

Appropriateness of Group A Beta-Hemolytic Streptococcal Testing in an Ambulatory Pediatric Setting

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Abstract: Acute pharyngotonsillitis is a common infection in children and one of the leading reasons for antibiotics prescription in children. Molecular point of care testing (MPOC) testing for Group A Beta Hemolytic Streptococcal (GABHS) pharyngitis has been very helpful in timely diagnosis of streptococcal pharyngitis and ultimately its treatment, for delay or lack of treatment could lead to complication of the disease. The purpose of this retrospective study in which we reviewed the charts of children and adolescents who had MPOC tests for GABHS in 2023 was to determine the appropriateness of MPOC testing for GABHS in children and adolescents.

Our results showed that children younger than 3 years of age were less likely to have streptococcal pharyngitis compared to older children and adolescent. Hence, testing children younger than 3 years old is not recommended, except that is history of exposure to someone with streptococcal pharyngitis. Also, children and adolescents with viral features, such as cough, congestion, runny nose, eye discharge or viral exanthem, should not be tested for GABHS because they are more likely to have negative test results. It is imperative to have appropriate GABHS testing to improve antibiotic stewardship and reduce unnecessary health care cost.

Keywords: Molecular Point of Care (MPOC) test, Group A Beta Hemolytic Streptococcus (GABHS), antibiotics, acute pharyngotonsillitis.

1. INTRODUCTION

Acute tonsillo-pharyngitis, an infection of the pharynx and/or tonsils, is one of the most common illnesses in the pediatric population and often necessitating consultation with a health care provider.¹ It is actually one of the leading causes of presentation at health care facility world-wide, afflicting about 450 million children annually.¹ Although most cases are viral in origin—caused by pathogens such as adenovirus, rhinovirus, and coronavirus, Group A beta-hemolytic streptococcus (GABHS), also known as *Streptococcus pyogenes*, accounts for approximately 15–30% of sore throat cases in children, making it the most common bacterial etiology. Other bacterial causes include Group C *Streptococcus*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, and anaerobes.^{1,2}

Typical signs and symptoms for GABHS pharyngitis may include high-grade fever, sore throat, tonsillar exudates, palatal petechiae, malaise, and tender anterior cervical lymphadenopathy.³⁻⁵ However, clinical features alone are not reliable for diagnosing GABHS pharyngitis as viral pharyngitis may be associated with some of these features as well. While supportive care remains the cornerstone of treatment for viral pharyngitis, GABHS pharyngitis requires antimicrobial therapy to prevent complications like acute rheumatic fever and rheumatic heart disease.³⁻⁵ Hence, the use of molecular point-of-care (MPOC) testing for GABHS, using throat swabs, provides rapid and easy to perform and convenient diagnosis with turnaround times of less than 15 minutes. Due to its high sensitivity and specificity, throat culture for GABHS, which normally takes 1-2 days to have result becomes unnecessary. It is pertinent that GABHS pharyngo-tonsillitis is promptly diagnosed or ruled out, while a positive test result allows for prompt prescription and use of antimicrobials to prevent suppurative and non-suppurative complications of GABHS while a negative test result would deter antibiotic use.^{4,5} This helps not only to reduce unnecessary use of antibiotics, it also helps to reduce the risk of adverse drug effects of antibiotics, antibiotics resistance and ultimately, health care expenditure. The use of MPOC testing has been shown to reduce the rate

of antibiotic prescription. However, the American Academy of Pediatrics (AAP) and the Infectious Diseases Society of America (IDSA) recommend against GABHS testing in patients who exhibit viral features.⁶⁻⁷ Thus, current guidelines would advocate that MPOC testing should be limited to patients with suspected GABHS infection, and not those with signs suggestive of a viral illness, such as cough, nasal congestion, runny nose, eye discharge or viral exanthem.^{6,7}

The objectives of this study were to determine the prevalence of GABHS among children less than 3 year, determine the proportion of children and adolescents with viral features undergoing GABHS testing and to assess the appropriateness of GABHS testing in children and adolescents at a tertiary care institution, University of Iowa Health Care (UIHC).

2. METHODS

We conducted a retrospective chart review of children and adolescents under 21 years of age who underwent MPOC testing for GABHS in 2023. These patients were seen in UIHC-affiliated urgent care centers, family medicine, and pediatric clinics. Throat swab specimens were analyzed using MPOC tests for GABHS with a sensitivity of 95% and specificity >90%. Due to the high sensitivity of the test, negative results did not require confirmatory throat cultures.

From this population, a random sample of 10% of patient charts was selected for detailed review. Data extracted included age, sex, presenting symptoms, and MPOC test results for GABHS. If the GABHS test had been performed in the presence of viral features, such as cough, nasal congestion, rhinorrhea, viral exanthem, eye discharge, or conjunctival injection, regardless of the presence of sore throat, then we classified the test as “inappropriate”.

Statistical analysis was performed using descriptive statistics (proportions and percentages), a two-proportion z-test for age-group comparison, and a chi-square test to assess differences in test positivity between appropriately and inappropriately tested patients. A $p < 0.05$ was considered statistically significant.

3. RESULTS

In total, 7,546 MPOC tests for GABHS were performed in 2023, with 2,034 (26.9%) testing positive. The male-to-female ratio was 1:1.2. When stratified by test locations, GABHS positivity at urgent care centers, family medicine clinics and pediatric clinics were 28 % (6535), 23.2 % (289) and 18.8 % (722) respectively. There is statistically significant difference in GABHS positivity among the three locations. ($X^2 = 12.93$, $df=2$, $p= 0.0016$). This suggests that test positivity varies considerably/significantly by clinical setting, with urgent care center having the highest likelihood of positive GABHS test. (fig 1).

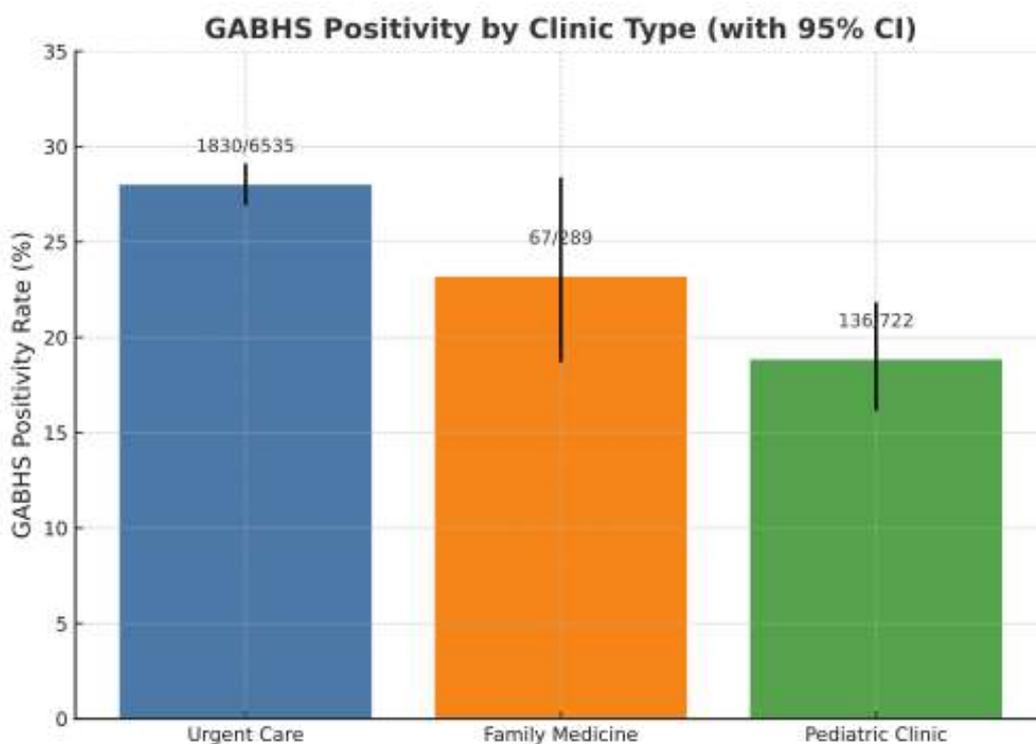
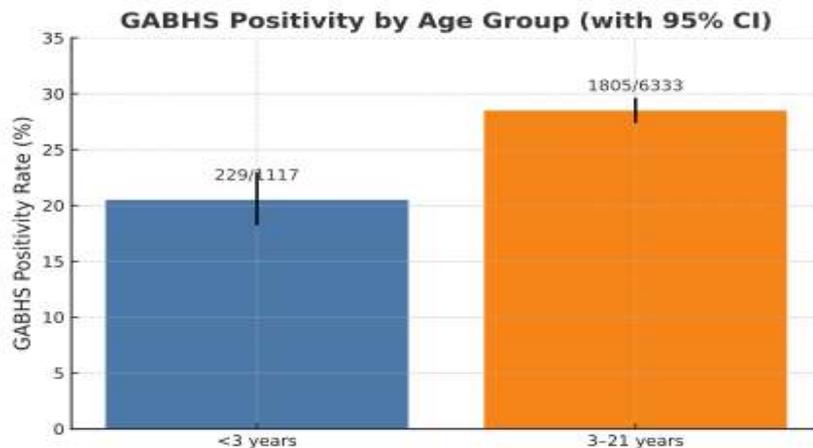


Fig 1

Among children under 3 years of age, 229 (20.5%) tested positive for GABHS, while 1,805 (28.5%) of those aged 3–21 years tested positive (fig 2). A two-proportion z-test revealed a statistically significant difference in positivity between these age groups ($z = -2.56, p 0.014$), indicating that children aged 3–21 years were significantly more likely to test positive for GABHS.



From the 10% chart sample (800 patients) that was randomly selected, GABHS testing was deemed inappropriate in 76.5% (610 patients) due to the presence of viral features such as cough, congestion, runny nose, viral exanthem or conjunctivitis. Cough and rhinorrhea were the most identified viral features, present in 87.4% of inappropriately tested patients. Viral exanthem was the least common, observed in 0.7%. The GABHS positivity rate for the inappropriately tested group was 18% (111 patients). In contrast, for the 23.5% (188 patients) of the chart sample that was deemed appropriate, the positivity rate was 55.8% (105 patients). This difference in positivity between the appropriately and inappropriately tested patients was statistically significant (chi-square test, $\chi^2 = 103.29, p < 0.000$).

4. DISCUSSION

Sore throat remains a common reason for pediatric outpatient visits and accounts for antibiotic prescriptions in approximately 60% of cases.⁹ While GABHS is the most prevalent bacterial cause of pharyngitis, most cases are viral in origin. Rapid identification and appropriate treatment of GABHS pharyngitis are essential to prevent complications; however, indiscriminate testing may lead to unnecessary costs and inappropriate antibiotic use that facilitates the emergence of microbial resistance.¹⁰ It is well known that the prevalence of multi-drug resistance bacteria has been increasing an alarming rate and not just a problem in outpatient pediatric practice, but has become a major public health issue.^{9,10}

Our study showed a GABHS positivity rate of 20.5% in children under 3 years, like previous findings by Shaikh et al. .24%⁸. Nonetheless, children under 3 years were significantly less likely to test positive than older children. Consistent with AAP and IDSA guidelines and our chart review, we do not recommend GABHS testing in children under 3 years unless there is known exposure to GABHS.^{2,3} Thus, testing in this age group should generally be avoided and even if they do have streptococcal pharyngitis, the risk of complications such as acute rheumatic fever and rheumatic heart disease is less likely.

We also observed a stark contrast in test positivity between appropriately and inappropriately tested patients. Children with sore throat without viral features were significantly more likely to test positive for GABHS, affirming the utility of clinical guidelines in informing test decisions. Limiting GABHS testing to patients with sore throat and without concurrent viral symptoms can reduce unnecessary diagnostic testing, minimize healthcare costs, and curb inappropriate antibiotic use.⁹ In addition, it is generally well known that those with sore throat and with viral features, such as cough, congestion, runny nose who are inappropriately tested for GABHS and with positive test result, do not necessarily have symptomatic streptococcal pharyngitis, they are likely carriers for the bacteria, their symptomatology is most likely of viral etiology.^{2,3}

5. CONCLUSION

Our chart review revealed that molecular point-of-care testing for GABHS was frequently used inappropriately in pediatric patients, particularly in those with symptoms suggestive of viral infection or under the age of 3. Adherence to clinical guidelines can improve diagnostic stewardship, enhance patient care, reduce unnecessary healthcare spending and antibiotic use. Providing education and decision support tools may aid in improving the appropriateness of GABHS testing in ambulatory pediatric settings.

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