

General studies-3; Topic : Science and Technology- developments and their applications and effects in everyday life. Achievements of Indians in science & technology; indigenization of technology and developing new technology.

Antimicrobial Resistance (AMR)

Introduction

- Antimicrobial resistance is the **ability of a pathogenic microbe to develop a resistance** to the effects of an antimicrobial medication.
- WHO has declared that AMR is one of the top 10 global public health threats facing humanity.
- It requires urgent multisectoral action in order to achieve the Sustainable Development Goals (SDGs).

Recent Trends on Antimicrobial resistance

- **Increased usage of antibiotics during Covid-19 can lead to more antimicrobial resistance**, health experts of the AIIMS said.
- At the beginning of the pandemic, majority of COVID patients were given antibiotics when potentially less than a tenth of them needed it.
- The widespread use of hand-sanitisers and antimicrobial soaps can further worsen the situation.
- Antibiotic-resistant organisms have become rigidly established in our environment with many infections failing to respond to currently available antimicrobials.
- The antimicrobial resistance has outpaced the development of newer antimicrobials.
- The World Health Organization (WHO) has published a priority list of a dozen types of drug-resistant bacteria for which new antibiotics are needed.

International Efforts

- Government regulation in China has considerably lowered the country's once-soaring use of antibiotics in agriculture.
- European countries are also successfully reducing antibiotic use in livestock.
- Globally, countries committed to the framework set out in the **Global Action Plan (GAP) 2015 on AMR** and committed to the development and implementation of multisectoral national action plans.

Concerns / Challenges

- Antimicrobial resistance is one of the biggest challenges of modern medicine.
- It mounts problems beyond the geographical as well as species barriers and can transmit from animals to humans.
- It has been estimated that by 2050, about 10 million human lives could be at risk every year if drug resistance is not managed.
- In India, at least 58,000 babies die each year as a result of 'superbugs' — microorganisms that are resistant to almost all known treatments.
- If left unchecked, drug-resistant diseases could kill more people than cancer.
- **Antibiotics are common treatments for illnesses — whether or not they are caused by bacteria.**
- **Misuse and overuse of antimicrobials** are the main drivers in the development of drug-resistant pathogens.
- Antimicrobial resistance continues to **threaten our ability to treat common infections.**
- Lack of new antibiotics is not just a biochemical problem — it is also a considerable **economic challenge.**
- A lack of awareness of the effect of infections such as measles and polio has contributed to a growing hesitancy by some to vaccinate.

- The WHO says that 1.1 billion people worldwide lack access to proper latrines, increasing the risk of bacterial infections that cause diarrhoea.
- The rise of resistance endangers life-saving procedures such as surgery, chemotherapy and organ transplants, all of which can expose people to deadly bacteria.
- Farmers using more antibiotics, prompting the emergence of drug-resistant bacteria and making the drugs less effective in livestock.
- 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.

Battling superbugs with Big Data

- Tackling the superbug problem requires **massive data collection and analysis**.
- 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.
- Access to this online database can help physicians track ABR patterns; predict health outcomes; and prescribe drugs suitable for patient needs.

Way Forward

- AMR requires a **united multisectoral approach**. The **One Health approach** brings together multiple sectors and stakeholders to attain better public health outcomes.
- **Greater innovation and investment** is required in operational research, and development of new antimicrobial medicines, vaccines, and diagnostic tools.
- There is an urgent need to **explore the alternative therapies**.
- The importance of these non-conventional and alternative therapeutic approaches like bacteriophages, endolysins, nanoparticles, probiotics and antimicrobial peptides are needed.
- Promotion of **better hygiene**, as has become commonplace during the COVID-19 pandemic, could help.
- Action is also required to **tackle the use of antimicrobials in livestock farming** — on land and in the sea.
- **High vaccination rates** can help to limit needless drug use that drives antibiotic resistance. Research found that **higher rates of influenza vaccination correlated with less use of antibiotics**.
- Besides searching for or developing new antibiotics, one strategy is **antibiotic stewardship** that involves coordinated and controlled use of antibiotics.
- Hospitals can set up their own antibiotic stewardship programs that promote optimal antibiotic use.
- Another strategy is **phage therapy**. Phages or bacteriophages are bacteria-specific viruses that occur naturally. They can be harvested and cultivated for use against the bacteria that they feed on.
- **Nanomaterial-based therapies** are promising tools to combat bacterial infections that are difficult to treat.