

### General Studies – 3; Topic: Science and Technology- developments and their applications and effects in everyday life

## Antibiotic Resistance

### 1) Introduction

- The WHO defines antibiotic resistance (AMR) as a condition wherein microbes survive when exposed to the drug which would have normally caused them to die.
- Antibiotics that once cured ailments across the spectrum are now turning into a potential source of prolonged illness, disability and death.

### 2) Reasons for Antibiotic Resistance (ABR)

- ABR in certain cases occurs through the natural evolution of resistance in bacterial pathogens
- The rising consumption of antibiotics is a major contributor.
- Free movement of ABR across boundaries, with serious consequences.
- Domestic factors such as a weak public health system, cheap antibiotics available in the market, and their unregulated use, have created ideal conditions for superbugs.
- Poor regulation of pharmacies and large number of unqualified personnel into the supply chain.
- Lack of awareness among patients regarding the appropriate use of antibiotics has led to self-medication
- Non-adherence to the prescribed course of antibiotics, further intensifying the problem.
- The misuse of high-end antibiotics for treatment of common health conditions gives rise to these bacteria.
- Other reasons include the use of antibiotics in animals, and environmental factors.

### 3) Concerns / Challenges

- The absence of a good statistical model to show the relationship between antibiotic consumption and associated resistance makes it difficult to frame usage guidelines for these antibiotics.
- Absence of any great success even post the Chennai declaration of 2012.
- WHO has published its first ever list of antibiotic-resistant 'priority pathogens' — a catalogue of 12 families of bacteria that pose the greatest threat to human health and most of these 12 superbugs have presence in India.
- Anti-microbial resistance threatens the effective prevention and treatment of an ever-increasing range of infectious diseases like tuberculosis, malaria, urinary tract infection (UTI) and even HIV.
- Antibiotic-resistant neonatal infections claim the lives of 60,000 newborn babies each year
- Many hospitals, nursing homes and family doctors continue to over-prescribe antibiotics, fuelling drug resistant infections
- Recently an American woman who had travelled to India died of a rare superbug
- Lack of regulatory provisions for the use of antimicrobial in cattle, chickens and pigs raised for domestic consumption

### 4) Government Initiatives

- National Programme on Containment of Antimicrobial Resistance was launched under the 12th Five-year Plan.
- The Union health ministry is set to roll out prescription audits as part of a multi-pronged strategy against anti-microbial resistance (AMR).

- The health ministry, along with WHO, has worked out a national action plan to combat antibiotic resistance.
- The campaign — 'Medicines with the Red Line', which involves packs of certain medicines carrying a 'red line' to differentiate them from other drugs
- Indian Council of Medical Research has issued new national guidelines on the use of Antibiotics.
- Public awareness messages on state-run radio channels cautioning patients against taking antibiotics without a prescription.

### 5) **Battling superbugs with Big Data**

- Tackling the superbug problem requires massive data collection and analysis.
- Studies can provide a clearer picture of the prescribed doses of antibiotics and their pattern of use
- Health departments of the Central and state governments must work in coordination with nodal bodies in the technology space to develop an information-sharing grid.
- Data analytics to track the correlation between antibiotic consumption and induced drug resistance
- Access to this online database can help physicians track ABR patterns; predict health outcomes; and prescribe drugs suitable for patient needs.
- Big Data and analytics promise a significant step towards personalized medicine.

### 6) **Way Forward**

- Promote research and development of new antibiotics to address the problem of growing global resistance to antimicrobial medicines.
- Digital prescriptions prove to be an apt solution to the menace by enabling right medicine for the right patient in the right amount.
- The ministries of environment, animal husbandry, agriculture and the department of pharmaceuticals should jointly strategise to contain AMR
- The use of bio-enhancers with drugs can also be explored as a solution to solve the problem of drug resistance
- Behavioural change plays an important role, stricter rules, effective enforcement and not mere penalty is the solution.
- Widespread media advocacy and building of public opinion and awareness, where do's and don'ts are communicated to larger stakeholders.
- A new national policy paradigm is needed which takes into consideration the various viewpoints of different stakeholders; say from the industry, civil society, medical professionals and policy makers
- Research on nano technology and quantum dots to attack these superbugs.