APRIL 12, 2024

Wise Use Today Preserves Cure Tomorrow

Management of Group A Strep

Nicole M. Poole, MD, MPH
Assistant Professor, Pediatrics
University of Colorado School of Medicine
Associate Medical Director, Pediatric Antimicrobial Stewardship
Children's Hospital Colorado
Nicole.Poole@ChildrensColorado.org

Children's Hospital Colorado
Here, it's different.

Affiliated with
University of Colorado
Anschutz Medical Can

Disclosures

- I have no conflicts of interest to disclose
- I will not be discussing the off-label use of any medications or devices

Clinical care pathway at CHCO

Uncomplicated Acute Respiratory Tract Infections (ARTI) Clinical Pathways

ARTI clinical pathways

- ARTI, including AOM, conjunctivitis and GAS pharyngitis

https://www.childrenscolorado.org/health-professionals/clinical-resources/clinical-pathways/uncomplicated-acute-respiratory-tract-infections/

Children's Hospital Colorado
Here, it's different.

Affiliated with
University of Colorado
Anschutz Medical Campus

Who do we test for strep throat?

Children's Hospital Colorado
Here, it's different.™

Affiliated with
University of Colorado
Anschutz Medical Campus

Testing for GAS

No individual element of history-taking or physical examination is accurate enough by itself to rule in or rule out strep throat.

Table 3. Accuracy for History and Physical Examination Elements in the Diagnosis of Strep Throat*

Symptoms and Signs	Patients, No.	Accuracy	Sensitivity (95% CI) or Range	Specificity	LR+ (95% CI) or Range	LR− (95% CI) or Range
Any exudates[15,16,18,19,20,21]	3268	0.68	0.21-0.58	0.69-0.92	1.5-2.6	0.66-0.94
Reported fever[15,17,20,21]	3232	0.68	0.3-0.92	0.23-0.90	0.97-2.6	0.32-1.0
Measured temperature >37.8°C[15,17,18,21]	3091	0.68	0.11-0.84	0.43-0.96	1.1-3.0	0.27-0.94
Anterior cervical nodes swollen/enlarged[15,16,18,20-23]	3831	0.67	0.55-0.82	0.34-0.73	0.47-2.9	0.58-0.92
Pharyngeal exudates[18,22,23]	1673	0.65	0.03-0.48	0.76-0.99	2.1 (1.4-3.1)*	0.90 (0.75-1.1)*
Tonsillar swelling/enlargement[18,19,20-22]	2703	0.65	0.56-0.86	0.56-0.86	1.4-3.1	0.63 (0.56-0.72)*
Tonsillar or pharyngeal exudates[15,16,19,21]	2246	0.65	0.28-0.61	0.62-0.88	1.8 (1.5-2.3)*	0.74 (0.66-0.82)*
Anterior cervical nodes tender[15,16,18,22]	2280	0.64	0.32-0.66	0.53-0.84	1.2-1.9	0.60 (0.49-0.71)*
Tonsillar exudates[20,22]	840	0.64	0.36 (0.21-0.52)*	0.71-0.98	3.4 (1.8-6.0)*	0.72 (0.60-0.88)*
No cough[15-19,21,23]	5122	0.63	0.51-0.79	0.36-0.68	1.1-1.7	0.53-0.89
No coryza[15-19,22]	3846	0.57	0.42-0.84	0.20-0.70	0.86-1.6	0.51-1.4
Myalgias[18,21,22]	2003	0.57	0.49 (0.43-0.56)*	0.52-0.69	1.4 (1.1-1.7)*	0.93 (0.86-1.0)*
History of sore throat[16,17,21,22]	3090	0.57	0.18-0.93	0.09-0.86	1.0-1.1	0.55-1.2
Headache[17,18,22]	2350	0.56	0.48 (0.42-0.53)*	0.50-0.80	0.81-2.6	0.55-1.1
Pharynx injected[16,18,19,22]	2939	0.54	0.43-0.99	0.03-0.62	0.66-1.63	0.18-6.42
Measured temperature ≥38.3°C[15,22,23]	1096	0.53	0.22-0.58	0.53-0.92	0.68-3.9	0.54-1.3
Nausea[17,21]	1941	0.52	0.26 (0.12-0.43)*	0.52-0.98	0.76-3.1	0.91 (0.86-0.97)*
Duration <3 d[20,22]	824	0.43	0.26-0.93	0.59 (0.54-0.64)*	0.72-3.5	0.15-2.2
Male sex[21,22]	1325	0.39	0.11-0.56	0.39-0.86	0.87 (0.72-1.05)*	1.1 (0.93-1.2)*
Palatine petechiae[18,22]	1202	NA	0.07 (0.02-0.14)*	0.95 (0.92-0.96)*	1.4 (0.48-3.1)*	0.96 (0.92-1.1)*
Strep exposure previous 2 wk[18,19,22,23]	2091	NA	0.19 (0.12-0.27)*	0.87-0.94	1.9 (1.3-2.8)*	0.92 (0.86-0.99)*
Rash[17,21,22]	2356	NA	0.04 (0.03-0.06)*	0.79-0.99	0.06-35	0.90-1.1

*Where one of these operating characteristics was homogeneous ($P>.05$ for the χ^2 test), the summary value and a 95% confidence interval (CI) are given. Where they are heterogeneous, only the range is given. Variables are given in the order of the area under the receiver operative characteristic curve, where one could be drawn. LR+ indicates positive likelihood ratio; LR−, negative likelihood ratio.

IDSA guidelines 2012, Ebell 2000

Children's Hospital Colorado
Here, it's different.

Affiliated with University of Colorado Anschutz Medical Campus

Testing for GAS

- **IDSA guidelines: Children under 3 years old should not be tested for GAS pharyngitis**
- Prevalence of GAS pharyngitis low for <3yo.
  - Estimated 10-14% with a positive test, but when ASO rise confirms, low as **0-6%.**
- iGAS cases without preceding pharyngitis
- Negligible risk for ARF*

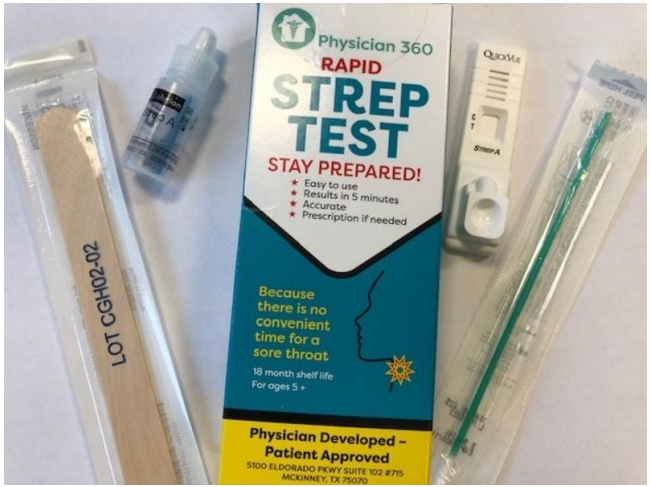
IDSA guidelines 2012

Testing for GAS

- **IDSA guidelines: Patients with viral symptoms should not be tested for GAS**
  - GAS carriage: 15-25% of children
  - Lack of viral symptoms have higher LR for GAS pharyngitis

At-Home Tests for Influenza, Strep, Others, Raising Eyebrows of Some Experts

Jun 17, 2019 | Madeleine Johnson



https://www.360dx.com/immunoassays/home-tests-influenza-strep-others-raising-eyebrows-some-experts

IDSA guidelines 2012

Antibiotic Prescribing – all ages

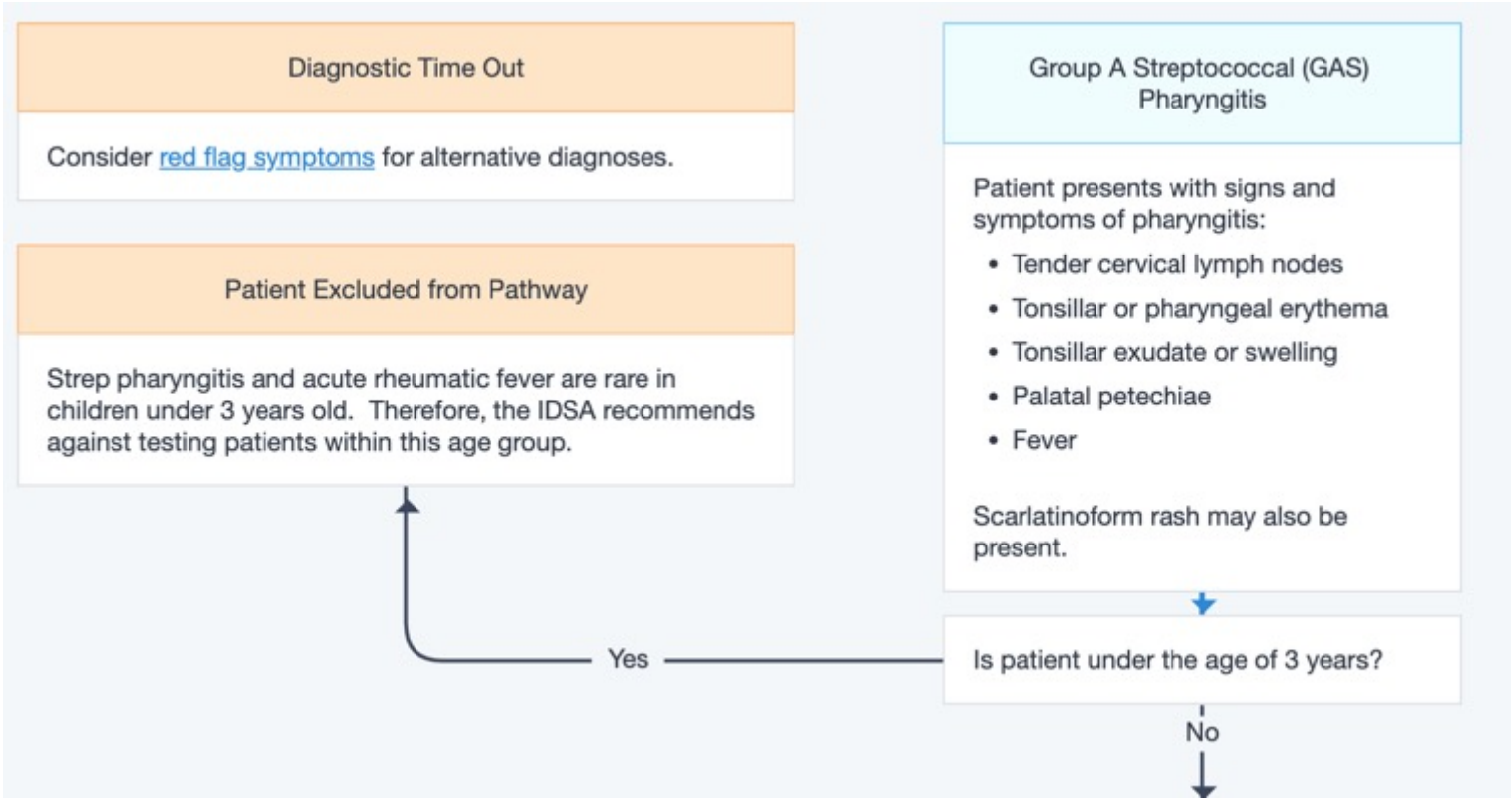
Diagnosis	Percentage of diagnoses with antibiotic prescribed			
	UCC	Retail Clinic	ED	Medical Office
CAP	83%	91%	67%	67%
Pharyngitis	60%	57%	47%	51%
Sinusitis	82%	87%	68%	76%
AOM	83%	86%	72%	79%
All Dx	39%	36%	14%	7%

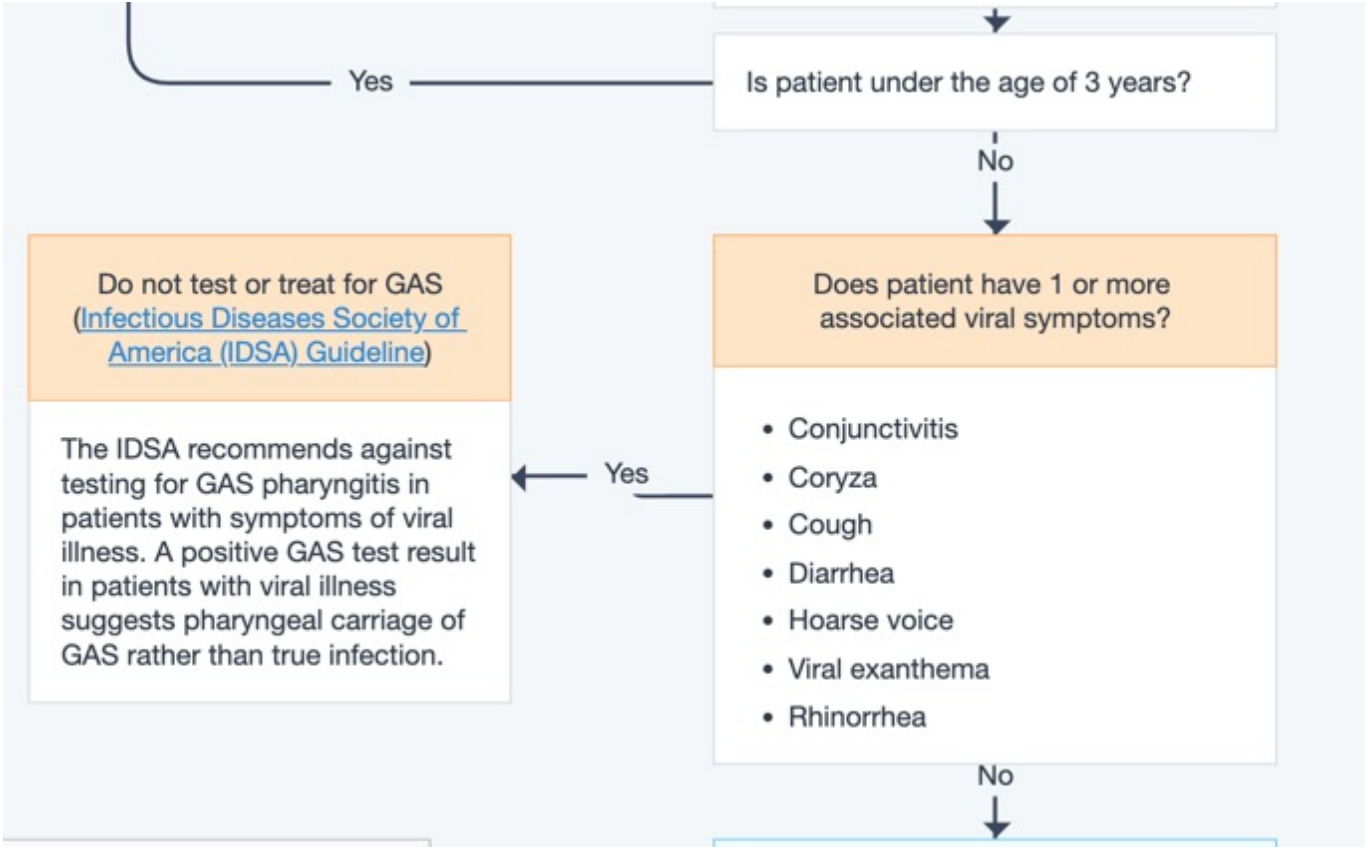
~15-37%

Children's Hospital Colorado
Here, it's different.

Affiliated with University of Colorado Anschutz Medical Campus

Palms 2018 JAMA Intern Med


Diagnostic Time Out
Consider red flag symptoms for alternative diagnoses.
Patient Excluded from Pathway
Strep pharyngitis and acute rheumatic fever are rare in children under 3 years old. Therefore, the IDSA recommends against testing patients within this age group.
Group A Streptococcal (GAS) Pharyngitis
Patient presents with signs and symptoms of pharyngitis:
• Tender cervical lymph nodes
• Tonsillar or pharyngeal erythema
• Tonsillar exudate or swelling
• Palatal petechiae
• Fever
Scarlatinoform rash may also be present.
Is patient under the age of 3 years?
Yes
No


Yes
Is patient under the age of 3 years?
No
Do not test or treat for GAS (Infectious Diseases Society of America (IDSA) Guideline)
Does patient have 1 or more associated viral symptoms?
The IDSA recommends against testing for GAS pharyngitis in patients with symptoms of viral illness. A positive GAS test result in patients with viral illness suggests pharyngeal carriage of GAS rather than true infection.
Yes
• Conjunctivitis
• Coryza
• Cough
• Diarrhea
• Hoarse voice
• Viral exanthema
• Rhinorrhea
No

Improving Guideline-Based Streptococcal Pharyngitis Testing: A Quality Improvement Initiative

Intervention:

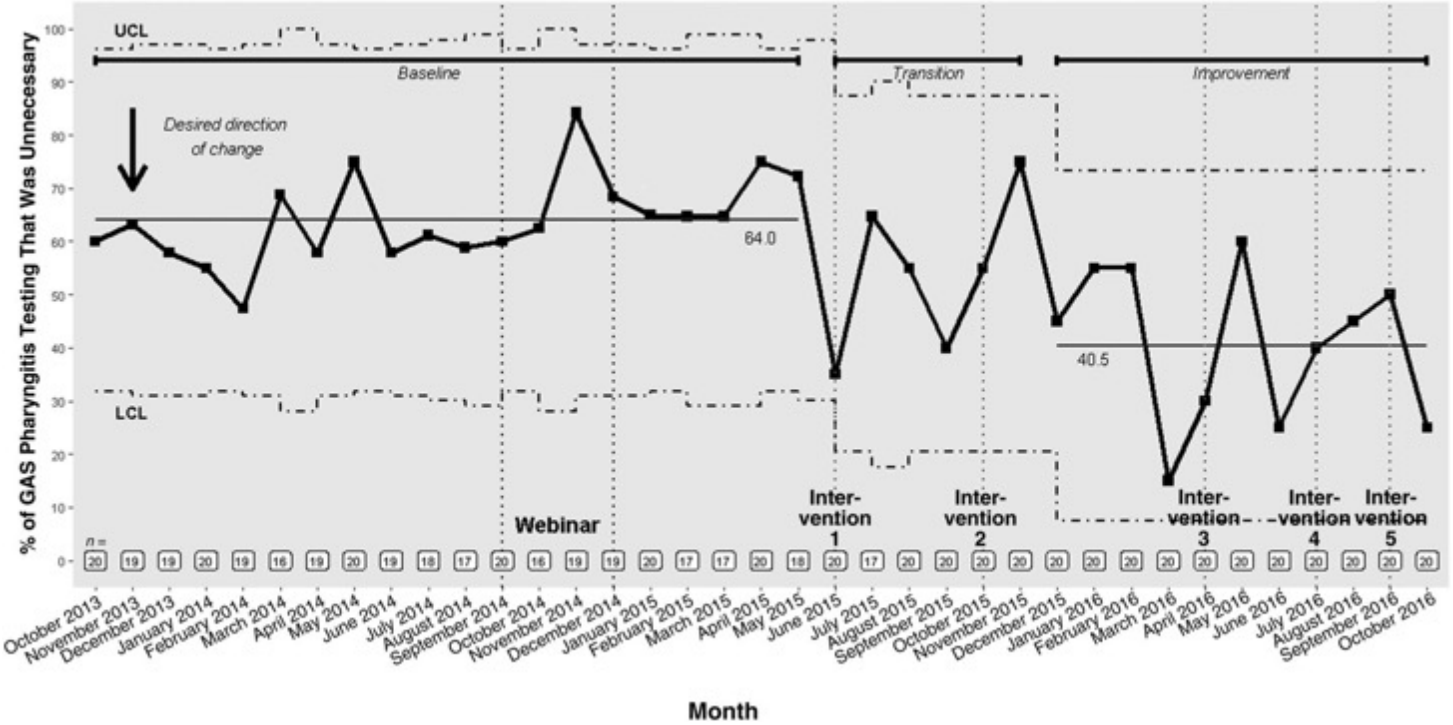
- Education
- Removed standing orders for rapid GAS
  - Provider assessment required first
- Communication flier and strategies to parents

Measured unnecessary GAS pharyngitis testing:

(1) age was <3 years and was without household contact with GAS pharyngitis, (2) presence of ≥2 viral symptoms, (3) had an absence of sore throat, **or** (4) had an absence of any expected GAS pharyngitis examination findings.

From: **Improving Guideline-Based Streptococcal Pharyngitis Testing: A Quality Improvement Initiative**

Pediatrics. 2018;142(1). doi:10.1542/peds.2017-2033



P-chart for the proportion of patients with unnecessary GAS pharyngitis testing over time. LCL, lower control limit; n, number of total charts included per month; UCL, upper control limit.

Why do we treat strep throat?

Photo by National Cancer Institute on Unsplash

Improvement of symptoms

- Treated patients will feel better (fever, sore throat) about 16-24 hrs faster (3-4 vs. 4-5 days)
- Strep throat will self-resolve

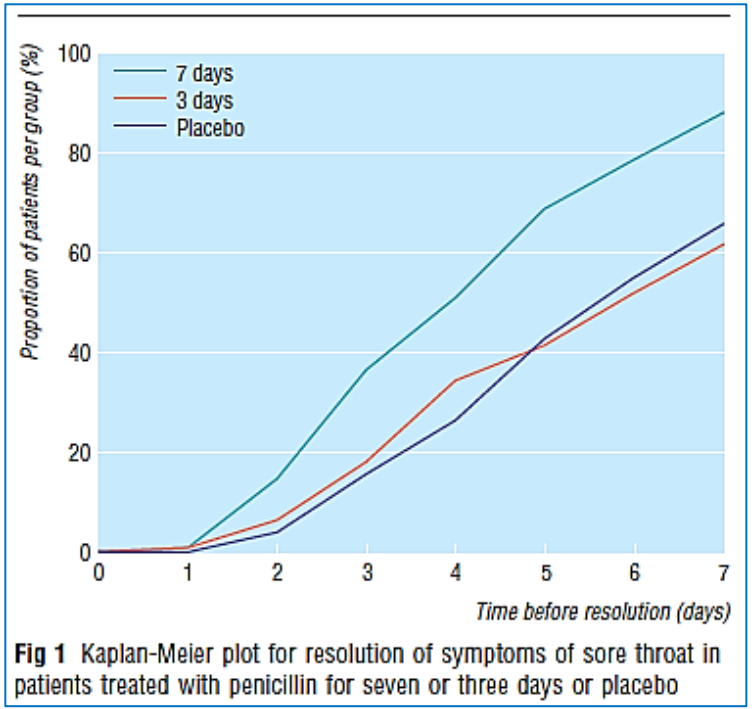


Fig 1 Kaplan-Meier plot for resolution of symptoms of sore throat in patients treated with penicillin for seven or three days or placebo

Zwart BMJ 2000

Prevent suppurative complications

Table 1| **Characteristic of patients at index consultation. Values are numbers (percentages) unless stated otherwise**

Characteristics	Not given antibiotics	Given antibiotics	Delayed antibiotics
Clinical assessment:			
Return <4 weeks with new or worsening symptoms	803/4974 (16.1)	864/5932 (14.6)	222/2382 (9.5)
Return <4 weeks with complications	75/4974 (1.5)	78/5932 (1.3)	21/2382 (0.9)
Individual complications:			
Quinsy Quinsy = abscess	11/4974 (0.2)	30/5932 (0.5)	6/2382 (0.3)
Sinusitis	23/4974 (0.5)	12/5932 (0.2)	3/2382 (0.1)
Otitis media	31/4974 (0.6)	27/5932 (0.5)	11/2382 (0.5)
Cellulitis or impetigo	10/4974 (0.2)	9/5932 (0.2)	1/2382 (0.0)

-Adult patients

-Clinical sx resolution & complications

- Complications RARE

Little 2013

Prevent suppurative complications

Variables	No (%) with no complications	No (%) with complications	Univariate odds ratio (95% CI)	P value	Multivariate odds ratio* (95% CI)	P value
Earache†	642/13 163 (4.9)	25/177 (14.2)	3.22 (2.10 to 4.96)	<0.01	3.02 (1.91. to 4.76)	<0.01
Severely inflamed tonsils	1615/12 544 (12.9)	37/173 (21.4)	1.84 (1.28 to 2.66)	<0.01	1.92 (1.28 to 2.89)	<0.01

Two predictors of suppurative complications:
-Ear ache (14% with complications, 5% without)
-Severely inflamed tonsils (13% w/ complications, 21% without)

Reductions in abscess and AOM
NNTB 200 for OM, ~2000 for abscess
Does not appear to prevent glomerulonephritis

Little et al, BMJ 2013

Prevent ARF

https://www.med-dept.com/articles/standard-terms-for-diagnoses-anatomical-locations-and-operations/

1950s military base: ARF occurred in 3-4% of those with pharyngitis

1961 Chicago **0.33%** in untreated children with pharyngitis

https://www.healthychildren.org/English/ages-stages/gradeschool/school/Pages/Back-to-School-Tips.aspx

High-risk countries: 50-500 per 100,000
0.05-0.5%, **NNT 494**

Low-risk countries: 1-10 per 100,000
0.001-0.01%, NNT up to 1 million

US: 0.61 per 100,000

Siegel 1961

CDC stopped tracking incidence of ARF in 1995:

when it fell below 1 per million

1953: 1st Guideline for treatment of GAS

"PCN is the drug of choice... Both the oral and th
administration have been utilized successfully
infections. IM injections have been proved to pr
on the value of oral pcn as a preventative are less complete.

Orals not studied for ARF

1955: Guide date:

"Effective bloo
penicillin] sho
for *a period of 10*
rheumatic fever by eradi
the streptococci from the throat.
Penicillin may be administered by
either IM or oral route.

Eradication not linked to ARF

TABLE 1. Duration of Antimicrobial Therapy for Common Infections

Year Published	Textbook	Meningitis	Pneumoni	Streptococcal Pharyngitis	Urinary Tract Infection	Acute Otitis Media
1942	Nelson	NDM	NDM	NDM	NDM	NDM
1945	Nelson	Clinical	NDM	NDM	Sterile urine	NDM
1950	Nelson	10 days	NDM	5 days	Sterile urine	NDM
1951	Harrison	NDM	Clinical	5–7 days	NDM	NDM
1954	Nelson	NDM	Clinical	10 days	Sterile urine	Clinical
1954	Harrison	2 weeks	Clinical	10 days	NDM	NDM
1958	Harrison	NDM	Clinical	10 days	10 days	NDM
1959	Nelson	10 days	Clinical	10 days	Sterile urine	Clinical
1962	Harrison	Clinical	Clinical	10 days	NDM	NDM
1964	Nelson	10 days	Clinical	10 days	1 month	Clinical
1966	Harrison	Clinical	Clinical	10 days	10 days	NDM
1969	Nelson	7 days	NDM	10 days	2 weeks	10 days
1970	Harrison	Clinical	Clinical	10 days	10 days	NDM
1974	Harrison	Clinical	Clinical	10 days	NDM	NDM
1975	Nelson	Clinical	7 days	10 days	2 weeks	10 days
1977	Harrison	Clinical	Clinical	10 days	10 days	NDM
1979	Nelson	10 days	10 days	10 days	2 weeks	2 weeks

NDM indicates no duration mentioned.

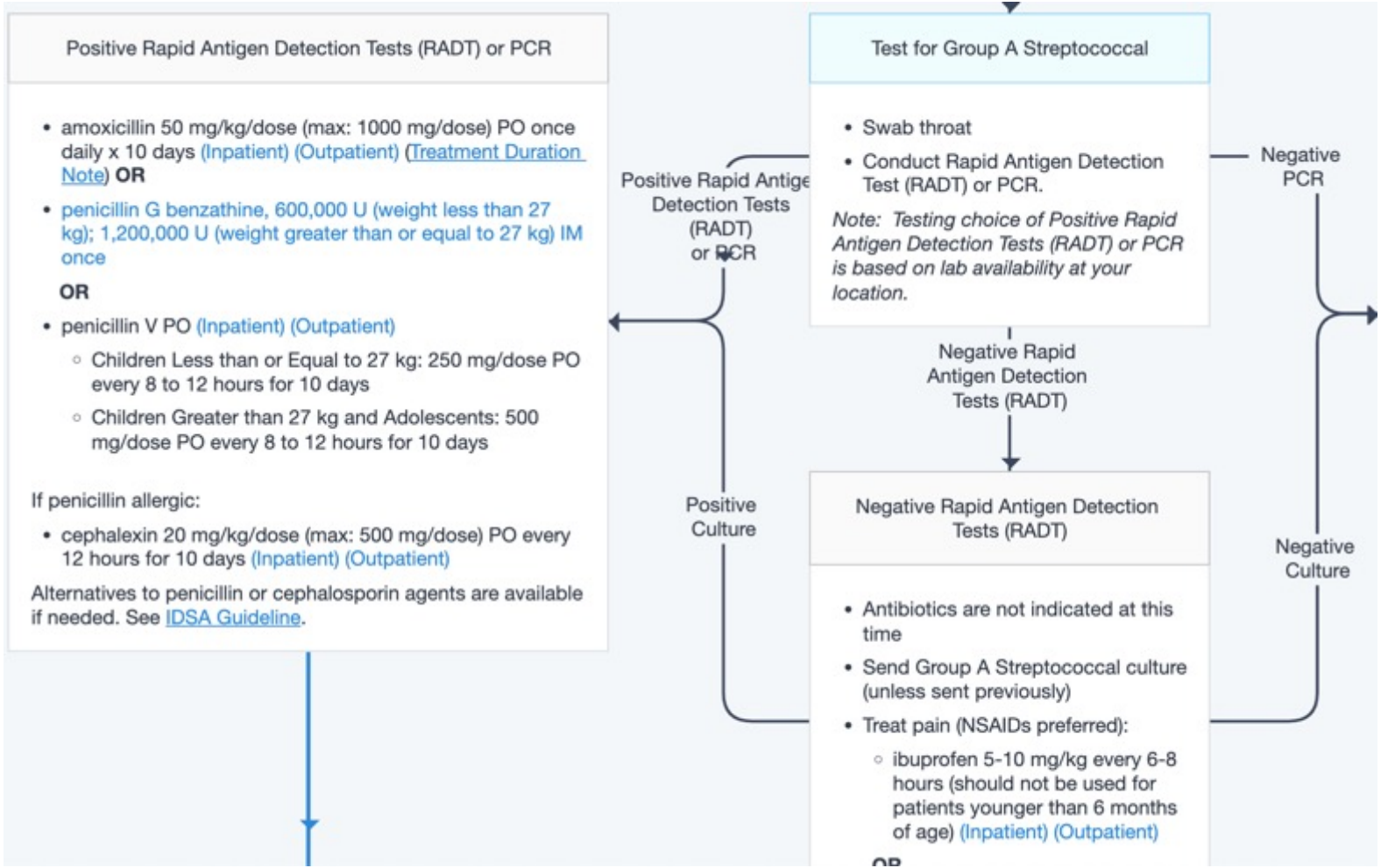
Breese 1953, 1955

Comparison 4. Antibiotics versus control for the treatment of sore throat: incidence of complications

Outcome or subgroup title	No. of studies	No. of partici-pants	Statistical method	Effect size
4.1 Incidence of acute rheumatic fever within 2 months. Rheumatic fever defined by clinical diagnosis	17	12132	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.36 [0.26, 0.50]
4.3.1 Incidence of acute rheumatic fever within 2 months: early (pre-1975) studies	10	7617	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.30 [0.20, 0.45]
4.3.2 Incidence of acute rheumatic fever within 2 months: late (post-1975) studies	5	2367	Peto Odds Ratio (Peto, Fixed, 95% CI)	Not estimable

Pre-1962

What antibiotic do we use?


Test for Group A Streptococcal
• Swab throat
• Conduct Rapid Antigen Detection Test (RADT) or PCR.
Note: Testing choice of Positive Rapid Antigen Detection Tests (RADT) or PCR is based on lab availability at your location.
Positive Rapid Antige Detection Tests (RADT) or PCR
Negative PCR
Negative Rapid Antigen Detection Tests (RADT)
Positive Culture
Negative Culture
Negative Rapid Antigen Detection Tests (RADT)
• Antibiotics are not indicated at this time
• Send Group A Streptococcal culture (unless sent previously)
• Treat pain (NSAIDs preferred):
◦ ibuprofen 5-10 mg/kg every 6-8 hours (should not be used for patients younger than 6 months of age) (Inpatient) (Outpatient)
OR
Positive Rapid Antigen Detection Tests (RADT) or PCR
• amoxicillin 50 mg/kg/dose (max: 1000 mg/dose) PO once daily x 10 days (Inpatient) (Outpatient) (Treatment Duration Note) OR
• penicillin G benzathine, 600,000 U (weight less than 27 kg); 1,200,000 U (weight greater than or equal to 27 kg) IM once
OR
• penicillin V PO (Inpatient) (Outpatient)
◦ Children Less than or Equal to 27 kg: 250 mg/dose PO every 8 to 12 hours for 10 days
◦ Children Greater than 27 kg and Adolescents: 500 mg/dose PO every 8 to 12 hours for 10 days
If penicillin allergic:
• cephalexin 20 mg/kg/dose (max: 500 mg/dose) PO every 12 hours for 10 days (Inpatient) (Outpatient)
Alternatives to penicillin or cephalosporin agents are available if needed. See IDSA Guideline.

“There has never been a report of a clinical isolate of group A strep that is resistant to penicillin.”

-CDC

Patients better but still test positive

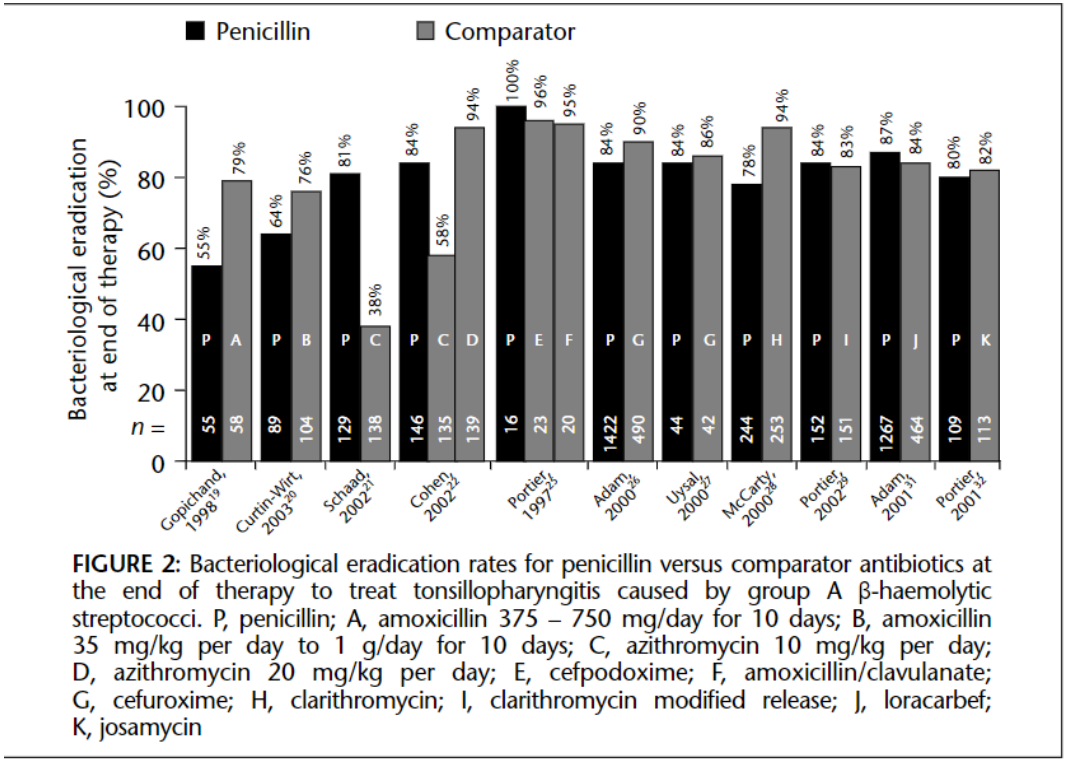


FIGURE 2: Bacteriological eradication rates for penicillin versus comparator antibiotics at the end of therapy to treat tonsillopharyngitis caused by group A β-haemolytic streptococci. P, penicillin; A, amoxicillin 375 – 750 mg/day for 10 days; B, amoxicillin 35 mg/kg per day to 1 g/day for 10 days; C, azithromycin 10 mg/kg per day; D, azithromycin 20 mg/kg per day; E, cefpodoxime; F, amoxicillin/clavulanate; G, cefuroxime; H, clarithromycin; I, clarithromycin modified release; J, loracarbef; K, josamycin

- 11 studies
  - 1998-2003
- PCN eradication rates 55-100% - majority 80-90%

Children's Hospital Colorado
Here, it's different.

Affiliated with
University of Colorado
Anschutz Medical Campus

Patients better but still test positive

Clinical Studies

Duration of Group A *Streptococcus* PCR positivity following antibiotic treatment of pharyngitis

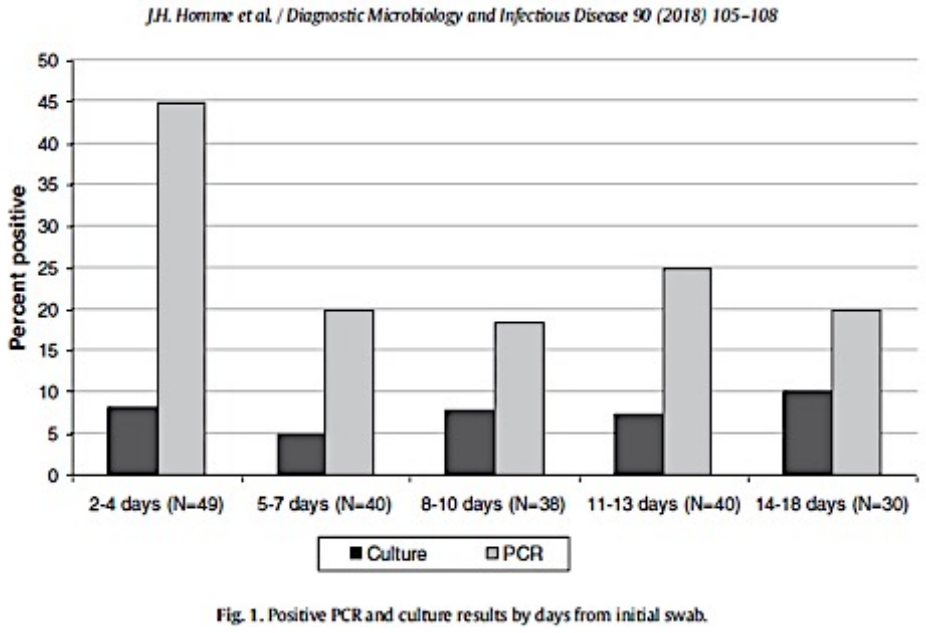


Fig. 1. Positive PCR and culture results by days from initial swab.

- Patients (n=50) all positive by PCR at day 0.
- All patients treated with AAP regimen (70% pcn)
- 5-10% still culture + at end of treatment

Homme 2018

- IDSA guidelines: These children are considered ‘bacteriologic failures’. Under most circumstances, these children are actually streptococcal carriers, and **further antimicrobial therapy is not warranted.**
- Persistent symptoms at 24-48h are most likely non-GAS pharyngitis. **Repeat testing is not recommended.**

Homme 2018

Should we try to decolonize?

Carriers:

- unlikely to spread organism to their close contacts
- very low risk, if any, for developing suppurative or invasive complications or nonsuppurative complications
- difficult to eradicate GAS pharyngitis from the throats of carriers

Once daily amoxicillin

- Amox 50mg/kg daily
- 4-6 days amoxicillin eradicates 90%
- Adult hypertensive study: **Compliance** improved from 59.0% on a three-time daily regimen to 83.6% on a once-daily regimen.

TABLE 1. Bacteriologic Response to Antibiotic Therapy

Feder et al, Pediatrics, 1999	Patients	No. of Positive Throat Cultures After Completion of Therapy*	
		4–6 Days *n* (%)	14–21 Days *n* (%)
Amoxicillin (once-daily)	79	9 (11)	4 (5)
Penicillin V (three times daily)	73	12 (16)	3 (4)

Children's Hospital Colorado
Here, it's different.

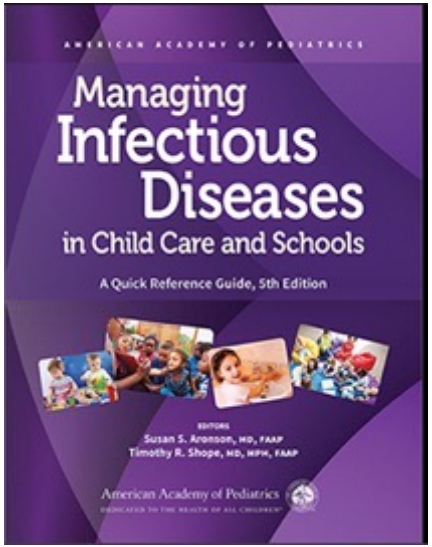
Affiliated with University of Colorado Anschutz Medical Campus

Feder 1999
Eisen 1990

Reduce contact transmission

A Reappraisal of the Minimum Duration of Antibiotic Treatment Before Approval of Return to School for Children With Streptococcal Pharyngitis

Richard H. Schwartz, MD,† Danica Kim, BA,‡ Michael Martin, MD,*† and Michael E. Pichichero, MD§¶*



- Single dose of 50/kg amoxicillin
- n = 111 children
- GAS was not detectable in 91% (CI: 86–96%) at 11–23h after initial visit

- AAP 'Purple Book' – can return to class 12h after starting abx
- "Children infected w strep do not pose a risk to others once they have received their 1st 12h of abx treatment.

Schwartz 2015
Shope 2019

Reduce contact transmission

- IDSA guidelines: against prophylaxis of asymptomatic contacts
- GABHS pharyngitis occurred in 54/1440 (3.8%) of siblings
- 30-day follow-up period
  - GABHS pharyngitis: 3.0% siblings in the prophylaxis group and 5.3% siblings in the control group (P=0.040).
    - Cephalosporin group was 1.8% vs 5.3% in control group (P=0.003)
    - Penicillin group was 4.3% vs control group (P=0.542).
- Guideline recommendations account risk vs harm

Hideaki 2007

Minimize adverse effects of inappropriate abx therapy

- Anaphylaxis to penicillin: 1-5 per 10,000 courses
- Penicillin allergy reported in 1 in 10 patients → labeled allergy (#1 reason: rash)

Gerber JAMA 2017

Minimize adverse effects of inappropriate abx therapy

- Resistance in outpatient conditions increasing
  - Receipt of 1 course of any antibiotic within 6 months is risk factor for drug-resistant UTI (OR 1.6)
- Increased risk of inflammatory bowel disease, juvenile idiopathic arthritis, and obesity
  - Cumulative effect (every dose counts!)
- ED visits for adverse drug events
  - 0-5 y/o: 56% of ED visits for adverse drug events (e.g., diarrhea, rash, anaphylaxis)

Shaikh J Pediatr 2016
Kronman, *Pediatrics* 2012
Horton, *Pediatrics* 2015
Miller, *Obes Rev* 2018
Shehab, *JAMA* 2016

Minimize adverse effects of inappropriate abx therapy

- Prospective 10,000 children (6mos-12y)
- Dx with AOM, GAS, or Acute Sinusitis

Patient-Centered Outcomes in the Prospective Cohort

Outcome	No./Total (%)[a]		Stratified Analysis[b]	
	Broad-Spectrum Antibiotics	Narrow-Spectrum Antibiotics	Risk Difference (95% CI), %[d]	*P* Value
Missed school or day care	305/702 (43.4)	503/1199 (42.0)	2.5 (−3.9 to 9.0)	.45
Required additional childcare	220/701 (31.4)	390/1190 (32.8)	−0.2 (−5.7 to 5.2)	.94
Experienced adverse events	258/725 (35.6)	341/1360 (25.1)	11.6 (6.0 to 17.2)	<.001
Symptoms present on day 3[f]	267/647 (41.3)	427/1128 (37.9)	2.3 (−4.5 to 9.1)	.50
Sleep disturbance	378/860 (44.0)	582/1570 (37.1)	4.6 (−0.5 to 9.6)	.08
Pediatric Quality of Life Inventory score[g]	(n = 860) 90.2 (10.5)[h]	(n = 1570) 91.5 (9.4)[h]	−1.6 (−2.8 to −0.5)[i]	.006

25% narrow spectrum w adverse events

- Diarrhea 70%
- Rash 40.1%
- Upset stomach +/- vomiting 20%
- > 1 adverse event 28%

Children's Hospital Colorado
Here, it's different.

Affiliated with University of Colorado Anschutz Medical Campus

Gerber JAMA 2017

1 in 4 children

on penicillin or amoxicillin will have an adverse drug event.

~1 million children

receive antibiotics to prevent 1 case of RHD in the US


Aphoriſmi
HIPPOCRATIS.
Græce & Latine:
JUXTA
Optimam Editionem
THEODORI JANSSONII ab
Almeloveen, Med. Doct.
Amſtelædami impreſſam, Anno 1685.
In uſum JUVENTUTIS ſtudioſæ.
EDINBURGI:
In Ædibus R. FLEMING, Sumptibus JOANNIS
PATON Bibliopolæ in Area Parliamentaria.
M. DCC. XXXVI.

Durations for desired outcomes

Prevent acute rheumatic fever

Do we even need to treat at all??

Prevent suppurative complications

? NNT~200 Treat the complication.

Improve clinical symptoms

~1-3days (for 16-24h benefit)

Reduce transmission to close contacts

12 hours

Minimize adverse effects of inappropriate antimicrobial therapy

As few as possible

Low-risk countries: NNT ~1 million

Clinical endpoints for duration decisions

	GAS Pharyngitis Durations
United States	10 days
United Kingdom (NICE)	5 days for symptomatic cure 10 days for microbiologic cure
The Netherlands	Forego antibiotics If treating, 5-7 days to shorten symptom duration
Australia	High-risk groups: 10 days Low-risk groups: forego antibiotics
WHO	High-risk groups: 10 days Low-risk groups: forgo antibiotics. If treating low-risk: 5 days

What about compliance?

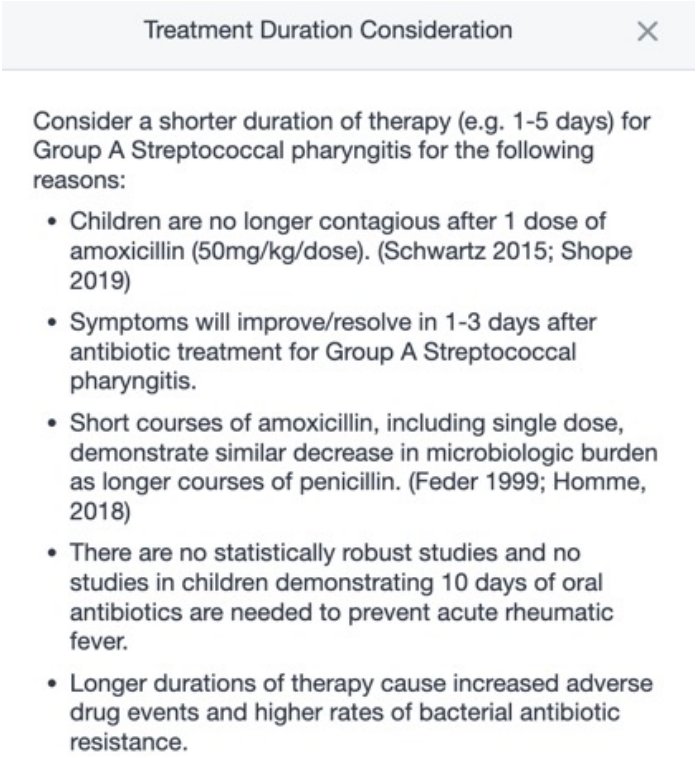
	n
Tonsillopharyngitis	231
Otitis media	170
Lower respiratory tract infection	114
Sinusitis	23

Duration of Treatment (Days)	Compliance	
	n	%
<7	47/63	74.6
7	116/147	78.9
>7–<10	47/74	63.5
≥10	196/300	65.3

- Chicago: RCT (2009-2015) for skin infection: full duration adherence (10d) was 38%
- Isreal: in GAS pharyngitis, most parents stop abx 1-2d after fever stopped
- Atlanta: 16% of parents store abx at home, most residual from previous prescription

Jorg 1999; Hoppe 1999; Daum 2017; Sarrell 2012; Bharath 2021

- Amox shortage → 5d
- 5 days studied in cephalosporins and accepted
- 10d is historical from 1940's when duration was studied
- ARF as outcome can only be studied in high risk populations. US to low.
- Other low-risk nations: 0 or 5d



Take Away Points

- Strep pharyngitis does not progress to iGAS
- GAS pathway at CHCO
- Children <3yo or with viral symptoms: no test
- Carriers often still carriers after tx → don't retest
- ARF incredibly rare
- Consider 5d durations

Thank you!

EXPLORE FIRSTLINE

Firstline

Nicole.Poole@ChildrensColorado.org

Children's Hospital Colorado
Here, it's different.

Affiliated with
University of Colorado
Anschutz Medical Campus

Speaker personal photo