2025 Clinical Practice Guideline Update by the Infectious Diseases Society of America on Group A Streptococcal (GAS) Pharyngitis: Risk assessment using clinical scoring systems in children and adults

Michael R. Wessels*,[1] Michael E. Watson, Jr.*,[2] Jeffrey A. Linder*,[3] Adam L. Cohen,[4] Danielle M. Carter,[5] Jennifer Dien Bard,[6] Guliz Erdem,[7] Christopher J. Gregory,[4] Athena P. Kourtis,[8] Judith M. Martin,[9] A. Brian Mochon,[10] Daniel Shapiro,[11] Ryan W. Stevens,[12] Dipleen Kaur+,[13] Miriam B. Barshak+[14]

*These authors contributed equally to the manuscript.

+These authors contributed equally to the manuscript

[1]Division of Infectious Diseases, Boston Children's Hospital, Harvard Medical School, Boston, MA, [2]Division of Pediatric Infectious Diseases, Department of Pediatrics, University of Michigan Medical School, Ann Arbor, MI, [3]Division of General Internal Medicine, Northwestern University Feinberg School of Medicine, Chicago, IL, [4]Division of Bacterial Diseases, Centers for Disease Control and Prevention, Atlanta, GA, [5]Ascension St. Vincent's Riverside, [6]Department of Pathology and Laboratory Medicine, Children's Hospital Los Angeles; Keck School of Medicine, University of Southern California, Los Angeles, CA, [7]Section of Infectious Diseases, Nationwide Children's Hospital and The Ohio State University, Columbus, Ohio, [8]Department of Obstetrics and Gynecology, Eastern Virginia Medical School, Norfolk, VA, [9]Department of Pediatrics, University of Pittsburgh School of Medicine, Pittsburgh, PA, [10]Division of Pathology and Laboratory Medicine, Phoenix Children's Hospital, Phoenix, AZ, [11]Departments of Emergency Medicine and Pediatrics, University of California, San Francisco, San Francisco, CA, [12]Department of Pharmacy Services, Mayo Clinic, Rochester, MN, [13]Clinical Affairs and Practice Guidelines, Infectious Diseases Society of America, Arlington, VA, [14]Infectious Diseases Division, Massachusetts General Hospital, Boston, MA

ABSTRACT

This publication represents the first part of an update to the clinical practice guideline on the diagnosis and management of group A streptococcal (*Streptococcus pyogenes* or GAS) pharyngitis, developed by the Infectious Diseases Society of America (IDSA). Diagnosis of GAS pharyngitis by clinician judgement alone is unreliable, and unselective testing incurs cost and inconvenience for individuals at low risk of having GAS infection. Clinical scoring systems have been used to quantify the probability of a positive GAS throat culture based on standardized criteria such as the presence of fever; tonsillar enlargement or exudate; tender and enlarged anterior cervical lymph nodes; and the absence of cough. The goal of this paper is to determine whether a scoring system should be used to decide which patients should have a diagnostic test performed by rapid antigen detection test (RADT), molecular methods, and/or throat culture. We performed a systematic review of randomized and non-randomized studies that compared the use of a clinical scoring system to clinician judgement alone in predicting the outcome of a throat culture. Evidence from studies in children and adults suggests the diagnostic accuracy of a clinical scoring system is comparable to or slightly higher than clinician judgement alone. However, the studies are limited due to small size, lack of uniformity in outcome measures, and incomplete data. The consensus of the panel is that the balance of benefits and harms favors use of a clinical

scoring system as part of the evaluation of patients with sore throat. The principal utility of using a scoring system is to identify patients with low probability of GAS pharyngitis and to reduce unnecessary testing.

Key words. Group A streptococcal pharyngitis, *Streptococcus pyogenes, strep* pharyngitis, clinical scoring system, risk assessment

In children and adults with sore throat, should a clinical scoring system be used to determine who should be tested for GAS?

Recommendation: In children and adults with sore throat, we suggest using a clinical scoring system to determine who should be tested for GAS *(conditional recommendation, very low certainty of evidence)*

Remarks:

1. High-risk individuals should be strongly considered for testing even if their clinical scores are low. Examples of high-risk individuals include those presenting with sore throat who have had household exposure to GAS (e.g., living or sleeping in the same indoor shared space as a person diagnosed with GAS infection), a history of a previous rheumatic fever diagnosis, or symptoms or signs suggestive of complicated local or systemic GAS infection (e.g., peritonsillar or retropharyngeal abscess, scarlet fever and/or toxic shock syndrome).
2. The panel recommends that a clinical scoring system be used as part of the evaluation of patients with sore throat. The principal utility of a scoring system is to identify patients with low probability of GAS pharyngitis, in whom further evaluation by diagnostic testing is unlikely to be helpful.
3. Given the lack of evidence favoring any particular scoring system, clinicians and patients may favor clinical scoring systems that do not include laboratory test(s).
4. The recommendation to use a scoring system does not apply to children under three years of age as GAS infection in this age group may not present with typical clinical features represented in these scoring systems *[Woods 1999]*.

*A **strong** recommendation means most informed people would choose the recommended course of action and* only a small proportion *would not.*

*A **conditional** recommendation means the majority of informed people would choose the suggested course of action, but* many *would not.*

INTRODUCTION

Group A *Streptococcus* (*Streptococcus pyogenes* or GAS) is the most common bacterial cause of acute pharyngitis *[Bisno 1996, Shaikh 2010]*. Diagnosis of GAS pharyngitis and initiation of appropriate antibiotic therapy is important for the prevention of acute rheumatic fever; for the prevention of suppurative complications (e.g., peritonsillar abscess, cervical lymphadenitis, mastoiditis, or more invasive disease); to minimize the risk of further GAS transmission; and to

enable a quicker return to school, work, and usual activities *[Gerber 2009]*. Antibiotic treatment of acute pharyngitis is primarily indicated for GAS infection, as treatment is of no proven benefit for most other pathogens (besides the rare cases of pharyngitis due to *Corynebacterium diphtheriae* and *Neisseria gonorrhoeae*). Accurate diagnosis of GAS pharyngitis is therefore important to avoid unnecessary antibiotic exposure and the associated expense and potential adverse effects of such therapy *[Gerber 2009, Shulman 2012, Barnett 2014]*. The diagnosis of GAS pharyngitis based on clinical judgement alone is unreliable *[Breese 1954, De Alencastro 2020, Nawaz 2000]*. It has been suggested that implementation of a standardized scoring system based on specified criteria (e.g., presence of fever, tonsillar exudate, tender and enlarged anterior cervical lymph nodes, and the absence of cough) could help to predict the likelihood of a positive throat culture for GAS among children aged 3 and older and adults presenting with sore throat *[Randolph 1970, Breese 1977, Centor 1981, Funamura 1983, Fuijikawa 1985, McIsaac 1998, Attia 2001,Woods 1999]*. The goal of this systematic review is to determine whether a clinical scoring system should be used to decide which patients should undergo laboratory testing (e.g., rapid antigen detection test (RADT), nucleic acid amplification test (NAAT), and/or throat culture) to evaluate for GAS infection.

The primary audience for this recommendation is clinicians evaluating and treating patients with suspected GAS pharyngitis.

METHODS

The panel's recommendation is based upon evidence derived from a systematic review and adheres to a standardized methodology for rating the certainty of evidence and strength of recommendation according to the GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) approach (Supplementary Figure 1) *[Guyatt 2008]*. The recommendation has been endorsed by the American Society for Microbiology (ASM) and the Society of Infectious Diseases Pharmacists (SIDP).

A strong recommendation means most informed people would choose the recommended course of action and only a small proportion would not. A conditional recommendation means the majority of informed people would choose the suggested course of action, but many would not.

A comprehensive literature search, with no start date and conducted through March 2025 was performed as part of a systematic review using the PICO (Patient/Population, Intervention, Comparison, Outcome) framework. Key eligibility criteria at both the overall topic (diagnosis of GAS pharyngitis) and clinical question (use of clinical scoring systems) levels guided the search and selection of studies for inclusion. For this question, we sought randomized and non-randomized studies published in English that compared use of a clinical scoring system to clinician judgement alone to determine which patients with sore throat should be tested for GAS. Studies focusing on the use of scoring systems to guide antibiotic prescriptions rather than testing, those not comparing against reference standards of throat culture or RADT, and those that did not report raw data needed to calculate sensitivities and specificities were excluded. For studies that reported non-standard definitions of sensitivity and specificity, we recalculated those outcomes using original data and standard methodologies to ensure consistent and accurate reporting across studies. Refer to the full list of eligibility criteria in the Supplementary Material.

A critical appraisal of the evidence according to the GRADE approach, along with an assessment of the benefits and harms of care options informed the recommendation(s) *[Guyatt 2008, IDSA*

Handbook]. Details of the systematic review and guideline development processes are available in the Supplementary Material.

SUMMARY OF EVIDENCE

Six observational studies were identified that met the inclusion criteria and assessed the accuracy of clinical scoring systems in determining who should be tested for GAS pharyngitis *[Breese 1977, Centor 1981, Funamura 1983, Fuijikawa 1985, McIsaac 1998, Attia 2001]*. All studies used throat culture as the reference standard. The scoring systems evaluated include those described by Breese, McIsaac, Centor, Attia, and Fujikawa *[Breese 1977, Centor 1981, Attia 1999, Fujikawa 1985].* One study *[McIsaac 1998]* reported data for combined pediatric and adult populations, as well as separately for each group. Four studies *[Breese 1977, Attia 2001, Funamura 1983, Fujikawa 1985]* focused exclusively on children and one study *[Centor 1981]* focused on adults.

Children

Three studies reported data on sensitivity and specificity outcomes among children *[Breese 1977, McIsaac 1998, Attia 2001]*. The scoring tools assessed in these studies include McIsaac, Breese and Attia *[Breese 1977, McIsaac 1998, Attia 1999]*. For the Attia 2001 study, we excluded data from the intermediate category due to lack of raw data to calculate sensitivity and specificity. Only definitive diagnosis from scores 0 and ≥4 categories were included in the forest plots. When compared to clinician judgement alone without using a scoring system, the scoring systems were found to have slightly better sensitivity (range, 0.83 – 0.97 versus 0.71 – 0.87) and comparable specificity (range, 0.60 – 0.72 versus 0.60 - 0.92).

Funamara et al did not report sensitivity and specificity; however, they found no significant difference between use of a scoring system and standard practice for correct diagnosis (70% vs 69%), false positive rate (20% vs 25%), positive predictive value (40% vs 44%), or negative predictive value (80% vs 75%) *[Funamara 1983]*. Similarly, Fujikawa et al found no significant difference in tentative diagnosis with use of a scoring system (54-93%) vs no scoring system (53.5%) *[Fujikawa 1985].*

Adults

Two studies compared the use of clinical scoring systems to clinician judgment alone in adults with sore throat. The first study *[Centor 1981]* reported the probability of a positive throat culture for GAS using a predictive model based on four clinical criteria: tonsillar exudates, swollen tender anterior cervical nodes, oral temperature above 101°F, and pharyngeal exudates. The probability of GAS was 2.5% with no criteria present, 6.5% with 1 criterion, 15% with 2, 32% with 3, and 55.7% with 4. The positive predictive value of a resident's (a physician trainee) guess was 36%.

The second study *[McIsaac 1998],* which used the same score as in Centor 1981, did not find significant differences among adult patients between using and not using the McIsaac scoring tool in sensitivity (0.70, 95% CI: 0.51–0.84 versus 0.68, 95% CI: 0.51–0.82) or specificity (0.98, 95% CI: 0.97–0.99 versus 0.97, 95% CI: 0.95–0.99).

Children and adults combined

McIsaac 1998 also reported on a combined population of children and adults, using a score that included age criteria, and found, compared to clinician judgement, the McIsaac scoring tool to have better sensitivity (0.83; 95% CI: 0.72 to 0.91 versus 0.69; 95% CI: 0.57 to 0.80) and comparable specificity (specificity – 0.94; 95% CI: 0.92 to 0.96 versus 0.97; 95% CI: 0.95 to 0.98).

Outcomes of the studies reviewed above are summarized in Table 1.

Table 1. Summary of Findings per Outcome for Studies Comparing Use of Clinical Scoring System vs. No Scoring System in Evaluation of Patients with Suspected GAS Pharyngitis

Outcome	No. of Studies, no. of patients*	Scoring tools evaluated	Scoring system	No scoring system
CHILDREN				
Sensitivity	3 studies [McIsaac 1998, Breese 1977, Attia 2001] 1309 patients	McIsaac, Breese and Attia	Range: 0.83 – 0.97 [Supplementary figure 4]	Range: 0.71 – 0.87 [Supplementary figure 4]
Specificity	3 studies [McIsaac 1998, Breese 1977, Attia 2001] 1309 patients	McIsaac, Breese and Attia	Range: 0.60 – 0.72 [Supplementary figure 4]	Range: 0.60 - 0.92 [Supplementary figure 4]
PPV[i]	1 [Funamura 1983] 892 patients	Breese	40%	44%
NPV[ii]	1 [Funamura 1983] 892 patients	Breese	80%	75%
Correct diagnosis[iii]	1 [Funamura 1983] 892 patients	Breese	70%	69%
Tentative diagnosis	1 [Fujikawa 1985] 271 patients	Fujikawa	54-93%	53.5%
False positive rate[iv]	1 [Funamura 1983] 892 patients	Breese	20%	25%
ADULTS				
Sensitivity	1 [McIsaac 1998] 423 patients	McIsaac score	0.70 (95%CI 0.51 - 0.84) [Supplementary figure 4]	0.68 (95% CI: 0.51–0.82) [Supplementary figure 4]
Specificity	1 [McIsaac 1998] 423 patients	McIsaac score	0.98 (95% CI: 0.97–0.99) [Supplementary figure 4]	0.97 (95% CI: 0.95–0.99) [Supplementary figure 4]
PPV	1 [Centor 1981] 286 patients	Centor score	2.5% - 55.7% (2.5% with no variables, 6.5% with 1 variable,	36%

			15% with 2 variables, 32% with 3 variables, & 55.7% with 4 variables)	
OVERALL POPULATION				
Sensitivity	1 [McIsaac 1998] 517 patients	McIsaac score	0.83 (95% CI: 0.72 - 0.91) [Supplementary figure 4]	0.69 (95% CI: 0.57 to 0.80) [Supplementary figure 4]
Specificity	1 [McIsaac 1998] 517 patients	McIsaac score	0.94 (95% CI: 0.92 to 0.96) [Supplementary figure 4]	0.97 (95% CI: 0.95 to 0.98) [Supplementary figure 4]

*The number of patients reflects the total across included studies and may vary between index and comparator arms due to missing or incomplete data

[i] PPV is the predictive value of a positive test referred to by the authors as the PVP (i.e., the likelihood that a patient with a score of 28 points or more will have a positive throat culture)

[ii] NPV is the predictive value of a negative test referred to by the authors as the PVN (i.e., the likelihood that a patient with a score of 27 or fewer points will have a negative throat culture)

[iii] Correct diagnosis defined as total number of correctly predicted positive and negative cultures

[iv] False positive rate is the per cent of patients with negative cultures who scored 28 or more points

The evidence supporting this recommendation is of very low certainty due to risk of bias (e.g., deriving and validating scoring tools on the same population, missing data and lack of blinding according to QUADAS-C assessment *[Yang 2021, McGuinness 2021]*), inconsistency in scoring tools used across studies, and imprecision due to wide confidence intervals. Refer to the Supplemental Materials for exact judgments affecting certainty of evidence for each outcome.

RATIONALE FOR RECOMMENDATION

Existing studies directly comparing the outcome of using a clinical scoring system versus usual clinical practice without a scoring system have limitations: small sample size, lack of uniformity in outcome measures, incomplete data, and not contemporary. Evidence from studies in children and adults suggest diagnostic accuracy is comparable or slightly higher with the use of a scoring system as compared to clinician judgement alone. In addition, the derivation and validation studies of the Centor *[Centor et al, 1981; Wigton et al, 1986]* and McIsaac *[McIsaac et al, 1998; McIsaac et al, 2000]* criteria, and particularly the large validation study of both systems by Fine et al *[Fine 2012]* provide robust estimates of the probability of a positive rapid test or throat culture for GAS associated with all possible scores of the Centor or McIsaac scoring systems (see Table 2 below, reproduced from Fine et al) *[Fine 2012].* These two scoring systems are nearly identical, with the only significant difference between them being that McIsaac adds an age criterion. As the two systems have similar performance characteristics *[Willis 2020, Kanagasabai 2024*], both have been validated, and neither requires a blood test, the panel suggests that either one would be an appropriate choice as a clinical decision-making aid.

A third clinical decision-making aid, the FeverPAIN score (*Fever*, *P*urulence, *A*ttended rapidly (≤3d), severely *I*nflamed tonsils, and *N*o cough or coryza), which is recommended by some guidelines, was derived to predict throat swab positivity for groups A, C, and G streptococci *[Little 2013, Little 2013, Seelay 2021, NICE Guideline]*. We did not find evidence comparing the FeverPAIN score to clinician judgement and could not include this scoring system in our analysis.

Table 2. Percentages of Patients Testing Positive for GAS by Clinical Score in National Retail Health Data Compared with Published Data

Centor score	Retail Health Data, Patient Age ≥15 y (n= 142081) % [95% CI]	Centor et al 1981 Derivation Study *[Centor 1981]* (n = 286) % [95% CI]	Wigton et al 1986 Validation Study *[Wigton 1986]* (n=516) % [95% CI]
0 (n= 13603)	7 (7-8)	3 (0-16)	3 (0-14)
1 (n= 45080)	12 (11-12)	7 (2-14)	14 (9-21)
2 (n= 47167)	21 (21-22)	16 (8-27)	23 (17-30)
3 (n= 26769)	38 (38-39)	34 (20-46)	45 (36-54)
4 (n= 9462)	57 (56-58)	56 (35-77)	54 (42-67)
Overall	23 (22-23)	17 (14-23)	26 (24-32)
McIsaac Score	**Retail Health Data, Patient Age ≥3 y (n= 206870) % [95% CI]**	**McIsaac et al 1998 Derivation Study *[McIsaac 1998]* (n = 521) % [95% CI]**	**McIsaac et al 2000 Validation Study *[McIsaac 2000]* (n=619) % [95% CI]**
0 (n=23229)	8 (8-9)	3 (1-6)	1 (0-4)
1 (n= 47083)	14 (13-14)	5 (2-10)	10 (6-16)
2 (n= 59130)	23 (23-23)	11 (6-19)	17 (11-25)
3 (n= 47234)	37 (37-37)	28 (18-41)	35 (25-45)
4 (n= 30084)	55 (55-56)	53 (40-66)	51 (40-62)
Overall	27 (27-27)	14 (11-17)	17 (14-20)

Reproduced with permission from Fine AM, Nizet V, Mandl KD. Arch Intern Med. 2012;172(11):847–852

The panel recommends that a clinical scoring system be used to identify patients with low probability of GAS pharyngitis, in whom further evaluation by diagnostic testing is unlikely to be helpful (e.g., a high risk of false positive testing in a low probability patient) or change clinical management. Use of a clinical scoring system can assist the clinician by providing a quantitative

estimate of the probability of a positive throat culture in an individual patient. Such estimates can be a valuable part of clinical decision-making regarding the need for further testing by RADT, NAAT, or throat culture, together with consideration of individual risk factors, local epidemiology, costs of testing and treatment, and patient and family preferences *[Daniels 2024, Gunnarsson 2023, Gunnarson 2022]*.

While studies have not addressed the impact of scoring systems on health care equity, the use of a scoring system may be expected to decrease risks of implicit or other biases by encouraging consistent and standardized decision-making regarding testing for GAS. Minimal direct harm is anticipated from implementing such a system. Implementation costs are expected to be low. The consensus of the panel is that the balance of benefits and harms favors implementation of a clinical scoring system as part of the evaluation of patients with sore throat.

IMPLEMENTATION CONSIDERATIONS

Using a scoring system with a favorable negative predictive value could reduce unnecessary testing (RADT, NAAT, and/or throat culture) and avoid unnecessary antibiotic use in patients with a low risk of GAS infection *[McIsaac 1998]*. Although we did not find contemporary cost-effectiveness analyses, to the extent that use of a scoring system reduces additional diagnostic testing and/or empiric treatment and antibiotic adverse effects, its use is expected to be cost saving *[Cebul 1986, Neuner 2003, Little 2013, Giraldez-Garcia 2011]*.

Patients and families are likely to have a range of values/preferences that could influence potential uses of a scoring system. For example, some will be reassured by a relatively low likelihood of GAS infection and the generally favorable outcome of GAS pharyngitis even without specific treatment, whereas others might prefer diagnostic testing even if the risk of infection is low.

The advantage of using a clinical scoring system is to avoid diagnostic testing in adults and children who are more likely to have a viral etiology for their current symptoms. Up to 26% of school-aged children may be colonized with GAS and are considered carriers *[Shaikh 2010]*. These children will test positive using standard diagnostic testing measures. However, these children generally do not require antimicrobial treatment for acute GAS pharyngitis. Using a clinical scoring system may help to avoid testing and treatment of children who are carriers at low risk of developing complications, including acute rheumatic fever.

The clinical scoring systems reported here were developed in eras when throat cultures were the gold standard for comparison. Modern day clinical practices are very different with most patients undergoing testing by rapid antigen testing or nucleic acid-amplification assays, with relatively few patients having cultures performed. The authors of this guideline acknowledge that limited data exist regarding the performance characteristics of these established scoring systems with our current clinical practice models. In addition, many patients with complaints of sore throat are pre-screened and tested immediately upon presentation to many ambulatory care settings prior to being evaluated by the primary clinician. Rather than unselected testing of patients with sore throat, we recommend workflow changes and the use of a clinical scoring system to identify low risk patients who do not require testing.

The following table (Table 3) lists examples of clinical scoring systems and their associated criteria that clinicians could consider using to help predict the likelihood of pharyngitis due to GAS.

Table 3. Clinical Scoring for Predicting Group A Streptococcal Pharyngitis						
Feature	**Centor**	**Score**	**McIsaac**	**Score**	**FeverPAIN***	**Score**
Viral Symptoms	Absence of Cough	1	Absence of Cough	1	Absence of Cough or Coyrza	1
Cervical Adenopathy	Swollen tender anterior cervical nodes	1	Swollen tender anterior cervical nodes	1	N/A	
Fever	≥100.4°F (38°C)	1	≥100.4°F (38°C)	1	Febrile in past 24 h	1
Tonsillar Appearance	Tonsillar Exudate or swelling	1	Tonsillar Exudate or swelling	1	Inflamed Tonsils Purulent Tonsils	1 1
Duration	N/A		N/A		<3 days since symptom onset	1
Age	N/A		3 y – 14 y 15 y – 44 y ≥45 y	1 0 -1	N/A	
Risk Stratification	**Points**	**% Strep**	**Points**	**% Strep**	**Points**	**% Strep**
Low Risk	0-1	7-12%	0-1	7.6-13.1%	0-1	1-10%
Intermediate Risk	2-3	21-38%	2-3	20.8-33.6%	2-3	11-35%
High Risk	4	57%	4-5	50.7-69.3%	4-5	51%-53%

* We did not find evidence that FeverPAIN has been compared to clinician judgement alone and therefore we did not include this scoring system in our analysis.

Columns show three scoring systems and the clinical features included in calculating the risk of testing positive for detection of GAS for each accumulated score (% Strep).

Adapted and reprinted with permission from Jennifer L. Hamilton, MD, PhD, and Leon McCrea, II, MD, MPH. Streptococcal Pharyngitis: Rapid Evidence Review, Am Fam Physician. © 2024 American Academy of Family Physicians. All Rights Reserved."

RESEARCH NEEDS

A more confident assessment of the value of a clinical scoring system will depend on the results of additional research. The field would benefit from contemporary, well designed, adequately powered, prospective, randomized, controlled trials comparing the use of a standardized clinical scoring system with clinician judgement alone in patients with sore throat. In addition, the role of AI and clinical scoring systems remains to be evaluated.

Acknowledgments

First, we would like to acknowledge the previous panel, under the leadership of Stanford Shulman, for their work on the previous iteration of this larger guideline. The panel would like to acknowledge the contributions of Elizabeth Kiscaden and Mary Beth McAteer, medical librarians, for the creation and execution of

question-specific literature searches. Hannah Rehm provided project coordination. The panel would also like to acknowledge the following selected external reviewers for their thoughtful review of the draft manuscript: Drs. Paul Lantos, Mark Pasternack, and Sarah Parker.

Miriam B. Barshak is the chair of GAS pharyngitis panel. Jeffrey Linder, Michael Watson, and Michael Wessels served as clinical leads for the questions addressed in this manuscript. Remaining panelists assisted with conception and design of the analysis, interpretation of data, drafting and revising the recommendations and manuscript, and final approval of the recommendations and manuscript to be published. Dipleen Kaur, methodologist, was responsible for general project management, organizing and presenting the data, and leading the panel according to the GRADE process.

Disclaimer: It is important to recognize that guidelines cannot always account for individual variation among patients. They are assessments of current scientific and clinical information provided as an educational service; are not continually updated and may not reflect the most recent evidence (new evidence may emerge between the time information is drafted and when it is published or read); should not be considered inclusive of all proper methods of care, or as a statement of the standard of care; do not mandate any course of medical care; and are not intended to supplant clinician judgment with respect to particular patients or situations. Whether to follow guidelines and to what extent is voluntary, with the ultimate determination regarding their application to be made by the clinician in the light of each patient's individual circumstances. While IDSA makes every effort to present accurate, complete, and reliable information, these guidelines are presented "as is" without any warranty, either express or implied. IDSA (and its officers, directors, members, employees, and agents) assume no responsibility for any loss, damage, or claim with respect to any liabilities, including direct, special, indirect, or consequential damages, incurred in connection with these guidelines or reliance on the information presented.

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Financial support. This work was supported by the Infectious Diseases Society of America.

Possible conflicts of interest. Evaluation of relationships as potential conflicts of interest is determined by a review process. The assessment of disclosed relationships for possible COIs is based on the relative weight of the financial relationship (i.e., monetary amount) and the relevance of the relationship (i.e., the degree to which an association might reasonably be interpreted by an independent observer as related to the topic or recommendation of consideration). The following panelists have reported relationships unrelated to the topic of Strep with indicated companies. M.R.W. served as a scientific advisor for Leduq Foundation; received research funding from NIAID; received author compensation from McGraw Hill; received author and editor compensation from UpToDate; and receives research funding from NIH. M.E.W. served as an advisor for BioFire Diagnostics, LLC; served as an honoraria for BioFire Diagnostics, LLC; served as a promotional (non- CME) speakers bureau for BioFire Diagnostics, LLC; receives research funding from NIH/NIAID; serves as Fellowship Awards Committee member for Pediatric Infectious Diseases Society. J.A.L. owns stock holding/Investment with Amgen, Biogen, and Eli Lilly; received funding from the National Institutes of Health, the Agency for Healthcare Research and Quality; and serves as a Fellowship Awards Committee Member for PIDS. D.M.C. served as a honoraria for American Academy of Family

Physicians; receives research funding from Florida Perinatal Quality Collaborative; served as a board Member, Finance Committee, Congress of Delegates and Vice President for Florida Academy of Family Physicians; and serves as an advisory board member for Winston YMCA; serves as a member of the Commission of Health of the Public and Science for the American Academy of Family Physician; served as a member of the Steering Committee for Florida Perinatal Quality Collaborative. J.D.B. served as a scientific advisor for bioMerieux, Genetic Signature, Thermo Fisher Scientific, BD and Clear Labs; received research funding from Abbott Molecular, bioMérieux, BioFire Defense, Cepheid, Diasorin, and Hologic; received an organizational benefit from The Saban Research Institute; served on the CARB-X advisory board; served as Chair of Personnel Standards and Workforce subcommittee for American Society of Microbiology; served as member of methods development and standardization working group for CLSI; serves as member of Diagnostic Committee for ARLG; serves as a member of Professional Relations Committee for Association for Molecular Pathology; serves as a member of the Diagnostic Centers of Excellence subcommittee for American Society of Microbiology; serves as member of the Clinical Microbiology Open steering committee for American Society of Microbiology; serves as a Microbiology Commitee member for College of American Pathologist; serves as Editor for Journal of Clinical Microbiology and for Clinical Microbiology Newsletter journal; serves as Associate Editor for Journal of Clinical Virology. G.E. served as a board member for the Pediatric Infectious Disease Society; serves as a board member for World Society for Pediatric Infectious Diseases and for Section on Infectious Diseases. J.M.M. served as an advisor for Merck, Sharp and Dohme; received research funding from CDC and Allegheny County Health Department and Moderna; receives research funding from NIH, CDC, and Vaxcyte. A.B.M. served as a consultant for Mira Vista Diagnostics; served as Vice Chair of Evidence-based Laboratory Medicine Practice Guidelines (EBLMPG) Committee for American Society of Microbiology; served as a member of the Microbiology Advisory Board for Shionogi; serves on the Editorial Board for JCM and as the Subcommittee Chair on the Evidence-based Laboratory Medicine Practice Guideline for American Society of Microbiology. R.S. served as a podcast panelist for Society of Infectious Diseases Pharmacists; and participated in a lecture at the 2025 Antimicrobial Stewardship Summit for Alaska Hospital and Healthcare Association. D.S. receives research funding from PCORI. M.B.B. owned stocks/bonds with Viatris; owns stocks/bonds with Boston Scientific, and Danaher; receives royalty from UpToDate; serves as a board member for Massachusetts ID society. The following panelists have advisory roles related to the topic of Strep with indicated companies: J.D.B. served on the research advisory panel for bioMerieux (concluded), M.B. owned stocks/bonds with Pfizer (concluded prior to joining the panel). No disclosures were reported from E.K., A.C., C.G., and A.K. All other authors: No disclosures reported.

Additional Information: More detailed information on the analysis and development of recommendations is available in the Appendix.

REFERENCES

1. Woods WA, Carter CT, Schlager TA. Detection of group A streptococci in children under 3 years of age with pharyngitis. Pediatr Emerg Care. 1999 Oct;15(5):338-40. doi: 10.1097/00006565-199910000-00011. PMID: 10532665.
2. Bisno AL. 1996. Acute pharyngitis: etiology and diagnosis. Pediatrics 97:949–54.
3. Shaikh N, Leonard E, Martin JM. Prevalence of streptococcal pharyngitis and streptococcal carriage in children: a meta-analysis. Pediatrics. 2010 Sep;126(3):e557-64. doi: 10.1542/peds.2009-2648.
4. Gerber M. A., Baltimore R. S., Eaton C. B., Gewitz M., Rowley A. H., Shulman S. T., et al. 2009. Prevention of rheumatic fever and diagnosis and treatment of acute Streptococcal pharyngitis: a scientific statement from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee of the Council on Cardiovascular... Circulation;119(11):1541–1551.
5. Barnett ML, Linder JA. Antibiotic prescribing to adults with sore throat in the United States, 1997-2010. *JAMA Intern Med*. 2014;174(1):138-140. doi:10.1001/jamainternmed.2013.11673
6. Shulman S. T., Bisno A. L., Clegg H. W., Gerber M. A., Kaplan E. L., Lee G., et al. 2012. Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012

update by the Infectious Diseases Society of America. Clinical Infectious Diseases;55(10):e86–e102.
7. Breese BB, Disney FA. 1954. The accuracy of diagnosis of beta streptococcal infections on clinical grounds. J Pediatr. Jun;44(6):670-3.
8. De Alencastro L, Locatelli I, Clair C, Ebell MH, Senn N. Correlation of clinical decision-making with probability of disease: A web-based study among general practitioners. *PLoS One*. 2020;15(10):e0241210. doi:10.1371/journal.pone.0241210.
9. Nawaz H, Smith DS, Mazhari R, Katz DL. Concordance of clinical findings and clinical judgment in the diagnosis of streptococcal pharyngitis. *Acad Emerg Med*. 2000;7(10):1104-1109. doi:10.1111/j.1553-2712.2000.tb01259.x
10. Randolph MF, Redys JJ, Hibbard EW: Streptococcal pharyngitis: I Correlation of cultures with clinical criteria. Del Med J 42:29-34, 1970
11. Breese BB. A simple scorecard for the tentative diagnosis of streptococcal pharyngitis. Am J Dis Child 1977;131:514–17.
12. Centor RM, Witherspoon JM, Dalton HP, et al. The diagnosis of strep throat in adults in the emergency room. Med Decis Making 1981;1:239–46.
13. Funamura JL, Berkowitz CD. Applicability of a scoring system in the diagnosis of streptococcal pharyngitis. Clin Pediatr 1983;22:622–6.
14. Fujikawa S, Ito Y, Ohkuni M. A new scoring system for diagnosis of streptopharyngitis. Jpn Circ J 1985;49:1258-61.
15. McIsaac WJ, White D, Tannenbaum D, et al. A clinical score to reduce unnecessary antibiotic use in patients with sore throat. CMAJ 1998;158:75–83.
16. Attia MW, Zaoutis T, Klein JD, et al. Performance of a predictive model for streptococcal pharyngitis in children. Arch Pediatr Adolesc Med 2001;155:687–91
17. Guyatt GH, Oxman AD, Vist GE, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. BMJ 2008; 336:924–6.
18. Infectious Diseases Society of America. IDSA Handbook on Clinical Practice Guideline Development. Available at: https://www.idsociety.org/practice-guideline/clinical-practice-guidelines-development-training-and-resources/. Accessed 01/03/2024.
19. Attia M, Zaoutis T, Eppes S, et al. Multivariate predictive models for group A beta-hemolytic streptococcal pharyngitis in children. Acad Emerg Med 1999;6:8–13.
20. Yang B, Mallett S, Takwoingi Y, et al. QUADAS-C: A Tool for Assessing Risk of Bias in Comparative Diagnostic Accuracy Studies. Ann Intern Med. 2021;174(11):1592-1599. doi:10.7326/M21-2234
21. McGuinness LA, Higgins JPT. Risk-of-bias VISualization (robvis): an R package and Shiny web app for visualizing risk-of-bias assessments. Res Synth Methods 2021; 12:55–61
22. Wigton RS, Connor JL, Centor RM. Transportability of a decision rule for the diagnosis of streptococcal pharyngitis. Arch Intern Med. 1986 Jan;146(1):81–83.
23. McIsaac, Warren & Goel, Vivel & To, Teresa & Low, Donald. (2000). The Validity of a Sore Throat Score in Family Practice. 163. 811-815.
24. Fine AM, Nizet V, Mandl KD. Large-scale validation of the Centor and McIsaac scores to predict group A streptococcal pharyngitis. Arch Intern Med. 2012 Jun 11;172(11):847-52.
25. Willis BH, Coomar D, Baragilly M. Comparison of Centor and McIsaac scores in primary care: a meta-analysis over multiple thresholds. Br J Gen Pract. 2020;70(693):e245-e254. doi:10.3399/bjgp20X708833
26. Kanagasabai A, Evans C, Jones HE, Hay AD, Dawson S, Savović J, Elwenspoek MMC. Systematic review and meta-analysis of the accuracy of McIsaac and Centor score in patients presenting to secondary care with pharyngitis. Clin Microbiol Infect. 2024 Apr;30(4):445-452.
27. Little P, Hobbs FDR, Moore M, et al. Clinical score and rapid antigen detection test to guide antibiotic use for sore throats: randomised controlled trial of PRISM (primary care streptococcal management). *BMJ*. 2013;347:f5806. doi:10.1136/bmj.f5806
28. Little P, Moore M, Hobbs FDR, et al. PRImary care Streptococcal Management (PRISM) study: identifying clinical variables associated with Lancefield group A β-haemolytic streptococci and Lancefield non-Group A streptococcal throat infections from two cohorts of patients presenting with an acute sore throat. BMJ Open. 2013;3(10):e003943. doi:10.1136/bmjopen-2013-003943
29. Seeley A, Fanshawe T, Voysey M, Hay A, Moore M, Hayward G. Diagnostic accuracy of Fever-PAIN and Centor criteria for bacterial throat infection in adults with sore throat: a secondary analysis of a randomised controlled trial. BJGP Open. 2021;5(6). doi:10.3399/BJGPO.2021.0122

30. Recommendations | Sore throat (acute): antimicrobial prescribing | Guidance | NICE. NICE guideline [NG84] Published: 26 January 2018. Accessed January 13, 2025. https://www.nice.org.uk/guidance/ng84/chapter/Recommendations#managing-acute-sore-throat
31. Daniels R, El Omda T, Mokbel K. Improving antimicrobial stewardship in acute sore throat: Comparison of FeverPAIN and McIsaac scores with molecular point of care testing using Abbott ID NOW. *Diagnostics (Basel)*. 2024;14(23):2680. doi:10.3390/diagnostics14232680
32. Gunnarsson RK, Ebell M, Centor R, et al. Best management of patients with an acute sore throat - a critical analysis of current evidence and a consensus of experts from different countries and traditions. *Infect Dis*. Published online March 27, 2023:1-12. doi:10.1080/23744235.2023.2191714
33. Gunnarsson R, Orda U, Elliott B, Heal C, Del Mar C. What is the optimal strategy for managing primary care patients with an uncomplicated acute sore throat? Comparing the consequences of nine different strategies using a compilation of previous studies. *BMJ Open*. 2022;12(4):e059069. doi:10.1136/bmjopen-2021-059069
34. Cebul RD, Poses RM. The comparative cost-effectiveness of statistical decision rules and experienced physicians in pharyngitis management. *JAMA*. 1986;256(24):3353-3357.
35. Neuner JM, Hamel MB, Phillips RS, Bona K, Aronson MD. Diagnosis and management of adults with pharyngitis. A cost-effectiveness analysis. Ann Intern Med. 2003 Jul 15;139(2):113-22. doi: 10.7326/0003-4819-139-2-200307150-00011. PMID: 12859161
36. Giraldez-Garcia, C., Rubio, B., Gallegos-Braun, J. F., Imaz, I., Gonzalez-Enriquez, J., & Sarria-Santamera, A. (2011). Diagnosis and management of acute pharyngitis in a paediatric population: a cost–effectiveness analysis. *European journal of pediatrics*, *170*, 1059-1067.
37. Hamilton & McCrea. 2024. Am Fam Physician. 2024; 109(4): 343-349