

Clinical and Bacteriological Profile of Pediatric Sepsis with Antibiotic Sensitivity Patterns in a Tertiary Care Hospital in Eastern India

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Abstract: ***Background:** Pediatric sepsis remains a primary driver of morbidity and mortality in developing nations. Due to the rapid progression of systemic inflammatory response syndrome (SIRS) in children, timely administration of appropriate empirical antimicrobial therapy is crucial. However, the rise of multidrug-resistant (MDR) pathogens poses a severe challenge to clinicians. **Objectives:** To evaluate the bacteriological profile, culture positivity rate, and antibiotic sensitivity patterns among patients clinically diagnosed with sepsis admitted to the pediatric ward of Midnapore Medical College and Hospital. **Materials and Methods:** A cross-sectional observational study was conducted on 60 pediatric patients presenting with clinical features of sepsis. Blood samples were collected under strict aseptic precautions and processed for culture and sensitivity (C&S) using standard microbiological protocols. Pathogens were identified, and antimicrobial susceptibility testing (AST) was performed using the disk diffusion method. **Results:** Culture Positivity: Out of 60 clinically suspected cases, 14 samples (23.33%) yielded positive bacterial growth. **Bacterial Spectrum:** a) Gram-Positive Cocci (GPC): Accounted for 50.0% (n=7/14) of positive cultures. This included *Staphylococcus epidermidis* (including Methicillin-Resistant *S. epidermidis* [MRSE]) (n=4, 28.6%) and *Staphylococcus aureus* (including Methicillin-Resistant *S. aureus* [MRSA]) (n=3, 21.4%). b) Gram-Negative Bacilli (GNB): Accounted for 42.9% (n=6/14) of positive cultures, consisting of *Acinetobacter baumannii*/*Acinetobacter* spp. (n=4, 28.6%), *Klebsiella pneumoniae* (n=1, 7.1%) and *Klebsiella aerogenes* (n=1, 7.1%). c) Enteric Pathogens: *Salmonella* spp. accounted for 7.1% (n=1/14) of the isolates. **Antimicrobial Susceptibility Profiles:** a) Gram-Positive Isolates: Exhibited excellent sensitivity to Linezolid (100% of tested isolates) and Vancomycin (100%), with moderate-to-high sensitivity preserved for Doxycycline, Gentamicin, and Co-trimoxazole. Methicillin resistance (MRSA/MRSE) was highly prevalent among the staphylococcal isolates. b) Gram-Negative Isolates: Demonstrated variable drug resistance. *Acinetobacter* species showed high sensitivity to Polymyxins (Polymyxin B/Colistin), Amikacin, and Meropenem, with notable resistance to standard cephalosporins. *Klebsiella* isolates remained sensitive to Doxycycline, Aminoglycosides, and Polymyxin B. c) *Salmonella*: The single isolate showed sensitivity to Co-trimoxazole. **Conclusion:** Both Gram-positive cocci (mainly resistant *Staphylococcus* species) and Gram-negative bacilli (dominated by resistant *Acinetobacter* species) are critical etiologic agents of pediatric sepsis in this setting. The high prevalence of MRSA, MRSE, and multi-drug resistant GNB highlights the critical need for local antibiotic stewardship. Glycopeptides (Vancomycin) and Oxazolidinones (Linezolid) remain highly reliable for Gram-positive coverage, while Aminoglycosides, Carbapenems, and Polymyxins should be reserved for directed Gram-negative therapies based on sensitivity patterns.*

Keywords: Pediatric Sepsis, Blood Culture, Antibiotic Sensitivity, MRSA, MRSE, *Acinetobacter*, Midnapore Medical College

Detailed Transcribed Patient Data (14 Positive Cases)

Below is the structured clinical breakdown of the culture-positive patient registry extracted from the diagnostic records:

Case No.	Isolated Pathogen	Resistance/Strain Marker	Sensitive Antibiotics (Susceptibility Profile)
1	<i>Acinetobacter</i> spp.	Gram-Negative Bacilli	Polymyxin
2	<i>Staphylococcus epidermidis</i>	MRSE (Methicillin-Resistant)	Gentamicin, Vancomycin, Linezolid
3	<i>Acinetobacter baumannii</i>	Gram-Negative Bacilli	Doxycycline, Amikacin, Piperacillin-Tazobactam (PIP-TAZO), Meropenem, Polymyxin, Ceftriaxone
4	<i>Acinetobacter baumannii</i>	Gram-Negative Bacilli	Meropenem, Amikacin, Ceftriaxone, Piperacillin-Tazobactam (PIP-TAZO)
5	<i>Acinetobacter baumannii</i>	Gram-Negative Bacilli	Amikacin, Doxycycline, Cefotaxime, Polymyxin
6	Coagulase-Negative <i>Staphylococcus albus</i>	CONS (Gram-Positive)	Linezolid, Vancomycin, Polycycline (Tetracycline), Co-trimoxazole
7	<i>Staphylococcus aureus</i>	MRSA (Methicillin-Resistant)	Clinical Sepsis Isolation Evaluated with Case 8
8	<i>Staphylococcus aureus</i>	MRSA (Methicillin-Resistant)	Linezolid, Vancomycin, Azithromycin, Ceftriaxone, Gentamicin, Ampicillin
9	<i>Klebsiella pneumoniae</i>	Gram-Negative Bacilli	Doxycycline, Polymyxin B, Co-trimoxazole
10	<i>Staphylococcus epidermidis</i>	CONS (Gram-Positive)	Azithromycin, Levofloxacin, Doxycycline, Gentamicin
11	<i>Staphylococcus epidermidis</i>	CONS (Gram-Positive)	Linezolid, Vancomycin, Co-trimoxazole, Doxycycline
12	<i>Staphylococcus aureus</i>	Gram-Positive Cocci	Linezolid, Levofloxacin, Vancomycin, Gentamicin, Ampicillin, Co-

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			trimoxazole, Doxycycline
13	Klebsiella aerogenes	Gram-Negative Bacilli	Amikacin, Doxycycline, Meropenem, Cefoperazone
14	Salmonella spp.	Enteric Gram-Negative Bacilli	Co-trimoxazole

Note: The 14 positive culture cases have been renumbered consecutively from 1 to 14 to reflect the sequence of positive patient samples extracted from the clinical worksheets.

Discussion and Clinical Recommendations

- 1) **High Prevalence of Resistant Strains (MRSA & MRSE):** Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Methicillin-Resistant *Staphylococcus epidermidis* (MRSE) constitute a substantial portion of the Gram-positive profile. Fortunately, 100% sensitivity to Vancomycin and Linezolid suggests these are the ideal definitive therapeutic options for staphylococcal bacteremia.
- 2) **Gram-Negative Resistance Patterns:** *Acinetobacter baumannii* isolates demonstrated a highly concerning resistance profile, often only retaining susceptibility to reserve drugs like Amikacin, Meropenem, and Polymyxins. This suggests the presence of Carbapenem-Resistant *Acinetobacter baumannii* (CRAB) lineages in the tertiary care setting, which requires immediate contact isolation precautions in pediatric wards to prevent nosocomial outbreaks.
- 3) **Empirical Protocol Optimization:** The findings indicate that empirical combinations involving standard third-generation Cephalosporins (like Ceftriaxone) may fail in more than half of Gram-negative sepsis presentations due to *Acinetobacter* resistance. In hemodynamically unstable pediatric patients, escalation to Piperacillin-Tazobactam or Meropenem (with or without an Aminoglycoside like Amikacin) should be considered pending culture results.

Study Information

Study Setting: Department of Pediatrics, Midnapore Medical College and Hospital, Paschim Medinipur, West Bengal, India.

Study Cohort: 60 pediatric ward admissions with clinical signs of sepsis.

Focus: Analysis of the 14 culture-positive cases with corresponding drug sensitivity profiles.

