UK NEQAS Novel EQA in Development – Group B Streptococcus Screening

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INTRODUCTION

Group B Streptococcus (GBS) is a dangerous infection affecting 1 in 1,750 infants, causing around 40 neonatal deaths annually[1]. GBS is often found in the rectum or vagina of 28% of women[2]. Although typically harmless, it can harm newborns if transmitted during birth, leading to conditions like meningitis, sepsis, pneumonia, and even death. Screening for GBS in pregnancy is vital, allowing intravenous antibiotics during labour to reduce transmission risk.
Efficient GBS screening in clinical labs can benefit from an external quality assessment (EQA) scheme. Standardised testing and EQA participation are crucial to prevent neonatal GBS infections, ensure accurate diagnoses, and maintain patient trust in healthcare.

Lyophilisation, or freeze-drying, preserves sample structure by removing water through freezing and vacuum sublimation[3]. This method ensures consistency in EQA samples, offering reliable and stable results[4]. For clinical labs, swabs are common samples, and selecting a similar transport medium minimises bias and represents real lab testing accurately.

AIM

To establish the need for a new EQA scheme focused on Group B *Strep*, *S. agalactiae*. This scheme will test participants' ability to detect GBS presence in a simulated sample.

To identify the ideal transport medium to use for a GBS EQA by determining the viability of transport mediums using clinical diagnostic methods.

KEYWORDS

Group B Screening, Streptococcus Agalactiae, EQA, External Quality Assessment, Pregnant Women

METHOD

A seven-question questionnaire was distributed to 711 participants who participate in the UK NEQAS for Microbiology GB and GE schemes. The aim was to assess the relevance and advantages of implementing a Group B Streptococcus Screening EQA scheme for pregnant individuals.
Before the pre-pilot sample distribution, we will investigate the best transport medium. Lyophilized samples and Liquid Amies swabs and Charcoal Amies swabs to ensure stable, viable, and homogeneous Group B Streptococcus (GBS) growth.

Four strains of organisms, including three varied GBS strains and one NCTC control organism, was tested using the selected transport media. To ensure accuracy and reliability, each test was performed in triplicate to confirm homogeneity, stability, and viability of the simulated samples. These samples were tested weekly over a 8-week period and stored under two conditions: room temperature (RT) and +4°C.

For Liquid Amies and Amies Charcoal Transport swabs, the agar plates were inoculated by rolling a swab in a specific area, followed by streaking with a sterile 10 µl loop to obtain single colonies. The agar plates were inoculated in the following order: less selective to most selective, starting with Columbia Blood agar (CBA), then Colistin-Nalidixic Acid Agar (CNA), followed by Colorex StrepB, and finally, Granada agar. All agar plates were incubated at 37 ˚C for 18-24 hours. CBA, CNA and Colorex StrepB agar were incubated in CO_2 and Granada agar was incubated aerobically. Following the appropriate incubation period, all plates were read and CFU values were recorded weekly. Organism identification using microscopy, latex agglutination, and biochemical profile were carried out weekly.

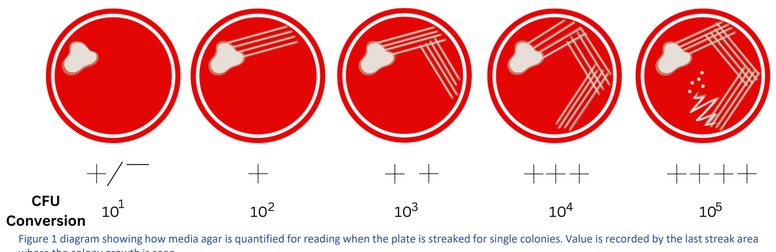

Figure 1 diagram showing how media agar is quantified for reading when the plate is streaked for single colonies. Value is recorded by the last streak area where the colony growth is seen.

RESULTS

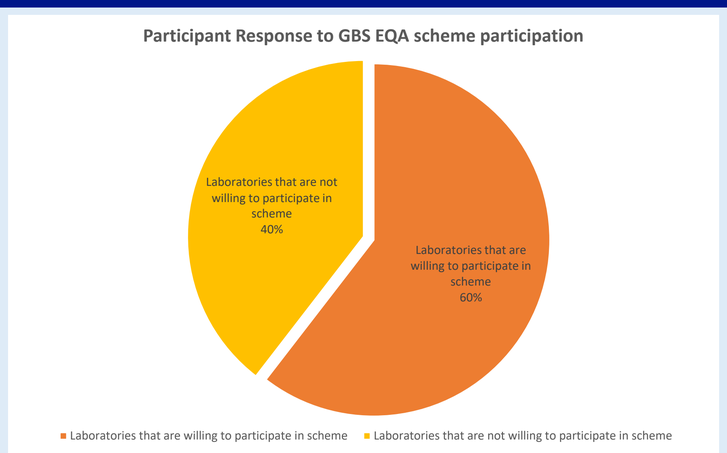

Figure 2 Participant Response to GBS Participation Questionnaire. Responses to the question: '*Would your laboratory be interested in participating in an EQA for the detection of Group B Streptococcus, if one was available?*' 129 replies out of 711 questionnaires sent to participants.

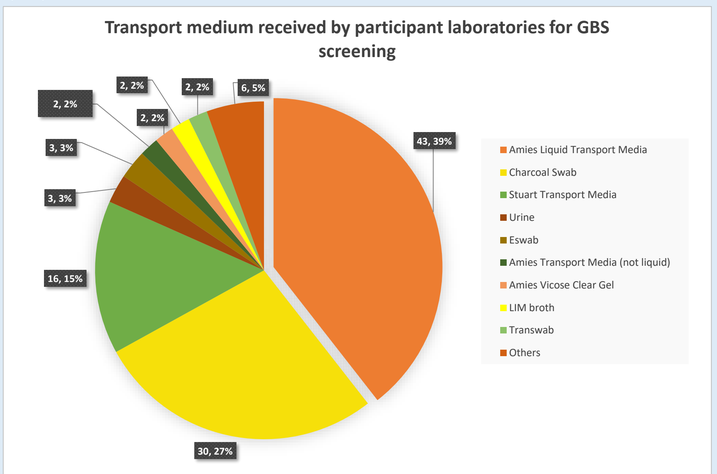

Figure 3 Participant Response to GBS Participation Questionnaire. Participant response to question '*Please indicate the specimen format your laboratory receives for Group B screening?*' 109 Laboratory replies

Out of 129 responding laboratories, 103 actively screen for GBS, and 78 of them were willing to participate in an EQA scheme for detecting Group B Streptococcus in simulated gestating patient samples. Among the respondents, the most common sample media received were Liquid Amies Transwab (35.7%) and Charcoal Amies Transport swabs (23.3%).

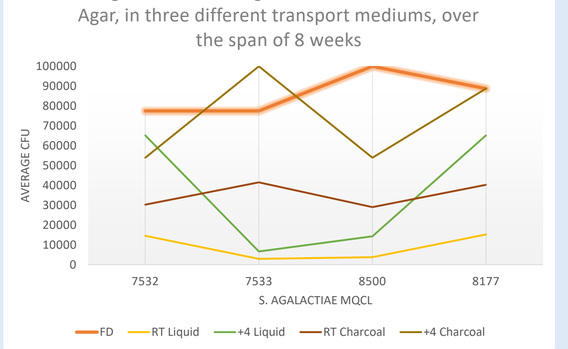

Figure 4 shows the average growth of *S. agalactiae* on CBA in three transports mediums (Freeze-dried, Liquid Amies and Amies with Charcoal) stored at various temperatures, (RT - ~21 ˚ C and 4˚C). The highlighted orange line is the average growth seen in freeze-dried/lyophilised specimens. Growth in Amies Charcoal and Liquid Amies swabs are compared to this line, as lyophilised samples are the current conventional sample type sent out by UK NEQAS for Microbiology.

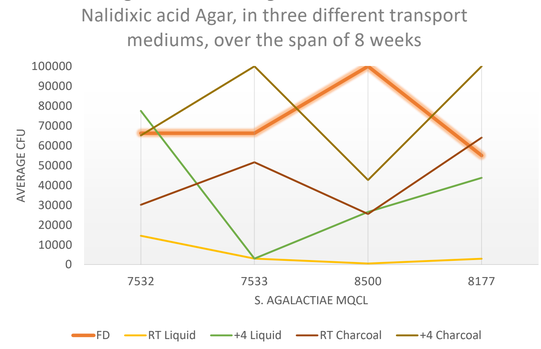

Figure 5 shows the average growth of *S. agalactiae* on CNA in three transports mediums (Freeze-dried, Liquid Amies and Amies with Charcoal) stored at various temperatures, (RT - ~21 ˚ C and 4˚C). The highlighted orange line is the average growth seen in freeze-dried/lyophilised specimens. Growth in Amies Charcoal and liquid Amies swabs are compared to this line, as lyophilised samples are the current conventional sample type sent out by UK NEQAS for Microbiology.

Table 1 shows P-values of transport mediums compared to freeze dried samples, FD, using T -test. Results show probability associated with a Student's paired t-Test, with a two-tailed distribution type.

Transport Media MQCL	FD – RT Liquid	FD - 4˚C Liquid	FD – RT Charcoal	FD – 4˚C Charcoal
7532	0.025	0.356	0.193	0.580
7533	0.006	0.006	0.173	0.172
8500	5.821×10^{-09}	0.000986	0.008	0.079
8177	0.040	0.580	0.187	0.356

Table 1 above shows p-values from *S. agalactiae* CFU values in liquid Amies and Amies Charcoal swabs compared with freeze-dried specimens. Values above 0.05 show there is no significant difference between the two mediums, whereas a value below 0.05 is seen as a significant difference.

DISCUSSION

Participants in GE and GB schemes received a questionnaire as they have the necessary testing facilities for *S. agalactiae*. With over 50% of respondents expressing interest in an EQA scheme focused on GBS detection and reporting, there is a clear demand. Notably, there's currently no accredited GBS screening EQA in the UK.

Amies Charcoal swabs are commonly used for clinical sample collection and transport. They contain nutrients like amino acids, salts, and carbohydrates, prolonging bacteria viability during transport (Zhang et al., 2007). Liquid Amies swabs serve a similar purpose, providing a moist environment for swabs collected from sites like the vagino-rectal area.

When examining GBS growth over 8 weeks on CBA and CNA agar, Amies Charcoal swabs stored at 4°C showed the most significant growth compared to lyophilized samples (Table 1). At room temperature, growth in Amies Charcoal swabs was consistently lower by at least one log compared to lyophilized samples or swabs stored at 4°C.

CONCLUSION

This study demonstrated that charcoal swabs are a viable transport medium for GBS samples, which is useful for developing a new EQA scheme. The pilot study will provide further insights into the use of these sample types and enable the development of an effective EQA scheme for GBS screening during pregnancy.

This study strongly suggests that there is a need for the introduction of an EQA scheme for GBS, due to the high number of participants that have shown an interest in participating in this scheme. The introduction of this scheme could lead to an improved reliability of testing and detection of GBS in samples which could ultimately could lead to a reduced number of neonatal illnesses or deaths.

ACKNOWLEDGEMENTS

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