



BACTEC and Conventional Culture Systems Comparison to Isolat of Microorganisms from Blood and Other Sterile Body Fluids



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Introduction

Bloodstream infectious diseases are prevalent in children and adults. Rapid and accurate diagnosis of bloodstream infections primary based on conventional culture results, which saves time and prevents empiric treatment. The aim of this study was to compare the results of BACTEC 9120 and conventional culture systems, on blood specimens collected from three university affiliated hospitals in Tehran, Iran.

Method & Material

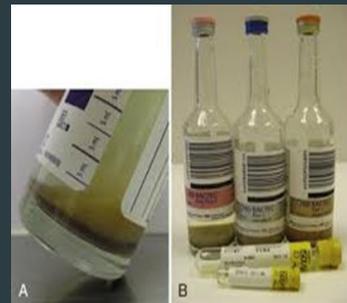
BACTEC 9120 and conventional methods were used for isolation of microorganism from specimens including blood and other body fluid samples collected from patients hospitalized in the selected hospitals during the study period. Time for positive and negative results and hospital charge were estimated for the two culture methods. In total 747 specimens were possessed by BACTEC 9120 systems and 787 by conventional method.

Patients hospitalized for less than 2 days were excluded. The Bacteriologic Apparatus was BACTEC 9120 (Becton Dickinson Diagnostic Instrument System USA) continuous monitoring Blood culturing instrument which accommodates 120 test bottles. BATEC 9000 systems feature the unique Bactec 9000 fluorescent sensor technology that allows for fully automated, walk away testing using a continuous monitoring instrument that agitates and incubates BACTEC/F blood culture bottles resulting in earlier detection of positive cultures. It provides advanced algorithms for individual bottle types for special circumstances as low blood volume, pediatric or other sterile fluid specimens.

Routine blood cultures in parallel with Bactec was performed. Organisms isolated from blood cultures and other body fluids were identified by conventional laboratory methods. Demographic data and medical records were abstracts patient, s files. Assessment of clinical significance was based on symptoms and positive numbers of bottle cultures

Results

Patients aged between 3 days and 8 years old, (mean 11.4±21.9 years); 52% of patients were male and 48% female; Out of 747 specimens were possessed by BACTEC 9120 system, 26% (196/747) and from 787 specimens cultured by conventional method 5% (49/ 787) were positive (p<0.05). Hospital stay was 13.8 ± 12.9 days in BACTEC 9120 and 17.9 ± 14.9 days in Conventional method,(p<0.05) respectively. Time for positivity by BACTEC system was 3.8 ± 1.1 Days and 5.9 ± 2.5 days in conventional method.(p<0.05), treatment response showed 1.8 day earlier result in patients that their specimens were processed by BACTEC 9120 system . Death rate in BACTEC 9120 method was 6% and 11% in Conventional method. (p>0.05).I



Microorganism	BACTEC n=747	Conventional n=787	p-Value
Coagulase-Negative staphylococci	58 (7.76%)	11 (1.4%)	<0.001
<i>E-coli</i>	27 (3.61%)	10 (1.27%)	0.003
<i>Staphylococcus aureus</i>	12 (1.61%)	9 (1.14%)	0.44
<i>Enterococcus faecalis</i>	9 (1.2%)	5 (0.64%)	0.24
<i>Klebsiella pneumoniae</i>	8 (1.07%)	3 (0.38%)	0.11
<i>Candida albicans</i>	7 (0.94%)	1 (0.13%)	0.03
<i>Citrobacter freundii</i>	7 (0.94%)	1 (0.13%)	0.03
<i>Streptococcus viridans</i>	7 (0.94%)	1 (0.13%)	0.03
<i>Enterobacter aerogenes</i>	6 (0.8%)	1 (0.13%)	0.06
<i>Proteus vulgaris</i>	6 (0.8%)	1 (0.13%)	0.06
<i>Stenotrophomonas maltophilia</i>	6 (0.8%)	1 (0.13%)	0.06
<i>Acinetobacter baumannii</i>	6 (0.8%)	0 (0%)	0.01
<i>Streptococcus pneumoniae</i>	6 (0.8%)	0 (0%)	0.01
<i>Proteus mirabilis</i>	5 (0.67%)	0 (0%)	0.03
<i>Pseudomonas aeroginosa</i>	5 (0.67%)	0 (0%)	0.03
<i>Burkholderia cepacia</i>	4 (0.54%)	0 (0%)	0.06
Bacteroides spp.	3 (0.4%)	0 (0%)	0.12
<i>Hafnia alvei</i>	3 (0.4%)	0 (0%)	0.12
<i>Moraxella catharralis</i>	3 (0.4%)	0 (0%)	0.12
<i>Providencia stuarti</i>	2 (0.27%)	0 (0%)	0.24
Enterobacter cloacae	1 (0.13%)	0 (0%)	0.49
Group D streptococci	1 (0.13%)	0 (0%)	0.49
<i>Edwardsiella tarda</i>	1 (0.13%)	0 (0%)	0.49
Beta hemolytic non-group A Streptococci	1 (0.13%)	0 (0%)	0.49
Peptostreptococcus sp	1 (0.13%)	0 (0%)	0.49
Peptococci	1 (0.13%)	0 (0%)	0.49
Total positive cultures	196 (26.24%)	44 (5.59%)	<0.001

Table 1. The result of different microorganisms isolated in BACTEC system and conventional culture method

Table 2. Frequency of different specimens			Ward	BACTEC	Routine
Specimen	BACTEC	Routine			
Blood	665(89%)	645(81%)	Gynecology	147(20%)	0
CSF	40(5%)	71(9%)	Cardiology	86(11%)	11(1%)
Tracheal aspiration	10(1%)	2	ICU	84(11%)	17(2%)
Peritoneal dialysis fluid	10(1%)	0	Othopedics	72(9%)	6(0.07%)
Pleura	7(0.09%)	4(0.05%)	hematology	66(8%)	56(7%)
Synovium	4(0.05%)	0	NICU	56(7%)	119(15%)
Shunt	3(0.04%)	0	Surgery	47(6%)	41(5%)
Cyst	3(0.04%)	0	Infectious disease	47(6%)	61(7%)
Ascite fluid	2(0.02%)	37(5%)	Gastrointestinal	35(4%)	74(9%)
Perioan	1(0.01%)	7(0.08%)	Emergency	25(3%)	166(21%)
Bone Marrow	1(0.01%)	0	nephrology	22(2%)	35(4%)
Wound	1(0.01%)	0	neonatal	15(2%)	129(16%)
Throat	0	21(2%)	Bone Marrow Transplant	13(1%)	43(5%)
Total	747	787	Internal	9(1%)	1(0.01%)
			Neurology	9(1%)	12(2%)
			PICU	5(0.06%)	6(0.07%)
			pediatric	4(0.05%)	0
			CCU	4(0.05%)	0
			Endocrinology	1(0.01%)	1(0.01%)
			Total	747	787

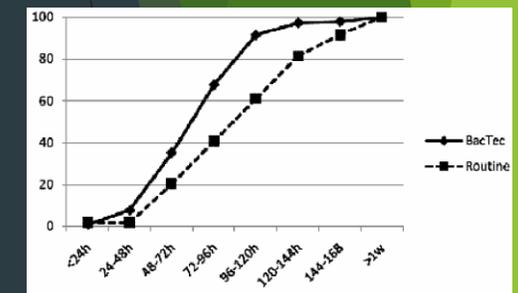


Fig. 1. Time needed for positive culture results in conventional and Bactec cultures

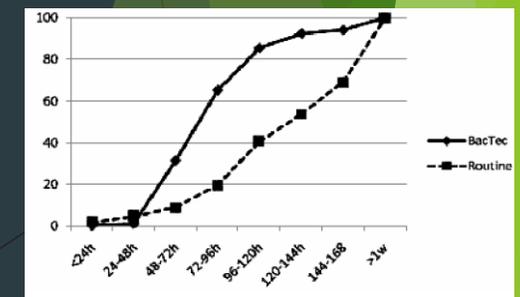


Fig. 2. Time needed for negative culture results in conventional and Bactec cultures

In conclusion implementation of BACTEC system for microbiologic detection of pathogens decreases the admission time and earl diagnosis and treatment results are cost effective for patient management and prevention of antibiotic resistance.