A clinical prediction model did well in diagnosing pediatric group A β-hemolytic streptococcal pharyngitis

Attia MW, Zaoutis T, Klein JD, Meier FA. **Performance of a predictive model for streptococcal pharyngitis in children.** Arch Pediatr Adolesc Med. 2001 Jun;155:687-91.

QUESTION

In children with suspected group A β-hemolytic streptococcal (GABHS) pharyngitis, how well does a prediction model predict a positive throat culture?

DESIGN

1-year validation of a previously derived prediction model.

SETTING

Pediatric emergency department and 2 pediatric outpatient clinics in Wilmington, Delaware, USA.

PATIENTS

587 children (mean age 6.8 y, 51% girls) who had signs and symptoms of acute pharyngitis. Exclusion criteria were antibiotic therapy within 5 days of enrollment.

DESCRIPTION OF PREDICTION GUIDE

During the clinical evaluation, the examining physician recorded 4 variables from the tested model: cervical lymphadenopathy, tonsillar swelling (2-category severity scale: absent or mild and moderate or severe), coryza, and scarletiniform rash (present or absent). 2 tonsillopharyngeal specimens were collected for each patient for serotyping (diagnostic standard) and a rapid streptococcal antigen detection test. Furthermore, the physician made a subjective probability estimate for a GABHS-positive throat culture result (11-point scale: 0 = most unlikely and 10 = extremely likely).

MAIN OUTCOME MEASURES

A performance score was calculated for the prediction model ranging from 0 to 5, with higher scores indicating more severe presentation of the clinical feature. Sensitivity, specificity, likelihood ratios, and post-test probability were calculated for cutoff points of the performance score.

MAIN RESULTS

218 children (37%) had positive culture results for GABHS. The prediction model did better than the physicians' probability estimates and was comparable to the rapid antigen detection test (Table). The model did not differ in performance according to setting (emergency department vs outpatient clinic) or study period (in season [January to March] vs off season [April to December]).

CONCLUSION

In children with suspected group A β-hemolytic streptococcal pharyngitis, a clinical prediction model predicted a positive throat culture as well as a rapid antigen detection test and better than subjective estimation by physicians.

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Validation at 1 year of a prediction model for diagnosing pediatric group A β-hemolytic streptococcal pharyngitis*

Assessment tool	Sensitivity (95% CI)	Specificity (CI)	+LR	–LR	PP (CI)
Prediction model†					
Score 0	99% (96 to 100)	5% (3 to 7)	1.0	0.2	0.12 (0.02 to 0.3)
Score 1 to 3	81% (75 to 86)	7% (5 to 10)	0.9	2.5	0.36 (0.3 to 0.4)
Score ≥ 4	17% (13 to 27)	98% (94 to 99)	5.9	0.8	0.79 (0.6 to 0.9)
Subjective score 6 to 10	75% (68 to 80)	56% (51 to 62)	1.7	0.5	0.52 (0.5 to 0.6)
Rapid antigen test	86% (81 to 91)	91% (87 to 94)	9.6	0.1	0.85 (0.8 to 0.9)

*Abbreviations and diagnostic terms defined in Glossary.
†Higher scores of the prediction model equal more severe presentation of the clinical feature.

COMMENTARY

The study by Attia and colleagues shows that clinicians are not good at estimating the presence of GABHS pharyngitis in symptomatic children (only about 50% of those subjectively estimated as being "strep positive" had a positive GABHS throat culture result). The simple predictive model described here is much more accurate (post-test probability of 79%) and almost as good as a rapid antigen test (post-test probability of 85%). Such results should encourage us to use the model for deciding on management: It is easy to use, quick, and cheaper than the rapid antigen test. However, one interesting finding from this well-conducted study was the high culture rate in the control group (children with no sore throat, being seen for other reasons) (15%) compared with that in children with symptoms (37%). In children with a strep-positive culture result, distinguishing the carrier state from infection remains difficult. This is a weakness of the study, unlike the study by Dagnelie and colleagues (1) in which a better measure of infection—a 4-item model (cough, exudate on the throat, fever, and neck lymph nodes)—was also compared with anti-streptolysin-O titers.

But let us step back a moment. Why is accurate diagnosis of streptococcal sore throat and its differentiation from other causes of sore throat important? It enables us to treat "strep throat" with antibiotics to prevent acute rheumatic fever (ARF), acute glomerulonephritis, and suppurative complications and to shorten the illness or decrease its severity.

But in many areas, ARF is so rare that treating it might create as much risk from the antibiotics as there is from the disease. And the symptomatic benefits of antibiotics are so modest (2) that alternative, nonantibiotic treatment (3) may be as good if not better.

Perhaps we should think carefully about what we intend to do once we diagnose GABHS before worrying too much about how to diagnose it. Only in clinical settings where ARF is common (e.g., developing countries) (4) or in patients with special concerns for symptomatic relief, should we concern ourselves with deciding the cause. After all, sore throats get better spontaneously.

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References

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