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NEWSLETTER

Best Practices in Blood Culture Collection

Blood culture bottles incubation period, 5 days or more?

Introduction

Blood is one of the most important specimens received by the microbiology laboratory for culture, and culture of blood is the most sensitive method for detection of bacteremia or fungemia. As we all know that the blood stream infection is one of the most serious problems in all infectious diseases.

In general, adult patients with bacteremia are likely to have low quantities of bacteria in the blood, even in the setting of severe clinical symptoms. In addition, bacteremia in adults is generally intermittent.

For this reason, multiple blood cultures, each containing large volumes of blood, are required to detect bacteraemia. Prior to initiation of antimicrobial therapy, at least two sets of blood cultures taken from separate venipuncture sites should be obtained. The technique, number of cultures, and volume of blood are more important factors for detection of bacteremia than timing of culture collection.

Length of Incubation of Blood Cultures

In routine circumstances, using automated continuous monitoring systems such as Becton Dickinson BACTEC System, blood cultures need not be incubated for longer than 5 days (1, 2, 3, 4, 5). For laboratories using manual blood culture systems, 7 days should suffice in most circumstances (6).

Patient suspected Infectious Endocarditis (IE)

A recent study at the Mayo Clinic, in which one of the widely used continuous monitoring blood culture systems was used, demonstrated that 99.5% of non-endocarditis BSIs and 100% of endocarditis episodes were detected within 5 days of incubation (1). These data suggest that the extended incubation periods recommended in the past for detection of fastidious microorganisms that sometimes cause en-

docarditis, including Brucella, Capnocytophaga, and Campylobacter spp.

There was another evaluation of extended incubation time with blind subculture of blood culture in patients with suspected endocarditis (7) support the claim. The study done at the Queen Elizabeth II Health Sciences Centre ('the centre') laboratory (Halifax, Nova Scotia). They have population of about 395,000 and become the regional of blood cultures centre. In this study, they have measured 507 blood cultures bottles, 53 blood culture in 27 patients were positive. Blood cultures were positive after 5 days is only five cases.

It means the prolonged incubation of blood cultures did not positively impact the care of any patient, because no additional cases of IE were diagnosed and no fastidious organisms were detected after 5 days. (7)

HACEK in IE

The Haemophilus, Actinobacillus, Cardiobacterium , Eikenella and Kingella (HACEK) group of microorganisms comprises bacteria that commonly colonize the human oropharynx as normal, indigenous flora. HACEK bacteria infrequently cause bacteremia but, when present, usually are clinically significant and are responsible for approximately 2 to 5% of culture-positive, infective endocarditis cases (8, 9, 10, 11).

There is a join study from four tertiary care microbiology laboratories (12). The incidence of and average time to detection for Haemophilus, Actinobacillus, Cardiobacterium, Eikenella, and Kingella (HACEK) bacteria in blood cultures with standard incubation and the utility of extended incubation of blood culture bottles has been reviewed. HACEK organisms were isolated from 35 (<0.005%) of 59,203 positive blood cultures. None of 407 blood cultures with extended incubation grew HACEK or other bacteria. Bacteremia from HACEK bacteria is rare, and extended incubation of blood cultures to recover HACEK bacteria is unnecessary.

General Bacterial and Yeast species

A study was conducted in the Clinical Microbiology Laboratory of Osmangazi University Medical Faculty Hospital from August 1996 to December 2001 (13).Most of the patients were adults from Intensive Care and Hematology Units. Two bottles were used in the culturing for every patient.

Time of positivity of blood cultures was tracked and documented using the BACTEC 9120 (Becton Dickinson Diagnostic Instrument Systems) blood culture system over a 5-year study period. A 7-day protocol of the incubation period was selected, and a total of 11,156 blood cultures were evaluated.

Findings: The clinically significant microorganisms (32.95%) were isolated in 3,676 specimens. Gram-positive and -negative bacterial isolation rates were found to be 41.07 and

44.88%, respectively. Yeasts were found in 14.03% of all pathogens. Both the false-positivity and -negativity rates were very low (0.1 and 0.3%, respectively).

The mean detection times for all of the pathogens were determined to be 19.45 h. Yeasts, nonfermentative gram-negative bacteria, and Brucella melitensis strains were isolated within 5 days.

This paper reveals that the TTD is even faster during incubation with the BACTEC system compare to other blood culture system. As a result, they have already cut down the incubation from 7 days to 5 days after this trial and it's sufficient for pathogen isolation.

Discussion

In most studies, Six to seven days incubation period was generally recommended with the continuous monitoring automated blood culture instruments when they were first introduced. But with longer incubation period of seven days, there would be delay in reporting negative cultures and additional instruments would be required to accommodate the increased number of bottles.

Times fly and there are many evaluation done to check the significant of further incubation for most of blood culture especially to catch the blood pathogen to be diagnose.

Base on all papers, journal, evaluation and clinical studies, the majorities agreed that the incubation for all the blood culture is sufficient for 5 days not more.

Conclusion

In general, the prolonged incubation of blood cultures did not positively impact the care of any patient. The variety of fastidious organisms seen in the study can be isolated within 5 days of incubation.

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