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Improving Antimicrobial Stewardship in Acute Sore Throat: Comparison of FeverPAIN and McIsaac Scores with Molecular Point of Care Testing using Abbott ID NOW

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Abstract: The diagnosis of streptococcal throat infection is an area where current practice results in significant over diagnosis of bacterial infection with resulting implications for antimicrobial use and resistance. The use of molecular point of care (POC) testing has been shown previously to alter antibiotic prescribing decisions when compared to Centor scoring. In this study POC testing was shown to perform significantly better than FeverPAIN and McIsaac scores in the diagnosis of streptococcal throat infection providing further support for the use of Abbott ID NOW point of care testing to reduce antibiotic prescribing.

Keywords: point-of-care-testing; GAS infections; quality improvement; antimicrobial stewardship

Introduction

Infections with streptococci continue to cause significant morbidity and mortality in developed and developing nations. The commonest presentation of these infections is with acute sore throat, and this remains one of the commonest indications for antibiotic prescribing, with an estimated 5 prescriptions per 100 patients per year in Europe [1]. Studies of the aetiology of acute sore throat suggest that only 15-30% of cases are caused by bacterial pathogens [2] but antibiotics are prescribed in 60-70% of cases [3], with NHS England prescribing data [4] identified 2.6 million prescriptions for Phenoxymethylpenicillin between April 23 and March 24, the majority of which were for sore throat. There are many reasons for this, with anxiety around rare but serious complications of streptococcal infection and perceived patient expectations prominent, together with clinical uncertainty in diagnosis. As a result, this area continues to represent a significant contributor to the over-prescribing of antibiotics. The management of acute sore throat also presents logistical challenges to supply chains, as seen in the winter 2021/2022 when a significant increase in cases of streptococcal infections in the community [5] caused unprecedented demand on primary care services in the United Kingdom, resulting in shortages of antibiotic supply [6] and capacity issues in primary care.

Considerable clinical overlap exists in the symptoms and signs of streptococcal and viral throat infections, a situation further complicated by an asymptomatic carriage rate of 10.5% in young children [7]. Conventional microbiological microscopy, culture and sensitivity analysis can take up to 72 hours, with earlier rapid antigen point of care tests have shown limited use due to inadequate sensitivity and specificity. As a result of the difficulty in accurately diagnosing or excluding streptococcal throat infections at the first point of contact has prompted the development of a range of clinical prediction rules, the most commonly used being FeverPAIN [8] and Centor/McIsaac [9]. These use combinations of symptoms and signs to stratify patients into groups, based on the likelihood of identifying streptococci on culture. Current NICE guidance [10] in use in the UK, and

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elsewhere such as the DEGAM guidance used in Germany [11], recommend the use of these tools in the assessment of sore throat, with prescribing decisions based on the result.

Although this approach is more accurate than clinical assessment alone [12], a FeverPAIN score ≥ 4 is still only associated with a probability of identifying streptococcal rather than viral infection in 62-65% [13] of cases, so if antibiotics are used, this will still result in over treatment in around 35% of patients. The TOAST study [14], a prospective study comparing CPR results with microbiological testing, confirmed the performance of this diagnostic and management strategy in clinical practice. Although NICE guidance suggests consideration of antibiotics rather than automatic prescribing, it is the authors experience that in the majority of patients with the highest scores, patients will opt for a prescribing strategy in shared decision-making scenarios.

The advent of affordable, rapid, bedside testing for streptococcal infections using nucleic acid technology with high sensitivity and specificity has potential to make a dramatic difference to antibiotic prescribing decisions whilst also reassuring patients and clinicians. The Abbott ID NOW system has reported sensitivity of 98.5% and specificity of 93.4% [15], with results in 3-6 minutes. A prospective quality improvement project to look at the impact of the addition of point-of-care testing (POCT) to clinical assessment with Centor scoring was previously carried out in primary care [16] which identified the potential to reduce antibiotic prescribing significantly through this strategy. Centor scores have received some criticism for their accuracy, so to further explore the potential of this approach we compared the performance of McIsaac and FeverPAIN with the results obtained through nucleic acid testing with the Abbott ID NOW platform.

Method

Patients suffering acute sore throat who were previously assessed using Centor scoring to triage patients for POC testing were identified through a computer search of their medical records. Patient records were then reviewed by an independent reviewer who had not taken part in the initial study, and where possible FeverPAIN and McIsaac scores calculated, depending on the clinical information provided. These results were then compared with the result obtained through POC testing and comparative data produced. In addition, medical records were reviewed to look for re-presentations in all patients assessed during this project, where records were available. Unfortunately it was not possible to accurately identify patients with acute sore throat who were not offered POC testing, due to inconsistent coding.

Results

a. Comparison of clinical prediction rule and POC test result

144 patients were assessed in the original project.

21 patients were assessed in a community pharmacy in the original project and their clinical records were unavailable for secondary analysis

In 121 (84%) of records it was possible to calculate FeverPAIN score and in 123 (86%) McIsaac scores were calculated.

The results for each CPR are shown below:

Fever Pain score	% positive on ID NOW (95% confidence interval)	n
1	26.7 (12.3-45.9)	30
2	25.6 (13.0-42.1)	39
3	44.1 (27.2-62.1)	34
4	66.7 (34.9-90.1)	12
5	50 (11.8-88.2)	6
Total	36.4 (27.8-45.6)	121

McIsaac score	% positive on ID NOW (95% confidence interval)	n

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2	14.5 (6.5-26.7)	55
3	45 (29.3-61.5)	40
4	68.2 (45.1-86.1)	22
5	50 (11.8-88.2)	6
Total	35.8 (27.3-44.9)	123

a. *Repeat consultation rates for patients receiving POC testing*

139 patient records were reviewed to identify return consultations within 10 days (5 patients were temporary residents whose medical records were not available).

- 16.3% of patients who tested positive, 16.7% of those who tested negative returned
- Of those testing positive, 38% had antibiotic side effects, 62% ongoing symptoms
- Of those testing negative, 60% had other symptoms of viral URTI, 26% had ongoing sore throat symptoms.
- 1 patient was admitted to hospital with Epstein Barr virus and 1 seen with unrelated symptoms

Discussion

The results reported here further support the use of POC testing using nucleic acid technology to confirm the presence of symptomatic streptococcal infection, after initial assessment using the NICE guidelines. The impact of applying this strategy to the NICE management guidance is shown in the table below:

Clinical Prediction Rule result	**NICE recommended management strategy**	**POC result**	**Potential impact on prescribing decisions***
FeverPAIN 0 or 1	Do not offer antibiotic	26.7% (12.3-45.9)	No impact (CPR does not support prescribing)
Centor 0,1,2	Do not offer antibiotic	22.7% (13.3-34.7)	No impact (CPR does not support prescribing)
FeverPAIN 2 or 3	Consider no antibiotic or a back-up prescription	34.2% (23.5-46.3)	65.8% (assuming back- up antibiotic prescribed)
Centor 3 or 4	Consider an immediate antibiotic or a back-up prescription	44.9% (33.6-56.60	55.1% reduction
FeverPAIN 4 or 5	Consider an immediate antibiotic or a back-up prescription	61.1% (35.7-82.7)	38.9% reduction

* assuming all patients opted for antibiotics following an informed shared decision making process.

Patient and staff surveys previously reported [16] for this QI project suggest high acceptability amongst both groups. Furthermore, the re-consultation rates were the same in both patients testing positive and negative on POC testing. The reasons for repeat consultation in patients testing negative support the diagnosis of non-bacterial throat infection, with most reporting other symptoms of viral upper respiratory tract infections, such as cough and coryza. In the group that tested positive on POC

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testing, around half complained of side effects of antibiotics such as diarrhoea, and half with failure to improve. This suggests a role for improved patient counselling and safety netting in both groups of patients. One (1/144) of the patients sampled, who had tested negative was admitted to hospital within 10 days of being assessed as part of this project, and a review of the discharge summary confirmed a diagnosis of confirmed Epstein-Barr Virus infection.

This data is consistent with the results of the TOAST study [14] and further supports the use of POC testing using the Abbott ID NOW system. It also facilitates the safe and efficient transfer of diagnosis from doctors to non-medical members of primary care team. This is particularly relevant in a United Kingdom context where recent strategies to improve access to primary care [17,18] have significantly increased the proportion of consultations for minor illness carried out by community pharmacists, nurses and paramedics. This additional capacity will improve access but has the risk of increasing antibiotic prescribing rates, with clinicians having less clinical and consultation skills training to allow them to conduct what can sometimes be complex consultations with shared decision making and clinical uncertainty. The ability to obtain a rapid result with high sensitivity and specificity, will further enhance the ability of these members of the primary care workforce to manage these patients safely and efficiently, while freeing up doctors to see more complex cases.

Although the addition of point of care testing to usual care comes with increased consumable and set up costs, this facilitates the transfer of care to lower paid members of the medical workforce, and reduces antibiotic costs. Furthermore, the ability to deliver services outside traditional primary care settings, in community pharmacies that may be more accessible to patients, suggests a potential role in reducing health inequalities through greater access to prompt diagnostics and treatment. Further work is required to look at the health economics of introducing POC testing in terms of direct care costs and wider system costs, to determine the net impact of introducing this technology. One limitation of this study was the small number of patients in some of the groups, resulting in wide confidence intervals. Larger studies with more patients in each group, would improve statistical accuracy and in addition a comparison with usual care process would allow a better assessment of the impact on prescription rates. Finally, these results assume that the reported sensitivity and specificity of the Abbott ID NOW Strep A assay in clinical practice match the reported results. Confirming this with confirmatory microbiological analysis during future studies would add further weight to arguments for wider use of point of care testing in the management of sore throat.

Conclusion

This study provides additional support for the potential role of POC testing to facilitate targeted antimicrobial prescribing, with significant benefit when compared to current best practice. Further work is required to look at the wider impacts on the health system in terms of costs, access and prescribing data.

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