

Treatment and Diagnostic Problems of Pneumonia in Children

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Abstract. Pneumonia in children is one of the most common, serious, potentially life-threatening diseases. The criteria for the diagnosis and treatment of pneumonia have been developed a long time ago and are clearly formulated. However, one has to deal with underdiagnosis and irrational therapy, which is observed more often at the outpatient stage. A comparative analysis of recommendations published recently in a number of countries on the diagnosis and treatment of pneumonia in children was carried out. We studied the timeliness of diagnosis and the adequacy of therapy at the outpatient stage in 167 hospitalized children with pneumonia.

Keywords: community-acquired pneumonia, clinical criteria, diagnosis, treatment standards.

Introduction

Pneumonia, one of the most common serious diseases in childhood, has always attracted the attention of pediatricians. However, despite the abundance of research on this problem (and perhaps as a result of this), many of its aspects are interpreted differently, which creates difficulties and reduces the effectiveness of practical work. It is no coincidence that over the past 10 years, recommendations for the diagnosis and treatment of pneumonia have been published by professional communities in different countries [1–3]

Materials And Methods

Analysis of the use of these recommendations demonstrates a different, far from 100%, level of implementation of optimal approaches in outpatient and inpatient pediatric institutions [4].

Definitions of the concept of “pneumonia” in different recommendations vary significantly, and they concern both the assessment of the predominant etiology and approaches to therapy. Underestimation of these differences leads to diagnostic confusion and affects the determination of the incidence of pneumonia. Diagnosis of pneumonia in practical work presents considerable difficulties, since they have to be “isolated” (preferably at the onset of the disease) from the total number of febrile children. The frequent absence of wheezing and underestimation of the general disorders characteristic of pneumonia are the reason for its underdiagnosis: such children, even despite persistent fever, are sometimes diagnosed with an acute respiratory viral infection and prescribed antipyretics. On the other hand, overestimation by pediatricians of the significance of auscultation data, as well as incorrect interpretation of radiograph data, make a significant contribution to the overdiagnosis of pneumonia. According to a number of private reports, economic aspects of medical standards contribute to the overdiagnosis of pneumonia in hospitals.

The purpose of this article is a comparative analysis of the criteria for diagnosing pneumonia in children in Uzbek and foreign recommendations, morbidity rates, as well as their compliance with the current recommendations in Uzbekistan for the diagnosis and treatment of pneumonia in children.

Results And Discussion

According to the purpose, the study was carried out in 2 stages:

- 1) comparative analysis of Uzbek and foreign (USA, UK, WHO) recommendations for the diagnosis and treatment of pneumonia in children, published over the past 5 years [2, 3];
- 2) assessment of the timeliness of diagnosis of pneumonia in children and the adequacy of therapy at the outpatient stage.

We also used data from assessing the quality of pneumonia diagnostics with expert analysis of radiographs at the National Center for Children's Health in 679 patients under the age of 5 years hospitalized in

children's hospitals in 3 cities. All medical institutions in the above-mentioned cities where patients with suspected community-acquired pneumonia were hospitalized took part in the PAPIRUS study.

According to the Guidelines for Community-Acquired Pneumonia in Children Over 3 Months Published by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of the United States [2], the criteria for diagnosing the pathology are “the presence of signs and symptoms of pneumonia in a previously healthy child.” The etiology of most pneumonias diagnosed in this way is recognized as viral. This approach can be explained by the tradition of calling bronchiolitis viral pneumonia, as well as by the peculiarities of the US health care system, when most patients are treated on an outpatient basis, often without X-ray confirmation. At the same time, the Recommendations contain the position of US regulatory authorities [1], according to which antibacterial therapy requires the patient to have “signs and symptoms of pneumonia in combination with x-ray documentation or microbiological confirmation”; Hospitalization of such children is considered justified.

Differences in the criteria for pneumonia are important when assessing incidence: for example, in the USA, the incidence is determined to be 74–92 and 35–52 per 1000 children aged 0–2 and 3–6 years, respectively; however, only 2 children out of 1000 are hospitalized [2]. However, when studying the effectiveness of pneumococcal vaccination, the frequency of X-ray positive pneumonia in the USA was only 4.3 per 1000 children aged 0–5 years [6].

According to UK criteria, the incidence of community-acquired pneumonia per 1000 children aged 0–16 years was 1.4, and 3.4 in children aged 0–5 years [1]. In Germany, this indicator for pneumonia “requiring hospitalization” was 3.0 and 6.8, respectively [2].

In Uzbekistan, a study of the incidence of community-acquired pneumonia, according to hospitalization data in 3 regions of the country (PAPIRUS) using WHO radiological criteria, demonstrated the following results - 5.3 per 1000 children aged 6 months - 5 years [5]. Similar data were obtained for the city of Andijan, where strict records of patients with pneumonia are kept: 3.2 in children aged 0–1 year; 8.6 - at the age of 1–3 years; 4.2 - at the age of 4–9 years; 4.7 - aged 0–14 years.

According to WHO [3], for mild pneumonia in the absence of HIV infection, amoxicillin (40 mg/kg 2 times a day) for a course of 5 days is recommended. If severe pneumonia develops, treatment should begin with the administration of ampicillin at a dose of 50 mg/kg, benzylpenicillin - 50,000 U/kg IM or IV every 6 hours for at least 5 days. After stopping the fever and reducing the level of intoxication, the patient is transferred to oral amoxicillin at 40 mg/kg 2 times a day.

The British Thoracic Society [3] recommends oral amoxicillin as first-line therapy. Young children do not need amoxicillin protection with clavulanic acid, since the national vaccination schedule necessarily includes vaccination against Haemophilus influenzae [1].

The recommendations of the Pediatric Society of Infectious Diseases of the United States [2] do not recommend treating all community-acquired pneumonia with antibiotics, since the diagnostic criteria include viral lesions of the lung tissue. Thus, for moderate pneumonia, it is recommended to prescribe amoxicillin orally at a dose of 90 mg/kg in 2 divided doses. In case of severe pneumonia, the antibacterial drug is administered parenterally, and the drug of choice is ampicillin (150–200 mg/kg per day every 6 hours) or penicillin (200,000–250,000 U/kg per day every 4–6 hours).

According to Russian recommendations, for uncomplicated typical pneumonia, children over 6 years of age are treated with amoxicillin at a dose of 50 mg/kg per day. For children under 5 years of age who have previously received an antibiotic and attended preschool institutions, it is recommended to take amoxicillin/clavulanate at 70–100 mg/kg per day.

Analysis of the timing of hospitalization of patients in a hospital allows us to talk about underdiagnosis of (late) pneumonia in children. According to our clinic, of the children with pneumonia on the 5th day of illness and later in 2002–2007. 37% (39) of patients were admitted in 2013–2014. - 47% (28) (Table 1).

Table 1. Duration of hospitalization for patients with pneumonia

Pneumonia, years	Total patients (n)	Sick day upon admission				
		1–2	3–4	5–6	7–9	10–12
Typical, 2010–2015	57	8	27	16	6	0

Typical, 2021–2022	45	10	18	8	7	2
Typical, overall	102	18	45	24	13	2
Atypical, 2010–2015	48	5	26	13	4	0
Atypical, 2021–2022	15	1	3	3	8	0
Atypical, total	63	6	29	16	12	0

Table 2. Timing of prescribing antibacterial therapy at the prehospital stage

Pneumonia	Sick day			
	1–2	3–4	5–6	“ “ 7
Typical (n = 55)	19	20	11	5
Atypical (n = 36)	15	13	5	3

Since the delay in hospitalization in some patients was associated with the ineffectiveness of previously started therapy, we analyzed the timing of outpatient treatment: 24 (26%) patients out of 91 began treatment on the 5th day of illness or later (Table 2). It could be assumed that late admission is associated with the expectation of a therapeutic effect, but this is not so: 43 (58%) of the 74 children were admitted to the department without treatment also after the 5th day of illness, which can only be explained by underdiagnosis of pneumonia on outpatient stage. Accordingly, the condition of the admitted children was much more severe: pronounced signs of intoxication (refusal to eat, drink, drowsiness), decreased oxygenation, severe respiratory failure. Children who started treatment were admitted due to ineffectiveness of therapy for 2–4 days, some of them immediately after the first dose of antibiotic was administered.

Conclusion

The analysis demonstrates the presence of significant shortcomings in the diagnosis and prescription of timely treatment of pneumonia in children. In this we see not only the mistakes of pediatricians, but also the difficulties in organizing a quick outpatient examination of acutely ill children, which forces doctors to resort to unjustified hospitalization. It is not surprising that at the same time, those children whose diagnosis of pneumonia is removed are admitted to the hospital, while others remain at home without receiving timely and adequate treatment before their condition seriously worsens.

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