

Applying Value-Based Healthcare Values in Optimization of Microbiological Investigation and Impact in the Septicemic and Bacteremic Patients Outcome

Saudi German Hospital Aseer - June 2024

Introduction

As Saudi German Health Group is the largest health care provider in Saudi Arabia, Improving the quality-of-service in microbiology laboratory has been one of the main priorities in SGH Aseer, accordingly, one of the main solutions provided is to shift the microbiological investigation process from the conventional method to the most advanced technology in microbiology field (Maldi-TOF Technology).

Matrix-Assisted Laser Desorption/Ionization-Time of Flight Mass Spectrometry (MALDI-TOF MS) is a highly accurate and reliable technique for identifying microorganisms by analyzing their mass-to-charge ratio. It is particularly effective in diagnosing septicemia and bacteremia, as it rapidly identifies a wide range of pathogens, including Gram-positive and Gram-negative bacteria, mycobacteria, yeast, and molds. This precision is crucial for managing life-threatening infections in immunocompromised and critically ill patients, surpassing traditional diagnostic methods in speed and accuracy.



Methods

- Turnaround time (TAT) of blood culture has been measured in this study period (4th quarter in 2023 and 1st quarter in 2024) which is one of microbiology process KPIs.
- Average recovery time for septicemic and bacteremic patients admitted to SGH Aseer has been measured in this study period (4th quarter in 2023 and 1st quarter in 2024) as an outcome KPI.
- A comparison study has been made for the process KPI (Blood Culture TAT) and outcome KPI (Average recovery time for septicemic and bacteremic patients admitted to hospital) between the period before adoption Maldi-TOF technology and after (4th quarter in 2023 and 1st quarter in 2024).
- Total number of septicemia and bacteremia events included in this study retrospectively was 61 events distributed between the 4th quarter 2023 and 1st quarter 2024.

Inclusion Criteria:

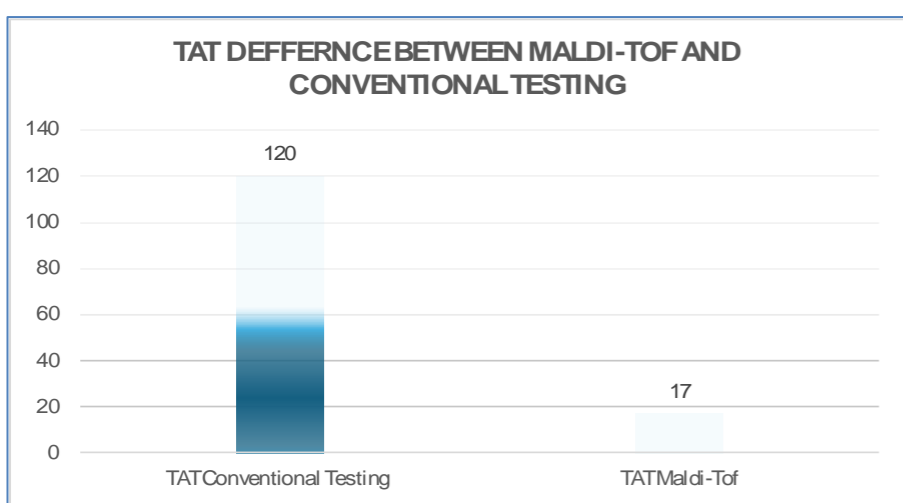
- All patients identified as septicemic or bacteremic patients in critical care units and hospital wards according to the approved CPG.

Exclusion criteria:

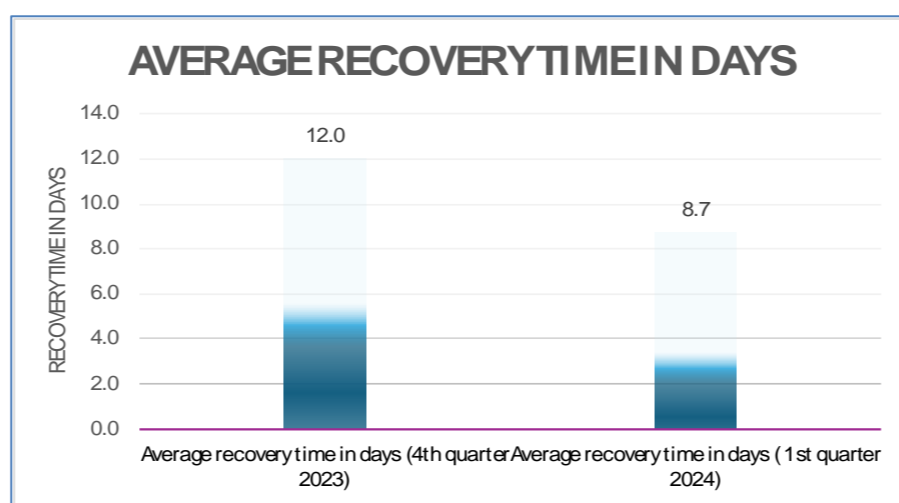
- Deceased patients before the recovery criteria study.
- Patients with no second blood cultures indicating the recovery process (negative blood culture).

Results

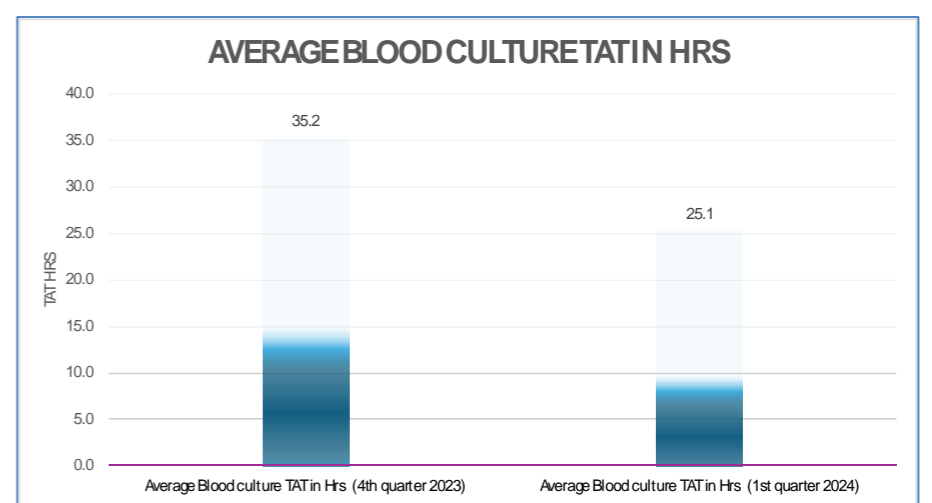
- The improvement in TAT of blood culture analysis (Graph 1) has a major impact in the patient's management which facilitate the improved recovery time of those patients (Graph 2) included in this study.
- Interlaboratory Reproducibility & Cost Effectiveness: 72 to 120 hrs. Conventional test to 17 hrs. for MALDI-TOF (Graph 3)



Graph 1



Graph 2



Graph 3

- Enhancing patient care as clinical value of MALDI-TOF test:

MALDI-TOF MS enables rapid, accurate pathogen identification, improving patient outcomes.

PARAMETER	RESULTS	UNITS	RANGES
Preliminary Result: (1st isolate)	Gram Negative Bacilli		
1st isolate Bottle	Aerobic bottle		
Culture Result (1st isolate)	Klebsiella pneumoniae		
Resistance Markers	Carbapenem-Resistant Organism (CRO)		
Preliminary Result (2nd isolate)	Gram Negative Bacilli		
2nd isolate Bottle	Anaerobic bottle		
Comment:	Ri hand & Li hand inform to razan #20218013 by mohd94719 SGH 4.5.2024 read back - yes		

MALDI-TOF MS rapidly detects difficult fungi (Aspergills), enabling precise patient

PARAMETER	RESULTS	UNITS	RANGES
Comment:	Fungal growth (Aspergillus niger)		

Conclusions

- Integrating MALDI-TOF MS into microbiological investigations aligns with value-based healthcare by providing rapid and precise pathogen identification, which directly improves outcomes for septicemia and bacteremic patients. This approach enables timely and effective treatment, reducing complications, hospital stays.
- Enabling cost reduction from 100SR Conventional test to 50SR for MALDI-TOF
- Focusing on high-quality, efficient, and patient-centered care, MALDI-TOF MS supports the core principles of value-based healthcare, optimizing both clinical outcomes and resource utilization."