the case histories of 40 children treated in the clinic showed that only 48% of children received protected aminopenicillins. Broad spectrum antibiotics were received in 52% of cases. Similar studies were carried out in Ukraine. Proper administration of antimicrobials was detected only in 24.4% of children hospitalized with community-acquired pneumonia [1]. Etiological structure of community-acquired pneumonia closely related to the age of the child. In patients aged from 3 months to 5 years the leading role belongs to *St. pneumoniae* (40%) [2]. Significant participation noted viral co-infections. Isolated detection viruses in patients with pneumonia is not diagnostically convincing [3, 4]. In Ukraine, according to the Survey of Antibiotic Resistance (SOAR) study (2014-2016), the level of resistance to amoxicillin and amoxicillin / clavulanate is 3%, cefuroxime - 11% [5]. New Global Sustainability Surveillance System to antimicrobials (GLASS), WHO released data showing that nearly 500,000 people with suspected bacterial infection in 22 countries faced with the problem of antibiotic resistance. Therefore, it is extremely important in containing antibiotic resistance to rationalize their use [6].

### Methods

Two groups of patients were examined: group I - 20 children with community-acquired pneumonia of 2-3 degrees of severity who received protected aminopenicillins and group II - 20 children with community-acquired pneumonia of 2-3 degrees of severity who received 3rd generation cephalosporins, Patients in group 1 for step therapy in this study received parenteral antibiotic amoxacillin clavunate at a dose of 75 mg / kg per day in 3 doses and antibiotic amoxacillin clavunate in suspension at a rate of 90 mg / kg per day in 2 receptions. Patients in group 2 for step therapy in this study received a parenteral antibiotic cephalosporin series III generation (ceftriaxone) at a dose of 100 mg / kg per day in 2 doses and the antibiotic cefodox in suspension at a rate of 10 mg / kg per day in 2 receptions. The duration of antibacterial therapy was in both groups 10 days. The age of children ranged from 3 months to 5 years. All patients had grade 2 respiratory failure at the time of admission, disturbed cough, fever, general disturbances. The dynamics of indicators of the general analysis of blood, acute phase indicators of blood, data of the radiograph of thoracic organs, bacteriological culture of sputum on pathological flora and sensitivity to antibiotics under the influence cephalosporins and protected aminopenicillins was studied In the study of acute phase indicators of blood, the level of procalcitonin and C- reactive protein in the blood serum was determined using immunochemiluminescent analysis and biochemical method. Statistical processing of results was conducted using the Excel application package.

### Results

Evaluation of the effectiveness of therapy was performed at 7-10 days of treatment based on objective clinical and laboratory indicators, Cough regressed in 78% of patients of group I and 54% of patients of group II, general weakness decreased by 82% in patients of group I and by 70% in patients of group II group, headache disappeared in 100% of patients of group I and decreased by 90% in children of group II, temperature normalized in 89% of patients of group I and 78%



of patients of group II, shortness of breath disappeared in 75% of patients of group I and 57% of patients of group II, appetite was restored in children of both groups on day 7-10 treatment. On admission to the hospital, dullness over the lungs was observed in all patients of groups I and II and was localized mainly in the lower lungs (65%), in the interscapular area (25%), less often in the axillary area (6%) and above the area of the apex of the lungs (4%). At discharge from the hospital dullness regressed in 100% of patients. Infiltrative changes of lung tissue according to the data X-ray examination on admission to the hospital were also observed in all patients of the two groups, most children (78%) had focal changes in chest radiograph, 20% of patients had signs of segmental pneumonia and 2% - interstitial pneumonia. At the time of discharge from the hospital during the examination of the control radiograph of the chest in 100% of patients regression occurred infiltrative changes. In 15% of patients of the first group there were residual changes on X-ray in the form of perivascular, peribronchial infiltration of lung tissue, in patients of the second group similar changes were observed in 26% of patients. In addition, 8% of patients in the second group on day 10 of treatment had residual effects of lung tissue infiltration. In the analysis of additional research methods it was noted that the inflammatory syndrome in the general blood test decreased on day 7 of antibacterial therapy in 62% of patients of the first group, while in patients of the second group it remained pronounced in 25% of patients until treatment. According to auscultatory data in patients of group I vesicular respiration was restored in 92%, in 8% patients had shortness of breath, moderate and large-bubble rales decreased by 94%. In patients of second group vesicular respiration was restored in 75% of children hard breathing remained in 25% of children. Dry rales and weakened breathing when listening to children decreased 70%. In patients of both groups, crepitation regressed completely in patients in both groups.

### **Discussion**

The primary task in solving the problem of antibiotic resistance is not only to limit the use of antimicrobials, but also a change in the structure of their prescribing with a priority of rescribing antibiotics to a lesser extent contribute to the formation of resistance of microorganisms. Conducted in 2016 multicenter pharmacoepidemiological study showed that the unreasonable prescription of antibiotics to children is 40% [7]. At list of prescribed antibiotics 22% accounted for to macrolides and 14% to cephalosporins, which are among the drugs that stimulate resistance [8]. Published in a new edition in 2016, Eurasian clinical guidelines "Strategy and tactics of rational use of antimicrobial agents in outpatient practice" offer a choice of antimicrobials, taking into account the likely pathogens of community-acquired pneumoniae and the level of their resistance to antimicrobial drugs in children of all age groups, as well as taking into account the potential risk of developing antibiotic resistance in a patient [9]. Amoxicillin / clavulanate at a dose of 45-90 mg / kg / a day in 3 doses (according to amoxicillin) is prescribed: children with background diseases; children who have taken antibiotics in the previous 3 months to cover  $\beta$ -lactamase, produced by co-pathogens from the upper respiratory tract; patients who developed pneumonia on the background of flu. Children with severe pneumonia and possible etiology associated with Haemophilus type B,



amoxicillin/clavulanate is preferred. Experts do not recommend the use of 2-3 generation oral cephalosporins in outpatient practice due to their insufficient anti-pneumococcal activity. In the study conducted in patients who received protected aminopenicillins, stepwise therapy with parenteral administration of amoxicillin/clavulanate during the first 3-4 days with transfer to oral administration of amoxicillin/clavulanate for a total course of 10 days showed pronounced positive dynamics of clinical and radiological indicators, rapid regression of respiratory changes in 85% of patients, while with the use of cephalosporins such positive dynamics occurred only in 70% of patients. The conducted study evaluating the effectiveness of protected aminopenicillins in children with community-acquired pneumonia showed that this group of antibiotics the drug has good clinical and radiological properties effectiveness and can be recommended for widely used in the treatment of such patients.

### Conclusion

1. It is established that in children in inpatient treatment with community-acquired pneumonia, the appointment of protected aminopenicillins is more effective than the appointment of 3rd generation cephalosporins, as it demonstrates positive dynamics, subjective, auscultatory data, instrumental and laboratory data.

2. This conclusion is consonant with the Eurasian clinical guidelines "Strategy and tactics of rational use of antimicrobial agents in outpatient practice", which offer a choice of antimicrobials, taking into account the likely pathogens of community-acquired pneumonia and the level of their resistance to antimicrobial drugs in children of all age groups, as well as taking into account the potential risk of developing antibiotic resistance in a patient [9].

3. Experts do not recommend the use of cephalosporins in the treatment of community-acquired pneumonia due to their insufficient anti-pneumococcal activity, which is consistent with our studies of the effectiveness of treatment with protected aminopenicillins and cephalosporins.

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**Вступ.** У статті наводяться результати застосування захищених амінопеніцилінів та цефалоспоринів в лікуванні позалікарняної пневмонії у дітей в умовах стаціонару. Продемонстровано їх порівняльний вплив на перебіг пневмонії, динаміку симптомів, даних додаткових методів дослідження. Доведена значно більша ефективність захищених пеніцилінів порівняно з цефалоспоринами.

**Мета.** Дослідження порівняльної ефективності захищених амінопеніцилінів та цефалоспоринів в лікуванні позалікарняної пневмонії у дітей в умовах стаціонару.

**Методи.** Обстежено 40 дітей від 3 місяців до 5 років з позалікарняними пневмоніями, 20 дітей отримували в лікуванні захищені амінопеніциліни, 20 дітей отримували в лікуванні цефалоспорини. Вивчався вплив антибактеріальної терапії на показники загального аналізу крові, динаміку змін на рентгенограмах органів грудної клітки, брались до уваги дані про зміни загального стану хворих дітей, динаміки при аускультативній легень.

**Результати.** У обстежених дітей, які отримували захищені амінопеніциліни скарги на кашель, загальну слабкість, головний біль регресували на 7-8 день лікування, тоді коли в пацієнтів, які отримували цефалоспорини, скарги мали місце до 10 дня лікування. Аускультативні та рентгенографічні зміни, а також зниження запального синдрому в лабораторних обстеженнях в середньому на 30% були більші динамічними під впливом лікування у пацієнтів, які отримували захищені амінопеніциліни.

**Висновки.** Дотримання рекомендацій ВООЗ (2017 року) по антибактеріальній терапії сприяє більшій ефективності динаміки симптомів. При лікуванні слід надавати перевагу антибіотикам групи ACCESS (доступність), куди належать амоксицилін та амоксициліна/клавуланат над препаратами групи WATCH (спостереження), куди відносяться, в тому числі, цефалоспорини 3 покоління, які є препаратами вибору та резерву, так як їх засосування підвищує ризик розвитку резистентності.

**Ключові слова:** позалікарняна пневмонія, антибіотики, стаціонарне лікування. Вступ.

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