

# Upper Respiratory Infections

**Mehreen Arshad, MD**

Assistant Professor

Pediatric Infectious Diseases

Duke University



# Disclosures

- None

# Objectives

- Know the common age- and season-specific causes of pharyngitis
- Recognize the specific clinical manifestations and relative frequency of different pharyngeal infections
- Know the indications for obtaining a bacterial throat culture in a patient with pharyngitis
- Know that specific laboratory tests (special media) identify uncommon agents as a cause of pharyngitis
- Plan the treatment of uncommon causes of pharyngitis

# Acute Pharyngitis

- Acute pharyngitis is one of the most common infectious illnesses in children
- Pediatricians make a diagnosis of pharyngitis 7 million times annually

**TABLE 27-1 -- Etiology of Acute Pharyngitis**

<b>Etiologic Agent</b>	<b>Associated Disorder(s) or Clinical Findings(s)</b>
<b>Bacterial</b>	
Streptococci	
Group A	Scarlet fever
Groups C and G	
Mixed anaerobes	Vincent angina
<i>Neisseria gonorrhoeae</i>	
<i>Corynebacterium diphtheriae</i>	Diphtheria
<i>Arcanobacterium haemolyticum</i>	Scarlatiniform rash
<i>Yersinia enterocolitica</i>	Enterocolitis
<i>Yersinia pestis</i>	Plague
<i>Francisella tularensis</i>	Tularemia
<i>Fusobacterium necrophorum</i>	Lemierre syndrome (jugular vein septic thrombophlebitis)
<b>Viral</b>	
Rhinovirus	Common cold
Coronavirus	Common cold
Adenovirus	Pharyngoconjunctival fever; acute respiratory disease
Herpes simplex virus types 1 and 2	Gingivostomatitis
Parainfluenza virus	Common cold; croup
Coxsackievirus A	Herpangina; hand, foot, and mouth disease
Epstein–Barr virus	Infectious mononucleosis
Cytomegalovirus	Cytomegalovirus mononucleosis
Human immunodeficiency virus (HIV)	Primary HIV infection
<b>Mycoplasmal</b>	
<i>Mycoplasma pneumoniae</i>	Acute respiratory disease; pneumonia
<b>Chlamydial</b>	
<i>Chlamydophila psittaci</i>	Acute respiratory disease; pneumonia
<i>Chlamydophila pneumoniae</i>	Pneumonia

# Epidemiology and Diagnostics

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- Group A strep (GAS) pharyngitis is most common between among the 5-15 yr olds
- Group C (GCS) and group G (GGS) strep also express the some of the same toxins as GAS, (e.g. streptolysin A and S) and have been reported in college students and young adults
- In temperate climates infections tend to occur in winter and early spring

- Diagnosis is done by obtaining throat swabs and doing rapid antigen detection test (RADT) and/or culture
- Cultures are recommended in children and adolescents because of the higher incidence of disease and the risk of acute rheumatic fever
- GCS and GGS are also beta-hemolytic, but have variable sensitivity to bacitracin
- Commercially available latex agglutination kits are now the standard for diagnosis





- Gonococcal pharyngitis occurs in sexually active adolescents and young adults through oral sex
- If isolated from a pre-pubertal child, sexual abuse must be suspected
- Up to 25% of pharyngeal cultures from sexually active individuals has been noted to be positive for gonorrhea (range 3-25%, highest in homosexuals)<sup>1</sup>
- The majority (>90%) of infections are asymptomatic, but these individuals are a significant public health risk
- Most cases of pharyngitis will self resolve in 8-12 weeks<sup>2</sup>

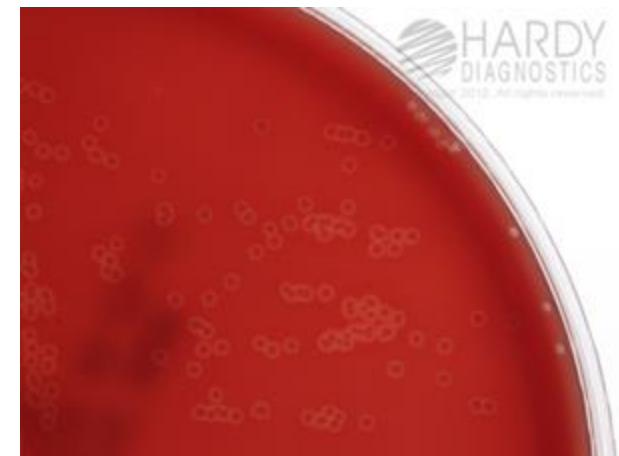
1. Holder NA. *Pediatr Rev.* 2008 Jul;29(7):228-34.

2. Janda WM et al. *JAMA.* 1980 Nov 7;244(18):2060-4.

- Culture is the gold standard when sample obtained from oropharynx
- Special media is necessary to prevent overgrowth of normal flora (Thayer-Martin, Martin Lewis and New York city medium)
- Sample should be put on media immediately to prevent drying
- Incubated 35°C to 37°C in a moist atmosphere enriched with CO<sub>2</sub>
- NAAT have the potential to cross-react with non-pathogenic *neisseria*
- Important when suspecting sexual abuse: all sites should be cultured



- *Arcanobacterium haemolyticum* is a pleomorphic, facultative, anaerobic gram positive rods
- It is difficult to recognize on routine culture media because hemolysis on horse or sheep blood agar is weak or absent and because it is slow growing compared with other organisms found in the oropharynx:  
pinpoint colonies appear at 24 hours, and colonies 1-2 mm in diameter appear after 48 hours
- Incubation on trypticase soy agar with 5% horse blood in 5% carbon dioxide may be the best medium



**Table 1.** Prevalence of *Arcanobacterium haemolyticum* in throat swabs during a 2-year study in Ottawa.

No. of positive specimens/no. of specimens tested (%)			
Age (y)	Patients*	Healthy controls <sup>†</sup>	P <sup>‡</sup>
<1-9	6/6,447 (0.09)	0/1,513	>.05
10-14	3/1,733 (0.17)	0/363	>.05
15-18	26/1,019 (2.5)	0/329	<.01
≥19	7/1,960 (0.36)	0/36	>.05
Total	42/11,159 (0.38)	0/2,241	

\* Throat swabs were collected from these individuals at three teaching hospitals over a 2-year period.

<sup>†</sup> From the community and schools.

<sup>‡</sup> Determined by Fisher's exact test.

- *Mycoplasma pneumoniae* is an important cause of non-GAS bacterial pharyngitis
- Esposito et al looked at 184 children (1-16 yrs).
- Acute *M. pneumoniae* infection was demonstrated
- in 44 of the 184 (23.9%) enrolled patients
- The infection was determined serologically in all of the infected subjects (specific IgM  $\geq$  1:100 in 36 children and 4-fold increase in IgG titre in 8) and confirmed by PCR in 31 (70.4%)
- No significant difference was observed in the seasonal distribution of the infections due to this pathogen.

## Aetiology of acute pharyngitis: the role of atypical bacteria

Susanna Esposito,<sup>1</sup> Francesco Blasi,<sup>2</sup> Samantha Bosis,<sup>1</sup>  
Roberta Droghetti,<sup>1</sup> Nadia Faelli,<sup>1</sup> Annalisa Lastrico<sup>1</sup> and Nicola Principi<sup>1</sup>

<sup>1,2</sup>Institute of Paediatrics<sup>1</sup> and Institute of Respiratory Diseases, IRCCS Maggiore Hospital<sup>2</sup>,  
University of Milan, Milan, Italy

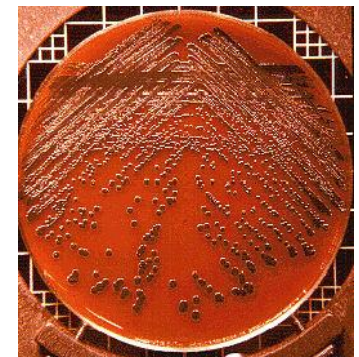
### Correspondence

Nicola Principi

Nicola.Principi@unimi.it

- 127 children with acute pharyngitis, various respiratory viruses—mainly adenoviruses and respiratory syncytial viruses—were the most common microorganisms detected (43 patients)
- *M. pneumoniae* was the most common bacterial etiology (25 patients), exceeding *S. pyogenes* (24 patients)

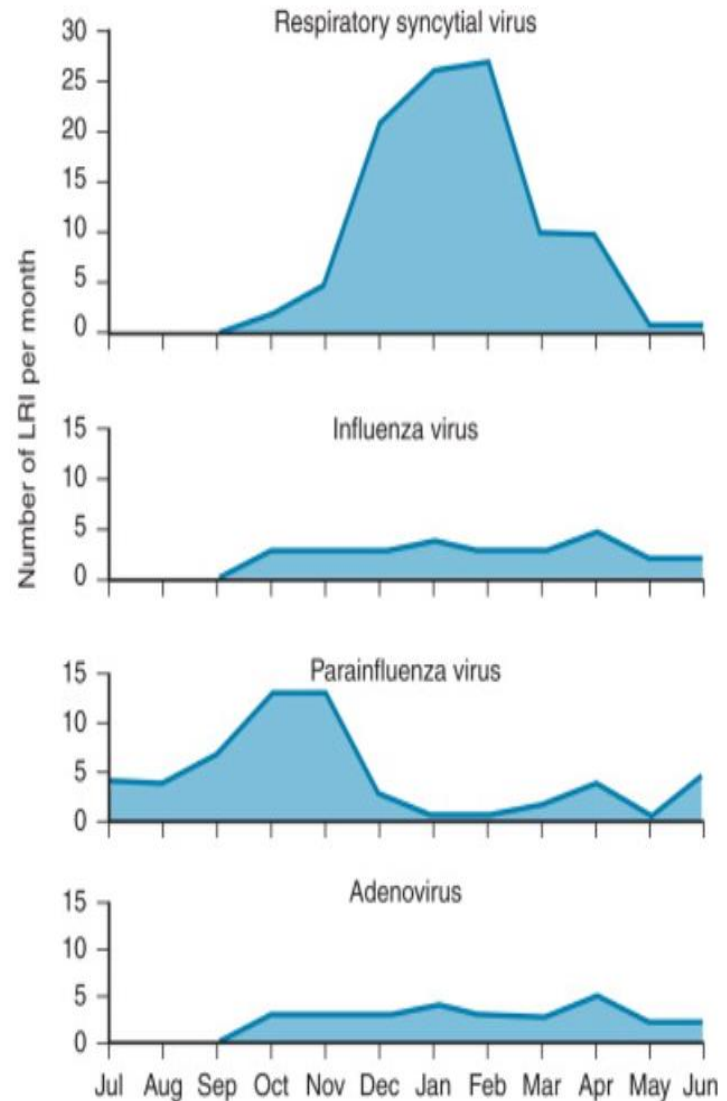
- Diphtheria: incidence highest in autumn and winter but summer epidemics can occur in warmer climates
- Continues to be endemic in Africa, Latin America and certain Asian countries
- No locally acquired case of respiratory diphtheria in the US since 2003
- Diagnosis requires sampling from beneath the membrane or part of the membrane itself, specimen can be collected in any sterile container or transport medium
- Cystine-tellurite blood agar or Tinsdale agar required



*Corynebacterium diphtheriae, mitis*  
Chocolate tellurite agar

## Viral etiologies:

- RSV: Occurs in winter and early spring, viral shedding usually 3-8 days but can be 3-4 weeks in infants and immunocompromised patients
- Influenza: Peak activity from November to May
- Parainfluenza: Type 1 usually in autumn of every other year, type 2 also in autumn but symptoms less severe. Type 3 more prominent in spring and summer in temperate climates
- Adenovirus: Lacks the seasonal variation of other respiratory viruses, with slight increase in incidence Jan-April





- EBV: widely disseminated herpes virus, spread by intimate contact
- Antibodies to EBV have been demonstrated in all population groups with a worldwide distribution; approximately 90 to 95 percent of adults are eventually EBV-seropositive

## CASE REPORTS

## The Changing Epidemiology of Infectious Mononucleosis?

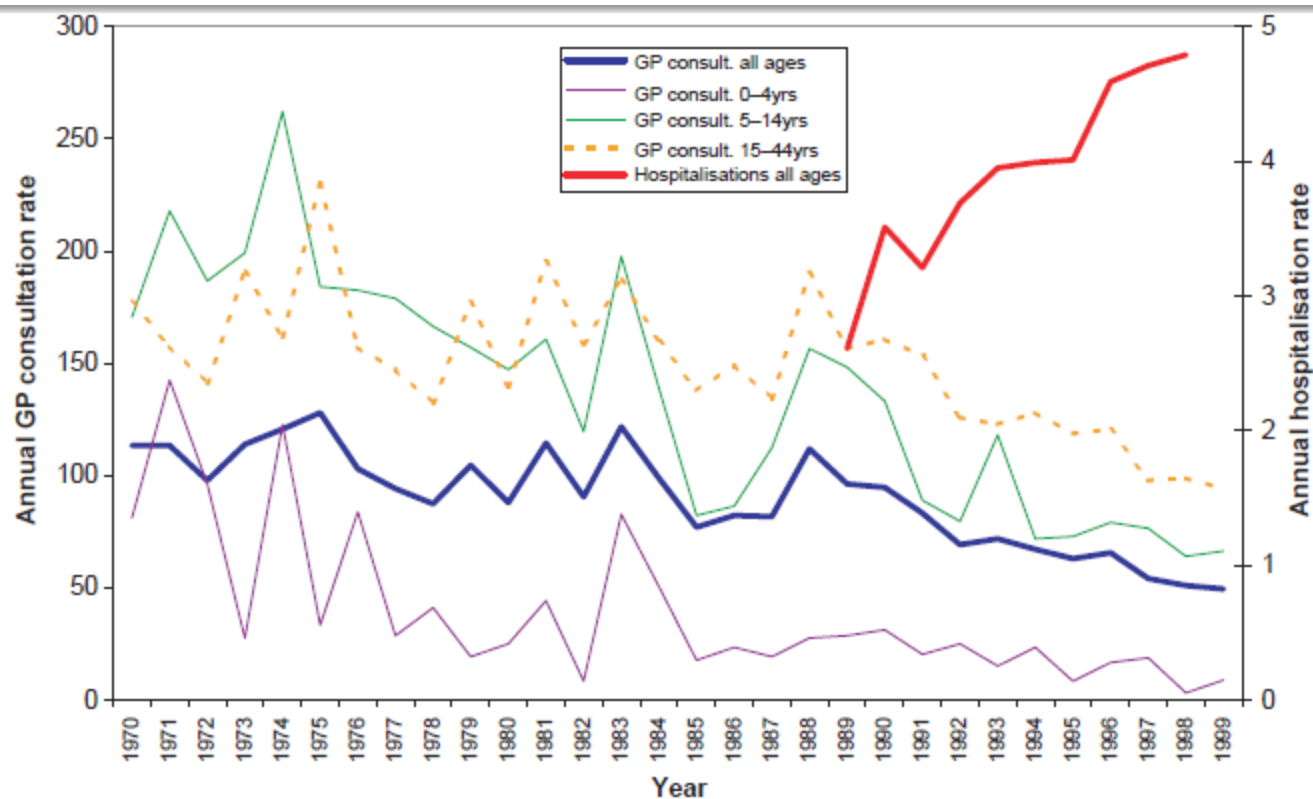
M. C. Morris<sup>\*1,2</sup> and W. J. Edmunds<sup>1,3</sup><sup>1</sup>Immunisation Division, PHLS Communicable Disease Surveillance Centre, 61 Colindale Avenue, London NW9 5EQ,<sup>2</sup>Infectious Disease Epidemiology Unit, London School of Hygiene and Tropical Medicine, <sup>3</sup>Department of Economics, City University

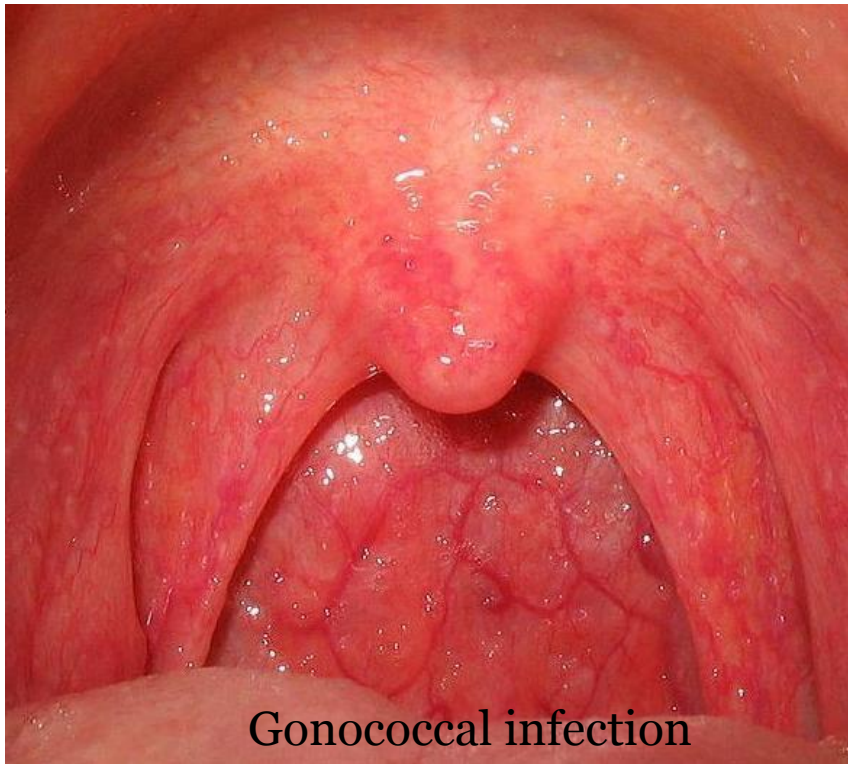
Figure 1. Annual GP consultation and hospitalisation rates per 100,000 population for infectious mononucleosis over time.

# Clinical manifestations



## GROUP A STREPTOCOCCAL

- Sudden onset of sore throat
- Age 5–15 years
- Fever
- Headache
- Nausea, vomiting, abdominal pain
- Tonsillopharyngeal inflammation
- Patchy tonsillopharyngeal exudates
- Palatal petechiae
- Anterior cervical adenitis (tender nodes)
- Winter and early spring presentation
- History of exposure to strep pharyngitis
- Scarletiform rash



Gonococcal infection



GAS

**Table 2**

Number of patients with clinical features with streptococcal culture as reference standards in 306 patients with sore throat by streptococcal culture, southern Norway 2000–2002.

Clinical features	GAS	C or G	Culture -ve	Total	GAS		C or G			
	n= 127n (%)	n= 33n (%)	n= 146n (%)	n= 306n (%)	Sens	Spec	LR	Sens	Spec	LR
Centor criteria:										
Cervical adenitis	114 (90) <sup>a</sup>	27 (82)	101 (70)	242 (80)	0.90	0.30	1.3	0.82	0.30	1.2
Absence of cough	96 (76) <sup>a</sup>	21 (64)	67 (46)	184 (60)	0.76	0.54	1.7	0.64	0.54	1.3
Reported fever >38.0°C	67 (53)	20 (61)	69 (48)	156 (52)	0.53	0.52	1.1	0.61	0.52	1.3
Tonsillar exudate	32 (25)	8 (24)	48 (34)	88 (29)	0.25	0.66	0.8	0.24	0.66	0.8
Considerable pain on swallowing	70 (57) <sup>a</sup>	12 (36)	50 (35)	132 (44)	0.57	0.65	1.6	0.36	0.65	1.0
Rubor in pharynx	112 (88) <sup>a</sup>	26 (79)	106 (75)	244 (81)	0.88	0.25	1.2	0.79	0.25	1.1
CRP value:										
>25 mg/l	68 (53)	22 (67) <sup>a</sup>	60 (41)	150 (49)	0.53	0.59	1.3	0.67	0.59	1.6
>50 mg/l	45 (35)	11 (33)	29 (20)	85 (28)	0.35	0.80	1.8	0.33	0.80	1.7

<sup>a</sup>P<0.05 in bivariate analysis of GAS versus group with no bacteria. GAS = group A streptococci. Sens = sensitivity. Spec = specificity. LR = likelihood ratio. CRP = C-reactive protein.

J Gen Intern Med. 2007 February; 22(2): 272–274.

Published online 2006 December 16. doi: [10.1007/s11606-006-0049-4](https://doi.org/10.1007/s11606-006-0049-4)

## **Severe Acute Pharyngitis Caused by Group C Streptococcus**

[Mobin Shah](#), MD,<sup>1</sup> [Robert M. Centor](#), MD,<sup>1,2</sup> and [May Jennings](#), MD<sup>2</sup>

- 30 yr old with negative rapid strep and worsening pharyngitis

**Table 2.** Clinical features present in 39 patients with *Arcanobacterium haemolyticum* infection during a 2-year study in Ottawa.

Feature	No. (%) with indicated feature
Pharyngitis	38 (97)
Pharyngeal exudate	21 (54)
Fever	25 (64)
Cervical lymphadenopathy	16 (41)
Rash	17 (44)
Urticarial	5
Macular	1
Maculopapular	6
Other	5





# *M. pneumoniae*

Characteristic	No. (%) of subjects	
	<i>M. pneumoniae</i> infected (n=44)	Non- <i>M. pneumoniae</i> infected (n=140)
Male	20 (45.4)	102 (55.4)
Caucasian	43 (97.7)	137 (97.8)
Age in years		
<2	15 (34.0)	38 (27.1)
2-5	14 (31.8)	52 (37.1)
>5	15 (34.0)	50 (35.7)
Breast-feeding ≥3 months	32 (72.7)	91 (65.0)
Urban residence	41 (93.2)	133 (95.0)
Full-time child-care attendance <sup>a</sup>	40 (90.9)	131 (93.5)
No. of subjects in each child-care centre		
<20	12 (30.0)	49 (36.8)
20-29	25 (62.5)	76 (57.1)
>29	3 (7.5)	8 (6.0)
Older sibling(s)	33 (75.0)*	81 (57.8)*
Passive smoking	24 (54.5)	69 (49.2)
Recurrent episodes of pharyngitis <sup>b</sup>	23 (52.2)**	4 (2.8)**
Antibiotic therapy in prior 6 months	5 (11.3)	16 (11.4)
Axillary temperature ≥38.5°C	40 (90.9)	123 (87.8)
Sore throat <sup>c</sup>	22 (75.8)	74 (72.5)
Dysphagia <sup>c</sup>	14 (48.3)	46 (45.1)
Pharyngeal erythema	44 (100.0)	140 (100.0)
Pharyngeal exudate	16 (36.3)	49 (35.0)
Tonsillar enlargement	36 (81.8)	110 (78.5)
Cervical lymphadenopathy	23 (52.2)	66 (47.1)

**Table 2** Laboratory data of the study population expressed as mean±SD

Parameter	<i>M. pneumoniae</i> infected (n=44)	Non- <i>M. pneumoniae</i> infected (n=140)
Leukocyte count (cells/ $\mu$ l)	12,204±4,830	11,743±4,300
Neutrophils (%)	61±14	57±16
Lymphocytes (%)	30±16	33±17
Monocytes (%)	6±5	7±4
Eosinophils (%)	2±3	1±2
Basophils (%)	0.4±0.6	0.4±0.5
ESR (mm/1 h)	36.98±17.50	37.14±16.19
CRP ( $\mu$ g/dl)	39.88±33.89	43.12±41.12

ESR, erythrocyte sedimentation rate; CRP, C-reactive protein

# *C. diphtheriae*

- Respiratory diphtheria occurs as membranous nasopharyngitis and obstructive laryngotracheitis
- Associated toxin can also cause myocarditis, ATN and peripheral neuropathy



**Pseudomembrane and bullneck of Diphtheria**

# EBV

**TABLE 139-5 -- Signs of Infectious Mononucleosis**

Sign	Rate	Percentage Range (%)
Lymphadenopathy	495/526	94 93-100
Pharyngitis	444/526	84 69-91
Fever	399/526	76 63-100
Splenomegaly	244/470	52 50-63
Hepatomegaly	34/370	12 6-14
Palatal enanthem	18/156	11 5-13
Jaundice	37/426	9 4-10
Rash	49/470	10 0-15

**TABLE 139-4 -- Symptoms of Infectious Mononucleosis**

Symptom	Rate	Percentage Range (%)
Sore throat	409/502	82 70-88
Malaise	243/426	57 43-76
Headache	216/426	51 37-55
Anorexia	117/546	21 10-27
Myalgias	66/326	20 12-22
Chills	54/326	16 9-18
Nausea	18/156	12 2-17
Abdominal discomfort	37/426	9 2-14
Cough	3/56	5 5
Vomiting	3/56	5 5
Arthralgias	1/56	2 2

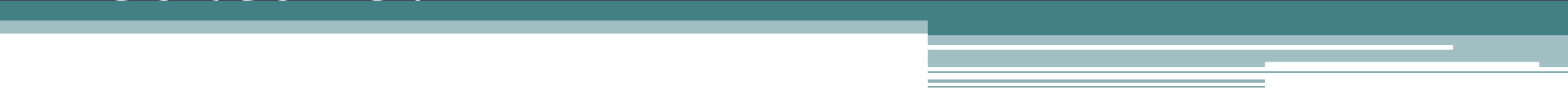


Tonsillar exudates



Beta-lactam induced rash

When should you obtain a throat culture?

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## GROUP A STREPTOCOCCAL

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## VIRAL

- Conjunctivitis
- Coryza
- Cough
- Diarrhea
- Hoarseness
- Discrete ulcerative stomatitis
- Viral exanthema

- Diagnostic studies for GAS are not indicated for children <3 years old because acute rheumatic fever is rare in children <3 years old
- The incidence of streptococcal pharyngitis and the classic presentation of streptococcal pharyngitis are uncommon in this age group
- Selected children <3 years old who have other risk factors, such as an older sibling with GAS infection, may be considered for testing
- High rate of colonization noted in school going children (upto 30%)<sup>1</sup>

1. Roberts et al. BMC Pediatr. 2012 Jan 9;12:3.



# Treatment



**Table 2. Antibiotic Regimens Recommended for Group A Streptococcal Pharyngitis**

Drug, Route	Dose or Dosage	Duration or Quantity	Recommendation Strength, Quality <sup>a</sup>	Reference(s)
For individuals without penicillin allergy				
Penicillin V, oral	Children: 250 mg twice daily or 3 times daily; adolescents and adults: 250 mg 4 times daily or 500 mg twice daily	10 d	Strong, high	[125, 126]
Amoxicillin, oral	50 mg/kg once daily (max = 1000 mg); alternate: 25 mg/kg (max = 500 mg) twice daily	10 d	Strong, high	[88–92]
Benzathine penicillin G, intramuscular	<27 kg: 600 000 U; ≥27 kg: 1 200 000 U	1 dose	Strong, high	[53, 125, 127]
For individuals with penicillin allergy				
Cephalexin, <sup>b</sup> oral	20 mg/kg/dose twice daily (max = 500 mg/dose)	10 d	Strong, high	[128–131]
Cefadroxil, <sup>b</sup> oral	30 mg/kg once daily (max = 1 g)	10 d	Strong, high	[132]
Clindamycin, oral	7 mg/kg/dose 3 times daily (max = 300 mg/dose)	10 d	Strong, moderate	[133]
Azithromycin, <sup>c</sup> oral	12 mg/kg once daily (max = 500 mg)	5 d	Strong, moderate	[97]
Clarithromycin, <sup>c</sup> oral	7.5 mg/kg/dose twice daily (max = 250 mg/dose)	10 d	Strong, moderate	[134]

**TABLE 2** Susceptibility of Beta-hemolytic Streptococci at Each Institution, %

	Penicillin <sup>a</sup>			Ampicillin			Ceftriaxone			Erythro <sup>c</sup>			Clinda <sup>d</sup>			Clarithro <sup>e</sup>			Azithro <sup>f</sup>		
	R ≥ 4, S ≤ 0.12 <sup>b</sup>			R ≥ 8, S ≤ 0.25			R ≥ 2, S ≤ 0.5			R > 1, S ≤ 0.25			R ≥ 1, S ≤ 0.25			R ≥ 1, S ≤ 0.25			R ≥ 2, S ≤ 0.5		
	S <sup>g</sup>	I <sup>g</sup>	R <sup>g</sup>	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R
<b>UUHSC</b>																					
Group A	100	—	—	100	—	—	99	—	1	95	—	5	100	—	—	96	1	3	95	—	5
Group B	100	—	—	99	1	—	100	—	—	93	—	7	97	—	3	91	2	7	93	—	7
Group C	100	—	—	100	—	—	100	—	—	89	—	11	100	—	—	84	4	12	88	—	12
Group F	100	—	—	86	14	—	100	—	—	100	—	—	100	—	—	90	5	5	100	—	—
Group G	100	—	—	98	2	—	100	—	—	92	—	8	98	—	2	94	—	6	96	2	2
Non-Type	95	5	—	100	—	—	100	—	—	89	—	11	100	—	—	89	—	11	89	—	11
Total	99	1	—	98	2	—	99.8	—	0.2	93	—	7	99	—	1	93.5	0.5	6	94.8	0.2	5
<b>LDSH</b>																					
Group A	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Group B	100	—	—	89	11	—	100	—	—	100	—	—	100	—	—	100	—	—	89	—	11
Group C	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Group F	100	—	—	75	25	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Group G	100	—	—	67	33	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Non-Type	100	—	—	50	50	—	100	—	—	100	—	—	100	—	—	50	50	—	50	—	50
Total	100	—	—	64	36	—	100	—	—	100	—	—	100	—	—	97	3	—	93	—	7
<b>PCMC</b>																					
Group A	100	—	—	99	1	—	100	—	—	99	—	1	100	—	—	100	—	—	98	—	2
Group B	100	—	—	94	6	—	100	—	—	94	—	6	100	—	—	94	—	6	94	3	3
Group C	100	—	—	100	—	—	100	—	—	90	—	10	100	—	—	90	—	10	90	—	10
Group F	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Group G	100	—	—	85	15	—	100	—	—	96	—	4	100	—	—	89	—	11	96	—	4
Total	100	—	—	97	3	—	100	—	—	98	—	2	100	—	—	97	—	3	96.6	0.4	3
<b>SLVAMC</b>																					
Group A	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Group B	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Group C	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Group F	100	—	—	80	20	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—
Group G	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	—	—	80	20	—
Total	100	—	—	96	4	—	100	—	—	100	—	—	100	—	—	100	—	—	96	4	—

<sup>a</sup>Penicillinase and ampicillinase data not shown; all isolates were 100% sensitive.

# A. hemolyticum

- Erythromycin is the drug of choice
- PCN has invitro susceptibility, but treatment failures are common likely due to intracellular invasion of this bacteria

TABLE 1. MICs of 11 antimicrobial agents for *A. haemolyticum* (n = 138)

Antimicrobial agent	MIC (µg/ml)			NCCLS breakpoints <sup>a</sup> in µg/ml (susceptible/resistant)
	Range	50%	90%	
Phenoxymethylpenicillin <sup>b</sup>	≤0.12–0.25	0.12	0.12	≤0.12/≥4
Cephalexin <sup>c</sup>	≤0.12–8	1	2	≤8/≥32
Cefuroxime	≤0.06–0.5	0.12	0.25	≤8/≥32
Cefotaxime	≤0.06	0.06	0.06	≤8/≥64
Erythromycin	≤0.06	0.06	0.06	≤0.5/≥8
Azithromycin <sup>d</sup>	≤0.06	0.06	0.06	≤0.5/≥8
Doxycycline <sup>e</sup>	≤0.06–8	0.12	0.12	≤4/≥16
Ciprofloxacin	≤0.12–2	0.5	0.5	≤1/≥4
Clindamycin	≤0.06	0.06	0.06	≤0.5/≥4
Vancomycin	≤0.25–0.5	0.5	0.5	≤4/≥32
Trimethoprim-sulfamethoxazole	>8/152	>8/152	>8/152	≤2/38/≥4/76

# *N. gonorrhoea*

Drug	Dose	Efficacy		Treatment Limitations
		Urogenital Infection	Pharyngeal Infection	
		Cure Rate, % (95% CI)	Cure Rate, % (95% CI)	
Ceftriaxone <sup>3,6</sup> (Rocephin)	250 mg (IM)	99.2 (98.8-99.5)	98.9 (94.2-100)	Intramuscular administration limits use in some settings.
Cefixime <sup>3,6</sup> (Suprax)	400 mg (PO)	97.5 (95.4-98.8)	92.3 (74.9-99.1)	Not recommended for treatment of pharyngeal infection due to lower cure rate than ceftriaxone.
Cefpodoxime <sup>7</sup> proxetil (Vantin)	400 mg (PO)	96.1 (93.1-100)	74.3 (56.8-87.5)	Not recommended for treatment of pharyngeal infection.
Cefuroxime <sup>3,6</sup> axetil (Ceftin)	1 gm (PO)	95.9 (94.3-97.2)	56.9 (42.2-70.7)	Not recommended for treatment of pharyngeal infection.
Azithromycin <sup>3,6,8</sup> (Zithromax; generic)	2 gm (PO)	99.2 (97.3-99.9)	95.2 (76.2-99.9)	Gastrointestinal side effects (nausea/vomiting) may occur. Concerns that widespread routine use may lead to rapid development of resistance.

### PHARYNGEAL GONORRHEA: Recommended Dual Antibiotic Therapy

Antibiotic 1		Antibiotic 2
Ceftriaxone 250 mg IM in a single dose (preferred)	PLUS	Azithromycin 1 g orally in a single dose (preferred)  <i>or</i>  Doxycycline 100 mg orally twice daily for 7 days
Oral cephalosporins should not be used for treatment of pharyngeal gonorrhea.		

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6131a3.htm>

# Diphtheria

- Anti-toxin: Since 1997, diphtheria antitoxin has been available only from CDC, and only through an Investigational New Drug (IND) protocol
- Antitoxin will not neutralize toxin that is already fixed to tissues, but it will neutralize circulating (unbound) toxin and will prevent progression of disease

- Antibiotics: Treatment with erythromycin orally or by injection (40 mg/kg/day; maximum, 2 gm/day) for 14 days
- Procaine penicillin G daily, intramuscularly (300,000 U/day for those weighing 10 kg or less, and 600,000 U/day for those weighing more than 10 kg) for 14 days
- The disease is usually not contagious 48 hours after antibiotics are instituted.



- Contacts should also receive antibiotics— benzathine penicillin G (600,000 units for persons younger than 6 years old and 1,200,000 units for those 6 years old and older)

or

- 7- to 10-day course of oral erythromycin, (40 mg/kg/day for children and 1 g/day for adults).

# Summary

- Appearance of pharyngitis similar for the different causes so history important to obtain
- GAS is the most common etiology, but important to distinguish from viral pharyngitis to prevent over use of antibiotics
- If rapid strep negative and patient getting worse, think about the unusual organisms

Thanks!

