Department Journey to Improved Sepsis Diagnosis, Liverpool Clinical Laboratories Microbiology

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Keywords: Sepsis, Blood cultures, Microbiology, 24/7

The burden of sepsis on healthcare services is significant (Singer *et al*., 2016). Blood cultures are a vital diagnostic test in detecting bloodstream infections. Each additional diagnosis offers the chance of improved therapeutic intervention and outcome. Microbiology at Liverpool Clinical Laboratories has undergone a considerable amount of change over the last 12 months. Including transfer of services to a purpose-built laboratory, introduction of automated equipment and implementation of 24/7 working. Some of the changes have had a major impact on diagnosis of sepsis, and have supported our journey to compliance of UK Standards for Microbiology Investigations relating to blood cultures and sepsis. Implementation of offsite loading of blood cultures has resulted in samples being loaded in a compliant timeframe, 24/7 working introduced management of positive blood cultures overnight and implementation of sepsityper to identify pathogens in blood cultures rapidly have greatly impacted on patient care.

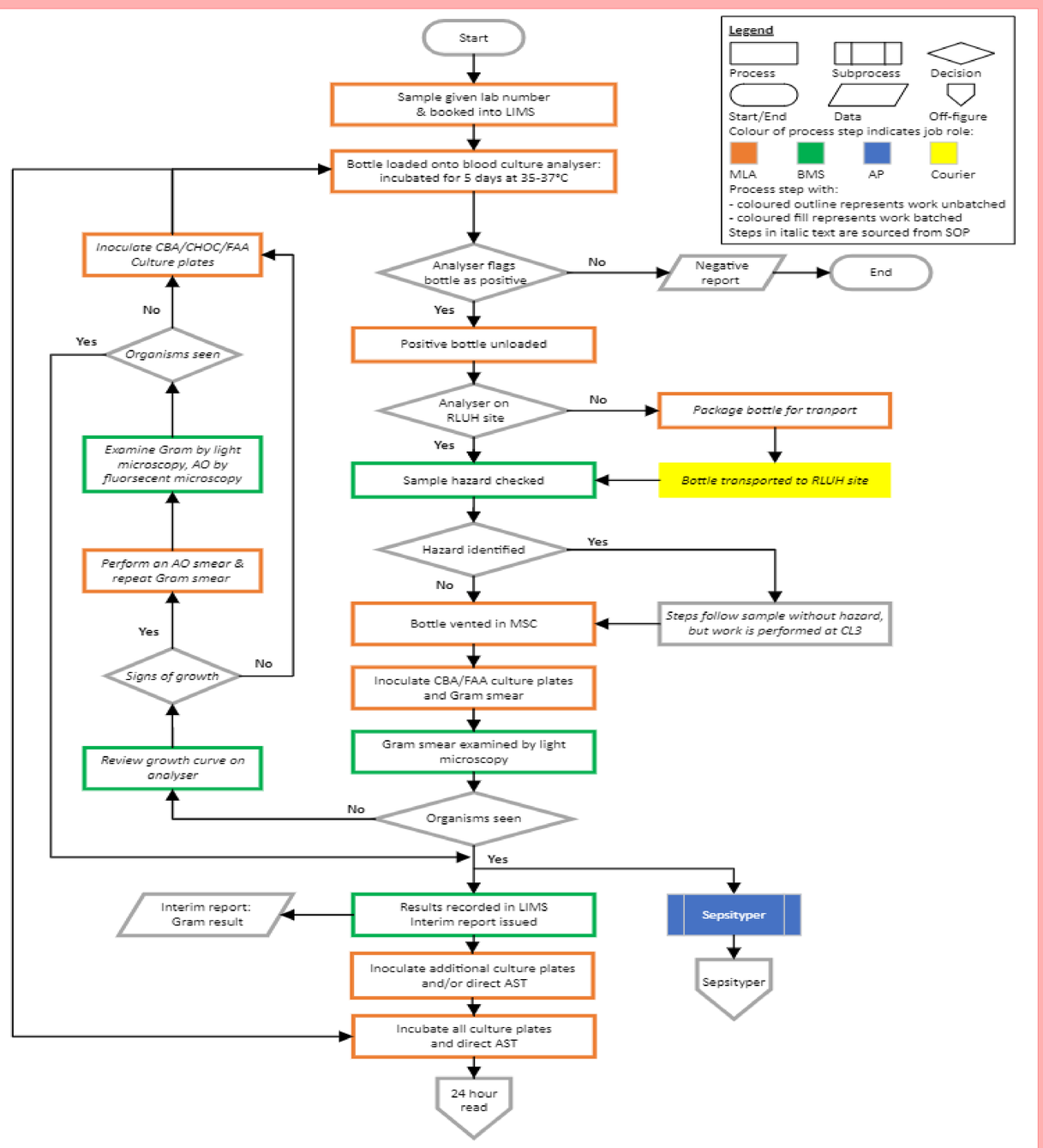
Method

Data extracted for all blood cultures obtained for June – Aug 2022

In-depth examination of up to 10 BC from the following groups:

- Pseudomonal organisms (*Pseudomonas*, *Acinetobacter* etc)
- ESBL or CPE
- Chromosomal *ampC* organisms
- *Candida* spp
- *Staphylococcus aureus*

SMI B37 used as standard



MLA: Medical Laboratory Assistant; BMS: Biomedical Scientist; AP: Associate Practitioner; SOP: Standard Operating Procedure; LIMS: Laboratory Information Management System; RLUH: Royal Liverpool University Hospital; CBA: Columbia Blood Agar; CHOC: Chocolate Agar; FAA: Fastidious Anaerobe Agar; MSC: Microbiological Safety Cabinet; CL3: Containment Level 3; AO: Acridine Orange

Fig 1: LCL Clinical Support Services Building

Results

Total BC – 681
17:00 – 09:00 – 453 (66.5%)
17:00 – 20:30 – 53 (7.8%)
20:30 – 09:00 – 400 (58.7%)

- OOH BC processing speeds up communication to team by approximately 14h for Gram results and 12h for ID/sens
- For the sub-sample ID/sens results, ~1/2 have initial antibiotics corrected 12h earlier than otherwise (for this sub-sample of resistant organisms)
- 28/39 (72%) had antibiotics changed as a result of Gram or ID/Sens
- Limited benefit gained from BCs flagging after 03:30

Conclusion

The changes made in Microbiology have focused on patient care, improving efficiencies and quality.

The dedication of the team has allowed the implementation of patient focused 24/7 service. Digital transformation has allowed for remote loading of blood cultures and access to real time data.

Fig 2: Blood culture process mapping

Fig 3: Blood culture value stream

Next steps for LCL Microbiology:

- Establish working group with key stakeholders
- Rapid improvement event to further optimise process and automation
- Repeat audit in one year to check ongoing benefit and to assess impact of new processes e.g. Sepsityper.
- Customised report on Blood culture pathway KPIs

Everyone has a part to play in the pathway

Acknowledgements: LCL Microbiology team, Dr Chris Darlow, Ines Santos & Chris Donaldson

References: 1. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016;315(8):801-10
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