

Point Of Care- Group A Streptococcus



Introducing a rapid molecular Point Of Care Group A Streptococcus test.

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Background

S.pyogenes, also known as Group A Streptococcus (GAS), is the prime cause of bacterial pharyngitis and causes major disease worldwide. Ranging from non-invasive disease to severe invasive disease such as necrotizing fasciitis, toxic shock syndrome and scarlet fever, which are associated with high morbidity and mortality.

Introduction

For decades, the clinical history, clinical examination and a throat swab for microbiological culture have been the only tools clinicians have had to rule in/out pharyngitis caused by *S. pyogenes* infection.

The Microbiology departments within our trust use traditional culture techniques to isolate *S. pyogenes*. With a minimum incubation time of 18 hours and follow-on confirmatory tests as well as antimicrobial susceptibility testing, the **turnaround time is 3 days**.

Since 2014, England has seen increased Scarlet fever activity, unprecedented in modern times. Mutations seen within the M protein (*emm1*) and the emergence of M1uk (a sublineage of *emm1*) were seen to be prevalent in patients with pharyngitis pre COVID-19 pandemic. *emm1 S. pyogenes* strains are highly virulent and disproportionately associated with invasive infections¹, most worryingly there is recognised association between *emm1 S. pyogenes* and fatal outcome of invasive infections¹. Furthermore, M1uk has been strongly associated with scarlet fever and invasive infection,¹ no doubt because of its increased production of streptococcal pyrogenic exotoxin A-SpeA.²

GAS infection subsided during the COVID-19 pandemic¹ but had a dramatic resurgence during the 2022-23 season. Its activity increased sharply early on and was described as a concern by the UK Health Security Agency (UKHSA). Data released showed by week 46 there were 851 cases compared to an average of 186 in preceding years.³ Although the rise was seen in all age groups the largest increases were observed in those under 10.

Zhi X et al.¹ found that M1UK lineage represented 91% of invasive *emm1* isolates in England in 2020, and during this last 2022-2023 season, *emm1* strains accounted for >50% of invasive infections in children in England.

The major factor for this was the COVID_19 pandemic restrictions. Children usually have their first episodes of scarlet fever in nursery/ early school years and gain immunity through repeated exposure. The restrictions put in place to reduce the spread of COVID 19 increased the age of first infection and reduced the rates of re exposure.

It was widely acknowledged during the peak of last season there were shortages of antibiotics (penicillin and amoxicillin). This was attributed by UKHSA issuing new guidance enabling health care professionals to lower the threshold to prescribe antibiotics to children presenting with features of GAS infection⁴.

Objectives

Paediatric Consultant Dr Catherine Hearnshaw (based at the Royal Derby Hospital) intended to trial the Abbott ID NOW, a molecular POC test for CED during the outbreak.

Our aim was to have a specific and sensitive method providing a faster result that could be used alongside a clinical algorithm to support antimicrobial stewardship.



Method

The Microbiology and the Point Of Care Departments worked with Paediatrics to determine the clinical value of the ID NOW Strep A Point Of Care test. This test was seen to be paramount in improving patient care as it a rapid NAAT test that **provides results in 6 minutes or less**, requiring a throat swab, and results transferred automatically to the patient's Electronic Healthcare Record (EHR).

Patients arriving in Children's ED presenting with symptoms of pharyngitis would follow clinical pathways and algorithms. In scenarios where patients would have a throat swab for traditional microbiology culture, they also had a throat swab to be tested on the ID NOW.

We compared 49 results between the ID NOW and the laboratory including a timeline comparison.

Furthermore, we compared the length of stay in ED during the verification and once the ID NOW had gone live as well as reviewing antimicrobial prescribing for each patient.

Results

The ID NOW has demonstrated Point Of Care tests have a **high sensitivity of 100%**. However, the **specificity was lower at only 81%**.

Time taken for results to be reported		Abbott ID NOW	Performance of Strep A Assay
Microbiology lab		Laboratory comparisons	Total = 49
Average time for results	71.25 hours	True positives	6
Average time for Negative report	38.12 hours	False positives	8
Average time for Positive report	Intrim= 56 Full 120	True negative	35
Shortest time for a report	25 hours	False negatives	0
Longest time for a report	144 hours		
ID NOW		Sensitivity	100.00%
Shortest time for result on ID Now	2 minutes	Specificity	81.40%
Longest time for a result on ID Now	6 minutes		
Average time for a report to be sent to	11 minutes		
	Length of time in ED (hours)		Patients in A&E
	During ID NOW verification	ID NOW live	49
Average	6	5	
Longest	15	9	Patients perscribed Abx
Shortest	1.25	1	16

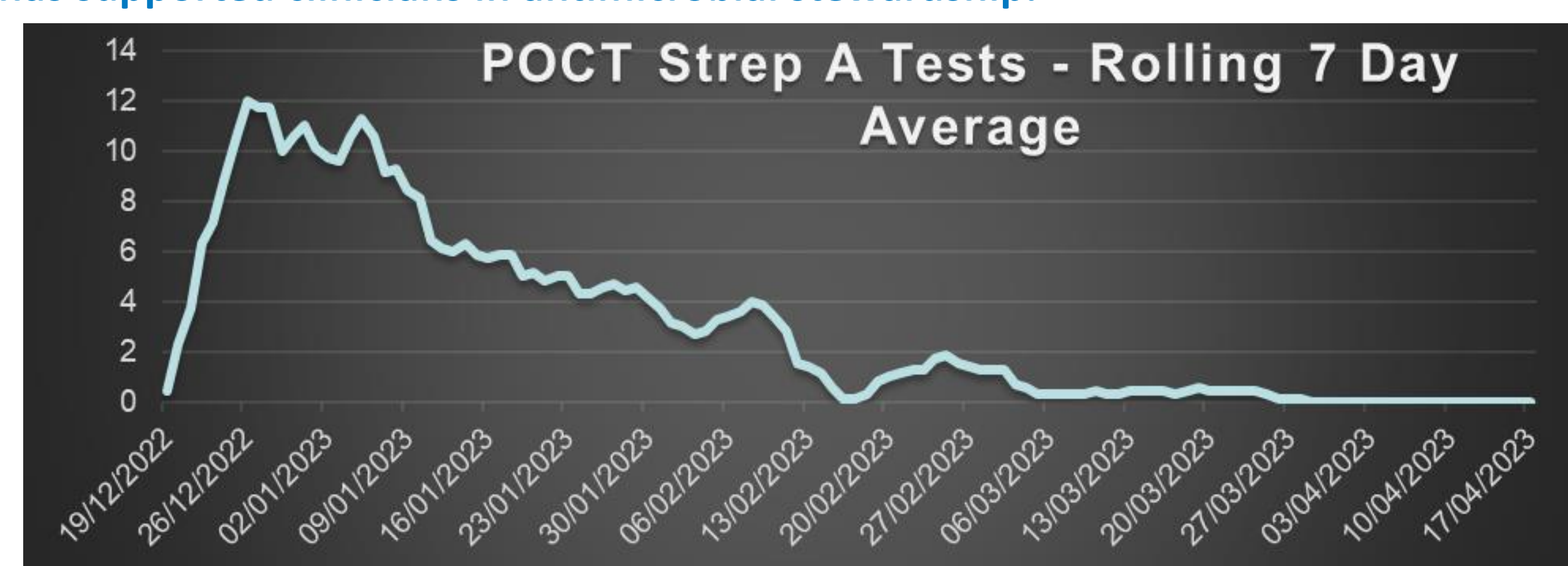
We demonstrated a far **quicker diagnosis of GAS** by using the ID NOW compared to traditional microbiology techniques. Alongside the algorithm put in place we were able to rule out patients, therefore allowing patients to go home without the need for antibiotics.

On reviewing antimicrobial prescriptions within the data set it **is clear the ID NOW helped maintain antimicrobial stewardship**.

32% of patients received antibiotics during a time when the threshold for prescribing them was lowered by UKHSA.

Conclusions

The ID NOW has successfully achieved our aims. It has demonstrated a good sensitivity and specificity providing good diagnostic data which consequently has supported clinicians in antimicrobial stewardship.



References:
1: DOI Emerging Invasive Group A Streptococcus M1UK Lineage Detected by Allele-Specific PCR, England, 2020 - Volume 29, Number 5—May 2023 - Emerging Infectious Diseases journal - CDC
2: Characterization of emergent toxigenic M1UK Streptococcus pyogenes and associated sublineages - PMC (nih.gov)
3: UKHSA update on scarlet fever and invasive Group A strep :: East Midlands Children's Critical Care Network (eastmidlandskids.nhs.uk)
4: PRN00247 Group-A-Streptococcus-reinstatement-of-NICE-sore-throat-guidance-for-children-and-young-people-and-wi.pdf (england.nhs.uk)