Respiratory tract infections

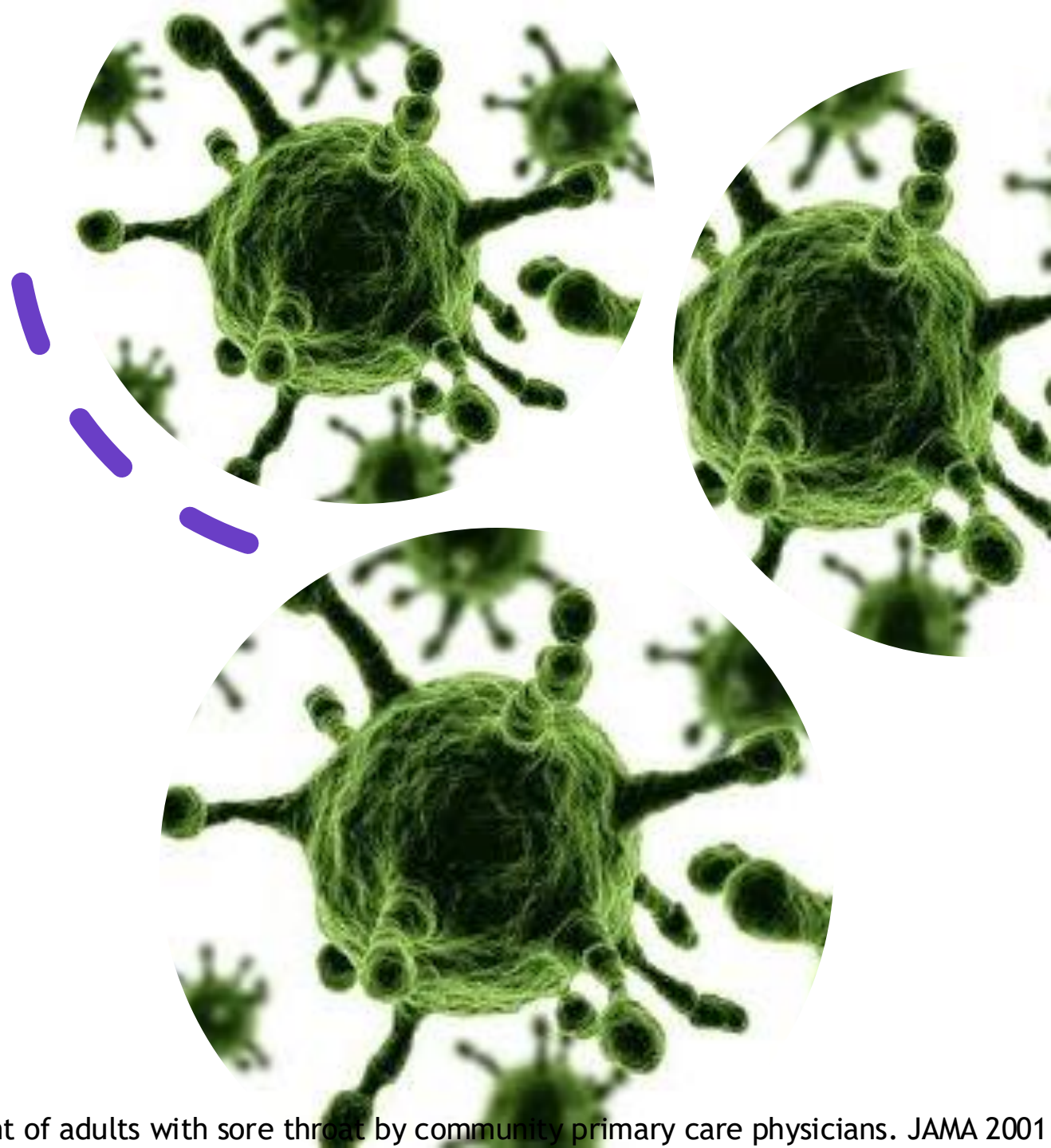
Warszawski Uniwersytet Medyczny
Klinika Chorób Zakaźnych i Pediatrii
Dziecięcy Szpital Kliniczny

How to distinguish between acute viral pharyngitis and streptococcal tonsillitis?

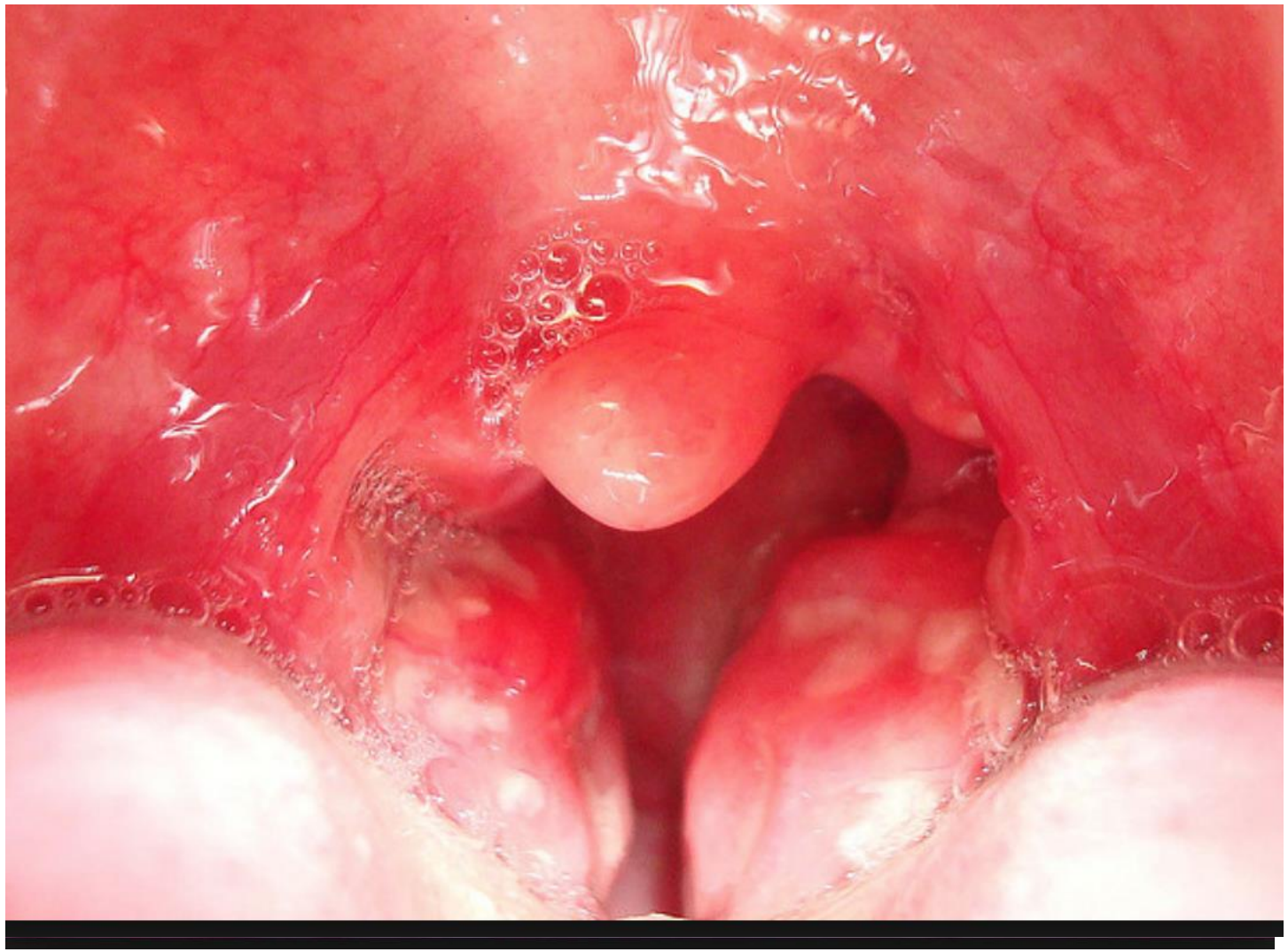
- 85 - 90% of pharyngitis or tonsillitis are caused by viruses

- Over 70% of patients receive an antibiotic for this reason

WHY?



Linder i wsp. Antibiotics treatment of adults with sore throat by community primary care physicians. JAMA 2001



How to distinguish between acute viral pharyngitis and streptococcal tonsillitis?

- Epidemiology
- Progress
- Signs and symptoms
- Diagnostic testing

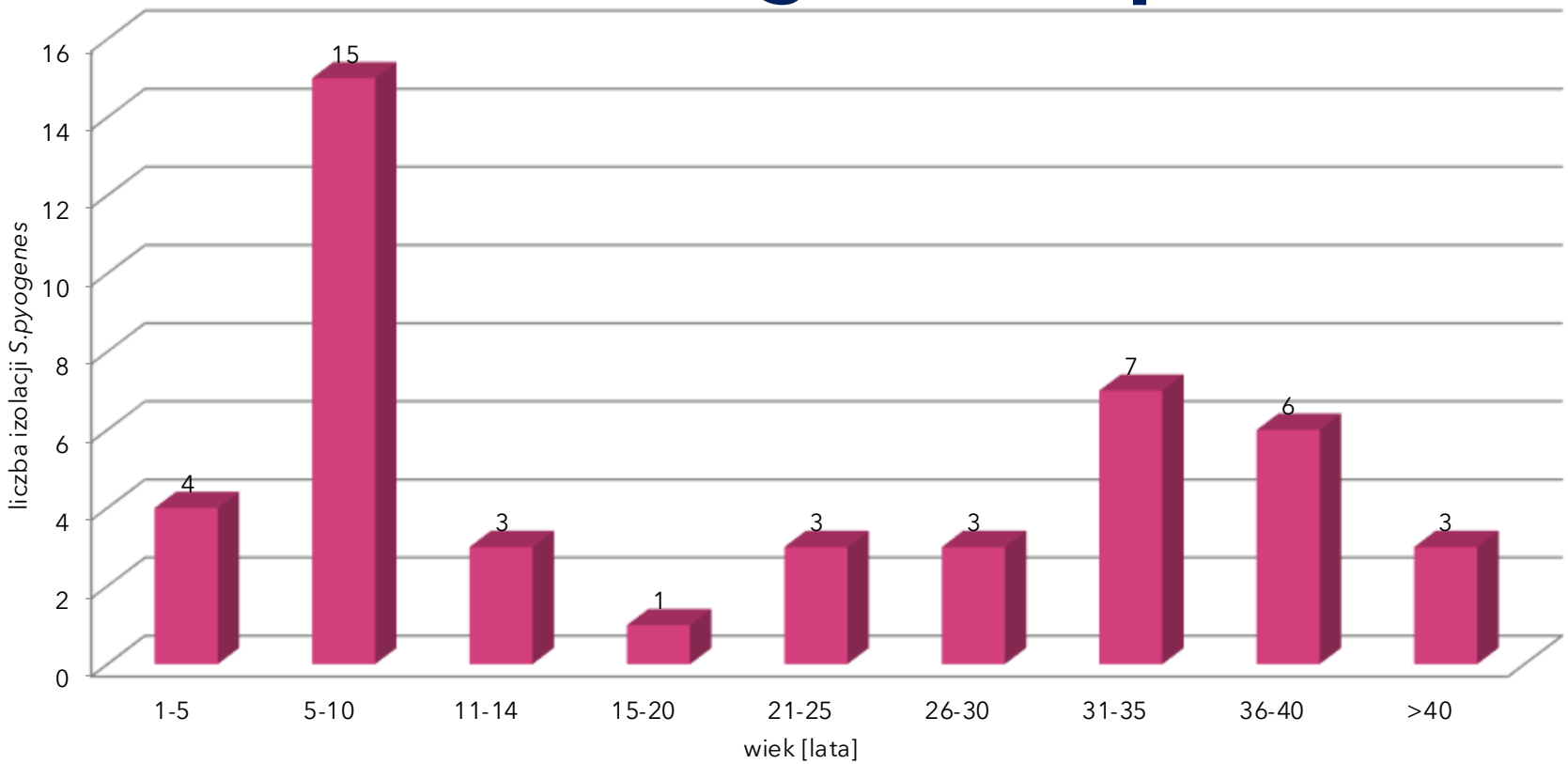
Epidemiology

- Late autumn
- winter
- Early spring

Risk factors

- contact with a patient with infectious pharyngitis or a asymptomatic carrier - PBHA
- age: 3–15 y – PBHA
- Children and young adults– mononucleosis (EBV),
- adults – *F. necrophorum*

Isolation of S.pyogenes according to the age of the patient



Bosacka K. i wsp. 2014

Characteristics of viral inflammation

- sore throat (usually of lesser intensity),
- headache, muscle and joint pain;
- a slight fever or normal body temperature,
- pharyngitis,
- conjunctivitis (adenovirus),
- rhinitis, coughing, hoarseness;
- sometimes marked ulcers of the oral mucosa (enterovirus, HSV-1)
- Generalised lymphadenopathy and spleen enlargement suggest mononucleosis
- Painful enlargement of the lymph nodes of the front neck triangle

Characteristics of streptococcal inflammation

- sudden start,
- severe sore throat and swallowing pain
- Fever
- resin-red or blood-red pharyngeal mucosa, swelling
- clusters of exudate on the tonsils
- blood-red and swollen uvula
- petechiae on the palate mucosa
- Tender, enlarged frontal jugular lymph nodes

Characteristics of streptococcal inflammation

- sudden start,
- severe sore throat and swallowing pain

NO COUGHING OR RHINITIS

- clusters of exudate on the tonsils
- blood-red and swollen uvula
- petechiae on the palate mucosa
- Tender, enlarged frontal jugular lymph nodes

Parameter	Points
Fever > 38 st	1
No cough	1
Enlarged frontal jugular nodes	1
Exudate on tonsils	1
3 - 14 y	1
5 - 44 y	0
> 45 y	-1

Centore scale in Mclsaac modyfication

Points	Probability of Srep	Suggested management
0	2-3 %	No antibiotic or culture needed
1	4-6%	Antibiotic based on culture or RADT
2	10-12 %	
3	27-28 %	Empiric antibiotics and culture or RADT
4	38-63 %	

Treatment of streptococcal angina

Drug	*Dose/dosage*	*Duration*	*Recommendation strength, quality of evidence*
Patients without penicillin allergy			
Penicillin V, oral	Children: 250 mg two or three times daily Adolescents and adults: 250 mg four times daily or 500 mg twice daily	10 days	Strong, high
Amoxicillin, oral	50 mg per kg once daily (maximum = 1,000 mg) Alternative: 25 mg per kg twice daily (maximum = 500 mg)	10 days	Strong, high
Penicillin G benzathine, intramuscular	< 60 lb (27 kg): 600,000 U ≥ 60 lb: 1,200,000 U	Single dose	Strong, high
Patients with penicillin allergy			
Cephalexin (Keflex), oral*	20 mg per kg per dose twice daily (maximum = 500 mg per dose)	10 days	Strong, high
Cefadroxil, oral*	30 mg per kg once daily (maximum = 1 g)	10 days	Strong, high
Clindamycin, oral	7 mg per kg per dose three times daily (maximum = 300 mg per dose)	10 days	Strong, moderate
Azithromycin (Zithromax), oral†	12 mg per kg once daily (maximum = 500 mg)	5 days	Strong, moderate
Clarithromycin (Biaxin), oral†	7.5 mg per kg per dose twice daily (maximum = 250 mg per dose)	10 days	Strong, moderate

*—Avoid in individuals with immediate hypersensitivity to penicillin.

†—Resistance of group A streptococcus to these agents is well-known and varies geographically and temporally.

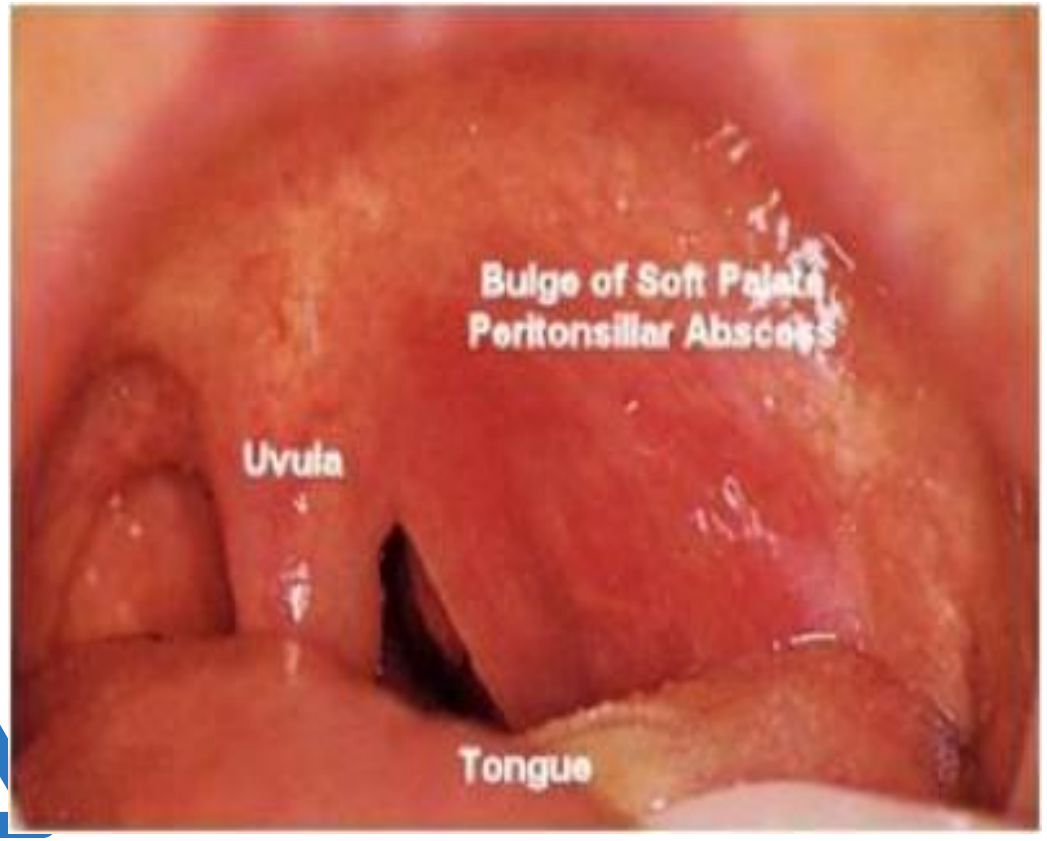
Adapted with permission from Shulman ST, Bisno AL, Clegg HW, et al. Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America. Clin Infect Dis. 2012;55(10):e89.

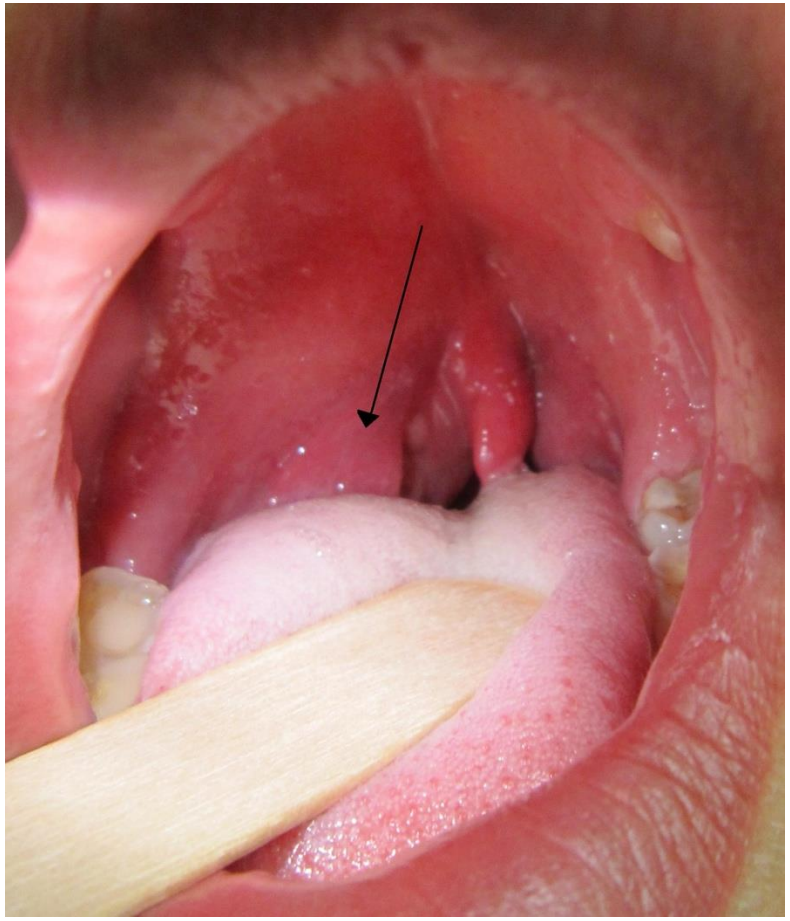
IDSA

Natural course

Most sore throat inflammations (including bacterial ones) resolve spontaneously - viral inflammation within 3-7 days, with bacterial etiology within 3-4 days (even without antibiotic).

Peritonsillar abscess





Questions to be asked during visit

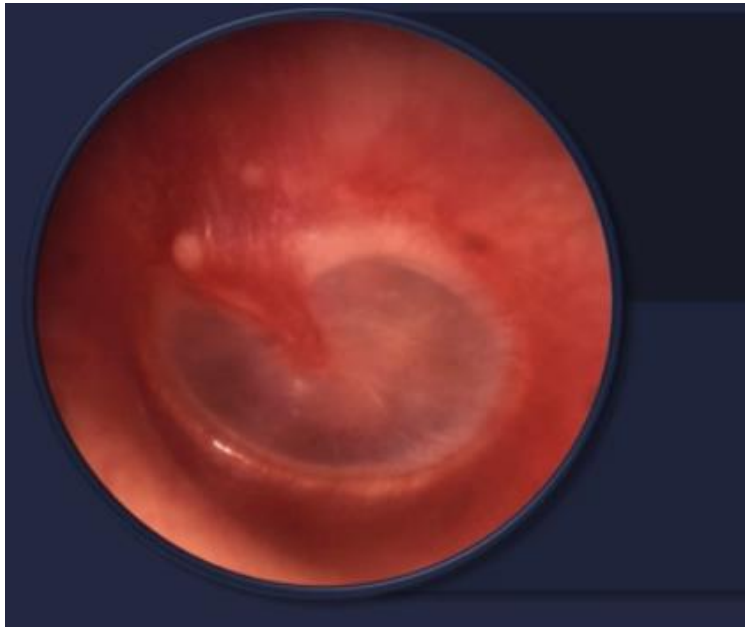
- Did the symptoms appear suddenly
- Is there a cough or rhinitis
- Has there recently been contact with a person with similar symptoms
- Was there bacterial tonsillitis in the interview

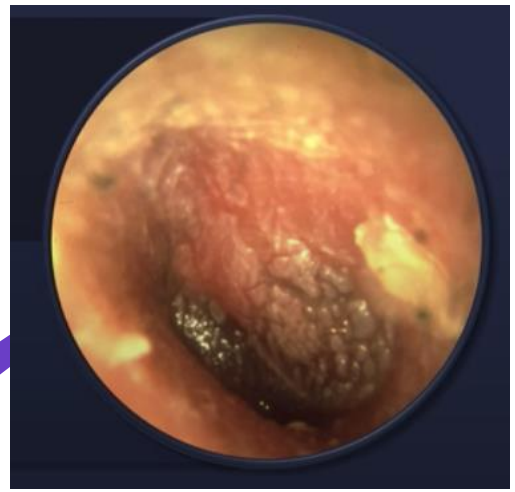
Key Points

- Clinical criteria (modified Centor score) can help to select patients for further testing or empiric antibiotic treatment, although the gold standard for diagnosis is a rapid antigen test and sometimes culture.
- Penicillin remains the drug of choice for streptococcal pharyngitis; cephalosporins or macrolides are alternatives for patients allergic to penicillin.

How to distinguish between acute viral otitis media and bacterial infection?

AOM

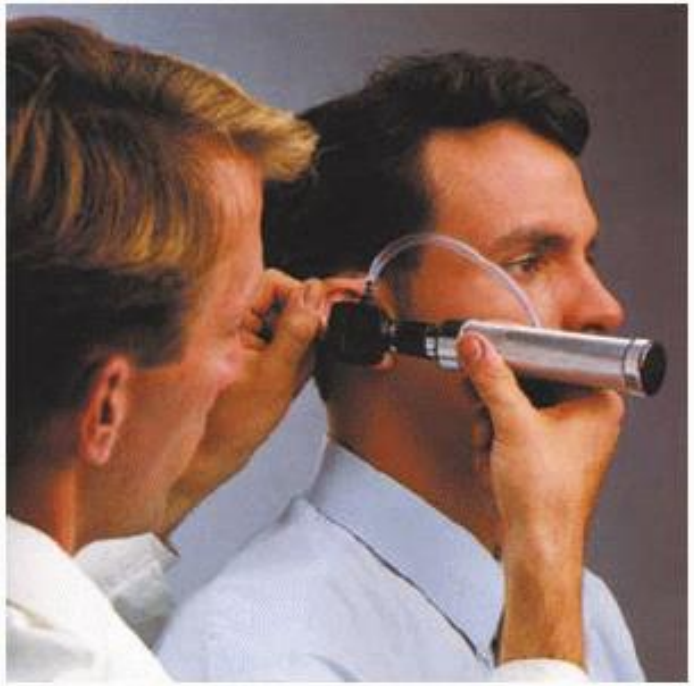




Main problems in the recognition of AOM

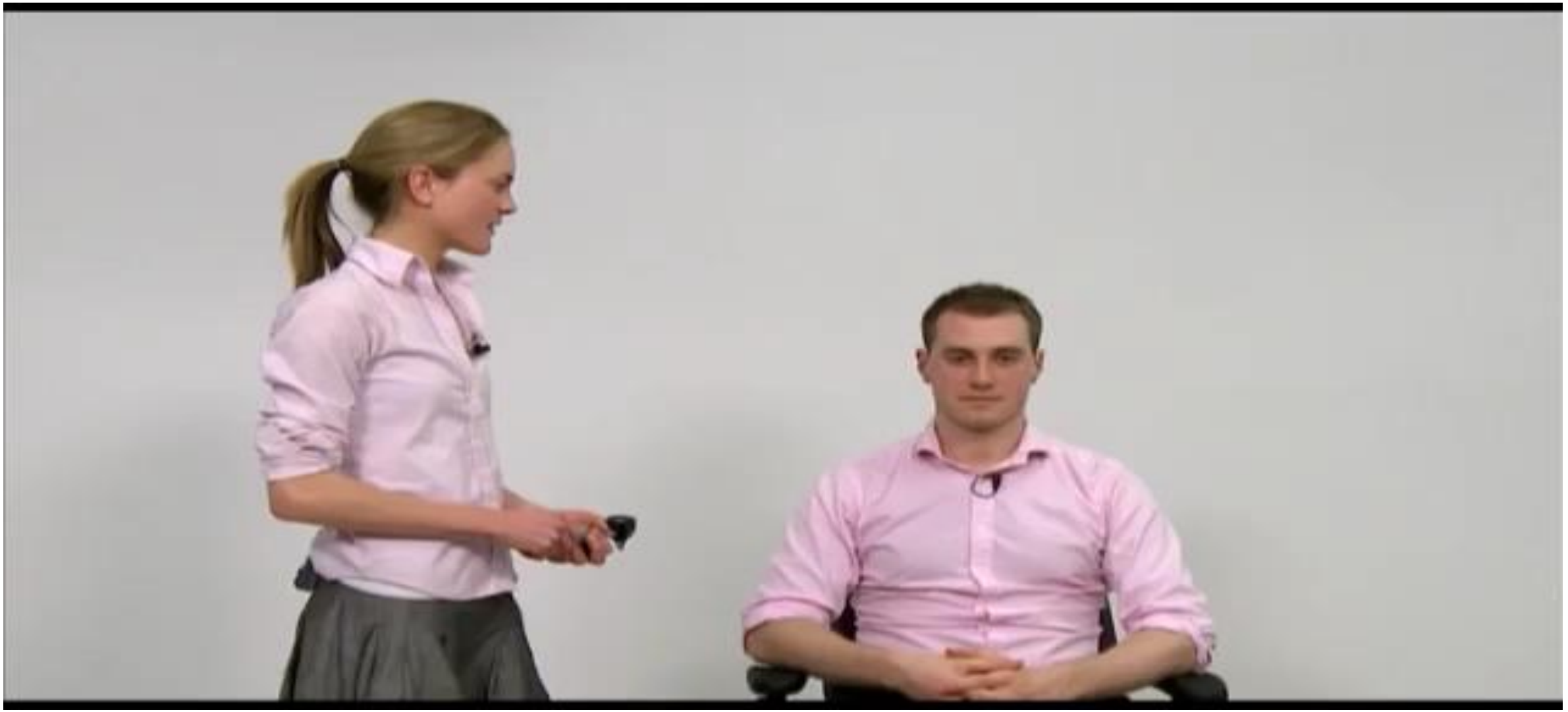
No otoscopic experience

Poor visibility of the eardrum

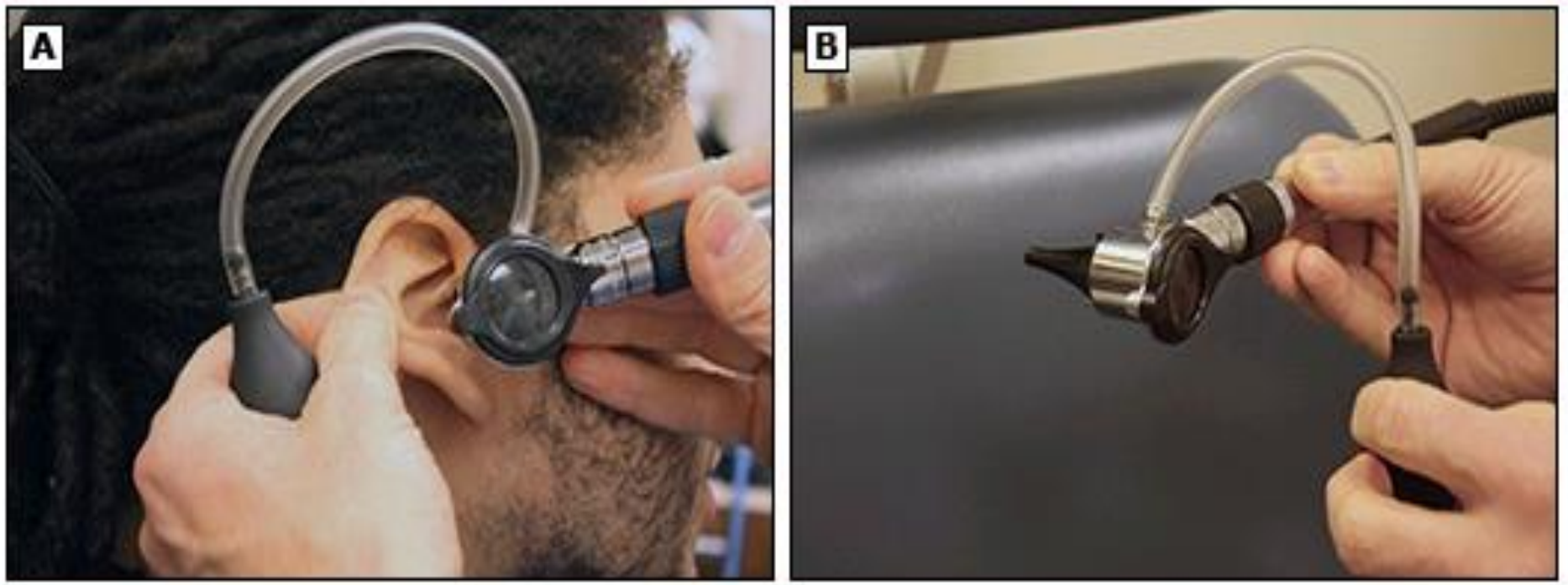


Jensen P i wsp. Criteria, performance and diagnostics problems in diagnosing AOM

OXFORD MEDICAL EDUCATION



Pneumatic otoscope



Courtesy of Laura Goguen, MD.

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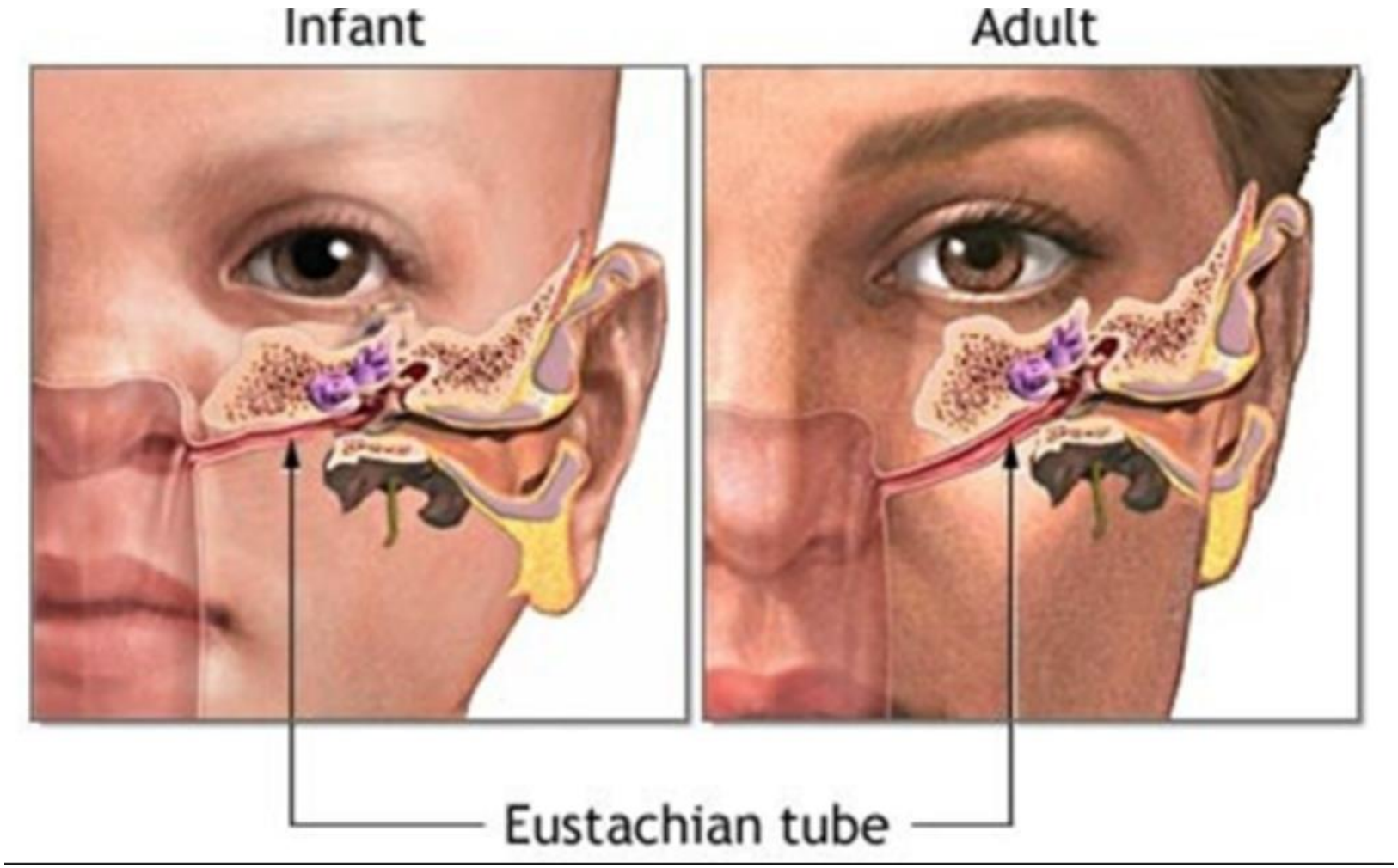
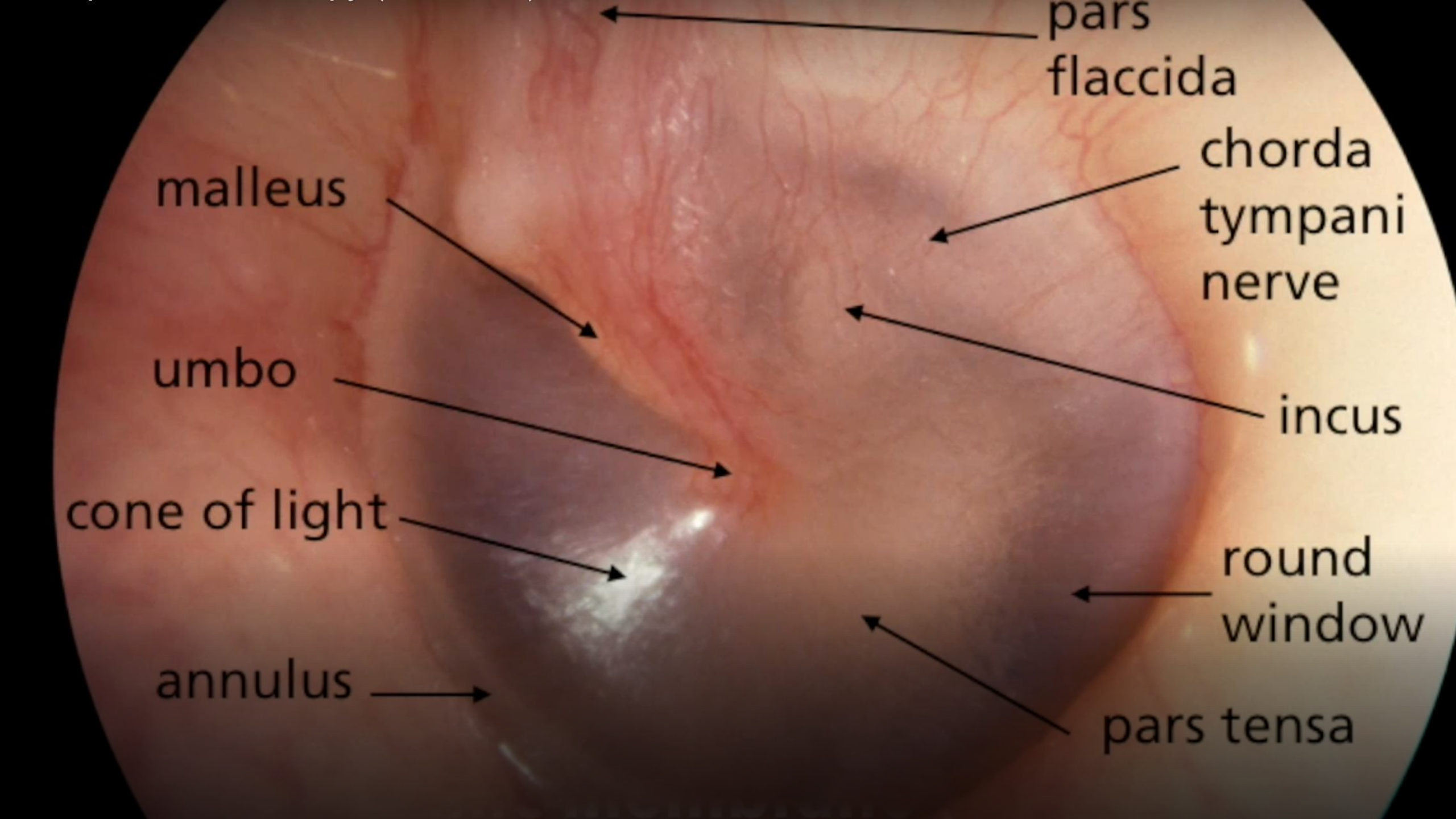
Pneumatic otoscopy

Mechanism of the development of AOM




pars flaccida
malleus
chorda tympani nerve
umbo
incus
cone of light
round window
annulus
pars tensa

Risk factors of AOM

- age < 2 years old
- exposure to respiratory infections,
- attending a nursery or kindergarten, older siblings,
- short breastfeeding period (less than 3 months),
- Long-term use of pacifier,
- passive smoking,
- genetic predisposition,
- facial defects (clefts of the palate)

Etiology of AOM

- *Streptococcus pneumoniae i Haemophilus influenzae – 5-60 %*
- *Moraxella catarrhalis* ok 3 – 14 %
- *S. pyogenes 15%* in adults mostly

Clinical presentation

- Acute ear pain
- Hearing loss
- Fever
- Tenderness on touch of the skin above the ear
- Purulent discharge from the ears
- Irritability, and diarrhea (in infants)

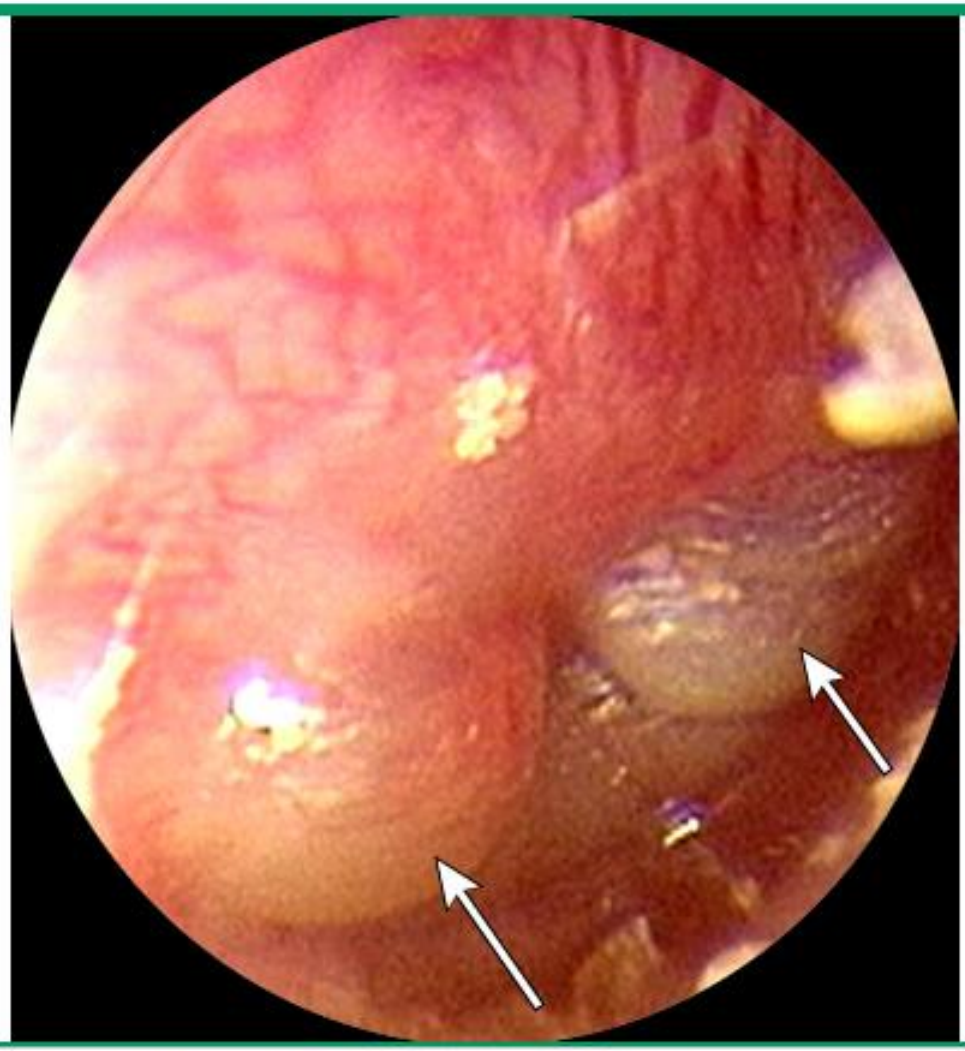
Otitis media with effusion (OME)

- Without prior infection or as an image after infection
- In allergy sufferers
- Common in people with Eustachian trumpet disorders

Bullous myringitis

- Bubbles on the eardrum
- No middle ear involvement
- Sudden onset of severe pain
- No fever
- No hearing impairment
- Bloody otorrhea if rupture
- Viral etiology
- Several papers describing blood bubbles in the course of M. pneumoniae infection

Bullous myringitis



Bullous myringitis is characterized by painful bullae (arrows) that appear on the tympanic membrane.

Courtesy of Glenn C Isaacson, MD, FAAP.

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Management of Acute Otitis Media

Initial presentation

Diagnosis established by physical examination findings and presence of symptoms

Treat pain

Children six months or older with otorrhea or severe signs or symptoms (moderate or severe otalgia, otalgia for at least 48 hours, or temperature of 102.2°F [39°C] or higher): antibiotic therapy for 10 days

Children six to 23 months of age with bilateral acute otitis media without severe signs or symptoms: antibiotic therapy for 10 days

Children six to 23 months of age with unilateral acute otitis media without severe signs or symptoms: observation or antibiotic therapy for 10 days

Children two years or older without severe signs or symptoms: observation or antibiotic therapy for five to seven days

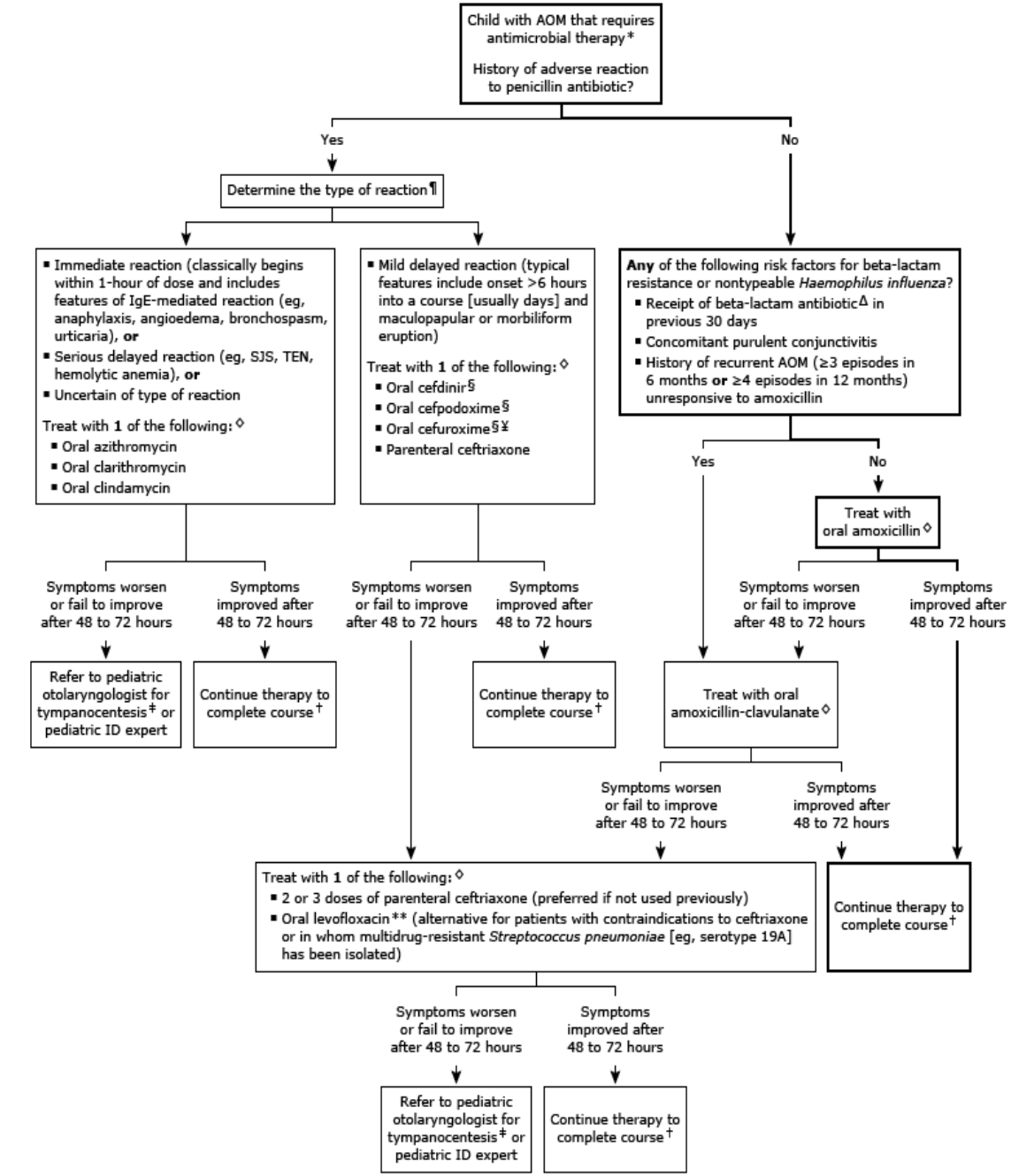
Persistent symptoms (48 to 72 hours)

Repeat ear examination for signs of otitis media

If otitis media is present, initiate or change antibiotic therapy

If symptoms persist despite appropriate antibiotic therapy, consider intramuscular ceftriaxone (Rocephin), clindamycin, or tympanocentesis

Our approach to antibiotic therapy for acute otitis media in children



Systemic antibiotics used for the initial treatment of acute otitis media in children

Antibiotic	Route	Dose	Maximum daily dose
First-line agents			
Amoxicillin	Oral	90 mg/kg per day in 2 doses	3 g/day
Amoxicillin-clavulanate*¶	Oral	90 mg/kg per day in 2 doses	3 g/day (amoxicillin component)
Alternatives for children with mild or remote allergy to penicillins (ie, without anaphylaxis, bronchospasm, or angioedema)			
Cefdinir	Oral	14 mg/kg per day in 1 or 2 doses	600 mg/day
Cefpodoxime	Oral	10 mg/kg per day in 2 doses	400 mg/day
Cefuroxime suspension¶Δ	Oral	30 mg/kg per day in 2 doses	1 g/day
Ceftriaxone¶	Intramuscular or intravenous	50 mg/kg per day	1 g/day
Alternatives for children with severe reaction◇ to beta-lactams including cephalosporins			
Azithromycin	Oral	10 mg/kg once on day 1, then 5 mg/kg once per day on days 2 through 5	500 mg/day on day 1; 250 mg/day on days 2 through 5
Clarithromycin§	Oral	15 mg/kg per day in 2 doses	1 g/day
Clindamycin	Oral	20 to 30 mg/kg per day in 3 doses	1.8 g/day

This table is meant to be used in conjunction with the UpToDate topics related to acute otitis media in children. Refer to UpToDate content for additional information regarding choice of therapy. The duration of treatment varies with age, associated clinical features, and antimicrobial agent:

- For amoxicillin, amoxicillin-clavulanate, oral cephalosporins, clarithromycin, and clindamycin:
  - Children <2 years and children (any age) with tympanic membrane perforation or history of recurrent AOM: 10 days
  - Children ≥2 years with intact tympanic membrane and no history of recurrent AOM: 5 to 7 days
- For ceftriaxone: 1 to 3 doses, depending on persistence of symptoms
- For azithromycin: 5 days

Prevention

- Vaccination against pneumococci
- Tympanostomy tubes

Questions to be asked

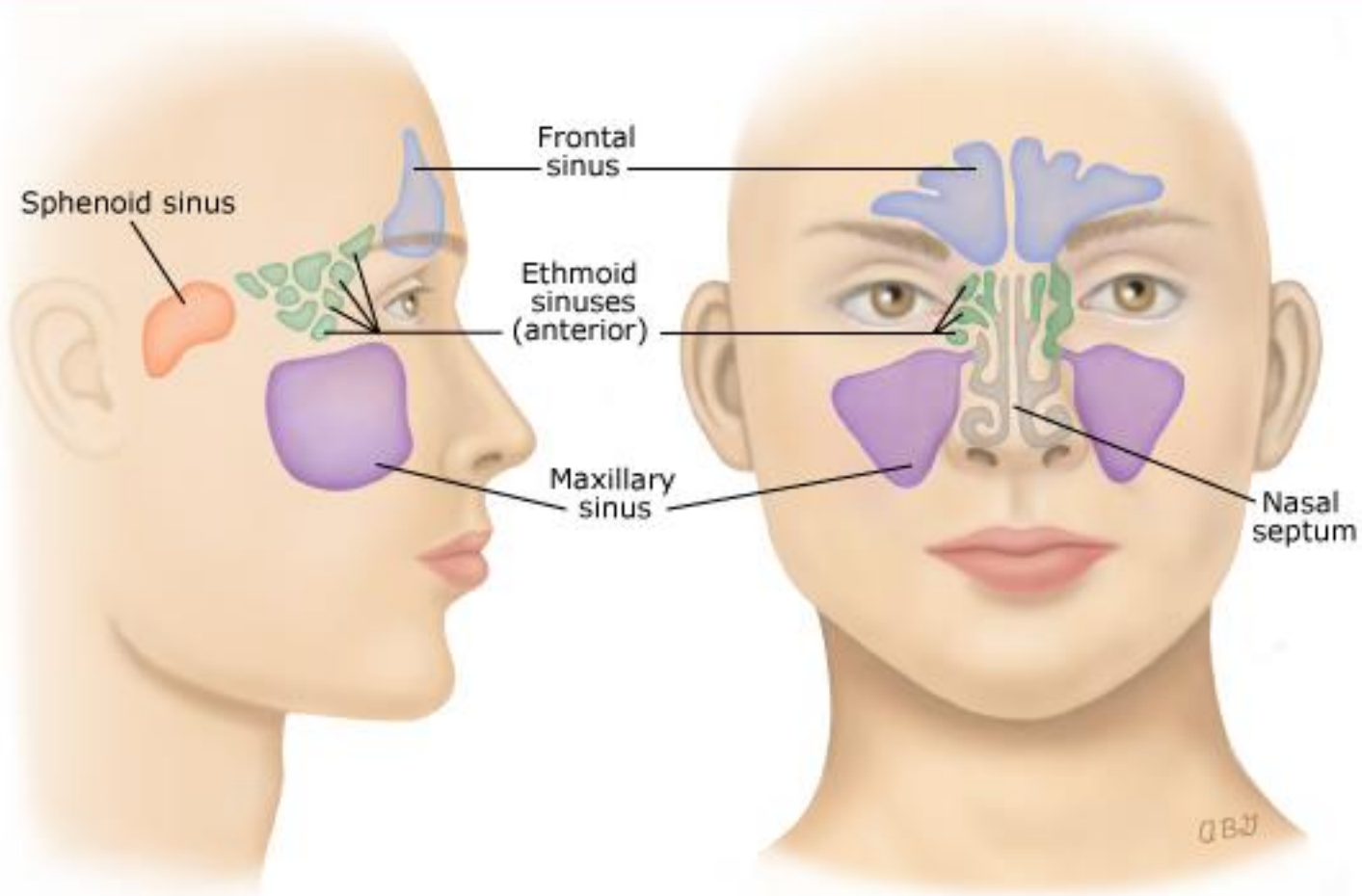
- Has there been a cataract infection in recent days
- Are there facial defects present
- Is there a hearing impairment
- Has there been an infection in recent weeks
- Is there a positive interview for ANN

Key Points

- Give analgesics to all patients.
- Antibiotics should be used selectively based on the age of the patient, severity of illness, and availability of follow-up.
- Antihistamines and decongestants are not recommended for children; oral or nasal decongestants may help adults, but antihistamines are reserved for adults with an allergic etiology.

How to distinguish between acute viral sinusitis and bacterial infection?

Paranasal sinus anatomy



Schematic drawing showing location of the frontal, ethmoid, maxillary, and sphenoid sinuses.

Symptoms - cough

- Dry or wet
- Up to 30% of children with maxillary sinusitis
- Often described as worse at night
- If the cough only occurs at night, it is more likely to suggest a discharge discharge syndrome on the back of the throat.

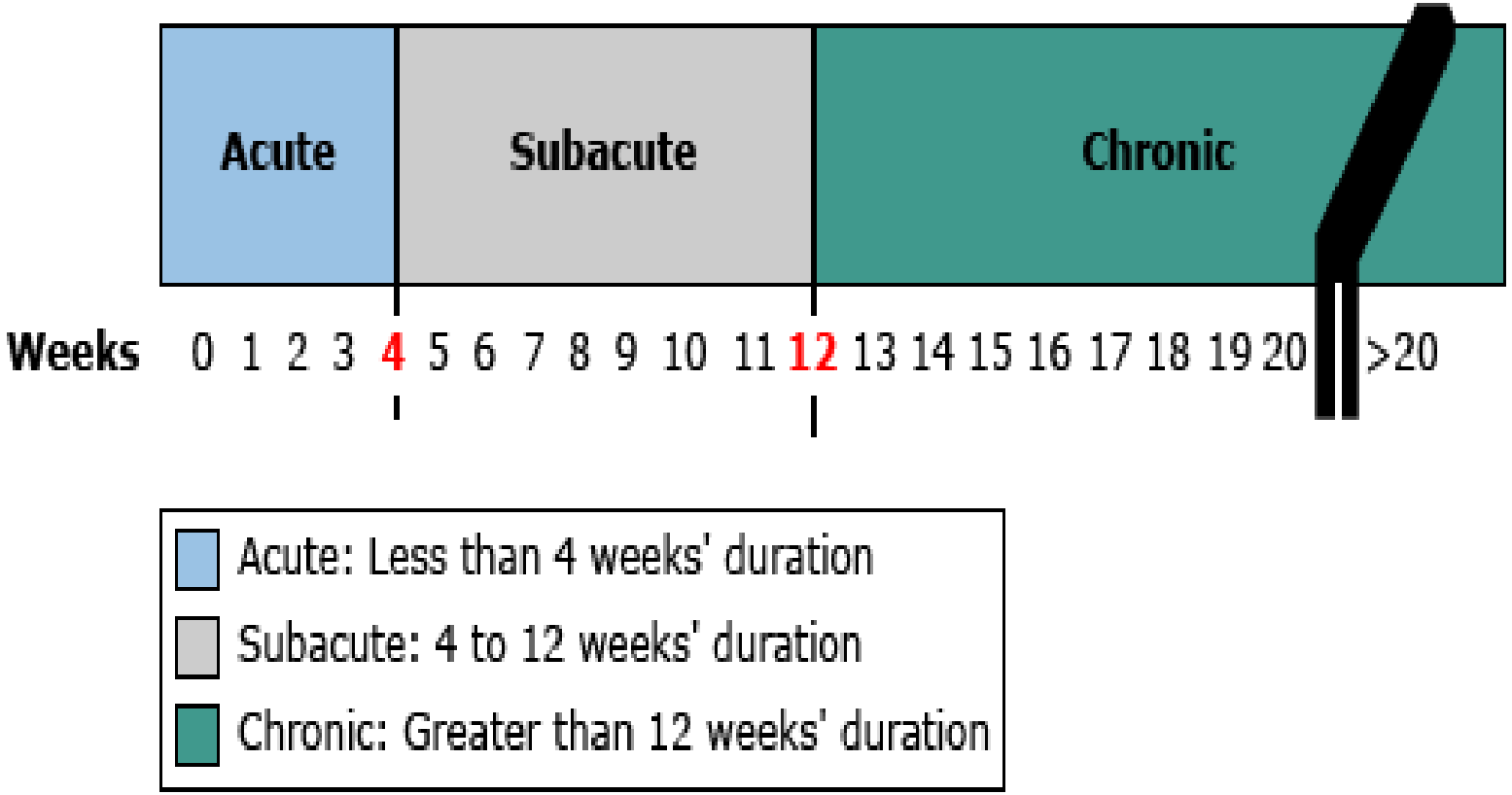
Wald ER, Milmoe GJ, Bowen A, Ledesma-Medina J, Salamon N, Bluestone CD. Acute maxillary sinusitis in children. *N Engl J Med*.

Symptoms - rhinitis

- Water, yellow, purulent secretion
- Up to 30% of children
- Fluid run-off can cause vomiting

Wald ER, Milmoe GJ, Bowen A, Ledesma-Medina J, Salamon N, Bluestone CD. Acute maxillary sinusitis in children. *N Engl J Med*.

Classification of rhinosinusitis by duration of disease



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Clinical presentations of acute bacterial rhinosinusitis in children

Clinical presentation	Description
Persistent symptoms	Nasal discharge or cough or both for >10 days without improvement
Severe symptoms	Onset with temperature of ≥39°C (102.2°F) and purulent nasal discharge for ≥3 consecutive days
Worsening symptoms	Respiratory symptoms (nasal discharge or cough, or both) that worsen after initial improvement, or
	Onset of new fever or severe headache

Clinical severity score for acute bacterial rhinosinusitis in children and adolescents

Symptom or sign	Points
Abnormal nasal or postnasal discharge	
Minimal	1
Severe	2
Nasal congestion	1
Cough	2
Malodorous breath	1
Facial tenderness	3
Erythematous nasal mucosa	1
Fever*	
<38.5°C	1
≥38.5°C	2
Headache (retro-orbital)/irritability	
Severe	3
Mild	1

A total score <8 indicates mild/moderate disease. A total score ≥8 indicates severe disease.
* Within 24 hours of presentation, either observed or according to history and documented with thermometer.

Complications of acute bacterial rhinosinusitis

Complication	Clinical features	Imaging evaluation*
Preseptal cellulitis	Ocular pain, eyelid swelling, and erythema	Clinical diagnosis (imaging usually not needed unless there is concern for orbital cellulitis)
Orbital cellulitis	Ocular pain, eyelid swelling, and erythema plus pain with eye movements, proptosis, or visual changes suggesting involvement of the orbital tissue	CT with contrast or MRI without and with contrast of the head, including the orbit and paranasal sinuses
Subperiosteal abscess	Displacement of the globe, in addition to symptoms of orbital cellulitis	MRI without and with contrast of the head, orbit, and paranasal sinuses
Intracranial abscess	Headache with or without altered mental status, fever, or nausea/vomiting	CT with contrast or MRI without and with contrast of the head and paranasal sinuses
Meningitis	Fever, neck stiffness, and/or altered mental status	CT of the head without contrast may be indicated prior to lumbar puncture¶
Septic cavernous sinus thrombosis	Cranial nerve palsies (CN III, IV, VI) with or without headache and fever	MRI without and with contrast of the head and paranasal sinuses. MR venography either without or with contrast.
Osteomyelitis	Dull pain at involved site often with overlying tenderness, erythema, or swelling	CT with contrast or MRI without and with contrast of the head and paranasal sinuses

CT: computed tomography; MRI: magnetic resonance imaging.
* Patient contraindications, severity of illness, available imaging modalities, and local expertise should also be taken into account when selecting an imaging approach.
¶ Refer to UpToDate content on clinical features and diagnosis of acute bacterial meningitis.

Preseptal cellulitis

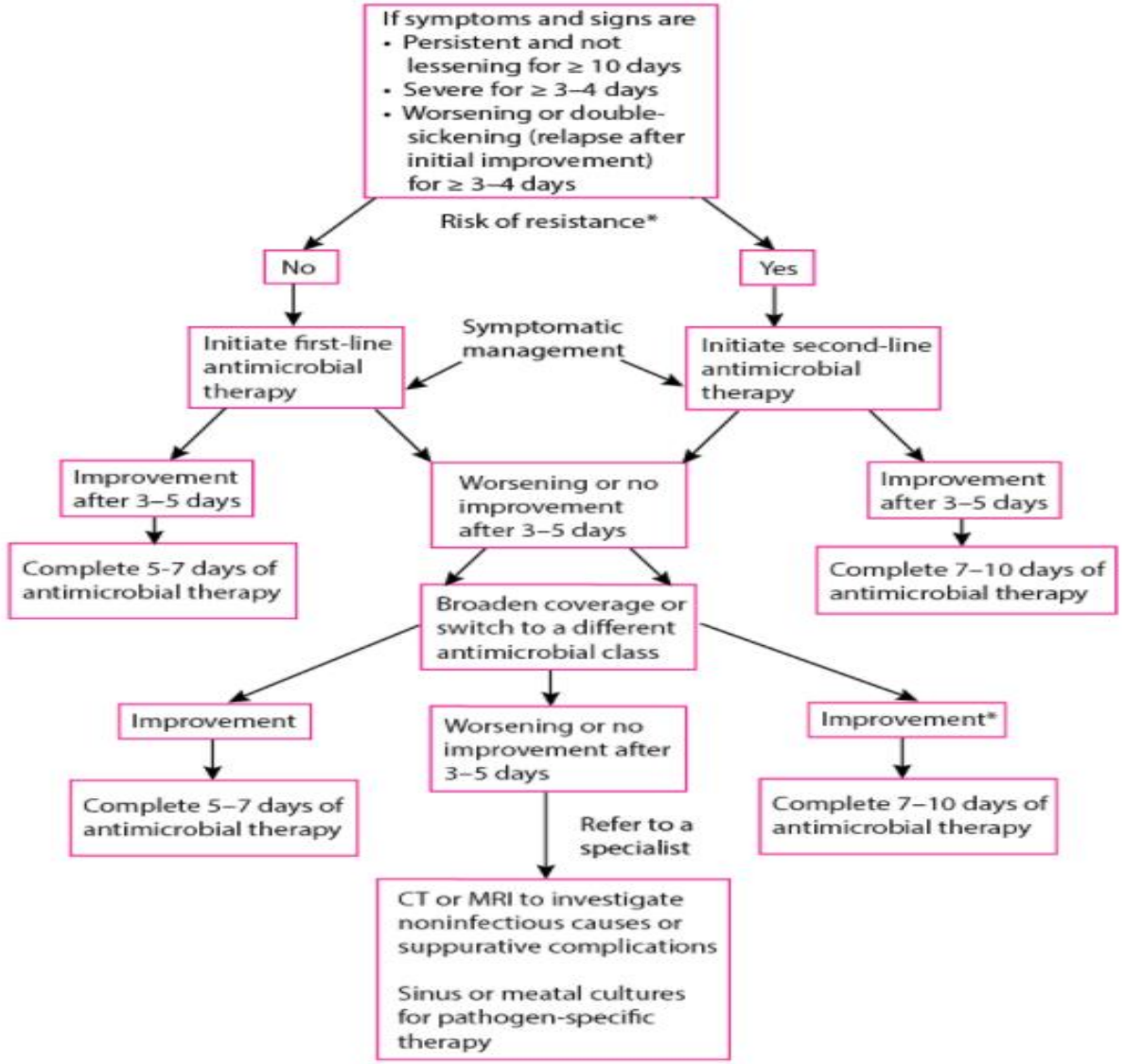
Orbital cellulitis

- A healthy 13 year old boy presented with swelling of the left eyelid that had been gradually enlarging over the previous 2 days.
- After raising the upper eyelid visual acuity was 0.8, and ocular motility was unremarkable.
- On the following day—after initiation of an oral antibiotic treatment –visual acuity decreased to 0.63, and there was a restriction in upward gaze of the left eye, indicating the presence of an inflammatory orbital complication(orbital cellulitis).
-

Treatment

- Local measures to enhance drainage (eg, steam, topical vasoconstrictors)
- Sometimes antibiotics
  (eg, amoxicillin/clavulanate, doxycycline)

Algorithm for use of antibiotics in acute sinusitis



What questions should be asked

- Since the symptoms last
- Was there initially an improvement and then a deterioration
- Do the symptoms go away
- Are there any symptoms suggesting complications
- Do recurrences occur

Which antibiotic to choose for upper respiratory tract infections

koroun.nil.gov.pl/koroun/projekt-aleksander/

Aplikacje WUM pubmed weekend warszawa ESCMID BBC TM SES bla eucast NPOA BIBL YOGA dzi

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Projekt Aleksander / Respi-Net

- Projekt Respi-Net 2019
- Projekt Aleksander i Respi-Net 2012-2016
- Projekt Aleksander 2009-2012
- Projekt Aleksander 2006-2008

EUCAST

EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING

European Society of Clinical Microbiology and Infectious Diseases

search term

QUICK NAVIGAT

- Organization
- EUCAST News
- New definitions of S, I and R
- Clinical breakpoints and dosing
- Rapid AST in blood cultures
- Expert rules and intrinsic resistance
- Resistance mechanisms
- SOPs and Guidance documents
- Co ons
- MIC and zone distributions and ECOFFs

The European Committee on Antimicrobial Susceptibility Testing - EUCAST

EUCAST is a standing committee jointly organized by ESCMID, ECDC and European national breakpoint committees. EUCAST was formed in 1997. It has been chaired by Ian Phillips (1997 - 2001), Gunnar Kahlmeter (2001 - 2012), Rafael Canton 2012 - 2016) and

EUCAST News

30 Dec 2020
Breakpoint table

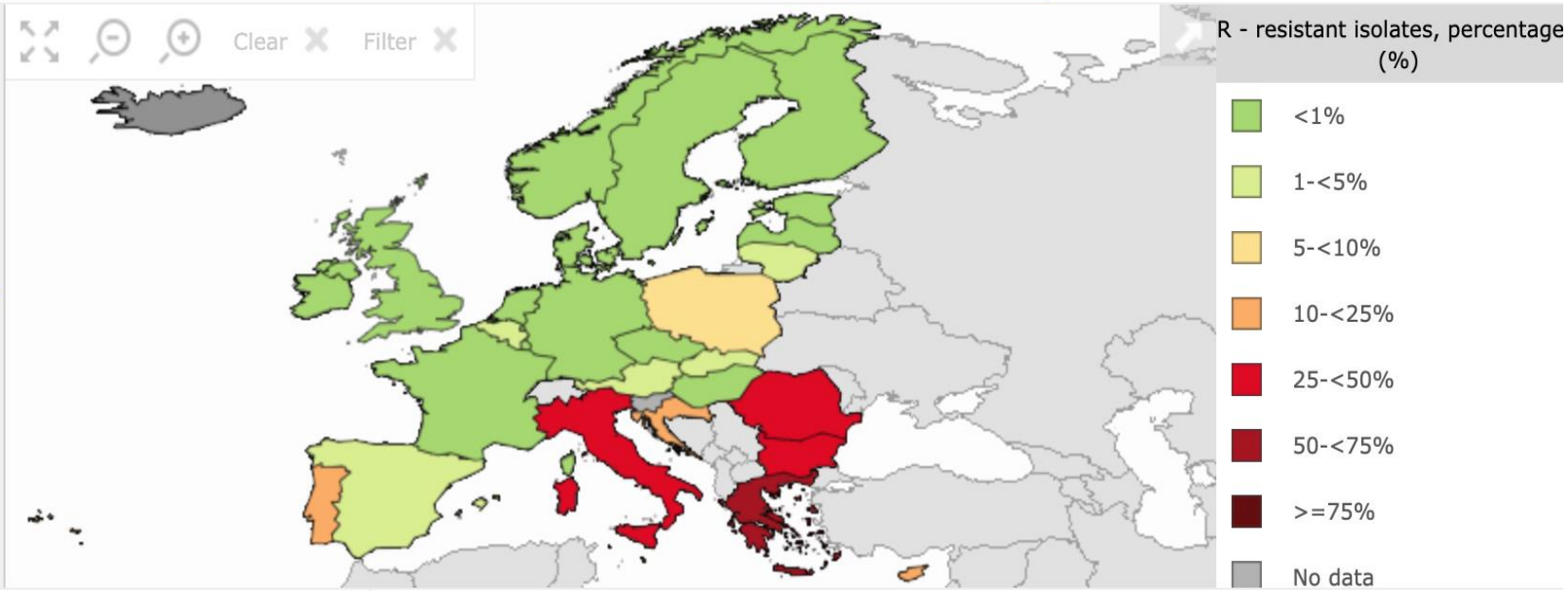
30 Dec 2020
Updated reading of bacteria

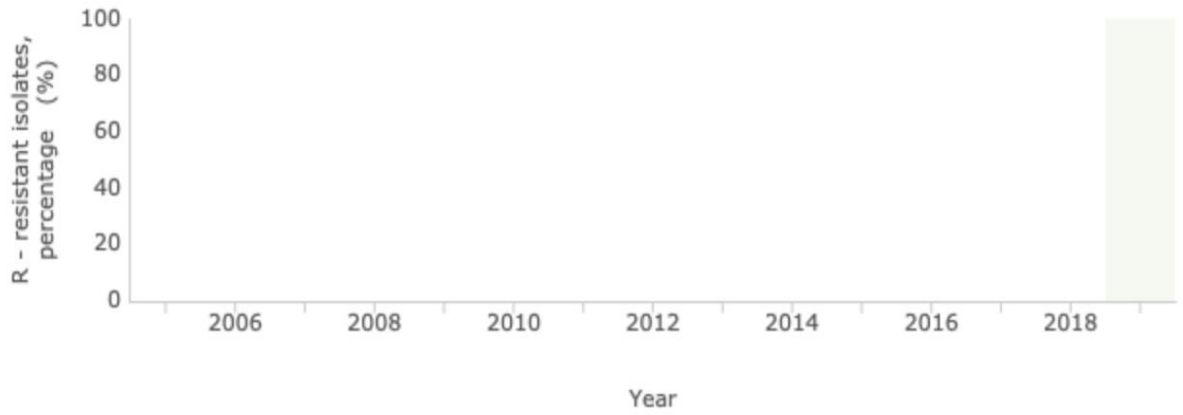
Surveillance Atlas of Infectious Diseases

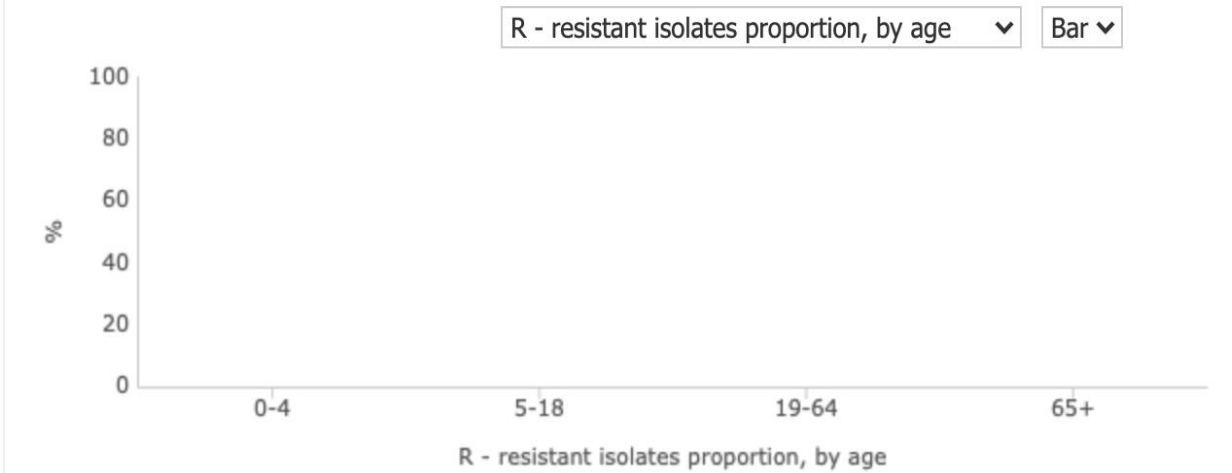
Antimicrobial resistance | Klebsiella pneumoniae | Carbapenems | R - resistant isolates, percentage

2019

Region	R - resistant isolates, percentage (%)
Austria	1.2
Belgium	1.1
Bulgaria	27.0
Croatia	12.0
Cyprus	13.3
Czechia	0.6
Denmark	0.3
Estonia	0.0
Finland	0.4
France	1.0
Germany	0.9



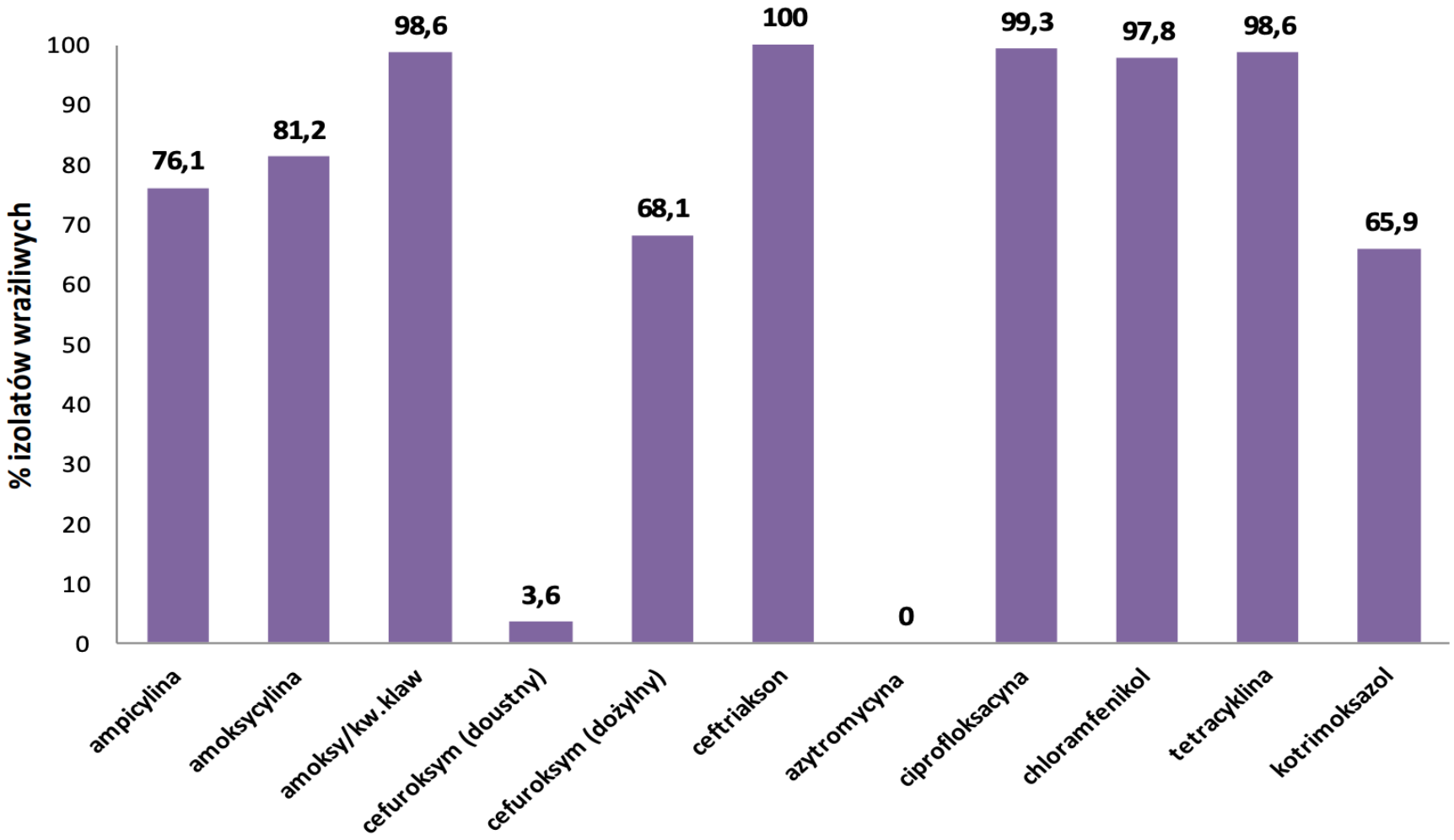




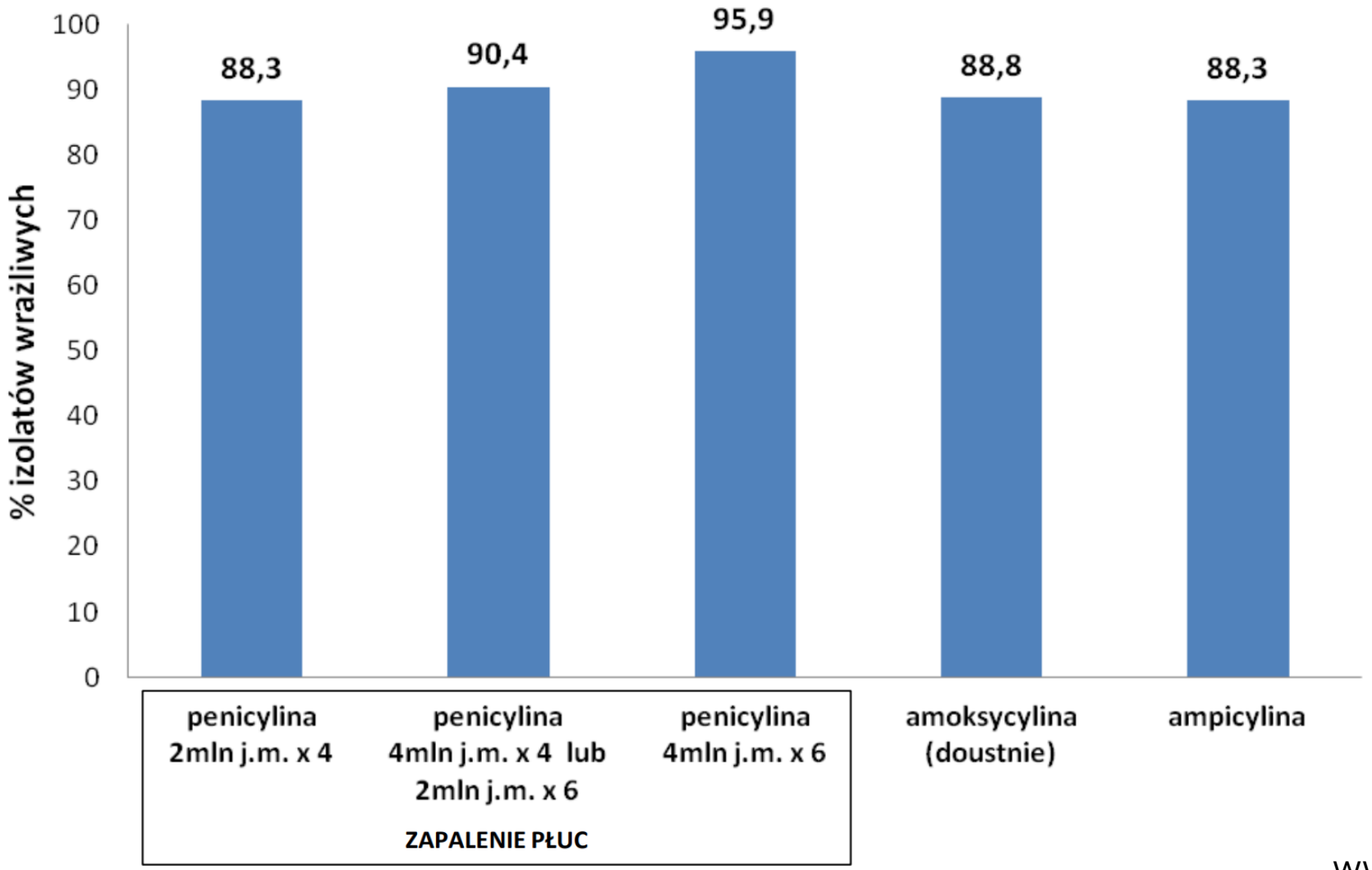
Where do the isolates come from?

- Sputum
- bronchial vesicular lavage
- Blood cultures
- Swabs

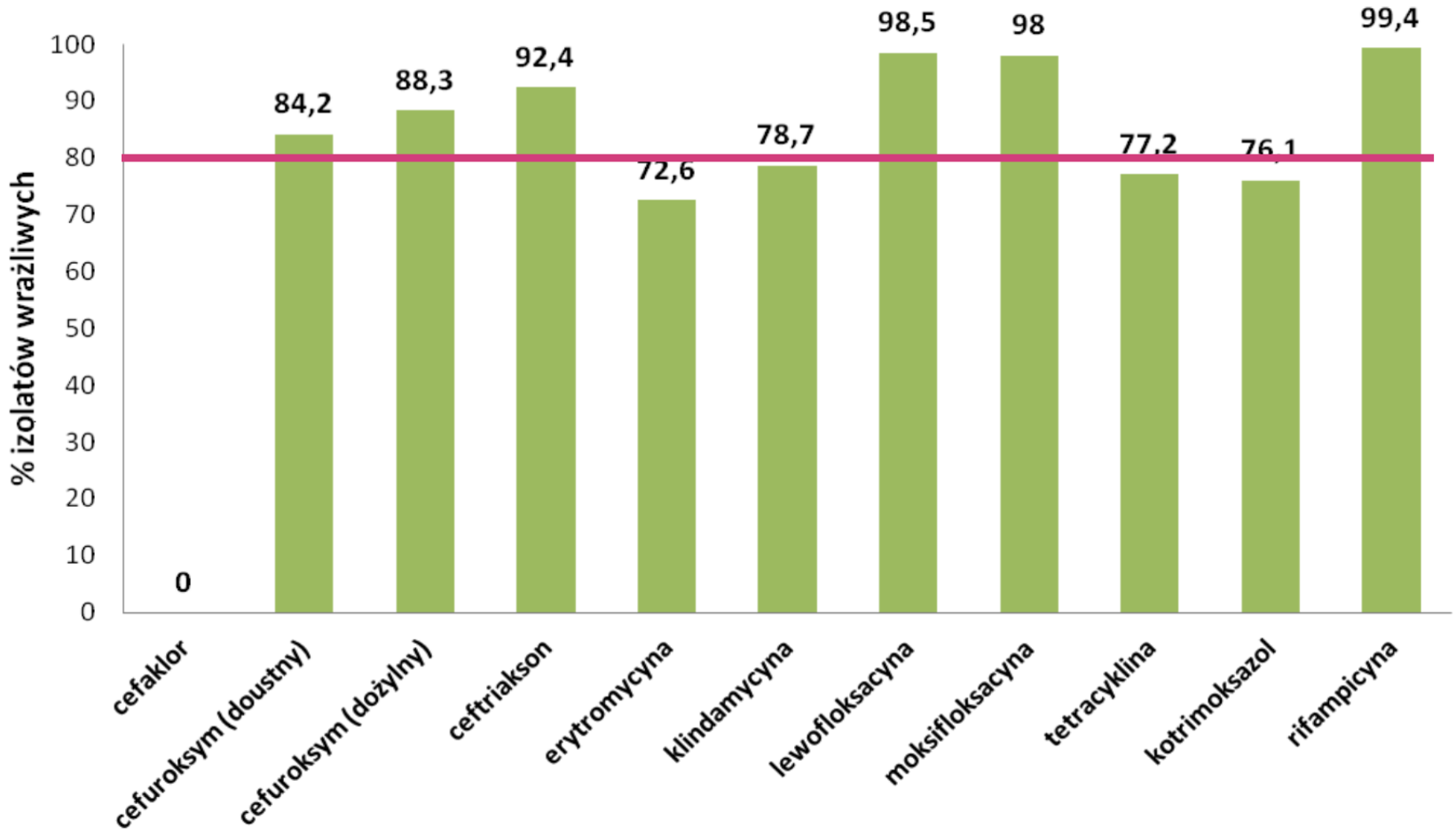
Wrażliwość szczepów *H. influenzae* na wybrane leki przeciwbakteryjne 2019 (n=138)



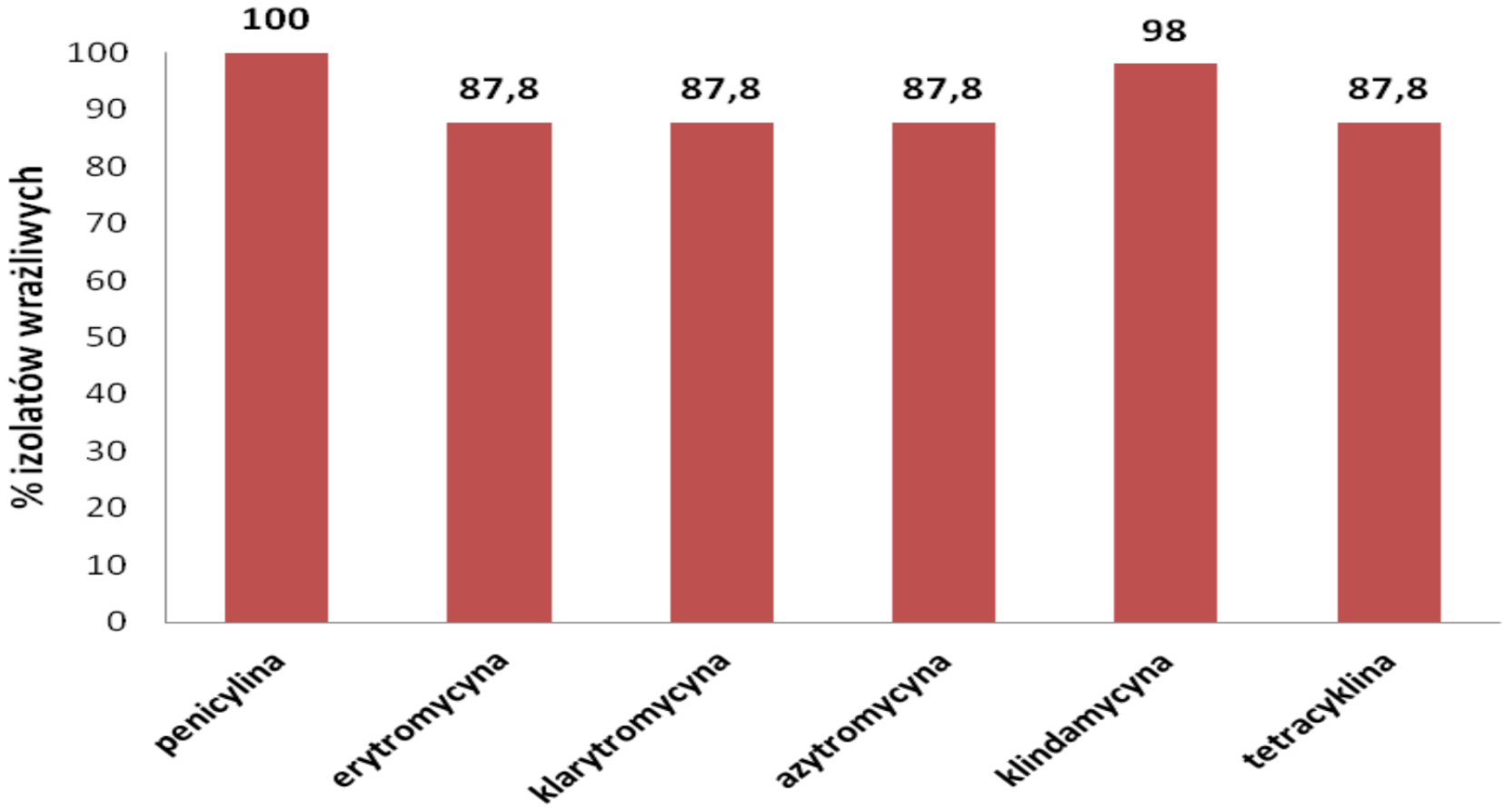
Wrażliwość szczepów *S. pneumoniae* na wybrane antybiotyki β-laktamowe; 2019 (n=197)



Wrażliwość szczepów *S. pneumoniae* na wybrane leki przeciwbakteryjne; 2019 (n=197)



Wrażliwość szczepów *S. pyogenes* na wybrane leki przeciwbakteryjne; 2019 (n=98)



What should be the guiding principle when choosing an antibiotic?

- Local drug-sensitivity
- Recommendations (www.antybiotyki.edu.pl)
- Narrow spectrum
- Results of microbiological tests
- Small amount of side effects
- Cost (not only for the patient...)

What shouldn't be the main focus when choosing an antibiotic?

- In our own experience
- By his own convictions
- Advertisements
- Patient suggestions

Thank you