



# Antibiotics; Gods hand or Evil Cliff

"Widespread use of antibiotics promotes the spread of antibiotics resistance. smart use of antibiotics is the key to controlling its spread.

-A P. J . Abdul Kalam

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# SCIENCIA

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## FROM PRINCIPAL DESK

**"The resistance is not something to be avoided its something to seek out "**

**-Seth Godin**

*It gives me immense pleasure to present the "Sciencia" Technical magazine issue 1 of our institute for the academic year 2022- 23.*

*The term antibiotics literally means "against life" in this case, against microbes. The success of antibiotics has been impressive. At the same time, however, excitement about them has been tempered by a phenomenon called antibiotic resistance. This is a problem that surfaced not along after the introduction of penicillin and now threatens the usefulness of these important medicines. Antibiotics should be used wisely and only as directed by your physician. following these guidelines the life saving properties will be preserved for your family and generations to come.*

*I congratulate to Mr. Swapnil S Patil Editor in chief, Mr. Gopal Pawar Student Editor and all the authors for their contribution in making this magazine a thoughtful approach with valuable insights, suggestions with emphasis on how use of medicines can change life style helps to prevent future chronic diseases.*

*We welcome any suggestions and feedback for further improvement, I hope you all will enjoy reading this issue ..... stay safe.....stay health.....*



**Prof. Dr. Mahesh G. Saralaya**  
**Executive Editor**  
**"Sciencia" Technical Magazine**





## FROM EDITORIAL DESK

**‘Goodness is like Antibiotics nowadays, normal dose heals overdose kills.’**

*Dear Readers,*

*We all faced pandemic situation in covid-19 in last two years and now we are running our life in a normal way. But the drugs and medicines we had taken in the same situation with high power are putting all of us in trouble for our health. As the data indicates in last few years the use of antibiotics is increased drastically and it shown various symptoms on the health of peoples. So by thinking on the same topic we thought the proper use of antibiotics can save many mores life in future or it may reduce use of antibiotics to help in maintaining normal health of people. To express the same...*

*It is my pleasure to present the “Sciencia” Technical magazine issue of the year 2022-23. Every year we are coming up with insight on new theme. Each year our team of Magazine, photographers, designers and correspondents involved in addition to generating creative content. Writers have given great contribution to upgrade the quality and standards of magazine. Insight of articles writers have written the articles on Antibiotics misuse, birth of antibiotics, antibiotics resistance, personal opinions of writers on the same theme and In the end, how ayurveda is a way of healthy life is discussed. Every article in our technical magazine aimed to focus on theme of present year i.e. “Antibiotics: Gods hand or evil cliff”.*

*In the spirit of continuous improvement, any constructive input on streamlining our processes is very welcome. So this year's issue is a compilation of fascination, education, experience, joy and more! We have a pleasure presenting this edition to you. We are pushing barriers and reaching greater heights with every edition. We wish to come back with a much more exciting and value-adding edition, next year. Till then, enjoy this reading.*

**Mr. Swapnil S. Patil**  
**Editor in chief**  
**"Sciencia" Technical Magazine**





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## Antibiotic Misuse: Could Exacerbate Drug Resistance

Antibiotics play a major role in the treatment of infectious diseases; the overuse of antibiotics is a serious public health problem and there is a clear correlation between their use and the emergence of resistant bacterial strains both in individual and population level. Antimicrobial resistance (AMR) is a global public health threat that directly caused 1.27 million deaths, and contributed to nearly 5 million more deaths, in 2019 alone—more than HIV/AIDS or malaria.

Antibiotics overprescribing exposes patients unnecessarily to risk of side-effects without achieving rapid recovery, further accelerate the spread of bacteria known as “superbugs,” which place an immense strain on health systems and economies, and result in increased hospitalizations and deaths. Globally, India tops the list of countries with the highest antibiotic consumption, and highest AMR. It is therefore important that both healthcare professionals and patients consider the risks of taking antibiotics when they are not needed.

In 2019 *World Health Organization's AWaRe Classification* Database was developed Access, Watch, and Reserve, which categorizes more than 180 antibiotics based on their optimal use and potential for AMR.

The AWaRe classification aims to help prescribers, pharmacists, antibiotic stewards and policy makers to address the AMR challenge.

**Access:** Which indicates the choice of antibiotic for 25 most common infections that represent first or second-line for empirical treatment of common infectious syndromes based on a systematic assessment of the available evidence and that have a favourable safety profile with a low propensity to further aggravate AMR. These antibiotics should be available at all times, affordable and quality-assured.

**Watch:** Which includes most of the “highest-priority critically important antimicrobials” for human medicine and veterinary use. These antibiotics are recommended only for specific, well-defined clinical syndromes, limited indications but their use should be tightly monitored and restricted to the limited indications.

Fluoroquinolones, which are unfortunately commonly used in many settings, belong to the Watch group as their use should be avoided for indications for which they are no longer first or second choice.

**Reserve** :Antibiotics that should only be used as a last resort when all other antibiotics have failed and that have activity against multi (MDR)- or extensively (XDR) resistant bacteria, and therefore represent a valuable, non-renewable resource that should be used as sparingly as possible.

Some of the newly approved antibiotics (e.g., ceftazidime-avibactam) fall into this class, as do some of the older “rediscovered” antibiotics (e.g., polymyxins).

**Discouraged antibiotics**– this fourth category mostly includes antibiotic combinations, such as certain fixed dose combinations of antibiotics, do not have any reasonable indications for the treatment of infectious diseases in humans and may negatively impact AMR and patient safety.

The overall goal is to reduce the use of Watch Group and Reserve Group antibiotics (the antibiotics most crucial for human medicine and at higher risk of resistance), and to increase the use of Access antibiotics where availability is low. The 2021 update of AwaRe classification (<https://apps.who.int/iris/rest/bitstreams/1374989/retrieve>) is a useful tool for monitoring antibiotic consumption, defining targets and monitoring the effects of stewardship policies that aim to optimize antibiotic use and curb antimicrobial resistance.

**Common infections that can be safely treated with No Antibiotic Care (i.e., symptomatic management only) for mild cases –**

Infection	Can it be safely treated without antibiotics?
<b>Acute diarrhoea</b> (Except Bloody Diarrhoea)	Most cases do not require antibiotic treatment because the infection is of viral origin and the illness is usually self-limiting regardless of the causative pathogen. The cornerstone of treatment is rehydration
<b>COPD exacerbations</b>	Most exacerbations of COPD are not triggered by bacterial infections; only certain cases will benefit from antibiotic treatment.
<b>Dental infections</b>	Dental treatment rather than prescribing antibiotics is generally more appropriate in the management of dental infections.
<b>Otitis media</b>	Most non-severe cases of acute otitis media can be managed symptomatically and do not require antibiotic treatment.
<b>Pharyngitis</b>	Most cases do not require antibiotics because the infection is viral.
<b>Sinusitis</b>	Most cases do not require antibiotics as the infections is viral.
<b>Skin and soft tissue infections</b>	In cases of wounds at low risk of becoming infected, antibiotic treatment is not needed.

*Responsibilities of different stakeholders for improving the use of antibiotics.*

Group	Responsibilities
<b>Health care policy-makers</b>	The unnecessary use of antibiotics should be discouraged. Focus on promoting the use of Access antibiotics where appropriate. Ensure local access to and availability of antibiotics in the national EML at the appropriate cost, quality and in the correct formulation. Make sure that the national EML is regularly updated and whenever adequate aligned with the model list. Undertake regular surveillance of antibiotic use at all levels, including by AWaRe group (e.g. Access/Watch ratio)
<b>Physicians</b>	<p><b>Focus clinical care on D8!</b></p> <ul style="list-style-type: none"> <li>·<b>Diagnosis:</b>what is the clinical diagnosis, is there evidence of a significant bacterial infection?</li> <li>·<b>Decisions:</b>are antibiotics really needed? Do I need to take any cultures or other tests?</li> <li>·<b>Drug (medicine):</b>which antibiotic to prescribe - is it Access or Watch or Reserve? Are there any allergies, interactions, or other contraindications?</li> <li>·<b>Dose:</b> what dose, how many times a day, are any dose adjustments needed e.g. because of renal impairment?</li> <li>·<b>Duration:</b>for how long and what is the Stop Date?</li> <li>·<b>Delivery:</b>what formulation to use, is this a quality product? If intravenous treatment, when is Step Down to oral possible?</li> <li>·<b>Discuss:</b>inform the patient of the diagnosis, likely duration of symptoms, any likely medicine toxicity and what to do if not recovering.</li> </ul>
<b>Pharmacists</b>	Review, adapt or adopt the AWaRe in line with local guidance document.Do not provide antibiotics without a prescription. Discourage self-medication with antibiotics. Monitor relative use of Access and Watch antibiotics.
<b>Professional societies</b>	Be aware of AWaRe in line with local guidance document. Contribute to awareness campaigns. Educate health care workers about AWaRe.

**Conclusion:**There is a clear need for simple resources to improve the quality of antibiotic prescribing globally.The AWaRe categorization illustrates which are the preferred antibiotic options for each syndrome, balancing benefits, harms and the potential for resistance. Antibiotic stewardship is the effort to measure and improve how antibiotics are prescribed by clinicians and used by patients. Improving antibiotic prescribing and use is critical to effectively treat infections, protect patients from harms caused by unnecessary antibiotic use, and combat antibiotic resistance.





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## BIRTH OF ANTIBIOTICS

The term antibiotic originated from the Greek language; *ἀντι*, means "against" and *βίος*, means "life" together it becomes "opposing life", nevertheless it is mainly used to refer to any substance or compound used against microbes. Penicillin the first broadly effective antibiotic signalled the emergence of the antibiotic era. Before the discovery of penicillin, there were no effective measures or treatments for microbial infections such as *pneumonia*, *gonorrhoea* or *rheumatic fever*. Hospitals were getting flooded with people suffering from blood poisoning originating from a cut or a scratch, and doctors were waiting helplessly and with the hope of remedy.

Earlier than the discovery of penicillin, Egyptian people thought of using bacteria against bacteria. In ancient Egyptian literature, the practice of applying a poultice of mouldy bread to infected wounds has been described. The moulds or fungus growing on bread is capable of inhibiting certain bacteria which leads to cause sepsis in a wound.

There are certain compounds produced by bacteria and fungi which can kill, or inhibit the growth of other competing microbial species, they are called antibiotics.

The discovery of penicillin took place in 1928, that penicillin, which was termed as the first true antibiotic eventually leads to the birth of an entire community of antibiotics. Sir Alexander Fleming, was a Professor of Bacteriology at St. Mary's Hospital in London and is considered as the father of Penicillin. The story of the discovery of penicillin is so interesting. Fleming was doing research on *Staphylococcus* bacteria that used to cause boils, sore throat, or abscesses. After returning from holiday on September 3, 1928, he noticed something unusual on one petri dish. It was full of dotted colonies of staphylococcus, however, there was one area where there was a spot of mould was growing. The area instantly around the mould was clear. The staphylococcus was unable to grow in the area surrounding the mould. Fleming started thinking that, the mould had secreted something which inhibited staphylococcus growth.

After certain experiments, Fleming found that the "mould juice" which he discovered was able to kill a variety of harmful microbes, such as some bacilli and well as cocci more precisely diphtheria bacillus and streptococcus, and meningococcus. He directed his assistants, Stuart Craddock and Frederick Ridley, to carry out the isolation of chemical moiety from mould juice which was eventually termed as penicillin and the mould used in this discovery was identified as *Penicillium notatum*.

The isolation process or extraction process of penicillin was very much challenging to Fleming, Stuart and Craddock. Although they succeed in preparing crude solutions of penicillin. The crude penicillin was very unstable, yet they managed to work with crude penicillin solutions. A year later in 1929, the experimental findings were communicated to the scientific society by Fleming and they were published in the British Journal of Experimental Pathology in June 1929. He aimed to make people aware of penicillin's potential therapeutic benefits.

Scientists were thinking of the main application of this discovery could be in finding and isolating penicillin-sensitive bacteria in a mixed culture of bacteria which kept the interest of bacteriologists in penicillin.

Professor Harold Raistrick, tried to purify penicillin but he didn't get much success in it. Howard Florey, Ernst Chain and co-workers at Oxford Universities Sir William Dunn School of Pathology got success in turning crude penicillin solution into a life-saving drug. Their work on the purification and chemical analysis of penicillin began in 1939, it was the time of world war which was making research difficult. To fulfil the need of animal experiments and clinical trials they were processing and using up to 500 litres of mould filtrate every week. Initially, they started growing the *Penicillium notatum* in a strange collection of culture vessels including bedpans, milk churns, baths, and food tins. However, a special fermentation vessel was designed for ease of growth and renewing the broth beneath the surface of the mould. These fermentation vessels were space-saving and hence they were used on a massive scale at Oxford university. Norman Heatley succeed in extracting penicillin on large by counter-current extraction, he used amyl acetate to extract penicillin filtrate coming off the production line and later he extracted it back with water.

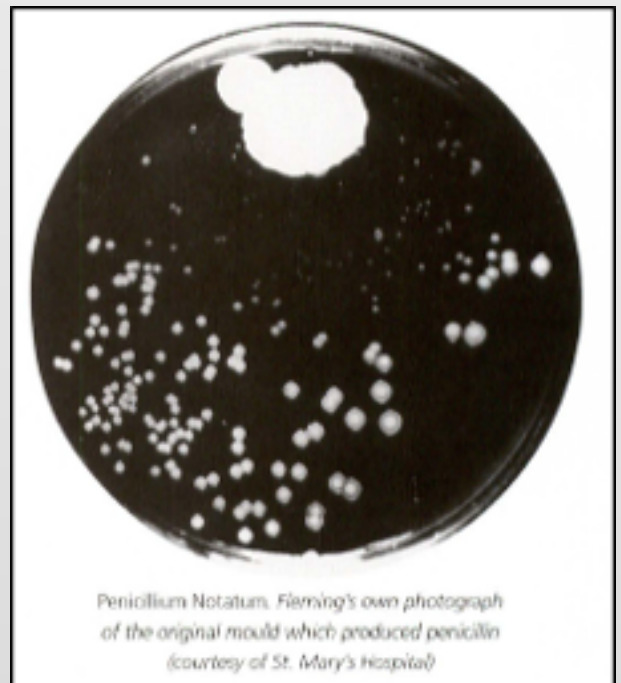
Edward Abraham, used a newly discovered column chromatography technique using alumina as a stationary phase to remove impurities from the penicillin. While the efforts of isolation and purification of penicillin, Florey carried out vital experiments in the year 1940 and showed that penicillin could protect mice against infection of *Streptococci*.

Then, on February 12, 1941, Albert Alexander a policeman, became the first recipient of the Oxford penicillin. He had developed a life-threatening infection with huge abscesses affecting his eyes, face, and lungs, the dose of 160 mg of Penicillin was injected as IV infusion and within 24 hours he made a remarkable recovery. By the fifth day of treatment, the team ran out of supply of penicillin as it was war time and it was difficult to produce more penicillin within a short span hence Constabel Albert died a few days later due to lack of medicines. However, better results were obtained in near future with other patients and soon there were plans to make penicillin available for British troops on the battlefield. War-time circumstances made industrial production of penicillin even more difficult. Several British companies, including Glaxo and Kemball Bishop, took up the challenge of Industrial production of penicillin.

This was the first described as the “single greatest victory ever achieved over disease” and hence after the world was looking for the dawn of the antibiotics era.

## Antibiotic Resistance:

Fleming cautioned about the use of penicillin in his many speeches around the world. On 26 June 1945,(Reference: New York Time article) he made the following cautionary statements: "the microbes are educated to resist penicillin and a host of penicillin-fast organisms is bred out ... In such cases the thoughtless person playing with penicillin is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism. ***I hope this evil can be averted.***"





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*Nowadays antibiotic resistance (AR) is a crucial challenge to human wellbeing throughout the world. It is one of the prime serious public health threats if left unnoticed and, and may proceed into motion of another pandemic and demands the urge for the development of global health solutions around AR.*

Antibiotic resistance (AR) poses a major global health threat which may lead to financial burden of approximately 100 trillion USD and over 10 million deaths by 2050 around the world. AR manifests as antibiotic resistant bacteria in clinical infections and is mediated by antibiotic resistance genes. These are naturally arising with human activity leading to their higher abundance and diversity worldwide and are appears as environmental pollutants. Hence, are universal in the environment and can be transferred among humans, animals, and atmosphere media (e.g., water, air, and soil).

## ANTIBIOTIC RESISTANCE – RATIONALE AND MANAGEMENT

**RATIONALE OF ANTIBIOTIC RESISTANCE:** Many bacterial strains developed the capability to tolerate antibiotics long before humans started to mass-produce them to prevent and manage the infectious diseases. The modification of bacteria, either structurally or physiologically, eventually lead to resistance of a drug by the microorganism. AR can arise both from mutations in the pre-existing genome of a bacterium and from the uptake of foreign DNA. The variation may protect the bacteria from the drug's effects or limit the drug's access to the bacteria. Or that modification may cause the bacteria to change the drug or destroy it. Microbes that survive an antibiotic therapy can multiply and pass on resistant properties. Also, some microbial organisms can pass on their drug-resistant properties to other microbes.

The over usage and misuse of antimicrobial agents are the key factors in developing antibiotic resistance. The overuse of antimicrobial drugs for prolonged duration, especially receiving antibiotic drugs when they are not prescribed or the right treatment and which also leads to antibiotic resistance.



According to the survey of Centers for Disease Control and Prevention, about 33% usage of antibiotic in people is not necessary nor recommended. Antibiotics are preferred to treat infections caused by bacteria, but they don't treat Viral infections. For instance, an antibiotic is the correct treatment for strep throat, which is caused by bacteria. But it's not the right treatment for most sore throats, which are caused by viruses. Other examples for common viral infections that aren't helped by the use of antibiotics include: Cold or runny nose, Flu (influenza), Bronchitis, most coughs, some ear infections and sinus infections, Stomach flu, Coronavirus disease 2019 (COVID-19), Whooping cough. If you are taking an antibiotic for a viral infection, then it won't eliminate or cure the infection effectively, but may cause harmful adverse effects and directs for the development of antibiotic resistance.

## MANAGEMENT OF ANTIBIOTIC

**RESISTANCE:** Current investigations lack the sensitivity and specificity needed to confidently diagnose infection. Blood culture and absolute neutrophil count are the most widely available tests and on their own are somewhat useful. Immature to total neutrophil ratio and C-reactive protein are also fairly widely available and add value to the above.

The general public, health care providers and hospitals all can help ensure correct use of the drugs. This can lessen the growth of antibiotic resistance. So, in making a decision to discontinue antibiotics we are left with making a clinical judgement.

## **Antibiotic stewardship- The proper use of**

**antibiotics:** It helps to monitor the effectiveness and extend the life span of current antibiotics. Protect people from antibiotic-resistant infections and prevent adverse effects. Many hospitals and medical associations have received new guidelines to diagnose and treat infections. These ensure effective treatments for specific bacterial infections and to reduce incorrect use of antibiotics. The public also plays a role in antibiotic stewardship. We can reduce the development of antibiotic resistance by following ways:

- Instead of prescription, ask your health care provider for advice on how to treat symptoms.
- Wash your hands regularly with soap and water for at least 20 seconds. Clean any cuts or wounds to avoid bacterial infections that need antibiotic treatment.
- Get all recommended vaccines. Some vaccines protect against bacterial infections, such as diphtheria and whooping cough (pertussis).

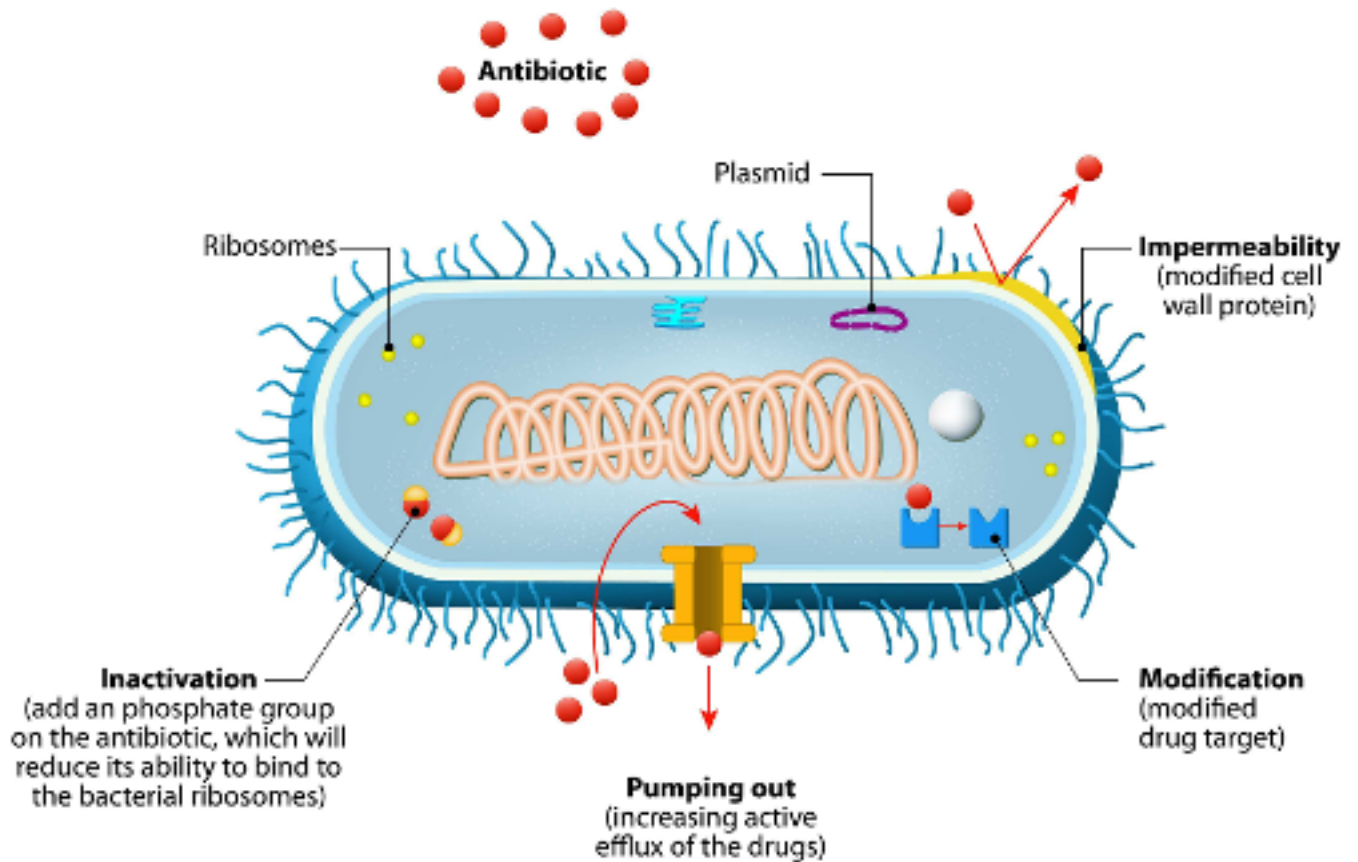
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·Lower your risk of getting a bacterial infection spread by food. Don't drink raw milk. Wash your hands before making food and before eating.

·Use antibiotics only as prescribed by your health care provider. Take the prescribed daily dose and complete the course of treatment. Never take leftover antibiotics for a later illness. Never take antibiotics prescribed for another person or let anyone else take your antibiotics.

**CONCLUSION:**AR is an inevitable part of microbial evolution. Antibiotic-resistant infections explore a substantial health and economic burden on the health care system and population. Coordinated efforts to implement new policies, renew research efforts, and pursue steps to manage the crisis are greatly needed.

# MECHANISMS OF ANTIMICROBIAL RESISTANCE



MAY CAUSE DIARRHEA



MAY CAUSE NAUSEA AND VOMITING



MAY INCREASE CANCER RISK



CAN WEAKEN YOUR IMMUNE SYSTEM



MAY HARM KIDNEY FUNCTION



MAY CAUSE URINARY TRACT INFECTIONS (UTIS)

## WHY ANTIBIOTICS ARE HARMFUL FOR YOUR HEALTH



To explore more, visit [www.Top10HomeRemedies.com](http://www.Top10HomeRemedies.com)





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## CONSEQUENCES OF ANTIBIOTICS

*If we use antibiotics when not needed, we may not have them when they are most needed.*

Self-treatment with **ANTIBIOTICS** has the greatest risk of harm when too small doses are used, as this will teach the germs to become resistant to the antibiotic rather than eradicating the infection. Today, one of the three biggest challenges to human health is antibiotic resistance.

Penicillin, the first antibiotic, was discovered in 1929. Since that time, the development of antibiotics has given our culture the advantage in the struggle against a number of deadly bacterial infections (such as tuberculosis, chronic bronchitis, pneumonia, and bacterial meningitis). Antimicrobials have shown great success. However, a condition known as antimicrobial resistance (AMR) has muted the euphoria surrounding them. This issue emerged shortly after penicillin was first introduced, and it currently threatens the efficacy of these vital medications.

AMR develops spontaneously over time, mostly through genetic alterations brought on by natural selection in the process of evolution. Drug resistance renders antibiotics and other antimicrobial medications ineffective, making it harder or impossible to treat illnesses.

Hospital acquired infections are a leading cause of death and disability globally, according to the World Health Organization, and experts have been warning about the dangers of unsafe hospital practices for years. Doctors are also instructed to use fewer antibiotics in order to stop the spread of resistant "superbugs." According to figures, 10 million people would die from AMR related causes in 2015, costing the economy \$102 trillion. If you look at the worldwide antibiotics markets, India ranks top in terms of antibiotic consumption. This is a result of a lack of knowledge about AMR, a lack of awareness, and lax regulations on the sale of these antibiotics over the counter. The most commonly reported resistant bacteria were **Escherichia coli**, **Klebsiella pneumoniae**, **Staphylococcus aureus** and **Streptococcus pneumoniae**, followed by **Salmonella spp.**



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Effective antimicrobials have played a crucial role in helping us live longer, be healthier, and take advantage of modern treatment, which is a blessing. According to research published in the New England Journal of Medicine, the advantages of starting antibiotic treatment immediately early, even before an infection manifests outweigh the dangers of people developing antibiotic resistance.

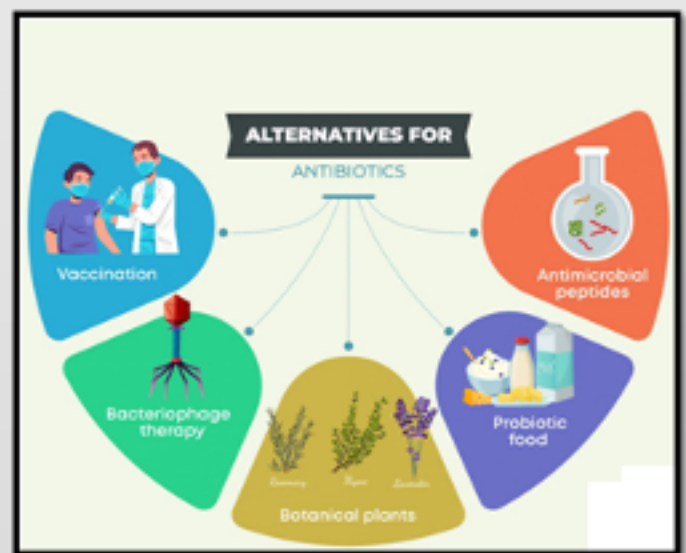
**Regarding our daily lives at home, certain simple actions can be taken to reduce antibiotic resistance, such as:**

- Take the prescribed antibiotic exactly as your Doctor tells you.
- Try to insist on vaccinal medication instead of antibiotics.
- Never skip doses as it may infer to taking more doses of antibiotics.
- Never take an antibiotic for a viral infection like a cold or the flu.
- Never insist for an antibiotic, try to avoid.
- Never save antibiotics for the next time when you got sick.
- Never take antibiotics prescribed for someone else.
- Unused and expired medication should not be flushed down in drain or through waste disposal.
- Safely dispose the leftover and expired medication.

Phage treatment and vaccinations to prevent infections are only two examples of the additional medical practices being developed to limit the need of antibiotics. In the current situation, limiting the spread of resistance requires wise antibiotic use.

Antibiotic resistance is becoming a greater problem, and the 'post-antibiotic era' may be just around the corner. This new period will resemble the "pre-antibiotic" era, which was marked by an incalculable number of deaths worldwide caused by bacterial illnesses. Many people may get shivers just thinking about this new era.

**"If we fail to act, we are looking at an almost unthinkable scenario where antibiotics no longer work and we are cast back into the dark ages of medicine"**





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## Antibiotic Resistance: Prevention and Control

Antibiotic resistance occurs when microorganisms stop responding to antibiotics that were intended to kill them. One of the major dangers to food security, development, and global health today is antibiotic resistance. Any person, regardless of age or nationality, can become antibiotic resistant. Despite the fact that antibiotic resistance develops naturally, the abuse of antibiotics in both humans and animals is hastening the process. As the effectiveness of the antibiotics used to treat those declines, it is becoming more difficult to treat an increasing range of infections such as pneumonia, TB, gonorrhoea, and salmonellosis. Antibiotic resistance results in lengthier hospital stays, increased healthcare expenses, and higher mortality.

Antibiotic medications can both prevent and treat bacterial infections. Antibiotic resistance results from bacteria developing a resistance to certain medications. Bacteria generate antibiotic resistance, not humans or other animals.

These bacteria can infect both humans and animals, and the diseases they produce are more challenging to treat than those caused by non-resistant bacteria. Antibiotic resistance lengthens hospital stays, rises, and enhances medical costs. The world needs to start using and prescribing antibiotics effectively right away. Even if new treatments are developed, antibiotic resistance will remain a significant problem if lifestyle does not change.

Antibiotic resistance is rising to alarmingly high levels over the entire world. The discovery and global spread of novel resistance mechanisms threatens our ability to treat contagious diseases: It is become harder, and in some cases impossible, to treat a growing number of illnesses like pneumonia, tuberculosis, blood poisoning, gonorrhoea, and food-related disorders as antibiotics lose their potency. When antibiotics are readily available for purchase without a prescription for human or animal use, the development and spread of resistance are sped up.

Similar to this, medical professionals routinely overprescribe antibiotics, and the general public frequently overuses them in countries without defined treatment recommendations. Without prompt action, we run the risk of entering a post-antibiotic era in which common illnesses and small wounds can once more be lethal.

## **Antibiotic resistance mechanisms:**

1. Limiting uptake of a drug.
2. Modifying a drug target.
3. Inactivating a drug.
4. Active drug efflux.

Antibiotic resistance mechanisms include enzymatic inactivation, avoiding the affected pathway, changing the target, pumping the drug outside of the cell, and breaking down the antibiotics external to the cell. Beta lactamases have an extended spectrum, for instance.

## **Prevention and control:**

The improper use, excessive use, and inefficient infection prevention and control of antibiotics all contribute to the acceleration of antibiotic resistance. Actions can be taken at all societal levels to reduce the effects and stop the spread of resistance.

**Individuals:** Individuals should only take antibiotics as prescribed by a qualified medical professional in order to prevent and restrict the spread of antibiotic resistance.

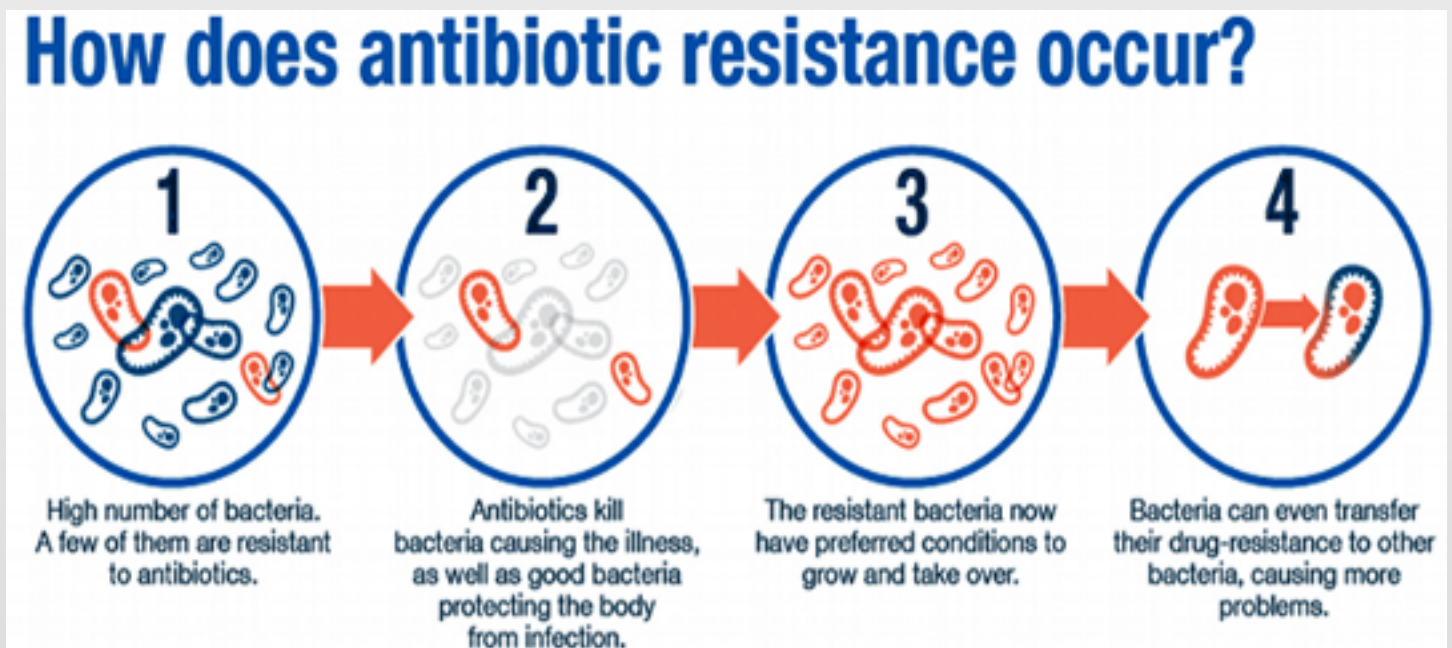
If a doctor says you don't need antibiotics, never insist on taking them. Always follow your doctor's instructions when taking antibiotics. Never share or use unused antibiotics. Regular hand washing and proper food preparation may help you stay healthy.

**A decision-maker:** Policymakers, ensure sure a robust national action plan is in place to tackle antibiotic resistance. Increase the monitoring of antibiotic-resistant illnesses, Boost the efficiency of policies, programmes, and execution for infection prevention and control Encourage and control the appropriate handling and disposal of beneficial pharmaceuticals, Make knowledge on the consequences of antibiotic resistance accessible.

**Healthcare professionals:** To prevent infections, keep your hands, equipment, and surroundings clean. According to the most recent standards, antibiotics should only be prescribed and given out when absolutely essential. Alert surveillance teams to illnesses that are antibiotic-resistant. Talk to your patients about the proper use of antibiotics and how to stay healthy (for example, vaccination, hand washing, safer sex, and covering nose and mouth when sneezing).

**Healthcare sector:** Spend money on creating new medical diagnostics, vaccines, and antibiotics.

There have been several recent discoveries, but none of them are projected to be effective against the most dangerous kinds of antibiotic resistant bacteria. Antibiotic resistance is a worldwide issue that needs to be tackled by all nations and multiple sectors; especially given how easy and common travel is today. The actions taken by FDA approval of specific new antibiotics, rules governing antibiotic labelling and usage, collaborating to raise public awareness and promoting the creation of new antibiotics.





# Antibiotics Resistance is a Threat to Your Health



**Poor Humans!!**  
They Try too Many  
Antibiotics on Me  
and Fail to  
Understand that  
they are Making Me  
**IMMORTAL!!**

**Let This  
Not Happen!!**  
Prevent Antibiotic  
Resistance!

**Talk to Your Doctor  
and Pharmacist!!**  
Use Antibiotics  
Responsibly and  
Wisely.



**“Responsible Use of Antibiotics Saves Lives”**



INDIAN PHARMACEUTICAL ASSOCIATION (IPA)

[www.ipapharma.org](http://www.ipapharma.org)



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Antibiotics have been called as the single most important therapeutic discovery in the history of medicine. An interesting feature of their historic discovery is that they occur within the lifetime of many populations living today. The most important event in the discovery of antibiotics occurred around 1940 and began the era of antibiotics. Although Alexander Fleming discovered penicillin in 1929, it was only recognised for its potential and potency by Florey and its team in 1940. Antibiotics were once called as “wonder drugs.” These drugs have been used for decades to treat effectively a wide variety of bacterial infections. If it is left untreated many of these bacterial infections would have been deadly. Along with vaccines, antibacterial antibiotics are perhaps the most successful pharmacologic therapy of the modern era. The use of antibiotics has markedly diminished mortality from infectious diseases, reduced the burden of tuberculosis in the modern world, improved survival after trauma, and allowed the development of therapies that intentionally or

## My Perspective on- Antibiotics Gods

### Hand or Evil Cliff

incidentally suppress the immune system for the treatment of autoimmune diseases and cancer. It is estimated that children’s on average one prescription for an antibiotic every year and that an antibiotic is prescribed in 15 to 20% of outpatient visits in adults.

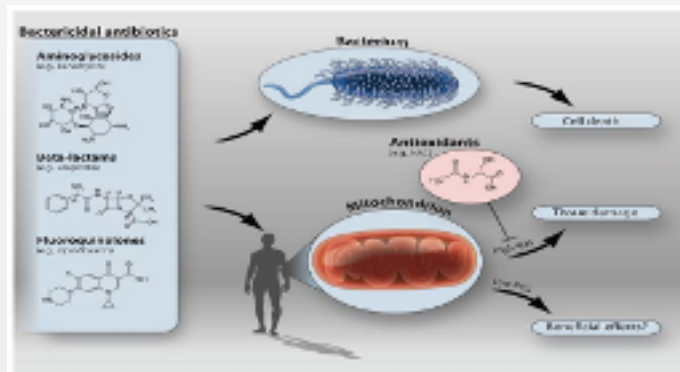
Nevertheless, antibiotics have been associated with measurable side effects that tend to be specific for classes of antibiotics sharing a similar mechanism of action.

Example- The aminoglycoside antibiotics, which block the bacterial 30S ribosome, are associated with an increased risk of acute kidney injury and ototoxicity, whereas quinolone antibiotics, which block the bacterial DNA topoisomerase II, have been associated with an increased risk of tendinitis. Penicillins, which disrupt the formation of the bacterial cell wall, most commonly induce a potentially severe allergic response. In this issue of *Science Translational Medicine*, Kalghatgiet *al.* similarly suggest that increased systemic oxidative stress may represent a hidden cost associated with antibiotic therapy. Antibiotics are intended to kill bacteria. Yet, Kalghatgiet *al.* found that bactericidal— but not bacteriostatic—antibiotics may also damage healthy mammalian tissues.

In conclusion, the study by Kalghatgiet *al.* is certain to generate controversy with respect to ongoing concerns about antibiotic overuse both in clinical medicine and in agriculture. This controversy will hopefully fuel additional research into how some antibiotics interfere with mammalian mitochondrial metabolism to affect key metabolic signalling pathways or induce oxidative cellular damage. As researchers identify new compounds that exhibit bactericidal properties, they might screen them by examining their effects on mammalian cells grown in media containing galactose instead of glucose. This forces cells to rely exclusively on mitochondrial ATP generation for growth and survival and will quickly identify any compounds that affect mitochondrial function.

Identifying and treating potential off-target effects of antibiotics is important as we face the challenge of increasing antibiotic resistance, particularly the threat posed by drug-resistant strains of common bacteria and extensively drug-resistant *Mycobacterium tuberculosis*. Successful treatment of these infections is likely to require multiple antibiotics administered over long periods of time, and some of these therapies have already been associated with treatment-limiting side effects.

Understanding the molecular mechanisms of toxicity may aid in the design of adjunctive therapies to improve an



## *The good and the bad of antibiotics*

*Bacteriostatic antibiotics with diverse mechanisms of action are known to induce cell death in bacteria. Kalghatgiet al. report that these antibiotics induced the generation of ROS from mitochondria in mammalian cells and in vivo in mice, which led to tissue damage. We also speculate that lower levels of antibiotic-induced mitochondrial ROS might play a signaling role, explaining some of the unexpected beneficial effects of these agents, including organismal growth.*



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*Over-prescribed and misused, these wonder drugs are leading to widespread drug resistance.*



*"If you are given antibiotics, you will kill all the sensitive bacteria most of the ones that will survive will be the resistant ones"*

For the past 70 years, antimicrobial drugs, such as antibiotics, have successfully treated patients with infections. But over time, many infectious organisms have adapted to the drugs that kill them, making them less effective. Overusing or misusing these drugs can make resistance develop even faster. Each year in the U.S. at least 2 million people become infected with bacteria that are resistant to antibiotics.

## The end of antibiotics?

At least 23,000 people die annually as a direct result of these infections. Many more people die from complications of antibiotic-resistant infections. To address this growing problem, the National Institute of Allergy and Infectious Diseases (NIAID) are working to speed the development of faster ways to detect resistance and ultimately to find new treatments that are effective against these drug-resistant bacteria.

### **Why are certain bacteria becoming more resistant to drugs?**

There is a multi-part answer to that question. One of the most important reasons is that bacteria generally mutate—all microbes mutate—naturally and spontaneously. However, you can do things that pressure them to mutate even more and develop resistance to drugs. One of the major factors in certain bacteria becoming resistant to drugs today is the overuse of antibiotics, particularly the inappropriate use of antibiotics. This includes using antibiotics when you do not really have to—either when you have a viral infection that you think is bacterial and treat it with an antibiotic, or you treat someone with the wrong antibiotic that is not particularly suited to the bacteria in question.



In other words, if you are given antibiotics, you will kill all the sensitive bacteria. Most of the ones that will survive will be the resistant ones.

**You and other experts in the field have said that we are on the edge of a national, even global crisis of drug-resistant bacteria. Why is that?**

The more we see this growing problem of antimicrobial resistance throughout the world, the more we will begin to see bacteria that are relatively untreatable or very, very difficult to treat. And if those bacteria become very widespread, that could lead to a serious crisis.

**What might such a situation look like to most people?**

A typical, real-life example would be someone gets a surgical procedure like a hip or knee replacement, or goes to the hospital for abdominal surgery. Then they get an infection that happens to come from another hospital patient who has resistant bacteria. What should be a routine procedure could lead to an infection that you struggle to treat, and you end up with a high degree of morbidity or even mortality. The routine surgical case becomes a medical emergency.

**What kinds of antimicrobial-resistant bacteria are common in the U.S.?**

We still have the problem of methicillin-resistant *Staphylococcus aureus* (MRSA), which is disturbing. Another one that is also disturbing is called Carbapenem-resistant Enterobacteriaceae, or CRE. That is a growing problem. We see that in hospital patients who are immunosuppressed as a result of, for example, transplants or drugs that suppress their cancer or their inflammatory disease. Another bacteria that causes infections when antibiotics are overused is *Clostridium difficile* (*C. Difficile*), which we see a lot of in nursing homes and hospital settings.

Those three are big ones—MRSA, CRE, and *C. Difficile*. And, depending on the population in question, globally we are seeing more and more resistance to gonorrhea, a sexually transmitted disease.



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Bacteria has been around on earth for over 3 billion years and when 95 years ago Alexander Fleming developed Penicillin the world's first antibiotic, his invention was truly genius as it helped humanity survive many diseases, but it also has limitations. When we talk about Ayurvedic therapeutics which we call chikitsa, the idea is very different

Millions of unnecessary antibiotics prescribed every year are doing more harm than good. It is also causing irreparable damage to the good bacteria in our gut.

Antimicrobials are necessary to treat various diseases. However, they cause adverse effects, such as allergic reactions, in addition to increased bacterial resistance. There is increasing awareness of the need to detect and evaluate adverse effects associated with medicines. Recently, severe and serious harms have been described for commonly used antibiotics. During the first & second year of the pandemic, many people died from antibiotic resistant infections commonly associated with healthcare.

## Ayurveda is a way of life.

The present review found a major use of antibiotics amongst Covid 19 hospitalized patients, mainly in an empirical setting. There is no proven efficacy of this practice. Further research to determine relevant indications for antibiotic use in Covid 19

The overuse and misuse of antibiotics are key factors leading to antibiotic resistance. Antibiotic resistance is one of the world's most urgent health problems

Imagine what would happen if antibiotics stopped working against diseases. When antibiotics are used for a long time, it makes the disease causing microorganisms develop a defense against the action of these medicines, thereby, becoming totally unresponsive to medicines. This issue is becoming a huge concern for entire humanity that is threatening the validity and effectiveness of modern medicines! What options are we left with if medicines don't work?

Ayurveda is born from the belief that mother nature has provided us with everything we need to treat various illnesses and live a healthy, active life. When mother nature put us on this planet, she took care of everything for us from food and water for nourishment to a plethora of herbs to protect us from diseases.

The fundamental tenet of Ayurveda is that life is balanced on four pillars: body, mind, soul and spirit. Since each pillar is crucial to our health and overall wellness, Ayurveda prescribes a holistic approach to maintaining perfect harmony among these building blocks of life.

**Ayurveda is more than just a traditional medicine system – it's a way of life.**

Ayurvedic Treatment is Long term Natural & Balanced Approach Ayurveda understands the delicate balance of nature and deals with diseases by taking a natural and balanced approach. Immunomodulatory rasayans in Ayurvedic medicines strengthen the body's innate defence mechanism to fight diseases. As a result, disease causing microbes do not become drug resistant. Ayurvedic treatment is also safe for the gut microbiota and does not damage it. In addition to these obvious benefits, Ayurvedic treatment also acts on the root cause rather than on symptoms, which means you get an effective, safe and natural treatment that does not create antibiotic resistance.

Ayurveda" which is more than 5000 years old system of Indian medicine. A question rises that are there any medicines which were utilized as effective as 'Antibiotics' and thus can be considered as antibiotics in Ayurveda?

As Ayurveda is the oldest health care system in the world does have many drugs which can act as Antibiotic that's why many references are there in Ayurvedic literature stating that certain diseases are produced due to micro-organisms (or germs) and one has to destroy disease causing micro-organisms to regain as well as to preserve the health. Various types of these organisms are also described in and Ayurveda. Another interesting thing can be noted in these references which is, Ayurveda has not only advised on destroying these disease producing organisms but has also stressed that one should also increase the resistance power (immunity) against these organisms to prevent the relapses of the disease. Long time back when patients do not have any option as antibiotics, even at that time ancient seers were successful in dealing with infections caused by micro-organisms.

There were many classical texts regarding Ayurveda drugs as an antibiotic property as well as the herbal and mineral ingredients mentioned in some formulation are compiled from Ayurveda texts such as 'Ashtangasangraha', 'Charaksamhita' and 'Sushruta Samhita'

Ayurveda recognizes the microbial approach to some degree, but generally does not recognize microbes as the primary cause of disease on the other hand Western allopathic medicine emphasizes the use of antibiotics and other medicines and approaches to defend against “germs” or microbes believed to be the primary cause of many health conditions and diseases. According to the Ayurvedic approach, anyone who has developed an imbalance in their bodily elements, or and has there by weakened their immune system, may be subject to a microbial infection which is considered a symptom of that imbalance.

In Ayurveda treatment is to support the person's immune system. The focus is to strengthen agni (metabolic capacity) and subsequently support the persons’ natural immune system. So, this leads to the premise that sickness comes from the person being off balance not the attack of a bacteria

Ayurveda system utilises herbs present in nature to treat various health concerns and help manifest a disease free life. That said, the importance of Ayurveda in daily life cannot be undermined.

Ayurveda is gaining popularity as people seek alternatives to Western medicine, and research is beginning to show the health benefits of this ancient practice. Here are some of the health benefits of Ayurveda.

It reduces Stress and Anxiety, Boosts Immune System, Promotes Digestion Improves Skin Health, Enhances Brain Function, Supports Heart Health, Improves Sleep Quality

'Sushruta', the father of Surgery, has written in detail about various surgical procedures and has also described number techniques to prevent the infection of these surgical wounds. He has described various means for doing post-operative surgical dressings. He has advised to use things like Sesame paste, Honey, Cow's, Skin from the stem of many antiseptic herbs etc. Though, Ayurveda don't describe anything about antibiotic drugs but they were quite aware of the after effects that may occur due to the microbes. Thus various processes and drugs were used for the antibiotic purpose. Without this the surgical part of Ayurveda wouldn't have flourished. Thus, it can be imagined that knowingly Ayurveda people were using the precautions against the microbial growth, e.g. the medicated decoctions [ etc.] which were used in the postoperative treatment by were of antibacterial nature. In the same way the treatment for leprosy is also indicative of the antibacterial properties of the herbs. He has also advised to fumigate the wound. It is also stated that the sun rays during sunrise and sunset has got germicidal effect.



Ayurveda not only mentions to treat the diseased person but also to treat the infected environment by means of is a collective term for the various Vedic techniques used in the purification of the atmosphere. The main idea here was: "Heal the atmosphere and it will heal you". This is a process of purification of the atmosphere with the agency of cosmic element fire, it creates pure medicinal atmosphere and prevents growth of pathogenic bacteria and can prevent infectious diseases on mass scale.

There are many herbs which are having antibacterial properties and are being used even today. These herbs are not only effective but also proved to be more safer than modern antibiotics. These are Haridra (Turmeric), Neem (Azadirachta indica), Guggul (Commiphora mukul), Arjun (Terminalia arjuna), Karanj (Pongamia pinnata), Adrak (Ginger), Garlic (Allium Sativum), Vacha (Acorus calamus), Kushtha (Saussurea lappa), Gandhaka Yoga, Parad, Shilajit, Tutthak, Kashish, Manashila, Gairik, Anjanam, kalpas Haridra, Tulsi (Ocimum sanctum) etc.

Ayurveda has enough potential and possibilities both for the prevention and treatment of COVID. This is the reason why, after recovery from the acute phase of the disease, many patients seek for Ayurveda treatment for long term lingering side effect. Clinical trials carried out in the past 1 year on the management of COVID 19 has reported that Ayurveda management is beneficial in mild to moderate cases of COVID 19 without long term lingering symptoms, especially as an add on treatment. This indicates that even if Ayurveda treatment is taken along with modern medicine in the acute stage, then, side effects may be reduced and there will not be long term residual symptoms.

# NATIONAL SUMMARY DATA

Estimated minimum number of illnesses and deaths caused by antibiotic resistance\*:

At least  **2,049,442** illnesses,  
 **23,000** deaths

*\*bacteria and fungus included in this report*



Estimated minimum number of illnesses and death due to *Clostridium difficile* (*C. difficile*), a unique bacterial infection that, although not significantly resistant to the drugs used to treat it, is directly related to antibiotic use and resistance:

At least  **250,000** illnesses,  
 **14,000** deaths

## WHERE DO INFECTIONS HAPPEN?

Antibiotic-resistant infections can happen anywhere. Data show that most happen in the general community; however, most deaths related to antibiotic resistance happen in healthcare settings, such as hospitals and nursing homes.



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

CS239559

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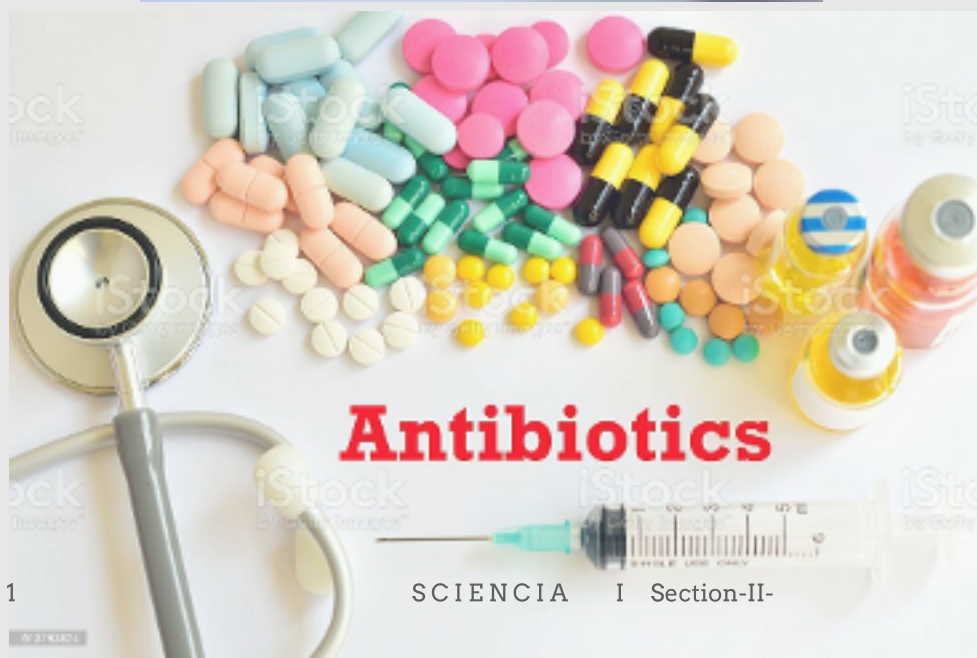
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Antibiotics have been a popular form of therapy in the delivery of healthcare since the 1940s. By promising to fight against numerous diseases and infections, they even save lives. Antibiotics have been used to treat and prevent a wide range of minor to major illnesses and problems by eliminating germs and restricting their growth.

### **When it comes to antibiotics, is it possible to take too much of a good thing?**

Antibiotics are potent drugs that help our bodies fight off diseases caused by germs. When correctly administered, they quickly and effectively treat illnesses and help us feel well within a few days. However, antibiotics are not only ineffective when used to treat a variety of medical conditions; they also pose a threat to our overall health. Our bodies develop a greater resistance to antibiotics when we use them to treat bacterial illnesses, contradicting their ability to heal us.

## **Pros & Cons of Antibiotics**

### **How do you know when they will work?**

Antibiotics fight off the microbes that cause strep throat, ear, sinus, and urinary infections. They are useless for treating colds, the flu, sore throats, or coughs. Talking to your doctor about your symptoms could help them determine the disease's underlying cause. Ask your physician about the benefits and drawbacks of prescribing antibiotics for your condition. Figure depicts the six main modalities of operation.

1. Interference with cell wall synthesis,
2. Inhibition of protein synthesis,
3. Interference with nucleic acid synthesis,
4. Inhibition of a metabolic pathway,
5. Inhibition of membrane function, Inhibition of ATP Synthase.

However, antibiotics usually lose their potency and may harm the body rather than help it. This depends on a number of factors, including the severity, type of disease or virus one is experiencing, and any medications being used. The following are some of the



## **Benefits of Highly Effective Antibiotics:**

-The most fundamental to the most complex ailments and infections can all be successfully treated with antibiotics.

-There are a number of additional disorders that can spread both systemically in one person and to have substantial effects. Continual low-dose antibiotic prophylaxis is a good UTI preventative.

-The majority of experts agree that respiratory tract injuries may facilitate viral infection-following bacterial infections.

-Low Cost - Due to their affordable cost, individuals from all walks of life enjoy receiving this treatment.

-Surgery is avoided because they assist in the treatment of serious problems and prevent them from getting worse. This makes it easier to postpone surgery as a result.

-Cases requiring surgery: The risk of infection increases during surgery because a variety of equipments are used and incisions are made. Antibiotics help to reduce the risk of infection.

-Use of antibacterial helps reduce the possibility that infections and illnesses may become serious and challenging situations.

## **Cons of Antibiotic Resistance:**

-When antibiotics are overused, it's possible for bacteria to develop resistance to the medication. In the future, major issues could arise if the germs are not effectively handled after becoming resistant.

-Using antibiotics has the problem of causing allergic reactions. The majority of allergic reactions are typically mild, but they might sporadically get worse. Fever and nausea are two of the more mild allergic reactions, although they can progress to more serious symptoms in extreme cases.

-A number of antibiotics could cause diarrhoea. This happens as a result of the composition of the bacteria species in your intestines altering. As a result, the prevalence of harmful bacteria like *Clostridium difficile*, which causes diarrhoea, may rise.

-Birth Control Reaction: It has been hypothesized that antibiotics may impair the effectiveness of birth control pills or other forms of contraception by interfering with how they work. This causes birth control pills to fail in some circumstances. However, numerous studies have indicated that this risk is just about 1%.

-Alcohol Reaction: The effectiveness of antibiotics is not greatly altered, despite the fact that moderate drinking does reduce the efficacy of some medicines. It does have a variety of harmful side effects with more alcohol.

## **Rules to follow to prevent antibiotic overuse**

Don't use another person's antibiotics. Any antibiotic that has been prescribed should be used up completely. Keep in mind that colds are viral illnesses, therefore taking antibiotics won't help.

## **Conclusion:**

Despite precautions, infections may inevitably occur, necessitating safe and effective antibiotic therapy. Antibiotic resistance is already pervasive in nature. Use effective antibiotics that won't lead to resistance.



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*“Taking care of your health through self-medication is good*

*But it is more harmful than good, so before taking it consult your physician”.*

Self-medication refers to administration of drugs or medicines without consulting to the physician due to lack of time as well as inappropriate knowledge regarding to the disease. Which further leads to misdiagnosis of the disease

The major risk of the self-medication involves the adverse drug reaction and different interaction of drug such as drug-food interaction as well as drug - drug interaction which further increase the severity of disease.

For e.g. A person is suffering from heartburn in that case a person may take a self-medication, i.e. antacids by considering that the heartburn is caused by acidity but what if that heartburn is not caused by acidity, it would be related to any heart problem so it results the misdiagnosis of the disease.

## SELF MEDICATION AND ANTIBIOTIC RESISTANCE

The reasons of Self medications are lack of time, also People assume there is no need to consult a physician in minor health issue like headache, acidity, common cold, etc. Inappropriate knowledge regarding to medicines as well as diseases, which may lead the chances of conversion of mild clinical features into chronic disorders. Consulting the physician is costly including physicians' visits and medications. Fear of side effects of medicines which is prescribed from the physician.

The measure risk factor of self-medication is antibiotic resistance, the antibiotics are used for treating the various infection which is caused by different microorganism the antibiotic resistance develop when the microorganism such as bacteria or fungi do not respond the antibiotics.

The antibiotics resistance is caused in cases such as an infection some time it would be caused by viruses in that cases the antibiotics can't be used to treat such infection in such a cases self-medication is dangerous and leads to the antibiotics resistance some time the condition become worse and the antibiotic resistances are difficult to treat.

The international studies reported that commonly used macrolide antibiotics like azithromycin develops resistance to streptococcus bacteria.

The treatment for same disease in different person may differ. it is based on the individual peculiarities which include the age, body weight, sex, and also if person having allergic reaction for a particular medication, and mostly the OTC (over the counter drug) medicines are administered as a self-medication the self-medication are having advantages but having disadvantages too.

## **Advantages of self-medication-**

**1.Easy availability of the medicines-**The OTC medication are mostly used as self-medication which does not require any prescription.

**2.Lowering the cost of health care programs-**the consulting fees of the physician and prescribed pathological and radiological investigations are not affordable by the patient so patient try to avoid it. That's why the self-medication helps to lower the cost. Also, the generic medicines are used as self-medication again it lowers the cost.

**3.Self-medication relieving minor health care symptoms or health issues.**

## **Disadvantages of self-medication**

**1.Misdiagnosis of disease** –self-medication leads to misdiagnosis of disease and sometime severe drug interaction would be happened including Allergic reaction of some medicines.

**2.Drug dependence and drug addiction-**Due to overuse of self-medication without knowing its dosage as well as its harmful effects for eg Continuous administration of antibiotics as self-medication increases the risk for develop the resistance called as antibiotic resistance.

**Conclusion-**Always take medicines according to prescription advised by physician do not self-administer a medicine without prescription it could be harmful for the patient which may results to increase the severity of disease so always consult a physician.





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## Antibiotics you throw away may be breeding superbugs in India.

### What are Superbugs?



Let us know about the superbugs, these are another name of bacteria or fungi which have the ability to resist commonly prescribed medications. There are no specific symptoms for these types of drugs, because when a healthy person carries germs without any symptoms they can infect other people.

Common Symptoms of disease such as, fever, fatigue coughing, body aches etc. The infections symptoms- are look as same as other infections. The main difference is that the symptoms does not respond to the antibiotic and antifungal medicines.

Anyone can get superbug infection even people who are young and healthy also cause symptoms of this. The Symptoms might be increased when immune System becomes weak. If you are work in healthcare facility or in veterinary sector or in an agricultural field then have chances of Symptoms of superbugs. If we have eaten contaminated food or products causes infections.

If superbug infection may occur then treatment is depending on the bacteria or fungi which causes infection. The Superbugs or drug resistant research is an urgent priority in world wide. According to a view of an antibiotics which are the agents that fight bacterial infections in people and animals. The resistance of antibiotic occurs when bacteria change in bacteria response to the use of these medicines. The main cause of antibiotic resistance is antibiotic use. When we use antibiotics, some bacteria die but the resistant bacteria can survive and may be multiply in various form. Overuse of antibiotics create resistance."

Let's highlight take a look on some news about this -

New Delhi:

Tonnes of antibiotics 1 pain- killers and other med. are flowing down the Yamuna and scientists at AIIMS Say our habit of throwing away leftover medicines in household garbage is partly to blame for this.

The drugs could be coming back to us in milk, vegetables and other agricultural produce and giving rise to superbugs that most antibiotics cannot kill. In 2015, researchers from AIIMS ocular pharmacology division started Studying pharmaceutical contamination in the Yamuna to explain the emergence of Superbugs.

"As its entry near Wazirabad in north Delhi, concentration of ofloxacin (antibiotic) and Ibuprofen (painkiller) were less than 0.05 micrograms per litre. A microgram is a millionth of gram So 20 million litres! of river water contained 1g or less of these drugs. The painkiller diclofenac was present in double strength - 0.1 microgram a litre.

**UNUSED DRUGS A CAUSE OF WORRY**

An AIIMS study shows that unused medicines that we throw in the garbage bin end up in the environment and contribute to the emergence of multi-drug resistant pathogens

**KEY FINDINGS**

- 50% of the drugs had a concentration of more than 0.1 microgram per litre in surface water, which is very high
- 35% of the drugs had a concentration of more than 0.1 microgram per litre in groundwater

**WATER SAMPLES FOR THE STUDY COLLECTED FROM...**

- > 7 points in the Yamuna between Wazirabad and Okhla Barrage
- > 35 borewells and water pumps in Delhi-NCR
- > Leachates at Ghazipur landfill sites

**WATER TESTED FOR 28 DRUGS...**

- > 24 antibiotics and antifungal drugs
- > 4 common painkillers, anti-hypertensive drugs, cough and cold medicines

**IMPACT AND ACTION REQUIRED**

- > Environmental pollution of antibiotics may favour transfer of resistant genes to human commensal and pathogenic bacteria
- > It can lead to the emergence of drug resistant microbes or superbugs
- > A policy to segregate medical waste is required to keep this in check
- > Unused medicines or expired medicines shouldn't be thrown into the bin

DRUG	Estimated use (Kg/million/yr)	Estimated free drug* (µg/L)	When Yamuna enters Delhi (µg/L)	When Yamuna exits Delhi (µg/L)	Increase	Landfill leachate (µg/L)	Aquifers (µg/L)
Fluconazole (Antifungal)	10.2	8.16	<0.05	4	80 times	38.1	44.1
Ofloxacin (Antibiotic)	19.7	16.7	<0.05	4.8	96 times	190	11.3
Diclofenac (Painkiller)	188.2	1.88	0.1	12.1	121 times	898	1390
Ibuprofen (Painkiller)	962.4	9.62	<0.05	2.5	50 times	136	<0.05

\* Free drug means the drug that is excreted without being metabolised by the body

µg/L: micrograms per litre



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Worldwide use of antibiotics varies with the clinical setting. Antibiotics are usually given to people with COVID-19, but antibiotics are not effective against the virus that causes COVID-19. From March 2020 to October 2020, almost 80% of hospitalized patients for COVID-19 were treated with antibiotics. Antibiotics and disinfectants save lives, but they create resistance every time they are used on humans, animals or plants. This may reflect the difficulty of distinguishing COVID-19 from community-acquired pneumonia when patients first arrive at the hospital for evaluation. Antibiotic use decreased in 2020 compared to 2019, due to reduced antibiotic use in ambulances and a greater reduction in the spread of other respiratory diseases for antibiotics. External antibiotic use recovered in 2021, but overall use is still low in 2021 compared to 2019. Most of the antibiotics used for older people from 2020 to December 2021 are for azithromycin, and azithromycin maxes out in COVID-19.

## ANTIMICROBIAL RESISTANCE (AMR) IN COVID-19 PATIENTS

Antibiotic use has increased as the number of COVID-19 cases in nursing homes has increased, but remains low. However, the use of azithromycin increased by 150% in April 2020 and 82% in December 2020 compared to the same period of 2019. The azithromycin dose remained high until October 2020. 5% on average compared to 2019. This decrease may be due to the fact that there were fewer people in nursing homes at that time. The pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus has been one of the greatest challenges of our time and has impacted treatment worldwide. At the same time, the rise of many antibiotics continues to threaten global health through serious illness, death and global economic losses. Significant progress has been made following the 2016 O'Neill review and recommendations addressing the antimicrobial resistance (AMR) crisis. However, access to patients has posed and continues to pose health risks associated with the spread of multidrug resistant (MDR) disease.

Recent evidence suggests that due to the spread of the 2019 coronavirus (COVID-19), large numbers of people in hospitals taking empirical antibiotics that may not be necessary may increase drug resistance worldwide. Although antibiotics are not effective in the treatment of COVID-19, antibiotic resistance may occur for various reasons, patients may have symptoms such as insect disease or other lung diseases, be puzzling, or accept the joint, current methods. The use of antibiotics and treatment methods may be recommended while it is appropriate to administer antibiotics to COVID-19 patients if they have bacterial or fungal infections, AMR and antibiotic administration considerations aimed at supporting the selection of the best empirical therapy and appropriate dose reduction or termination if infection occurs. The use or absence of antibiotics is important. Evidence suggests that AMR may increase after antibiotics in COVID-19 patients, but the composition of AMR prevalence and relative infection impact rates have not been published in a review to date.

It is important to understand AMR in COVID-19 patients.

There is clear evidence that overuse of antibiotics in humans leads to the development of immune-mediated diseases that affect humans, and AMR has been identified as one of ten threats to global health, food security and development. The important information is that there is a difference between the number of diseases and their characteristics of bacterial. Access to COVID-19 between November 2019 and June 2021. While the prevalence of co-infection varies by sample and location in each study, we estimate the rate of co-infection with a combined bacterial and fungal infection to be 24% and 0.3%, respectively. In addition, 569 (29%) of the 1959 unique isolates in the included studies were considered resistant. Although there is an extensive literature describing the potential impact of the COVID-19 pandemic on AMR, this is the first study to collect AMR-related data that could have important implications for current and future antibiotic management and provide information for the identification of infectious diseases. on the way and on the approach. The report was rejected. Based on their findings, concerns about AMRs appear low in the first year of the COVID-19 pandemic.



However, due to the lack of reports and insufficient data, more research is needed to better understand AMR in the COVID-19 era. Also, these findings will need to be reassessed as more evidence becomes available as the outbreak continues.

The risk of co infection in people with influenza is well documented and estimates range from 2% to 65%. Our study identified SARS-CoV-2 coinfection; this is consistent with previously reported reviews and large studies in multiple antibiotic use indicators, suggesting that many coin diseases are present. The exact incidence of AMR is currently not documented and not well defined even before the influenza virus or the recent COVID-19 virus. Several studies have documented the prevalence of MRSA coinfection in influenza patients ranging from 20% to 48%; However, other resistant diseases have been reported rarely. In addition, reports of co-infection with drug-resistant Gram-negative bacteria during flu season are approximately 2. Up to 2% for carbapenems and up to 21% for fluoroquinolones, not necessarily from patients with fever. In addition, the perception of antibiotic use may contribute to the prediction of AMR. In one study examining cases of fever associated with outbreaks, antibiotic use ranged from 20% to 50%. At the start of the COVID-19 outbreak, up to 60% of patients were given antibiotics.

At the same time, integration of social distancing and public health measures, including public cohesion, less travel, and improved hand hygiene can be made. Help reduce the spread. While our study did not explicitly report antibiotic use or health and public health measures during the study period, patient observations found that 95% of patients were given antibiotics before or at admission. Until SARS-CoV-2 is confirmed, avoiding unnecessary antibiotic use is difficult due to the difficulty of distinguishing the virus from pneumonia. Given this, it is necessary to evaluate the reality of AMR to guide the use of appropriate therapy and to understand the types of antibodies that arise in COVID-19 patients. This may be associated with high azithromycin use. However, despite our study not being able to specifically capture resistance to azithromycin, there is the possibility of increases in macrolide resistance as a result the initial empiric therapy used during this pandemic.



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The advent of antibiotics created an optimistic attitude toward fighting infectious diseases. The antibiotics work by showing various inhibition processes like inhibition of protein biosynthesis, inhibition of folic acid metabolism, and inhibition of DNA metabolism; some may also target bacterial cell wall synthesis. Development of antibiotic resistance by the bacteria is by different mechanisms such as the prevention of gathering antibiotics either by reducing its intake or increasing the excretion from tissues, i.e., changing the outer membrane permeability, antibiotic inactivation, target modification, and bypassing the metabolic path. A better interpretation of the antibiotic resistance mechanism can help combat the smartness of the bacteria.

Keeping in mind the patient's pharmacokinetics and the dynamics of the drugs choosing and prescribing the most appropriate medication is the key to optimally treating the infections along with reduced adverse effects and fewer chances of developing antibiotic resistance.

## My Prespective on- antibiotics:god's Hand or evil cliff

Individuals' adherence to prescriptions and careful use of antibiotics are among the most prevalent factors that can reduce the development of drug resistance; thus, there is a demand to change individuals' behaviors regarding the use of antibiotics.

One of the many causes of the emergence of antibiotic resistance is an interruption in the ongoing medical treatment of a disease. This could be because people tend to forget their dosage and drug consumption when they start to feel better after their symptoms subside. The bacteria have become more resistant due to this inadequate treatment in terms of dose and duration. The regular and incorrect administration of antibiotics for self-limiting diseases, such as the common cold, flu-like symptoms, diarrhea, and sore throat, is recognized as the most significant contributor to antimicrobial resistance growth. The resistance has increased organisms' virulence and led to the widespread prevalence of diseases caused by bacteria. The public health sector faces a global challenge in developing strategies to prevent and fight the emergence of antibiotic resistance.

Globalization and growth in worldwide travel and trade both unavoidably produce opportunities for the quick transmission of hazardous diseases and make the issue of antibiotic resistance considerably more challenging to solve [13]. Even the last-resort antibiotics are no longer effective in treating infections caused by resistant microorganisms.

## Pros of taking antibiotics

Antibiotics can slow the growth of and kill many types of infection.

In some cases, such as before surgery, antibiotics can prevent infection from occurring.

Antibiotics are fast-acting; some will begin working within a few hours.

They are easy to take: Most antibiotics are oral medications. Your doctor may decide to give you an injection, if it is imperative that the medicine gets into your system quickly.

## Cons of taking antibiotics

If you take antibiotics often, your body can build a resistance to antibiotic drugs, which could cause antibiotics to become less effective.

Some antibiotics can have side effects, from digestive issues to bone damage to sensitivity to sunlight. Make sure to read the fine print that comes with your medicine, so that you know the risks.

## Self medication

It may help treat acute illnesses that do not need consultation from a doctor, or recurring disorders diagnosed previously during earlier consultations. When done responsibly, it may facilitate faster relief to the patient by providing prompt medication access. It can be a cost-effective option in settings of limited sources, particularly in LMICs. However, inappropriate self-medication subjects the patient to several risks and drawbacks like adverse drug reactions, development of antibiotic resistance, masking of a more severe underlying condition and failure to consult a doctor in time. It is still practiced all over the globe. The prevalence of self-medication in different regions.

## Conclusion

We are dependent on antibiotics for the treatment of infectious diseases and they are critical for the success of advanced surgical procedures, such as organ and prosthetic transplants. Antibiotic-resistance mechanisms create an enormous clinical and financial burden on healthcare systems worldwide. Despite the problem of antibiotic resistance in infectious bacteria, little is known about the diversity, distribution and origins of resistance genes, especially for the unculturable majority of environmental bacteria.

# CAUSES OF ANTIBIOTIC RESISTANCE



Antibiotic resistance happens when bacteria change and become resistant to the antibiotics used to treat the infections they cause.



Over-prescribing of antibiotics



Patients not finishing their treatment



Over-use of antibiotics in livestock and fish farming



Poor infection control in hospitals and clinics



Lack of hygiene and poor sanitation



Lack of new antibiotics being developed

[www.who.int/drugresistance](http://www.who.int/drugresistance)

**#AntibioticResistance**



World Health Organization





## ■ Institute Vision

**“To create competent pharmacy professionals who can efficiently contribute for the healthcare system of society and to the pharmacy profession.”**

## ■ Institute Mission

- 1) To provide student centric active innovative learning environment, with strategically planned quality pharmacy education consistent with the policies of state and nation.
- 2) To nurture and inculcate the team spirit, research, innovation, creativity and entrepreneurship.
- 3) To strengthen Industry-Institute and Institute - Institute interaction for the overall development of students.
- 4) To help the students to disseminate acquired knowledge through the fullest commitment for health care services.

