

Background:

Spurred by a short supply of intravenous amoxicillin (September 2020) and in the interest of antimicrobial stewardship, we undertook a review of our algorithm for the management of suspected meningitis/sepsis in infants less than 3 months of age.¹

Until recently it was accepted that antibiotics are reviewed if blood cultures remain sterile at 48 hours incubation, however recent studies suggest it is safe to consider discontinuing antibiotics in infants if blood cultures are sterile at 36 hours.²

Before altering our algorithm we undertook a local audit of time to positivity (TTP) of significant blood cultures to ensure that this recommendation was supported by local data.

Methods:

The LIMS was interrogated to find all significant paediatric (0-18 years) blood cultures between 2017 and Nov 2020. These and associated data were exported to Microsoft Excel. Where they were analysed along with data from clinical records where relevant.

Results:

One hundred and sixty-nine blood cultures tagged significant were found. Sixteen were excluded from the study; repeat positives n=8, antibiotics administered prior to obtaining culture n=4, blood culture referred from external site n=3, isolate deemed non-significant on review n=1.

Of the 153 blood cultures which met inclusion criteria, the mean TTP was 16.4 hours SD 9.35, with over 97% of significant blood cultures detected positive within 36 hours of incubation. In the 0-3 month subgroup n=37 blood cultures, mean TTP was 14.43 hours SD 4.07. All significant blood cultures from the 0-3 month age group were detected culture positive within 36 hours of incubation.

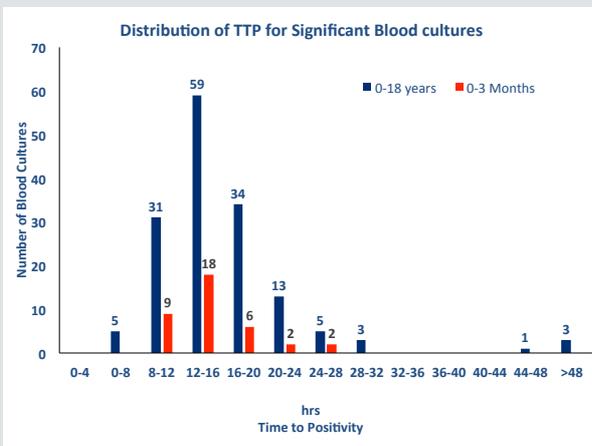


Figure 1: Distribution of time to positivity for paediatric blood cultures of significance, all ages (blue), and 0-3 months (red).

Four blood cultures were detected positive after 36 hours of incubation, all of these were from infants older than three months. Noting the distribution of the significant positives, these appear to be outliers (Figure 1).

Detailed chart review was performed on the outliers to ensure they did not meet exclusion criteria. This was limited by chart unavailability n=2 and incomplete clinical data n=2. See summary (Table 1)

TTP (hrs)	Organism	Clinical Scenario
47	F. necrophorum	Chart not available. Pharyngeal abscess with cavernous sinus thrombosis. (?Lemiere Syndrome)
74	H. influenzae	Osteomyelitis, recent admission, unclear if antibiotics administered then.
84	S. aureus	Chart not available. ICU admission. Possible transfer from another centre
114	S. aureus	Recent admission with appendicitis - likely undocumented course of antibiotics. Query significance as not reproducible on repeat blood cultures.

Table 1: Characteristics of blood cultures with outlier TTP

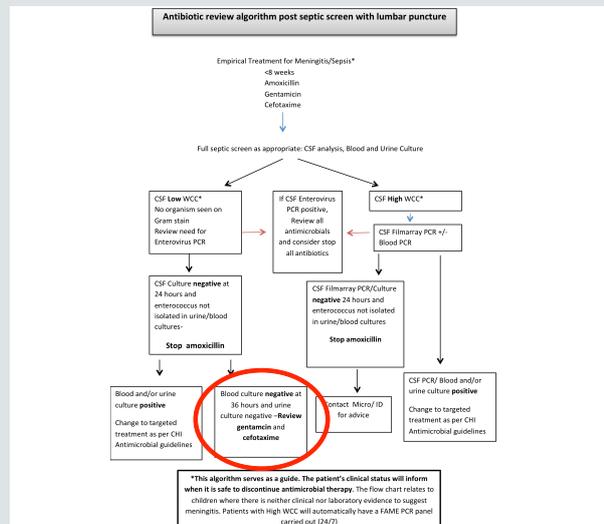


Figure 2: Updated Treatment Algorithm informed by this audit (in red). Please note this is a draft version of the algorithm and is yet to be finalised.

Conclusions:

Local data suggests that significant blood cultures were unlikely to flag positive after 36 hours, with no significant isolates in the 0-3m old group beyond 36 hours incubation.

Our audit indicates that it is appropriate for us to recommend review of antibiotics in infants with presumed sepsis who have negative blood cultures at 36 hours incubation, provided blood cultures are obtained prior to antibiotic administration.

This highlights the role local audit has in the development and improvement of local treatment algorithms, (see Figure 2), and guidelines, particularly with regard to the generalisability of national or international recommendations to local settings.

References:

- Cormican M, Philbin M. Amoxil® (amoxicillin) intravenous discontinuation. 2020 Sept. HSE AMRIC Circular. Available at <https://www.hse.ie/eng/services/list/2/gp/antibiotic-prescribing/hospital-related-guidelines/amoxil%C2%AE-amoxicillin-intravenous-discontinuation-memo-september-2020.pdf>
- O'Hagan S, Nelson P, Speirs L, Moriarty P, Mallett P. How to interpret a paediatric blood culture. *Arch. Dis. Child.* Accepted for publication Jan 2021.