ORIGINAL ARTICLE

Evaluation of Direct Antimicrobial Susceptibility Testing from Positive Flagged Blood Cultures in Sepsis Patients

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ABSTRACT

Background: Presently, many laboratories are equipped with automated system for antimicrobial susceptibility testing (AST) for minimum inhibitory concentration-based reporting which enables the clinician to choose the right antimicrobial for timely treatment of sepsis. The study aimed to assess performance of direct AST from blood culture positive broth using automated AST system for accuracy and time taken to release the report.

Materials and methods: The present study conducted in a 25-bedded ICU in North India for 12 months. Single morphotype of bacteria on gram stain from positively flagged blood culture bottles were included, which was directly identified (using an in-house protocol) with MALDI-TOF-MS from positive blood culture broths. DAST was carried out from 200 such blood culture broths and results were compared with reference AST (RAST) which was also done using VITEK-2 using overnight grown bacterial colonies as per standard protocol.

Results: Among 60 isolates of Enterobacterales, 99% categorical agreement for both *E. coli* and *K. pneumoniae* observed by two methods were tested for AST. Among non-fermenters, *Pseudomonas aeruginosa* showed a categorical agreement of 99.6%, as compared with *Acinetobacter* spp. and exotic GNBs, which showed 95–96% agreement. A significant difference of 18–24 hours was noted in time to release the report between DAST and RAST, for GNB and GPC both.

Conclusion: Direct AST from positive flagged blood culture bottles can significantly reduce the time to release the bacterial susceptibility report by up to 24 hours, at the same time maintaining the accuracy.

Keywords: Categorical agreement, Direct antimicrobial susceptibility testing, Enterobacterales, Essential agreement, Flagged blood culture, Gram-positive bacteria, Non-fermenters, Time to release report.

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HIGHLIGHTS

Timely reporting of antimicrobial therapy in sepsis patients plays a pivotal role in reducing mortality and morbidity. Direct antimicrobial susceptibility testing (DAST) protocol exhibited a significantly lower time to report when compared with reference AST (RAST). It is worth noting that there was less processing time substantially in the new protocol, leading to earlier availability of final result approximately 1 day earlier than usual.

INTRODUCTION

Bloodstream infections (BSIs) are potentially life-threatening medical emergencies that are associated with significant morbidity and mortality globally.[1] Worldwide more than 3 lakh cases of sepsis occur annually, with mortality rates varying from 17.5 to 50% in different countries.[2–6] The recommended procedure is culture of causative organism from paired blood samples for diagnosis of BSI.[2] Surviving sepsis campaign of 2021 emphasizes the importance of paired blood culture, early diagnosis, and targeting microorganism-specific antimicrobial therapy at the earliest possible time. However, the conventional method of blood culture with a further 48 hours for AST after being positive prolongs laboratory turnaround time (TAT). With the availability of an automated blood culture system for sepsis patients, the duration required for positive blood culture containing microorganisms has decreased by 24–48 hours; however, AST still takes a further 48 hours and includes subculture from blood bottles and then targeted AST plate incubation and interpretation.[3,4] From clinical acumen and perspective, early determination of antimicrobials to which organism is sensitive

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helps in judicious use of antibiotics which in turn plays a pivotal role in saving lives. There is an increase in mortality by 7.6% with every hour of delay in determining rapid diagnosis and initiating appropriate antimicrobial agents for BSIs.[5]

Prolonged empirical therapy, because of delayed MIC-based AST reports, has been blamed as a significant barrier to successful antibiotic stewardship programs. Moreover, it was also shown that when MIC-based reports were made available to the intensivists earlier, it was possible to successfully control and reverse the growing menace of antimicrobial resistance (AMR) in bacteria and also reduce the volume of antibiotics consumed.[7]

Table 1: Performance of DAST compared with reference AST method test by VITEK-2 system

Organisms and antibiotic tested (n × Ab = N)	Categorical agreement, n (%)	Categorical disagreement, n (%) among isolate–antibiotic combinations tested				Essential agreement	
		Minor error	Major error	Very major error	Total	Agreed	Disagreed
Escherichia coli (19 × 18 = 342)	339 (99.1%)	0 (0%)	3 (0.9%)	0 (0%)	3 (0.9%)	340 (99.4%)	02 (0.6%)
Klebsiella pneumoniae (41 × 18 = 738)	732 (99.2%)	1 (0.2%)	4 (0.5%)	0 (0%)	6 (0.78%)	735 (99.6%)	03 (0.4%)
Acinetobacter baumannii (25 × 15 = 375)	363 (96.8%)	5 (1.3%)	7 (1.9%)	0 (0%)	12 (3.2%)	370 (98.7%)	05 (1.3%)
Pseudomonas aeruginosa (35 × 15 = 525)	523 (99.6%)	0 (0%)	2 (0.4%)	0 (0%)	2 (0.4%)	524 (99.8%)	01 (0.2%)
Exotic GNB (15 × 15 = 225)	215 (95.6%)	0 (0%)	6 (2.7%)	4 (1.7%)	10 (4.4%)	221 (98.2%)	04 (1.8%)

Performing DAST from flagged positive broths of blood culture can expedite AST by at least 24 hours.[6,8] Since 2010, many studies have aimed to optimize DAST from blood cultures using conventional Kirby Bauer disc diffusion and automated testing.[6,8–11] However, many studies reported mixed results for directly performing disc diffusion from broth.[9,12] In the present study, we have tried to standardize the DAST from positive broths of blood culture bottle using automated method for different microbial pathogens and assess its impact on time to generate report, errors associated with the method adopted and technical ease of carrying out the DAST procedure.

Materials and Methods

This prospective study was performed at a superspeciality public sector 1,000-beded hospital (with 25-bed intensive care unit) in North India, from February 2022 to January 2023. The study was intramurally funded and ethically approved by Institutional Ethics Committee (Dr. RMLIMS/IEC no.173/22). All positive flagged blood cultures (BACT/ALERT®BioMérieux, Marcyl'Etoile, France; aerobic and anaerobic) from patients admitted to ICU with suspicion of BSI were subjected to Gram staining. Blood cultures showing single type of morphology were further processed by an in-house protocol (details in Supplementary file), which included three steps centrifugation to obtain a pellet for bacterial identification by MALDI-TOF-MS (BioMérieux, Marcy-l'Etoile, France). After identification, appropriate AST cards (for GNB fermenters AST-405; GNB non-fermenters AST-406 and GPC AST-P628) were used for DAST using VITEK-2 system (BioMérieux, Marcy-l'Etoile, France). Direct antimicrobial susceptibility testing was compared with reference antimicrobial susceptibility testing (RAST) that included processing of overnight subculture from positively flagged blood culture broths on commonly used laboratory media blood agar and MacConkey agar to obtain bacterial colonies after overnight incubation, which were then identified using automated identification system MALDI-TOF-MS and AST using the automated system as per the manufacturer's protocol.

Positive blood culture broths that appeared polymicrobial on Gram staining, repeat isolate from the same patient and positive blood cultures showing contaminants such as diphtheroids and micrococci were excluded from the study. Considering confidence level of 95% (Z score = 1.96), and the detection of DAST from positive blood culture broth in a previous study sample size was calculated as 236.[10]

According to ISO 20776–2:2019 guidelines, categorical and essential agreement expression was used for comparison between DAST performance with RAST.[12] Whenever a novel test procedure (DAST) yields similar sensitivity to the RAST method, it was said to be in agreement. The disagreement was categorized into minor error (mE), major error (ME), and very major error (VME). When DAST is intermediate and RAST is susceptible or resistant, it is referred as mE. When RAST yields a resistant category and DAST reports susceptible category, this type of error is known as VME. When RAST result is susceptible and DAST shows resistant result, it is called as ME. Essential agreement for an isolate–drug combination means that minimum inhibitory concentration (MICs obtained for the DAST was within ± 2-fold dilution of the RAST method. Any new method of AST is acceptable and is said to give "excellent agreement" when the selection criteria proposed by Jorgensen are met, which is <3% VME and <7% major and minor errors in combination, compared with the reference AST method.[13] Data collected from DAST and RAST were entered into a Microsoft Excel and SPSS software version 22 was used for data analysis.

Results

Positive flagged 180 blood cultures in the study period were analyzed, which involved 60 isolates of Enterobacterales family (*Klebsiella pneumoniae* 41; *Escherichia coli* 19), 60 non-fermenters (*Pseudomonas aeruginosa* 35; *Acinetobacter baumannii* 25), 15 exotic GNBs (distribution enclosed in Supplementary file) and 65 Gram-positive cocci (*Staphylococcus* spp. 49; *Enterococcus* spp. 16). There was 100% concordance in identification of bacterial isolates when MALDI TOF-MS was performed from positive blood culture bottle broth and bacterial colony from overnight subculture plate.

DAST Result for Gram-negative Rods

Table 1 demonstrates performance of DAST compared with reference AST method in GNB. *Klebsiella pneumoniae* showed a categorical agreement of 99.2%, *Escherichia coli*: 99.1%, and among non-fermenters *Pseudomonas aeruginosa*: 99.6% and *Acinetobacter baumannii*: 96.8%. Assessment of categorical disagreement revealed, mE and ME were highest in *A. baumannii* (1.3 and 1.9%), while VME was only observed in exotic GNBs like *Burkholderia* spp, *Elizabethkingiae meningoseptica* (1.7%). Essential agreement was 98.7–99.6% for four common GNBs isolated in our study.

Among Enterobacterales, antimicrobials present in the VITEK-2 panel in DAST protocol showed an excellent categorical agreement >99%, except imipenem (90%), meropenem (98.3%) and gentamicin (98.3%). Categorical disagreement for imipenem was more than acceptable level (>3%) in mE and ME. For meropenem and gentamicin ME showed categorical disagreement (<3%) which was

Table 2: Performance of DAST compared with reference AST method for *Enterobacterales* by VITEK-2 system

Enterobacterales (60)	Categorical agreement, n (%)	Categorical disagreement n (%)				Essential agreement	
		Minor error	Major error	Very major error	Total	Agreed	Disagreed
Cefoperazone sulbactam	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Amoxicillin/clavulanic acid	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Piperacillin/tazobactam	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Cefuroxime	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Cefuroxime axetil	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Cefepime	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Ceftriaxone	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Imipenem	54 (90.0%)	2 (3.3%)	4 (6.7%)	0 (0.0%)	6 (10.0%)	57 (95%)	3 (5.0%)
Meropenem	59 (98.3%)	0 (0.0%)	1 (1.7%)	0 (0.0%)	1 (1.7%)	58 (96.7%)	2 (3.3%)
Amikacin	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Gentamicin	59 (98.3%)	0 (0.0%)	1 (1.7%)	0 (0.0%)	1 (1.7%)	58 (96.7%)	2 (3.3%)
Ciprofloxacin	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)
Tigecycline	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100.0%)	0 (0.0%)
Colistin	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100.0%)	0 (0.0%)
Cotrimoxazole	60 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	60 (100.0%)	0 (0.0%)

Table 3: Performance of DAST compared with reference AST method for non-fermenters by VITEK-2 system

Non-fermenters (75)	Categorical agreement, n (%)	Categorical disagreement (%)				Essential agreement	
		Minor error	Major error	Very major error	Total	Agreed	Disagreed
Aztreonam	75 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	75 (100.0%)	0 (0.0%)
Piperacillin/tazobactam	70 (93.3%)	2 (2.6%)	3 (4.1%)	0 (0.0%)	5 (6.7%)	74 (98.7%)	1 (1.3%)
Ceftazidime	74 (98.7%)	1 (1.3%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	75 (100.0%)	0 (0.0%)
Cefepime	74 (98.7%)	1 (1.3%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	75 (100.0%)	0 (0.0%)
Cotrimoxazole	75 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	75 (100.0%)	0 (0.0%)
Imipenem	74 (98.7%)	1 (1.3%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	75 (100.0%)	0 (0.0%)
Meropenem	74 (98.7%)	1 (1.3%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	75 (100.0%)	0 (0.0%)
Amikacin	73 (97.4%)	1 (1.3%)	0 (0.0%)	1 (1.3%)	2 (2.6%)	74 (98.7%)	1 (1.3%)
Gentamicin	74 (98.7%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	1 (1.3%)	75 (100.0%)	0 (0.0%)
Ciprofloxacin	72 (96.1%)	1 (1.3%)	2 (2.6%)	0 (0.0%)	3 (3.9%)	74 (98.7%)	1 (1.3%)
Levofloxacin	72 (96.1%)	1 (1.3%)	1 (1.3%)	1 (1.3%)	3 (3.9%)	74 (98.7%)	1 (1.3%)
Minocycline	75 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	75 (100.0%)	0 (0.0%)
Tigecycline	75 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	75 (100.0%)	0 (0.0%)
Colistin	75 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	75 (100.0%)	0 (0.0%)

within acceptable level. More than 3% essential disagreement was reported for imipenem (5.0%), meropenem (3.3%) and gentamicin (3.3%), as given in Table 2.

Categorical agreement of >95% also reported for non-fermenter GNB, except for piperacillin–tazobactam (93.3%). It was observed that VME was within acceptable categorical disagreement of 1.3% for aminoglycosides and levofloxacin (Table 3). Antimicrobials such as ceftazidime, cefepime, carbapenem, aminoglycosides, and fluoroquinolone showed acceptable categorical disagreement below 7% for minor and major error.

DAST Result in GPC

As presented in Table 4, gram-positive organisms such as *Staphylococcus* spp. and *Enterococcus* spp. showed more than 99.2% categorical agreement and 99.2–99.6% essential agreement. Permitted levels of categorical disagreement was observed for mE, ME, and VME were <1% in this study. Minor error for glycopeptides and fluoroquinolones, ME for glycopeptides and macrolide antibiotics were reported in *Staphylococcus* spp. while two *Enterococcus* spp. isolates showed ME for glycopeptides.

Among GPCs, many antimicrobials present in automated AST cartridges demonstrated >95% categorical agreement, except teicoplanin (92.3%) and vancomycin (89.2%). Categorical disagreement for glycopeptides was more than acceptable level (>3%) for mE and ME. The essential disagreement of >3% was also seen in teicoplanin (3.1%) and vancomycin (4.6%), as given in Tables 4 to 6.

Turnaround Time

The present study also recorded the turnaround time for the release of report of different organisms tested using DAST method and compared with the reporting time taken by Reference AST.

(A) For GNB

Mean difference: 1274.250 minutes (DAST vs RAST).

T-statistic value: 54.522 and *p*-value: $p < 0.0001$ significance level.

Table 4: Performance of DAST compared with reference AST method for GPC by VITEK-2 System

Organisms and antibiotic tested (n × Ab = N)	Categorical agreement, n (%)	Categorical disagreement, n (%) among isolate-antibiotic combinations tested				Essential agreement	
		Minor error	Major error	Very major error	Total	Agreed	Disagreed
Staphylococcus spp. (49 × 15 = 735)	729 (99.2%)	3 (0.4%)	2 (0.27%)	1 (0.13%)	6 (0.8%)	732 (99.6%)	03 (0.4%)
Enterococcus spp. (16 × 15 = 240)	238 (99.2%)	0 (0.0%)	2 (0.8%)	0 (0.0%)	2 (0.8%)	238 (99.2%)	02 (0.8%)

Antibiotics tested (N = 65)	Categorical agreement, n (%)	Categorical disagreement (%)				Essential agreement	
		Minor error	Major error	Very major error	Total	Agreed	Disagreed
Benzyl penicillin	65 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	65 (100.0%)	0 (0.0%)
Tetracycline	65 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	65 (100.0%)	0 (0.0%)
Teicoplanin	60 (92.3%)	3 (4.6%)	2 (3.1%)	0 (0.0%)	5 (7.7%)	63 (96.9%)	2 (3.1%)
Vancomycin	58 (89.2%)	3 (4.6%)	4 (6.2%)	0 (0.0%)	7 (10.8%)	62 (95.4%)	3 (4.6%)
Erythromycin	63 (96.9%)	0 (0.0%)	2 (3.1%)	0 (0.0%)	2 (3.1%)	65 (100.0%)	0 (0.0%)
Clindamycin	64 (98.5%)	0 (0.0%)	1 (1.5%)	0 (0.0%)	1 (1.5%)	65 (100.0%)	0 (0.0%)
Linezolid	65 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	65 (100.0%)	0 (0.0%)
Levofloxacin	62 (95.4%)	3 (4.6%)	0 (0.0%)	0 (0.0%)	3 (4.6%)	64 (98.5%)	1 (1.5%)
Ciprofloxacin	62 (95.4%)	3 (4.6%)	0 (0.0%)	0 (0.0%)	3 (4.6%)	64 (98.5%)	1 (1.5%)
Cotrimoxazole	63 (96.9%)	0 (0.0%)	2 (3.1%)	0 (0.0%)	2 (3.1%)	65 (100.0%)	0 (0.0%)

Table 5: Difference in time taken to release the report for gram-negative bacteria

Microorganisms	DAST Time in minutes	RAST Time in minutes
Escherichia coli	625	1765
Klebsiella pneumoniae	650	1997
Pseudomonas aeruginosa	900	2128
Acinetobacter baumannii	955	2227
Average time	755.00	2029.25

Table 6: Difference in time taken to release the report for gram-positive bacteria

Microorganisms	DAST Time in minutes	RAST Time in minutes
Staphylococcus aureus	695	1935
Coagulase negative *Staphylococcus*	690	1865
Enterococcus spp.	770	2170
Average time	698.33	1990.00

(B) For GPC

Mean difference reported: 1291.670 minutes (RAST Time – DAST Time).

T-statistic value: 61.024 and *p*-value < 0.0001 significance level.

The inference from above findings is that the difference in two means (average time taken to release the report between DAST and RAST) is significant.

DISCUSSION

The availability of AST reports in a shorter time is the need of the hour for saving precious lives lost due to inappropriate antibiotic therapy. Most of the DAST studies from blood culture broth in cases of sepsis in the past were done using the disk diffusion AST method.[10,13–16] The present study emphasizes the importance of DAST based on an automated AST system, and the available literature for which is scanty.

In the present study, there was more than 95–99% and 98–99% categorical agreement and essential agreement, respectively between various GNB and GPC organisms tested directly from flagged blood culture bottle and by reference method using overnight grown bacterial colonies. Kavipriya D et al. conducted similar study in South India in 2021, but only for GNB.[8] They have reported >95% concordance of DAST result for GNB with RAST, which was similar to our study. Barnini et al. in 2016 conducted a similar study in Italy, where the essential agreement for direct AST by two different protocols for all isolate/antimicrobial agent combinations was 87.8 and 90.5% for GNB and 93.1 and 93.8% for GPC, respectively.[17] Mauri et al. observed 98.1% categorical agreement for GNBs-antimicrobial combination and essential agreement between drug–bug combination found to be 97.7%. In their study, MALDI-TOF mass spectrometry was used for bacterial identification and VITEK-2 on 3-hour subculture plates from positively flagged blood culture bottles.[18] In comparison to other studies, the present study has a much less technically cumbersome, more economical and faster protocol for Direct AST.[15–18] Also, most studies have used cards AST 280 and AST 281 while we have conducted this study on cards like AST-405 and AST-406 cards for fermenter GNB and non-fermenter GNB, respectively.[14–16]

Among GNB isolates tested by DAST, maximum essential disagreement (1.3%) was observed in *A.baumannii*. *A.baumannii* also showed highest categorical disagreement in mE and ME, whereas VME was higher in Exotic GNB organisms which were lower in numbers in our study and are in general not isolated very frequently from blood culture. However, all these errors were within acceptable range of <3%, a finding also reported by Kavipriya et al. from South India.[8] Mauri et al. did not report any ME and VME in *K. pneumoniae* and *A. baumannii* isolates; but their sample size was small.[18] Among GPC isolates tested by DAST, the present study has shown excellent and >99% acceptable categorical and essential agreement. There are very few studies on GPC isolates tested directly from flagged blood culture bottles; one such study by Barnini et al. demonstrated only 93% agreement.[17] It becomes important that for DAST pellet after washing, suspension should be equivalent to 0.5 MacFarland for getting the appropriate result or else errors will increase.

For Enterobacterales, different antimicrobial analysis showed less essential agreement than the permitted level (<95%) for imipenem, with 2 mE and 4 ME categorical errors. A study from South India by Kavipriya et al. reported maximum categorical error for Enterobacterales and piperacillin–tazobactam combination.[8] Amoxicillin–clavulanic acid and piperacillin–tazobactam showed mE for Enterobacterales in the study done by Mauri et al. also.[18] The present study has shown permissible level of disagreement (<3% for any error) 2.7% ME and 1.7% VME in exotic GNBs, in order to understand the reason behind this low percentage of error could be because of multiple mechanisms involved in drug resistance as suggested by artificial intelligence of automated system. Among non-fermenters, the piperacillin–tazobactam drug bug combination has shown maximum disagreement of 6.7%; rest all have >95% acceptable categorical and essential agreement. Kavipriya et al. reported essential disagreement <95% for levofloxacin and minocycline among non-fermenters.[8] In our study, mEs and VMEs were not significant in the non-fermenter, which was in accordance with other studies.[16–18] Less essential agreement for carbapenem and cephalosporin group of the drugs was reported by Pan et al., which was not the case in this study.[19] The present study also analyzed the drug–bug combination DAST for GPC, where the categorical agreement was <95% in the case of vancomycin and teicoplanin. Other GPC–drug combination showed excellent acceptable agreement in terms of categorical and essential data. Barnini et al. who used two protocols for GPC bug–drug combination showed agreement of 78.6–93.1% for first protocol and 76.7–93.8% for second protocol; both are less compared with the protocol used in present study.[17]

In addition to good agreement rates for antimicrobial susceptibility testing, our DAST protocol demonstrated remarkably less time to report when compared with RAST. It is worth noting that final result made available approximately 1 day earlier than usual duration of reporting. We however noted that non-fermenter GNB and *Enterococcus* spp. took longer time (≥5 hours) for DAST results compared with Enterobacterales and *Staphylococcus* spp., respectively. Authors are of the view that this could be due to the antimicrobial agent's ability to slowly permeate into these microbes. Though, to corroborate these observations, we need further studies from different centers. Decreasing TAT especially in the case of blood culture diagnostics and sepsis prevention remains a critical factor in patient management. Less hands-on time and slightly lower cost (by avoiding a subculture) are the added advantages of using automated DAST.[18,19]

Limitations of the Study

The present study comprises of small sample size of isolates and is from a single center. To validate our observations, we need larger, multicentric studies.

Conclusion

The present study compared the RAST and DAST methods from blood cultures flagging positive in an automated system. In the present study, we observed that direct automated VITEK-2 AST from positive blood culture broth could provide prompt and precise antimicrobial sensitivity reports for commonly isolated Enterobacterales, non-fermenters, and GPCs. The direct automated AST method reduces the turnaround time to generate AST reports by 18–24 hours.

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