Antibiotics: Antibiotics are medications that destroy or slow down the growth of bacteria. They include a range of powerful drugs used to treat diseases caused by bacteria. Antibiotics cannot treat viral infections, such as cold, flu, and most coughs.

The first antibiotic was penicillin. Penicillin-based antibiotics, such as ampicillin, amoxicillin, and penicillin G, are still available to treat a variety of infections and have been in use for many years.

- Five Basic Mechanisms of Antibiotic Action against Bacterial Cells:

1. Inhibition of Cell Wall Synthesis.
2. Inhibition of Protein Synthesis (Translation).
3. Alteration of Cell Membranes.
4. Inhibition of Nucleic Acid Synthesis.

Antimicrobial resistance is mainly caused by the overuse of antimicrobials. This leads to microbes either evolving a defense against drugs used to treat them, or certain strains of microbes that have a natural resistance to antimicrobials becoming much more prevalent than the ones that are easily defeated with medication. While antimicrobial resistance does occur naturally over time, the use of antimicrobial agents in a variety of settings both within the healthcare industry and outside of has led to antimicrobial resistance becoming increasingly more prevalent.

- Antibiotics commonly cause the following side effects:

1. diarrhea
2. nausea
3. vomiting
4. rash
5. upset stomach
6. sensitivity to sunlight, when taking tetracyclines
7. with certain antibiotics or prolonged use, fungal infections of the mouth, digestive tract, and vagina

Antiviral

Antiviral medications help the body fight off harmful viruses. The drugs can ease symptoms and shorten the length of a viral infection. Antivirals also lower the risk of getting or spreading viruses that cause herpes and HIV. One approved antiviral treats the coronavirus that causes COVID-19.

How do antiviral medications work?

1. Block receptors so viruses can't bind to and enter healthy cells.
2. Boost the immune system, helping it fight off a viral infection.
3. Lower the viral load (amount of active virus) in the body.

vaccines

Vaccines are made using several processes. They may contain live viruses that have been attenuated (weakened or altered to not cause illness); inactivated or killed organisms or viruses; inactivated toxins (for bacterial diseases where toxins generated by the bacteria, and not the bacteria themselves, cause illness); or merely segments of the pathogen (this includes both subunit and conjugate vaccines). Live, attenuated vaccines currently recommended as part of the U.S. Childhood Immunization Schedule include those against measles, mumps, and rubella (via the combined MMR vaccine), varicella (chickenpox), and influenza (in the nasal spray version of the seasonal flu vaccine). In addition to live, attenuated vaccines, the immunization schedule includes vaccines of every major type.

The different vaccine types each require different development techniques. Each section below addresses one of the vaccine types

1. **Live, Attenuated Vaccines**
2. **Killed or Inactivated Vaccines**
3. **Toxoids**
4. **Subunit and Conjugate Vaccines**
5. **mRNA Vaccines**
6. **Viral Vector**