

Ticking Time Bombs: The Race against Resistant Bacteria in Kashmir's Healthcare System

The present era of medicine continues to witness an ever-increasing success in diagnostic and therapeutic modalities of non-communicable diseases. While considerable advancements have been made in diagnosing, treating, and preventing various infectious diseases, the ongoing challenge persists on a global scale due to the emergence of novel infections and the continuous evolution of antimicrobial resistance. The dynamics of microbial ecology and antibiotic susceptibility continue to jeopardize the management and outcome of even common infectious ailments. This worrying reality is further fueled by the inappropriate use of existing antibiotics and suboptimal progress in developing newer ones. Over time the expected consequences are the suboptimal or no response of infections to the use of commonly prescribed antimicrobials with the subsequent increase in morbidity and mortality. To overcome this threat, robust local surveillance and understanding of dynamic antibiotic susceptibility patterns is essential for healthcare professionals to make treatment decisions in managing infections effectively especially so in critical care settings where a wrong antibiotic choice would matter the most.

In the current issue, a study by Koul A et al. aims to provide insight into the spectrum of microbes responsible for bloodstream infections among hospitalized patients. In addition, the study also provides the antibiotic susceptibility/resistance patterns of isolated organisms. Such information is critical and is needed regularly from various healthcare areas to help clinicians make correct and effective antibiotic selections for the management of infectious ailments. The study has recruited patients with evidence of systemic inflammatory response syndrome

(SIRS), from whom blood cultures have been obtained and the growth of a pathogenic organism obtained. While the study has analyzed 136 patients with bacteremia in line with its objectives, the researchers have not provided a count of the overall number of patients with Systemic Inflammatory Response Syndrome (SIRS) and negative blood cultures. This would have provided additional information about the sensitivity of blood cultures in patients having SIRS, which would translate to identifying the yield of blood cultures in different clinical settings and guide to judicious use of blood cultures in various clinical syndromes.

The study identifies various risk factors for bloodstream infections in the form of instrumentation, trauma, immunosuppression and recent surgery. Among symptoms fever, breathlessness and cough are reported as the commonest symptoms in their cohort of bacteremic patients. The researchers however have not considered proper clinical syndromes like pneumonia, urinary tract infections, gastrointestinal infections and others as likely foci for bloodstream infections. Such knowledge would help treating clinicians in suspecting particular organisms in particular clinical settings giving rise to SIRS and thereby making proper antibiotic selection.

The current study reports a predominance of Gram-negative bacteremia (78.7%) over Gram-positive (18.4%) bloodstream infections. Globally, the contribution of Gram-negative or positive bacteria to bloodstream infections differs by geographical location, site of care whether ICU or non-ICU, as well as patient-related factors like immunosuppression, focus of infection, presence of central venous catheters and many more.¹ This study although has given us a glimpse of prevalent microbes in our part of the world, further knowledge about pathogens concerning site of care and other patient-related factors needs to be explored

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by further studies to guide empiric treatment options for different clinical settings and ICU or non-ICU settings. In India, *E.coli* followed by *K. pneumonia* and *Staphylococcus haemolyticus* are the predominantly isolated pathogens from blood.² In the current study, the predominance of *Burkholderia* among Gram-negative bacteria and *Enterococcus* among Gram-positives demonstrates the changing dynamics of microbial ecology concerning various factors and reflects the need for continuous surveillance.

Over the past few decades, the recent surge of antimicrobial resistance has made it a global health issue and a potential threat to human life. A global review on Antimicrobial Resistance has projected an estimate of 10 million annual deaths by 2050.³ WHO has specified a priority pathogen list of highly resistant Gram-negative microbes with limited treatment options, which includes *Acinetobacter*, *Pseudomonas* and *Enterobacterales*. The primary mechanism of resistance among these organisms is by synthesis of carbapenam hydrolyzing enzymes known as carbapenamases.⁴ In a systematic review, previous carbapenem use, colonization with carbapenem-resistant organisms, ICU stay and mechanical ventilation, presence of a catheter, length of hospital stay and high APACHE emerged as risk factors for infection with carbapenem-resistant Gram-negative bacteria.⁵ In the current study, although *B.cepacia* has shown appreciable sensitivity to meropenam, other Gram-negative pathogens (*E.coli*, *A.baumannii*, *K.pneumonia*, *P.aeruginosa*) isolated from patients with hospital-acquired bloodstream infections have demonstrated high rates of resistance to carbapenems. Moreover, this study has reported high levels of resistance to fluoroquinolone like levofloxacin and ciprofloxacin both in community and hospital-acquired bloodstream infections. This is worrying because quinolones remain a widely prescribed antibiotic for use in infectious syndromes like urinary and respiratory tract infections. Resistance rates ranging from 50-100% as reported in the current study among organisms like *P. aeruginosa*, *E. coli*, and *Klebsiella* for levofloxacin is alarming and a caution for its use without a proper patient selection. Although all the community-acquired isolates of Gram-negative bacilli like *E. coli*, *A. baumannii* and *P. aeruginosa* were reported to be sensitive to aminoglycoside antibiotics like amikacin and gentamycin,

but the resistance rates ranging from 30-75% among hospital-acquired isolates is again alarming. In addition, among Gram-positive bacteria, the emergence of vancomycin-resistant isolates of *Enterococcus faecium* reported in the study also remains a concern among patients with hospital-acquired bacteremia.

In conclusion, the escalating levels of antimicrobial resistance are an imminent threat to global progress in healthcare, rendering our most potent weapons against microbes increasingly ineffective. The consequences are grave and our ability to combat infections may jeopardize the foundation of modern medicine. Thus, it becomes imperative for healthcare professionals, researchers and policymakers both at national and international levels to work collaboratively through innovative strategies, responsible antibiotic use and the development of novel drugs.

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