EDITORIAL

Antimicrobial Resistance a Global Health Threat

Vishal R Tandon, Annil Mahajan*

Antimicrobial resistance (AMR) is posing a global health threat presently world wide including Indian subcontinent. The crude mortality from infectious diseases in India today is 417 per 100,000 persons and it is expected that if scenario of AMR continues then sepsis will take over as a leading cause of death world wide.

The emergence of resistance is not only limited to the older and more frequently used classes of drugs but there has also been a rapid increase in resistance to the newer and less frequently used drugs as well. This threat is compounded by the lack of development of new antibiotics proportionate to the antibiotics undergoing in to AMR.(1, 2)

The need of hour is to focus on creating awareness, both in consumers and providers. Surveillance of AMR is also very important. The Indian Council of Medical Research (ICMR) established a national network on surveillance of antimicrobial resistance in laboratories based at tertiary care academic centres, targeting medically important index microbes which have been identified by WHO.(1, 2)

Rational and judicial antimicrobial utilization and a stringent adherence to infection control practices/ programme, therefore remain the major strategies to counter this threat.

A safe and effective strategy for antibiotic use involves prescribing an antibiotic only when it is needed and selecting an appropriate and effective agent at the recommended dose, with the narrowest spectrum of antimicrobial activity, fewest adverse effects and lowest cost.

Good antibiotic prescription practices include:

1. Prescribing empiric antibiotics for suspected bacterial infections only if:

Symptoms are significant or severe

There is a high risk of complications

The infection is not resolving or is unlikely to resolve

2. Using first-line antibiotics first

3. Reserving broad spectrum antibiotics for specifically indicated Conditions

The hospital anti-biogram with susceptibility pattern of various organisms is reviewed every year and antibiotic recommendations are modified accordingly

Principles of rational antibiotic Prescribing (1, 2)

Empiric antimicrobial treatment should be limited to conditions where immediate / early initiation of antimicrobials has been shown to be beneficial. Some examples are:

Severe sepsis (sepsis-induced tissue hypoperfusion or organ dysfunction) and septic shock

Acute bacterial meningitis

Community acquired pneumonia

Ventilator associated pneumonia

Necrotizing fasciitis

Febrile neutropenia

2. Fever, leukocytosis or elevated c-reactive protein (CRP) levels by themselves should not be considered indications for starting empiric antimicrobials, as these

From the Department of Pharmacology & *General Medicine, Govt. Medical College Jammu, (J&K)- India 1800001
Correspondence to : Dr Vishal R Tandon Associate Professor Department of Pharmacology GMC, Jammu (J&K)-India 180001

have been shown to have very poor specificity to diagnose bacterial sepsis. Always consider multiple data points (history, physical findings and investigation reports) together to make an accurate diagnosis.

3. Incomplete or inaccurate diagnosis is the most important reason for inappropriate use of antimicrobials.

4. Always obtain cultures (two sets of blood cultures and other appropriate samples as clinically indicated - e.g. normally sterile body fluids, deep pus etc.) before starting empiric antimicrobial treatment.

Avoid the practice of obtaining "pan cultures" unless clinically indicated

5. Avoid sending cultures from superficial wounds, decubitus ulcers, and chronic wounds and draining sinuses. Surface swab cultures are either inadequate or provide misleading information regarding diagnosis (as they cannot differentiate infection from colonization / contamination).

6. When starting antimicrobials, use full therapeutic doses, paying close attention to dose, frequency, and route of administration and duration of treatment.

7. Review all antimicrobial prescriptions after 48 to 72 hours ("antimicrobial timeout") with a view to modify or stop the initial empiric therapy.

8. De-escalate (targeted or pathogen-specific therapy) the antimicrobial regimen once culture and susceptibility reports are available, and the patient is showing signs of improvement with the initial empiric broad-spectrum antimicrobials.

Examples of optimization include switch

i. To a narrow-spectrum antimicrobial,

ii. From combination to single agent,

iii. To less toxic or expensive drug, or

iv. From i.v. to an oral formulation.

9. Stop antimicrobials if the cause of initial symptoms is found to be non-infectious

10. The doses mentioned in these guidelines are for patients with normal renal function. The doses have to be modified for those with renal insufficiency.

Further, the identification and detection of bacteria in a patient's sample is critical for point-of-care diagnostics and in a clinical setting, the consequent determination of the correct antibiotic for a patient-tailored therapy is equally crucial. (3)

Recent advances have been made in the developments of antimicrobial susceptibility testing (AST) measurements. Detection of antibiotic resistance by genomic AST techniques relies on the prediction of antibiotic resistance via extracted bacterial DNA content, while phenotypic determinations typically track physiological changes in cells and/or populations exposed to antibiotics. This technology and sensing systems demonstrates the most effctive potential to detect antimicrobial resistance in a clinical setting.(3)

The rapid emergence of resistant bacteria is occurring worldwide, endangering the efficacy of antibiotics, which have transformed medicine and saved millions of lives.(4)

References

1. National Centre for Disease Control . National Treatment Guidelines for Antimicrobial Use in Infectious DiseasesAvailable at : http://www.pbhealth.gov.in/AMR_guideline7001495889.pdf Cited on Jan, 2018
2. Guidelines for Prevention and Control of Antibiotic Resistant Organisms in Health Care Settings Available at : https://www.dhs.wisconsin.gov/publications/p4/p42513.pdf Cited on Jan, 2018
3. Leonard H, Colodner R, Halachmi S, Segal E. Recent Advances in the Race to Design a Rapid Diagnostic Test for Antimicrobial Resistance.*ACS Sens* 2018 doi: 10.1021/acssensors.8b00900
4. Golkar Z, Bagazra O, Pace DG. Bacteriophage therapy: a potential solution for the antibiotic resistance crisis. *J Infect Dev Ctries* 2014;8(2):129–136. 13.