PNEUMONIA

Definition

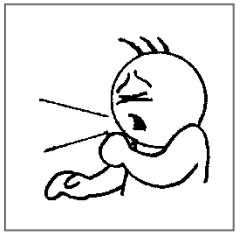
Pneumonia is an acute inflammatory disease of the distal part of respiratory tract, which manifests usually with fever, cough, dyspnea and infiltrations on a chest x ray.

Etiology according to age

Newborns	3 w. - 3 m.	4 m – 4y	> 5 y

Bacterias are the most common etiologic factors

- **group B *Streptococci*,**
- ***Enterobacteriacae*,**
- ***Chlamydia trachomatis,***
- ***Listeria monocytogenes***



Etiology according to age

Newborns	3 w. - 3 m.	4 m. – 4y.	> 5 y.

Bacterias are the most common etiologic factors

- ***Streptococcus pneumoniae***
- ***Chlamydia trachomatis***
- ***Bordetella pertussis***
- ***Staphylococcus aureus***

- **RSV**
- **Parainfluenza**

Etiology according to age

Newborns	3 w. - 3 m.	4 m. – 4 y.	> 5 y.

Viruses are the most common etiologic factors

Etiology of viral lower respiratory tract infections in children

RSV

Parainfluenza 1, 2, 3

Influenza A i B

Adenovirus

Rhinovirus

Human metapneumovirus

Coronavirus

Human bocavirus

Etiology according to age

Newborns	3 w. - 3 m.	4 m. – 4 y.	> 5 y.

Viruses are the most common etiologic factors

Streptococcus pneumoniae **the most common bacteria**

Mycoplasma pneumoniae is not an unusual cause of pneumonias in this age group

Etiology according to age

Newborns	3 w. - 3 m.	4 m. – 4 y.	> 5 y.

Bacterias are the most common etiologic factors

- ***Streptococcus pneumoniae***
- ***Mycoplasma pneumoniae***
- ***Chlamydophila pneumoniae***
- ***Heamophilus influenzae***
- ***Moraxella catarrhalis***

Symptoms of pneumonia

Fever and difficulty with breathing are the most common presenting symptoms of pneumonia.

The absence of fever has a negative predictive value of up to 97%.

Symtoms of pneumonia

- Cough, lethargy, poor feeding and an ‘unwell’ child.
- Localized chest or abdominal pain is a feature of pleural irritation.

Percussion and auscultation findings

- Dullness to percussion
- Crackles
- Bronchial breathing
- Wheeze - more suggestive of viral and mycoplasma infection.

Objective clinical signs

- Skin colour
- Retractions and use of accessory muscles.
- The presence of **conjunctivitis in infants** less than 3 months old with prominent cough suggests **Chlamydia trachomatis** infection

Extrapulmonary symptoms of *M. pneumoniae* infection

headache, malaise, fever, sore throat

hemolytic anemia, thrombocytopenia

arthralgia, arthritis

erythema multiforme, erythema nodosum, urticaria

pericarditis, myocarditis

aseptic meningitis, cerebellar ataxia, transverse myelitis, peripheral neuropathy, Guillain-Barre syndrome

nusea, vomiting, diarrhea, pancreatitis (rarely)

The WHO has defined tachypnoea as

a) more than 60 breaths/min in children < 2 months of age

b) more than 50 breaths/min in children aged 2 -12 months

c) more than 40 breaths/min in children aged >12 months

d) more than 30 breaths/min in children > 5 years

Indications for hospital admission

- hypoxaemia (SaO_2 92%), cyanosis,
- in infants, respiratory rate > 70/min, dyspnoea, intermittent apnoea, grunting and feeding difficulty,
- in older children, respiratory rate > 50/min, dyspnea, grunting and signs of dehydration,
- prolonged capillary refill time > 2 s,
- chronic conditions (e.g. congenital heart disease)
- significant tachycardia
- inability of family to provide appropriate care,

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Investigations

Acute phase reactants

- **Total leukocyte** and **neutrophil count**,
- **CRP**
- **Procalcitonine**
- Erytrocyte sedimentation rate

Investigations

- **Electrolites:** should be done if the patient is severely ill or shows the evidence of dehydration.
- Inappropriate secretion of antidiuretic hormone - results hyponatremia and low plasma osmolality (less than 280 m.osm./l).
- Treatment is with fluid restriction.

Microbiological investigations

Community: There is no indication for microbiological investigation of the child with pneumonia in the community.

Microbiological investigations in hospital

- Blood culture.
- Nasopharyngeal secretions and/or nasal swabs for viral detection by PCR and/or immunofluorescence.
- Acute and convalescent serology for respiratory viruses, *Mycoplasma* and *Chlamydia.*
- If present, pleural fluid should be sent for microscopy, culture, pneumococcal antigen detection and/or PCR.
- Urinary pneumococcal antigen detection should not be done in young children.

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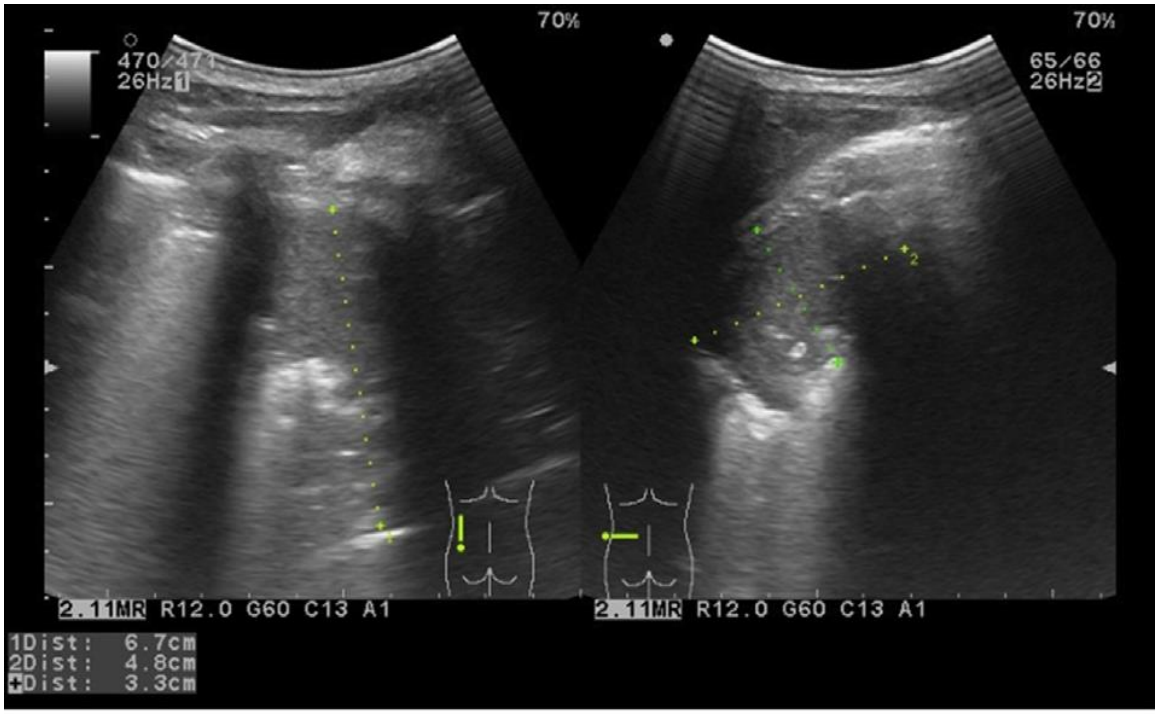
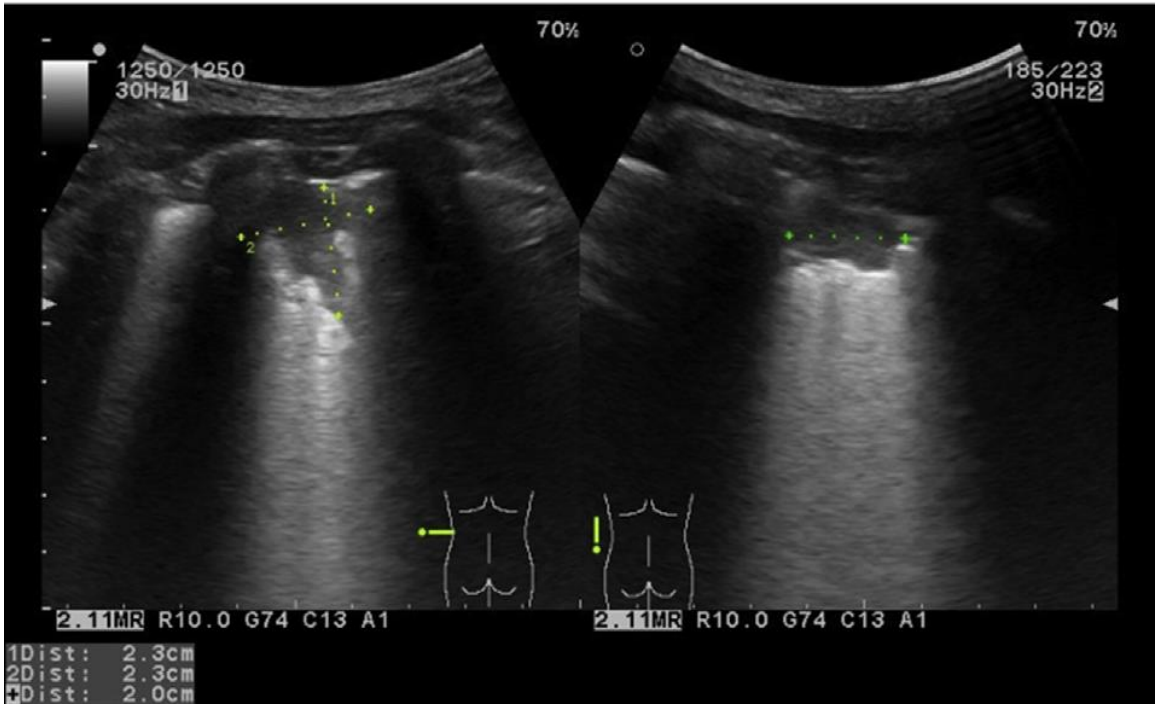
Radiological investigations

Follow up chest radiography should only be performed in case of

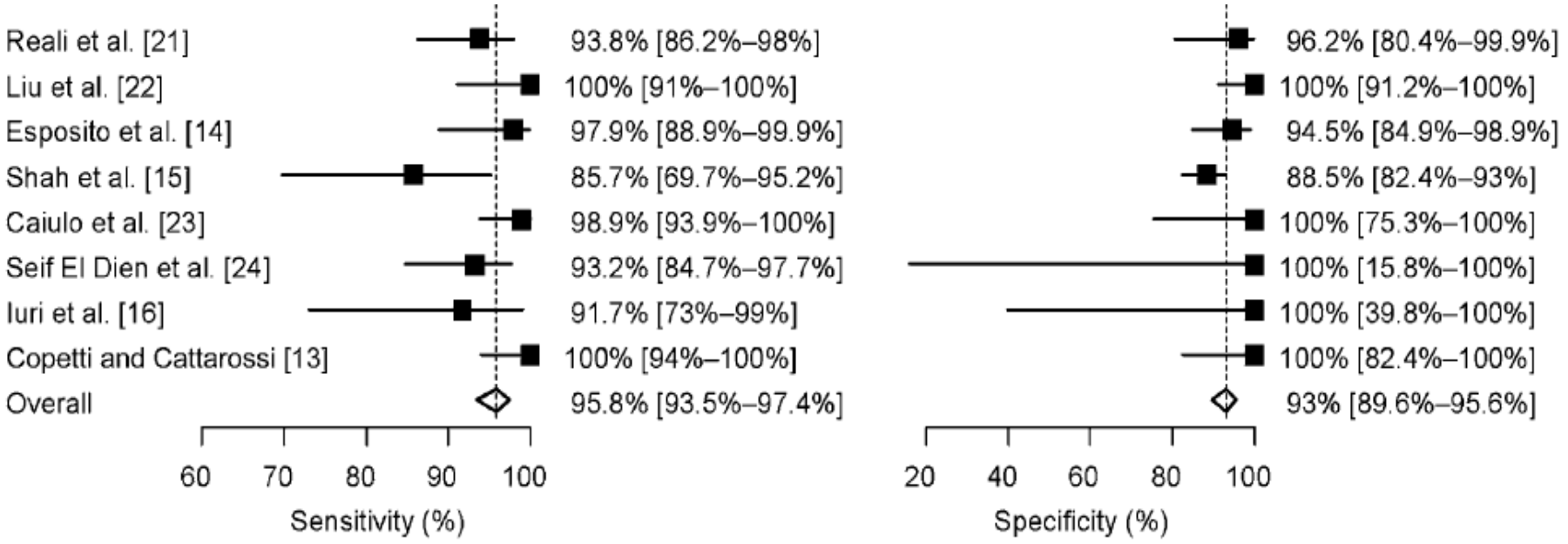
- lobar collapse
- round pneumonia
- continuing symptoms


70%
470/471
26Hz1
70%
65/66
26Hz2
2.11MR R12.0 G60 C13 A1
2.11MR R12.0 G60 C13 A1
1Dist: 6.7cm
2Dist: 4.8cm
+Dist: 3.3cm


70%
1250/1250
30Hz1
70%
185/223
30Hz2
2.11MR R10.0 G74 C13 A1
2.11MR R10.0 G74 C13 A1
1Dist: 2.3cm
2Dist: 2.3cm
+Dist: 2.0cm

Lung Ultrasound for the Diagnosis of Pneumonia in Children: A Meta-analysis

Maria A. Pereda, MD[a], Miguel A. Chavez, MD[a,b], Catherine C. Hooper-Miele, MD[a], Robert H. Gilman, MD, DTMH[c], Mark C. Steinhoff, MD[d], Laura E. Ellington, MD[a], Margaret Gross, MA, MLIS[e], Carrie Price, MLS[e], James M. Tielsch, PhD[f], William Checkley, MD, PhD[a,b,c]



Pediatrics 2015

The Clinical Respiratory Journal REVIEW ARTICLE

Overview of antimicrobial options for *Mycoplasma pneumoniae* pneumonia: focus on macrolide resistance

Bin Cao[1,2]*, Jiu-Xin Qu[1]*, Yu-Dong Yin[1]* and Johan Van Eldere[3]*

2015

Denmark – 0,9% - 2,9%

Germany – 3% - 3,6%

USA – 8,2%

Canada - 12,1%

Italy – 26%

Belgium – 53%

Spain – 54%

China - 95%

Tetracycline >12y.

Fluoroquinolones >18y.


Netherlands
Estonia
Latvia
Hungary
Austria
Sweden
Slovenia
Germany
Lithuania
Denmark
Norway
Czech Republic
Bulgaria
Finland
Poland
Slovakia
United Kingdom
Spain (b)
EU/EEA
Croatia
Iceland (a)
Malta
Portugal
Ireland
Italy
Luxembourg
France
Cyprus (a)
Belgium
Romania (a)
Greece
Penicillins (J01C)
Cephalosporins and other beta-lactams (J01D)
Tetracyclines (J01A)
Macrolides, lincosamides and streptogramins (J01F)
Quinolones (J01M)
Sulfonamides and trimethoprim (J01E)
Other J01 classes
0
5
10
15
20
25
30
35
DDD per 1 000 inhabitants and per day

Treatment of pneumonias

Recommendations

- Amoxicillin is recommended as first choice for oral antibiotic therapy in all children because it is effective against the majority of pathogens which cause CAP in this group, is well tolerated and cheap. Alternatives are co-amoxiclav, cefaclor, erythromycin, azithromycin and clarithromycin. [B]
- Macrolide antibiotics may be added at any age if there is no response to first-line empirical therapy. [D]
- Macrolide antibiotics should be used if either mycoplasma or chlamydia pneumonia is suspected or in very severe disease. [D]
- In pneumonia associated with influenza, co-amoxiclav is recommended. [D]

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Treatment of pneumonias

Newborns	3 w. - 3 m.	4 m. – 4 y.	> 5 y.

Antibiotics

- **ampicyllin iv (+/-) aminoglycosid iv**
- **III generation cephalosporin (+/-) aminoglycosid**

Treatment of pneumonias

Newborns	3 w. - 3 m.	4 m. – 4 y.	> 5 y.

Streptococcus pneumoniae

Ampicyllin, Amoxicillin

C. trachomatis* or *B. pertussis

Erytromycin

Hale K, Isaacs D. Pediatr Respir Rev 2006;7:145-151

Treatment of pneumonias

Newborns	3 w. - 3 m.	4 m. – 4 y.	> 5 y.

- Children aged <2 years presenting with mild symptoms of lower respiratory tract infection do not usually have pneumonia and need not be treated with antibiotics but should be reviewed if symptoms persist. A history of conjugate pneumococcal vaccination gives greater confidence to this decision. [C]

Treatment of pneumonias

Newborns	3 w. - 3 m.	4 m. – 4 y.	> 5 y.

Amoxicillin

Treatment of pneumonias

Newborns	3 w.- 3 m.	4 m. – 4 y.	> 5 y.

Amoxicillin

Macrolides