



Revisit Of Drug-Resistant Diseases And India's Fight -PAPER - III



Drug-resistant diseases have emerged as one of the most alarming public health challenges of the modern era. The rise of antimicrobial resistance (AMR) — when bacteria, viruses, fungi, and parasites no longer respond to medicines — poses a grave threat to global health. The situation is particularly dire for illnesses like pneumonia, tuberculosis, and urinary tract infections, which have become increasingly resistant to standard treatments.

Amid this crisis, India has stepped up its fight against drug resistance with groundbreaking contributions to antibiotic development, particularly with its recent launch of **Nafithromycin**, a new weapon in the fight against pneumonia.

The Growing Threat of Drug-Resistant Diseases

Drug resistance occurs when pathogens evolve to survive the medicines designed to kill them. The misuse and overuse of antibiotics in humans and animals, coupled with poor infection control practices, have accelerated this problem. Globally, diseases like pneumonia and tuberculosis are becoming harder to treat, leading to longer hospital stays, higher medical costs, and increased mortality rates.



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In India, the problem is amplified by factors such as:



1. Widespread antibiotic misuse and over-prescription.
2. Self-medication practices.
3. Limited access to healthcare in rural areas.
4. Poor sanitation and hygiene, which facilitate the spread of resistant pathogens.

Community-Acquired Bacterial Pneumonia (CABP) is one of the most prominent examples of a drug-resistant disease. Pneumonia alone accounts for over **two million deaths annually worldwide**, and India bears 23% of the global burden of community pneumonia cases. This has made the fight against drug resistance a top priority for India's healthcare system.

India's Efforts in Antibiotic Development

India has long been a global pharmaceutical powerhouse, known as the "**pharmacy of the world**" for its production of affordable generic medicines. In recent years, India has focused on developing novel antibiotics to tackle the growing AMR crisis. One of the most notable recent breakthroughs is the development of **Nafithromycin**, a new-generation antibiotic.

The Development of Nafithromycin

Nafithromycin is a historic achievement for India, representing the **first new antibiotic in its class globally in over 30 years**. It has been specifically designed to combat drug-resistant pneumonia, a life-threatening illness that disproportionately affects vulnerable populations such as children, the elderly, and immune-compromised patients (e.g., those with diabetes or cancer). This antibiotic, developed by Wockhardt with the support of the **Biotechnology Industry Research Assistance Council (BIRAC)** under India's Department of Biotechnology, reflects 14 years of research and an investment of ₹500 crore. Clinical trials conducted across India, the US, and Europe have validated its efficacy and safety.

What Makes Nafithromycin a Game-Changer?

1. **High Potency and Efficacy:**
 - Nafithromycin is **10 times more potent than Azithromycin**, a widely-used antibiotic that has become less effective against resistant bacterial strains.
 - It provides **eight times higher lung exposure**, ensuring it reaches effective concentrations in the lungs to fight severe infections.
2. **Simplified Treatment Regimen:**
 - Requires just a **three-day, once-daily dosage**, significantly improving patient compliance and outcomes.



- Demonstrates a **96.7% clinical cure rate**, making it a reliable treatment option for Community-Acquired Bacterial Pneumonia (CABP).
- 3. Minimal Side Effects:**
 - Unlike many antibiotics, Nafithromycin has minimal gastrointestinal side effects.
 - It has no significant drug interactions and is unaffected by food, making it versatile and patient-friendly.
 - 4. Public Health Impact:**
 - By effectively treating drug-resistant pneumonia, Nafithromycin is expected to reduce healthcare costs associated with prolonged hospital stays and ineffective treatments.
 - It is a crucial tool for addressing AMR in India, a country heavily burdened by resistant pathogens.

India's Contribution to Global Healthcare

The launch of Nafithromycin underscores India's role as a leader in global healthcare innovation. Over the decades, India has become the largest provider of generic medicines worldwide, supplying life-saving drugs to developing and developed countries alike. Its pharmaceutical industry has consistently demonstrated the ability to produce high-quality, cost-effective medicines that meet global standards.

Some key contributions of India to the pharmaceutical world include:

- Affordable antiretroviral drugs for HIV/AIDS treatment, which have helped millions in Africa.
- Vaccines for polio, hepatitis, and COVID-19, including the indigenously developed **Covaxin**.
- Research and production of biosimilars, reducing the cost of biologic therapies.

Future Scope for India

India's progress in tackling AMR with Nafithromycin is a significant milestone, but it is only the beginning. The future holds immense potential for India to:

- 1. Invest in Innovative Research:**
 - Develop more antibiotics to combat resistant pathogens.
 - Explore new treatments for fungal and viral infections that exhibit drug resistance.
- 2. Strengthen Public Health Systems:**
 - Improve diagnostic capabilities to detect resistant infections early.
 - Launch awareness campaigns to promote the responsible use of antibiotics.



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3. **Collaborate Internationally:**

- Partner with global health organizations to share expertise and resources.
- Contribute to the development of global strategies for combating AMR.

4. **Advance Biotech and AI Integration:**

- Leverage artificial intelligence to accelerate drug discovery and predict resistance patterns.
- Foster innovation in biotechnology to address future healthcare challenges.

Conclusion

- Drug-resistant diseases present one of the greatest threats to modern medicine, but India's proactive approach offers hope for the future. With the launch of Nafithromycin, India has demonstrated its ability to develop innovative solutions that not only benefit its own population but also contribute to global health.
- As the world grapples with the AMR crisis, India's pharmaceutical industry stands poised to lead the charge against resistance, ensuring that life-saving treatments remain effective for generations to come.
- By continuing to invest in research, technology, and public health initiatives, India can cement its position as a global healthcare leader, helping the world combat the silent epidemic of drug
- resistance. **The fight against AMR is far from over, but with tools like Nafithromycin, it is a fight we are better equipped to win.**

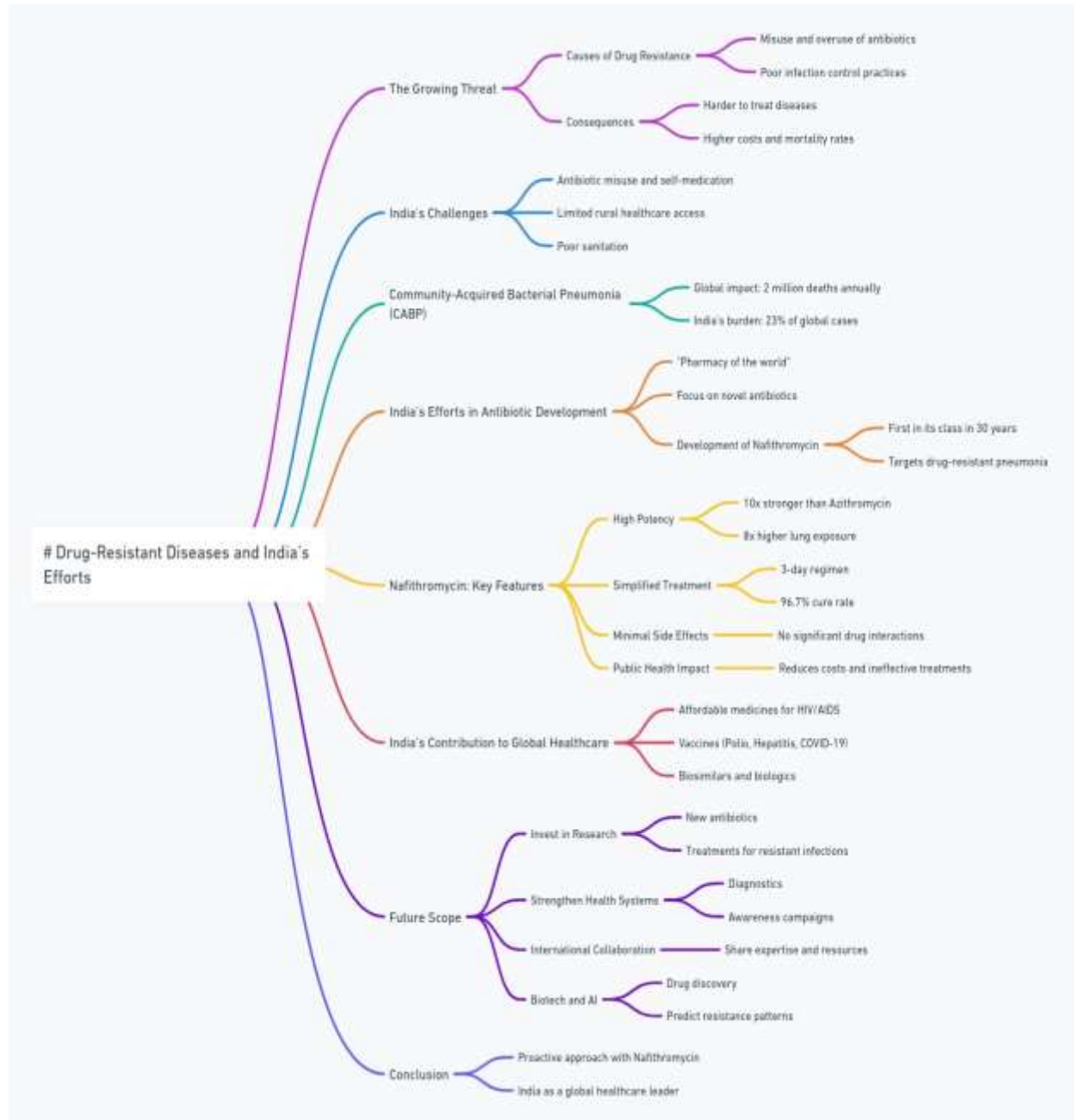
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Mind Map



Prelims Practice Questions

1. Consider the following statements regarding Antimicrobial Resistance (AMR):

1. AMR occurs when bacteria, viruses, fungi, and parasites no longer respond to antimicrobial drugs, making infections harder to treat.
2. Overuse and misuse of antibiotics in humans and animals are key factors driving AMR.
3. The World Health Organization (WHO) recognizes AMR as one of the top 10 global public health threats.

Choose the correct answer using the codes below:

- a) 1 and 2 only b) 2 and 3 only c) 1 and 3 only d) 1, 2, and 3

2. Consider the following statements about India's response to drug-resistant diseases:

1. India has implemented a National Action Plan on Antimicrobial Resistance to combat AMR.
2. The Chennai Declaration is a collective effort by Indian hospitals to reduce antibiotic misuse.
3. India is the largest consumer of antibiotics globally, contributing to higher rates of AMR.

Choose the correct answer using the codes below:

- a) 1 and 2 only b) 2 and 3 only c) 1 and 3 only d) 1, 2, and 3

3. Consider the following statements regarding measures to prevent AMR:

1. Restricting over-the-counter sales of antibiotics is a proven strategy to combat AMR.
2. Promoting the use of vaccines reduces the need for antibiotics, indirectly curbing AMR.
3. Agricultural use of antibiotics in animal feed has no impact on human health.

Choose the correct answer using the codes below:

- a) 1 and 2 only b) 2 and 3 only c) 1 and 3 only d) 1, 2, and 3

4. Consider the following statements about global efforts against AMR:

1. The Global Antimicrobial Resistance and Use Surveillance System (GLASS) monitors AMR trends worldwide.
2. The United Nations Environment Programme (UNEP) has declared AMR a key environmental concern.
3. The WHO's "One Health" approach addresses AMR by integrating human, animal, and environmental health.

Choose the correct answer using the codes below:

- a) 1 and 2 only b) 2 and 3 only c) 1 and 3 only d) 1, 2, and 3

5. Consider the following statements regarding the economic impact of AMR:

AMR is expected to result in a loss of up to \$100 trillion globally by 2050 if left unaddressed.

1. Drug-resistant infections increase healthcare costs due to longer hospital stays and more intensive treatments.
2. The cost of developing new antibiotics is significantly lower compared to other pharmaceutical drugs.

Choose the correct answer using the codes below:

- a) 1 and 2 only b) 2 and 3 only c) 1 and 3 only d) 1, 2, and 3

Answers and Explanations

1. Answer: d) 1, 2, and 3

Explanation:

- **Statement 1:** Correct. AMR is defined as the resistance developed by bacteria, viruses, fungi, and parasites to antimicrobial drugs, which makes infections harder to treat.
- **Statement 2:** Correct. Overuse and misuse of antibiotics in humans and animals are major contributors to the rise of AMR.
- **Statement 3:** Correct. WHO recognizes AMR as one of the top global public health threats due to its widespread implications for health, economic stability, and societal progress.

2. Answer: d) 1, 2, and 3

Explanation:

- **Statement 1:** Correct. India has a National Action Plan on AMR, launched in 2017, to combat resistance through a multi-sectoral approach.
- **Statement 2:** Correct. The Chennai Declaration is a national initiative aimed at reducing antibiotic misuse in India, especially in hospitals.
- **Statement 3:** Correct. India is among the largest consumers of antibiotics globally, which exacerbates the challenge of AMR.

3. Answer: a) 1 and 2 only

Explanation:

- **Statement 1:** Correct. Restricting the sale of over-the-counter antibiotics is a critical strategy to limit misuse and reduce AMR.
- **Statement 2:** Correct. Vaccines prevent infections, thereby reducing the need for antibiotics, indirectly mitigating AMR.
- **Statement 3:** Incorrect. The use of antibiotics in animal feed for growth promotion has been shown to contribute to AMR in humans through environmental transmission and food chains.

4. Answer: d) 1, 2, and 3

Explanation:

- **Statement 1:** Correct. GLASS is a WHO initiative that tracks AMR data globally to guide public health actions.
- **Statement 2:** Correct. UNEP has identified AMR as an environmental issue due to the impact of antibiotic residues in water and soil.
- **Statement 3:** Correct. The "One Health" approach integrates strategies across human, animal, and environmental health sectors to address AMR comprehensively.

5. Answer: a) 1 and 2 only

Explanation:

- **Statement 1:** Correct. AMR is projected to cause an economic loss of up to \$100 trillion globally by 2050 if not addressed effectively.
- **Statement 2:** Correct. Drug-resistant infections increase healthcare costs significantly because they require prolonged treatments, expensive drugs, and extended hospital stays.

- **Statement 3:** Incorrect. Developing new antibiotics is extremely costly and involves rigorous research, trials, and regulatory approvals, making it more expensive than many other pharmaceutical drugs.

Main Practice Question

Analyze the challenges posed by drug-resistant diseases in India and evaluate the measures taken by the government to combat this threat. Suggest additional strategies to address these challenges effectively. (250 words)

Answer Guidelines:

Introduction (30-40 words):

- Define drug-resistant diseases and their growing prevalence in India.
- Highlight the global and national implications of antimicrobial resistance (AMR) on public health and economic systems.

Main Body (160-180 words):

1. Challenges:

- Overuse and misuse of antibiotics in humans and livestock.
- Lack of public awareness about AMR.
- Inadequate regulation of over-the-counter antibiotics.
- Poor surveillance systems and limited research into new antibiotics.
- Environmental factors like pharmaceutical waste.

2. Measures Taken by the Government:

- **National Action Plan on AMR:** Multi-sectoral approach involving human health, animal health, and the environment.
- **Chennai Declaration:** Hospital-led initiative to reduce antibiotic misuse.
- Policies to regulate the sale of antibiotics.
- Inclusion of AMR in National Health Policy, 2017.

3. Suggestions for Improvement:

- Strengthen AMR surveillance systems nationwide.
- Promote vaccine development and alternative treatments.
- Encourage public awareness campaigns about the dangers of antibiotic misuse.
- Implement stricter regulations on antibiotic use in agriculture and animal husbandry.
- Enhance research funding for the development of new drugs.

Conclusion (30-40 words):

- Highlight the critical need for a coordinated global and national effort.
- Emphasize sustainable healthcare practices to curb the rising threat of drug-resistant disease