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V. N. Karazin Kharkiv National University

PNEUMONIA IN PEDIATRIC PRACTICE

Methodical recommendations

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LIST OF ACRONYMS

GBS – Group B Streptococcus .
CMV – cytomegalo virus
CNS – central nervous system
hMPV – human metapneumovirus
HiB – H. influenzae type B
CBC count – complete blood cell count
WBC – white blood cell
PCR – polymerase chain reactions
CT – computed tomography

BACKGROUND

Pneumonia – polyetiologicalinfectious disease of respiratory system lower parts with alveolar exudation which is confirmed by radiological method. (*European pulmonological society*).

Pneumonia is the leading causes of death all around the world. Correctly diagnosing pneumonia, proper recognizing of complications and appropriate treatment of patients are important, because of association of pneumonia with high level of morbidity and mortality.

Pneumonia may be both independent illness in the lung or be a focal complication of any other inflammatory process. Abnormalities of airway patency, alveolar ventilation and perfusion usually occur frequently due to various mechanisms. These derangements often alter gas exchange and metabolism of cells in the many tissues and organs. The major factors in the care of children with pneumonia are recognition, prevention, and treatment of these problems.

CLASSIFICATION

Classification accordant to World Health Organization, 2014 (ISBN 978 924 1507 NLM classification WA 320)

Forms due to conditions of contamination: community, acquired, hospital (nosocomial); at perinatal infections, ventilate–associative, aspiration, at immune deficiency.

Morphological forms: focal, segmental, croupous , interstitial ***.***

Course: lingering, recurrent, acute***.***

Severity of the course: mild, moderate, severe.

Complications: – *pulmonary* (pleurisy, pulmonary destruction, pulmonary abscess, pneumothorax, pyopneumothorax);

extrapulmonary (Infectious–toxic syndrome, DIC–syndrome, cardio–vascular insufficiency, respiratory dystress–syndrome of adult type);

metastatic (meningitis, CNS abscess, pericarditis, endocarditis, osteomyelitis, septic arthritis).

ETIOLOGY

Usually etiologic agents vary based on age groups (ie, newborns, young infants, toddlers, 5–year–olds, school–aged children and young adolescents, older adolescents).

Newborns. In newborns (age 0–30 d), pneumonia can manifest as early–onset disease (within the first week of life) or late–onset disease

(≥7 days of life). Maternal genitourinary and gastrointestinal tract flora play significant role in both processes. Infections with group B *Streptococcus*, *Listeria monocytogenes*, or gram–negative rods (eg, *Escherichia coli*, *Klebsiella pneumoniae*) are common causes of bacterial pneumonia. These pathogens can be acquired in utero, via aspiration of organisms present in the birth canal, amniotic fluid, or by postnatal contact with other people or contaminated equipment.

Group B Streptococcus (GBS) was the most common bacteria of early–onset pneumonia transmitted to the fetus in utero, usually as a result of colonization of the mother's vagina and cervix by the organism.

E. coli, Listeria monocytogenes, and other gramnegative bacilli can cause severe respiratory distress resembling hyaline membrane disease, usually as a part of a widespread systemic infection.

Some organisms as *Chlamydia trachomatis*, *U urealyticum*, *Mycoplasma hominis*, *CMV*, and *Pneumocystis carinii* are transmitted at birth during passage through an infected birth canal; most infants are asymptomatic during the first 24 hours and develop pneumonia after the first 2 weeks of life.

Treponema pallidum, *Toxoplasma gondii,* and others, may cause pneumonia in the first 24 hours of life. The clinical presentation usually involves other organ systems as well. Viral and bacterial infections that more commonly cause for older infants and children can occur in newborns, but rare**..** Risk factors for infection include premature infants older siblings, and lack of immunization.

Young infants. In the young infant (aged 1–3 mo),the most typical bacterial pneumonia in this age group is acquired and includes: *S. pneumoniae, S. aureus*, *H. influenza*, *S. pneumoniae* . Most lower respiratory tract disease in young infants occurs during the respiratory virus season and is viral in origin, particularly in the patient with clinical bronchiolitis. The most common viral agents include RSV, *parainfluenza viruses, influenza virus, adenovirus, and human metapneumovirus* (hMPV). may rarely cause infection in infants. Atypical organisms such as: *C. trachomatis, U. urealyticum, CMV*, and *P. carinii* can rarely cause infection in infants but were described. Pneumonia as a complication of the whooping cough infection (*Bordetella pertussis*) leads in as many as 20 % of infected infants.

Infants, toddlers, and preschool–aged children. In this age group viruses are the most common cause of pneumonia. In the winter and spring occurs *Parainfluenza types 1, 2, and 3 and Influenza A or B.*

Other viruses that cause pneumonia less frequently but possible in infants and young children involve: *Adenovirus, Enterovirus, Rhinovirus*, and *Coronavirus.*

In this age group bacterial infections are seen on a regular basis. *S pneumoniae* is the most common bacterial cause of pneumonia.

Other agents to consider include *H. influenzae* type B (HiB) (uncommon in immunized children), *S. pyogenes,* and *S .aureus*.

School–aged children and young adolescents. The most often cause of pneumonia among older children and adolescents is *M. pneumoniae*. *Mycoplasma* accounts up to 35 % of pneumonia in this age group.

Other pyogenic bacterial pathogens to consider involve: *S .aureus* and *S .pyogenes*.

Also causes pneumonia may be *Chlamydophila pneumoniae*. Viral pneumonia remains common in this age group.

Older adolescents. During the teenage years the most common cause of acquired pneumonia is *M pneumoniae*.

Bacterial pneumonia caused by *S. pneumoniae* is also seen.

C. pneumoniae may present in case of atypical pneumonia.

In this age group are possible pulmonary infections caused by *Dimorphic fungi* and *Blastomyces dermatitides*.

Usually viral pneumonias in this age group are mild and self–limited, but *Influenza* pneumonia can be severe.

The agent of Legionnaires disease, *Legionella pneumophila*, can also cause pneumonia, although it is uncommon in the pediatric age group.

PATHOPHYSIOLOGY

An infectious organism must bypass the host's defense mechanisms in order to cause pneumonia. Humans have two types of such mechanisms: nonimmune and immune.

The nonimmune mechanisms works as a filter of inhaled particles based on shape, size, and electrostatic charges; the cough reflex; mucociliary clearance; and different secreted substances (eg, lysozymes, complement, defensins).

The immune–mediated host defense includes: macrophages, neutrophils, lymphocytes, and eosinophils.

PATHOGENESIS

Pneumonia is an inflammation of the alveoli as a response to invasion by an infectious agent introduced into the lungs through hematogenous spread or inhalation.

The inflammatory cascade triggers the leakage of plasma and the loss of surfactant that leads to air loss and consolidation.

As a response of inflammation is often aimed on migration of phagocytes, with the release of toxic substances from granules and other microbicidal packages and the initiation of poorly regulated cascades (eg, complement, coagulation, and cytokines).

First – contamination with microorganisms, inflammatory obstruction of upper respiratory ways, disorder of function of ciliated epithelium with further spreading of pathogen along tracheo–bronchial tree up to pulmonary parenchyma.

Second – primary alteration of pulmonary parenchyma, activation of processes of peroxidation, development of inflammatory response.

Third – alteration of not only pathogen but of own organism including surfactant, destabilization of biological membranes of subcellular structures – phase of secondary toxic autoagression.

Forth – disorders of tissue respiration, central regulation of respiration, ventilation, gas exchange and pulmonary perfusion.

Fifth – development of respiratory insufficiency and non–respiratory pulmonary functions.

Sixth – metabolic functional disorders of other organs and systems.

Four stages of lobar pneumonia

The First stage which occurs during 24 hours of infection, the lung is described by vascular congestion and alveolar edema. A lot of bacterias and few neutrophils are present.

The stage of red hepatization occurs next 2–3 days, has such name because of its similarity to the liver`s consistency,and it is characterized by the presence of many erythrocytes, neutrophils, epithelial cells, and fibrin within the alveoli.

The stage of gray hepatization which occurs after 2–3 days, because of fibrinopurulent exudate, disintegration of RBCs, and hemosiderin. the lung have gray–brown to yellow color .

The final stage stage of resolution is characterized by resorption and restoration of the lungs. Fibrinous inflammation may lead to resolution or to organization and pleural adhesions.

CLINICAL PRESENTATION

Pneumonia in newborns is commonly present with poor feeding and irritability, as well as tachypnea, retractions, and hypoxemia. Cough is rare or absent. Grunting in a newborn may be suggested as a lower respiratory tract disease. Babies keep their lower airways open, due to vocal cord

approximation as they try to provide increased positive end–expiratory pressure.

For infants older than 1 month of life, cough is the most common presenting symptom of pneumonia. Tachypnea, retractions, and hypoxemia are common and may be accompanied by a persistent cough, congestion, fever, irritability, and poor feeding. At the same time grunting may be less common.

Babies with viral pneumonia or pneumonia caused by atypical organisms usually have a low–grade fever or may be afebrile. But bacterial pneumonia are often febrile. The parents might complain that the baby is wheezing or has noisy breathing.

Toddlers and children of preschool age often have fever, cough (productive or nonproductive), tachypnea, and congestion. Also they may have some vomiting.

Adolescents usually have fever, cough (productive or nonproductive), congestion, also chest pain, dehydration, and lethargy.

Sometimes younger children and adolescents may have other constitutional symptoms, like headache, chest pain, and abdominal pain. Other common symptoms are: diarrhea, pharyngitis, and otalgia/otitis.

Complications

Pulmonary complications:

- pleural effusion or empyema;
- pneumothorax;
- lung abscess;
- bronchopleural fistula;
- necrotizing pneumonia;
- acute respiratory failure.

Extrapulmonary(metostatic) complications:

- meningitis;
- central nervous system abscess;
- pericarditis;
- endocarditis;
- osteomyelitis;
- septic arthritis.

PHYSICAL EXAMINATION

The pneumonia is often has wide variety of symptoms of that based on the patient's age and the infectious agents. Tachypnea is the most common sing in patients with diagnosed pneumonia.

Initial evaluation. Extremely important is to start the physical examination, identifying and treating respiratory distress, hypoxemia, and hypercarbia as early as possible. Visual examination of the degree of respiratory effort and accessory muscle use helps assess the presence and severity of respiratory distress. A doctor should observe the patient's respiratory effort and count the respirations for a one full minute. In babies, inspection should include an attempt at feeding, unless the baby has extreme tachypnea.

In all age groups pulmonary findings may involve accessory respiratory muscle recruitment, such as nasal flaring and retractions at subcostal, intercostal, or suprasternal sites. Symptoms like grunting, flaring, tachypnea, and retractions should prompt the doctor to provide immediate respiratory support. Retractions result from the effort to increase intrathoracic pressure to compensate for decreased compliance.

Kids with tachypnea as defined by WHO respiratory rate thresholds usually more often to have pneumonia than children without tachypnea. The WHO thresholds are as follows:

- Kids younger than 2 months – Greater than or equal to 60 breaths/min.
- Kids aged 2–11 months – Greater than or equal to 50 breaths/min.
- Kids aged 12–59 month – Greater than or equal to 40 breaths/min.

Substance of airway secretions may have a wide variety in quality and quantity, but are most common progress and profuse from serosanguineous to purulent appearance. Colors may be: white, yellow, green, or hemorrhagic and textures are usually creamy or chunky are not. In case of aspiration of meconium or blood, other colors and textures reflective of the aspirated material may be seen.

Babies might have external staining or discoloration of skin, hair, and nails with meconium or blood, which may be present in the amniotic fluid. The oral, nasal, and, especially, tracheal presence of such substances is particularly suggestive of aspiration.

All children with respiratory symptoms need an assessment of oxygen saturation by pulse oximetry as early as possible. In severe cases might be present cyanosis.

Auscultation. The most important part of the examination of the child with respiratory symptoms is auscultation. Usually infants and toddlers cry during the physical examination, it brings difficulties in making auscultation. Hands and instruments must be warm. Also chance to listen to a sleeping baby should never be lost.

Kids with respiratory symptoms might have an upper respiratory infection with copious upper airway secretions. It can become another problem, the transmission of upper airway sounds. Quite often, the sounds created by upper airway secretions can almost obscure breath sounds and it can lead to misdiagnosing. If the etiology of sounds heard through the stethoscope is unclear, the doctor should listen to the lung fields and then put the stethoscope close to the kid's nose. If the sounds from both locations are the same, the source of the breath sounds is the upper respiratory tract.

Rales, rhonchi, and cough are all observed much less often in infants with pneumonia than in older children. A focal crackle as a stand–alone physical examination finding is neither sensitive nor specific for the diagnosis of pneumonia. But, not all kids with pneumonia have crackles. If present, they may be caused by noninflammatory processes, for example – congestive heart failure. Although alternative explanations are possible, these findings should prompt careful consideration of pneumonia in the differential diagnosis.

One more important finding suggestive of pneumonia involve asymmetry of breath sounds in babies, such as focal wheezing or decreased breath sounds in one lung field. Sometimes, chest excursions may be asymmetric, which suggest air leak or emphysematous changes secondary to partial airway obstruction. Generalized crackles or wheezing may be a symptom of diffuse lung infections (eg, viral infections).

A rub heard by auscultation is a sign of lobar pneumonia; fibrinous inflammation may extend into the pleural space. Lower lobe pneumonia (consider *H.influenzae*) can lead to pericardial effusion it may be also cause a rub.

Actually, a kid presents with a high fever and cough but without ausculatory findings suggestive of pneumonia. In such cases, percussion may help to identify an area of consolidation.

Systemic and localized findings. Accordant to the etiology of pneumonia in newborns it is possible to find systemic findings. Jaundice or rash at birth may be sings of congenital infection. Localized sings such as conjunctivitis (consider *C. trachomatis*), unusual nasal secretions (consider congenital syphilis) and vesicles on a skin (consider *HSV*) in Older children might have an adenopathy as a symptom of long–standing infection and should suggest a more chronic cause such as TB or a dimorphic fungal infection (eg, histoplasmosis, blastomycosis). Hepatomegaly from infection may result from the presence of some chronic causative agents, cardiac impairment, or increased intravascular volume.

WORKUP

Diagnostic tests for pneumonia may include the following:

- Pulse oximetry
- Complete blood cell (CBC) count
- Sputum and blood cultures
- Serology
- Chest radiography
- Ultrasonography

Complete Blood Cell Count. The total white blood cell (WBC) count might show if an infection is bacterial (leukocytosis) or viral (leucopenia). Also it may be useful in monitoring the course of pneumonia (with ESR, clinical signs , and chest radiography).

Sputum Gram Stain and Culture. It is rarely situation, when sputum produced in kids younger than ten years. That is the reason why samples are always contaminated by oral flora. It is possible to get a result in older child with a productive cough, but very few children are able to cooperate with such type of test. Also endotracheal cultures and/or bronchoalveolar lavage culture can be sent for the isolation of offending pathogens. In case of severe pneumonia or in children with compromised immune systems it can be extremely important.

Blood Culture. A blood culture is recommended in complicated cases of pneumonia. In other situations, the results are rarely positive. However, It may be the only way to identify the pathogen and its antimicrobial susceptibility patterns.

Serology. In situation when usual treatment does not lead to the positive result such lung pathogens as *M. pneumoniae, Chlamydophila* species, and *Legionella* may be suspected. Acute and convalescent serum samples were tested using enzyme immunoassay for IgM and IgG antibodies. Nasopharyngeal aspirates were tested using PCR and cultured with a Pneumofast kit. Also, lung infections caused by dimorphic fungi (eg, histoplasmosis) are more commonly diagnosed serologically.

However, serologic testing can support or establish the diagnosis.

Inflammatory markers. The markers of inflammation such as CRP, procalcitonin, cytokines (eg, interleukin [IL]–6), inter–alpha inhibitor proteins (IaIp), and batteries of acute–phase reactants have been touted to be more specific but are limited by suboptimal positive predictive value. zDecisions about antimicrobial therapy should not be based on inflammatory markers alone.

Polymerase chain reaction. Advantage of PCR that it is noninvasive (over lung aspirate or bronchoalveolar lavage). PCR is more sensitive than antigen assays, and for some viruses (eg, hMPV), this study may be the only test available. PCR also may be helpful in diagnosing streptococcal pneumonia. However, positive test results must correlate with symptoms to have any validity. PCR testing for Tuberculosis is also useful in early identification of TB from other mycobacteria in acid–fast cultures.

Mantoux skin test. These tests are used in diagnosing TB (intra-dermal [ID] inoculation of 5 tuberculin units [TU] of purified protein derivative [PPD]) results should be read 48–72 hours after placement.

Even if the child has received the BCG vaccine, Mantoux test results should be interpreted using the criteria outlined as follows. In children older than 4 years without any risk factors, test results are positive if the induration (not the area of erythema, which may be larger) is 15 mm or larger. Among children younger than 4 years, those who have an increased environmental exposure to TB or other medical risk factors (eg, lymphoma, diabetes mellitus, malnutrition, renal failure), results are positive if the induration is 10 mm or larger. In immunosuppressed children or those in close contact with others who have known or suspected cases of TB, test results are positive if the induration is 5 mm or larger. Chest radiography helps to confirm the diagnosis of a child with positive Mantoux test results.

Cold agglutinin testing. A cold agglutinins test might help confirm the clinical suspicion of mycoplasmal infection. But this test is positive in only half the cases of mycoplasmal infection, and it is not very specific.

Direct antigen detection. Actually, antiviral therapy is used rare, performing a nasopharyngeal swab or nasal wash for RSV and influenza enzyme–linked immunoassay (ELISA) and viral culture can help to make a quick diagnosis, that might be useful in differential diagnosis. Viral cultures may be obtained after 1–2 days using newer cell culture techniques and might help to avoid unnecessary antibiotics. What is more, correct diagnosis permit for appropriate placement of patients in the hospital.

Chest radiography. Chest radiography is the most informative method of indication of pneumonua. It helps to identify localization of inflammatory process.

Computed tomography (CT) scanning of the chest and ***ultraso-nography*** are indicated in children with complications such as pleural effusions and in those in whom antibiotic treatment fails to elicit a response.

Bronchoscopy. Flexible fiberoptic bronchoscopy is useful to obtain lower airway secretions for culture or cytology. This procedure is most

useful in immunocompromised patients who are believed to be infected with unusual organisms (*Pneumocystis*, other fungi) or in patients who are severely ill.

Protected brush tracheal aspirate sampling. It may be used when site distant from the larger bronchi cannot be sampled. Specimens may have an increased risk of contamination with oral or airway commensals compared with bronchoscopic sampling but are thought to be more accurate than a conventional endotracheal aspirate.

Lung aspiration. Lung aspiration is more efficient method of obtaining a culture. If a prominent infiltrate can be adequately localized in multiple planes, direct aspiration of the infected lung may be performed for culture or biopsy. The risk of air leak associated with this procedure is high. A lung aspirate should not be performed in patients who are on ventilators, who have a bleeding diathesis, or who are suspected of having an infection with *Pneumocystis*.

Lung puncture. Diagnostic lung puncture can be useful in situation in when pleural and subpleural lung surfaces are visibly involved and can be well localized. It may lead to such complications as pneumothorax, broncho-pleural fistula, and hemothorax, as well as sampling a nondiagnostic site.

TREATMENT AND MANAGEMENT

Treatment of kids with pneumonia must base both on clinical status of the patient and the etiology of the infectious organism.

Hospitalization. If patients are not toxic or hypoxic enough to require supplemental oxygen they do not require hospitalization and respond well to oral antibiotics. Except of they are vomiting, require intravenous fluids or antibiotics. A parapneumonic effusion that requires drainage usually dictates a hospital admission.

Kids younger than 5 years need hospitalization more often, but their clinical status, degree of hydration, degree of hypoxia, and need for intravenous therapy dictate this decision. Infants who are younger than 2 months or premature must be hospitalized because of the high risk of apnea.

Hemodynamic support. Delivery of adequate amounts of glucose and maintenance of thermoregulation, electrolyte balance, and other elements of neonatal supportive care are essential aspects of clinical care. RBCs should be administered to ensure a hemoglobin concentration of 13–16 g/dL in the acutely ill infant to ensure optimal oxygen delivery to the tissues.

Respiratory management. Grunting, flaring, severe tachypnea, and retractions should prompt immediate respiratory support.

Pharmacologic therapy. Antibiotic agents:

1. Penicillins (such as amoxicillin 20 mg/kg per day 3 times, ampicillin 50 mg/kg per day every 4–6 hours) are used as a first–line agent for children with uncomplicated community–acquired pneumonia, which provides coverage for *S pneumoniae*.

2. Macrolides (such as azithromycin 10mg/kg per day ones a day) are useful in school–aged children, because they cover the most common bacteriologic and atypical agents (*Mycoplasma, Chlamydophila, Legionella*).

3. Second – or third–generation cephalosporins are acceptable alternatives but should not be used as first–line (Cephatoksim 50–100mg/kg per day twice a day, cephtriokson 50mg/kg per day, twice a day).

4. Vancomycin 15mg/kg per day (particularly in areas where penicillin–resistant pneumococci and methicillin–resistant *S aureus* are prevalent) along with a second– or third–generation cephalosporin.

Anti–inflammatory therapy. Glucocorticoid use might be beneficial in the treatment of serious (hospitalized) community–acquired pneumonia, but steroids should not be routinely used for uncomplicated pneumonia.

Antiviral agents. Infants with respiratory syncytial virus (RSV) pneumonia do not require antimicrobials. Serious infections with this organism usually occur in infants with underlying lung disease.Influenza A viruses, including 2 subtypes (H1N1) and (H3N2), and influenza B viruses currently circulate worldwide, but the prevalence of each can vary among communities and within a single community over the course of an influenza season. Antiviral medications (oseltamivir [Tamiflu], zanamivir, amantadine, rimantadine) are approved for treatment and chemoprophylaxis of influenza.

Bronchodilators. Children with reactive airway disease or asthma may react to a viral infection with bronchospasm, which responds to bronchodilators. But they must not be used routinely.

Thoracentesis. If a child with pneumonia develops a pleural effusion, thoracentesis can be performed for diagnostic and therapeutic purposes.

Intubation can be demanded in case of hard stage of respiratory failure.

PREVENTION

Non–specific prevention – it is avoiding infectious contacts (difficult for many families who use daycare facilities) and isolation of ill person.

Specific prevention is vaccination. Conjugated and unconjugated polysaccharide vaccines for *S pneumoniae* have been developed for infants and children, respectively. The 23–valent polysaccharide vaccine (PPVSV) is recommended for children 24 months or older who are at high risk of pneumococcal disease

Influenza vaccine is recommended for children aged 6 months and older. Especially it is recommended for children at high risk, such as those with cystic fibrosis, or asthma.

QUESTIONS FOR SELF – CONTROL

1. Formulate the definition of pneumonia.
2. What criteria are the basis for the classification of pneumonia?
3. Etiological factors of pneumonia in different age periods.
4. Pathogenetic links in the development of pneumonia in childhood.
5. Clinical features of pneumonia in young children.
6. Clinical features of pneumonia in older children.
7. Principles of antibacterial therapy of pneumonia in children.
8. Prevention of pneumonia.

TEST

1. The most common etiology agent of pneumonia in newborns is:
a) influenza virus;
b) chlamydophila pneumoniae;
c) group B Streptococcus .

2. Influenza virus is most common reason of pneumonia in age:
a) newborns;
b) pre–school age children;
c) teenagers.

3. The stage of red hepatization occurs:
a) it is a primary stage;
b) it is a recovering stage;
c) occurs next 2–3 days after the first stage.

4. The most common symptom of pneumonia for newborns is:
a) cough;
b) tachypnea;
c) fever.

5. The most common symptom for older children is:

a) pour feeding;

b) fever;

c) cough.

6. The most informative method of diagnosing pneumonia is:

a) complete blood count;

b) chest radiography;

c) bronchoscopy.

7. Which group of antibiotics is reasonable to use as a first–line agent for children with uncomplicated community–acquired pneumonia:

a) vancomycin;

b) cephalosporins;

c) penicillins.

8) Doses of azithromycin:

a) 10mg/kg per day, ones a day;

b) 10mg/kg per day, every 4 hours;

c) 50 mg/kg per day, two times.

Wright answers: 1.C, 2.B, 3. C, 4. B, 5. C, 6. B, 7. C, 8. A.

Situational tasks :

1. A 2 week– old child. The mother noticed a poorfeeding, lethargy. From the anamnesis it is known that during the pregnancy a maternal Chlamydia infection was established. Objectively: the child is sluggish, the skin is pale, the tachypnia (100 per hour). Which most probable diagnosis can be suspected. Tactics of examination and treatment of the child.

2. A 14 – years old child was diagnosed with pneumonia caused by mycoplasma. What group of antibiotics and in what dosage is the most appropriate in this case?

LITERATURE

Main sources of information:

1. Jadavji T, Law B, Lebel MH, Kennedy WA, Gold R, Wang EEL.

A practical guide for the diagnosis and treatment of pediatric pneumonia. CMAJ. 1997;156:S703–11.

2. Illustrated Textbook of Paediatrics, 4th Edition. Published by Lissauer & Clayden, 2012, p. 552 ISBN: 978–072–343–566–2.

3. Nelson Textbook of Pediatrics, 19th Edition Kliegman, Behrman. Published by Jenson & Stanton, 2011, 2608. ISBN: 978–080–892–420–3.

4. Oxford Textbook of Medicine: Infection by David Warrell, Timothy M. Cox, John Firth and Mili Estee Torok , Published by Wiley–Blackwell, 2012.

5. Pediatrics [Text] / ed. O. V. Tiazhka. – Nova knyga, 2008. – 1092 p.

6. On approval of clinical protocols for the provision of medical assistance in emergencies at children at hospital and pre–hospital stages: order of the Ministry of Health of Ukraine dated August 31, 2004 No. 437 [Electronic resource]. – Mode of access: http://www.moz.gov.ua/ua/portal/dn_20040831_437.html.

7. On approval of the protocols for the provision of medical aid to children for the specialty " Pulmonology in children": order of the Ministry of Health of Ukraine dated January 13, 2005 No. 18 [Electronic resource]. – Mode of access: http://www.moz.gov.ua/ua/portal/dn_20050113_18.html.

For notes

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