ENVIRONMENTAL STUDIES & LIFE SCIENCES

Types of Infectious diseases

Infectious diseases

Significantly contribute to the mortality in

- Elderly
- Immunosuppressed

Chronic disease states

How microorganisms cause disease?

- Humans harbour a complex ecosystem of microflora.
- Attenuation of normal host- defence healthy" microbial flora to cause pathologic infections.
- Non-commensal organisms with a wide range of virulence.
- Highly infectious microbes produce disease in healthy individuals.

Bloodborne Diseases:HIV/AIDS, Hepatitis B and C.

Bacterial: "Staph" skin infection, Pneumonia, Urinary tract infection, Anthrax, Botulism

Parasitic: Malaria

Viral: Influenza, or the flu. Respiratory infections, Diarrhea, Chickenpox, measles, mumps.

Fungi: Candidiasis, Aspergillosis.

Infectious diseases: Definitions

- **Disease:** A pathological condition of body parts or tissues characterized by an identifiable group of signs and symptoms.
- **Infectious disease:** Disease caused by an infectious agent such as bacteria, virus, fungi, protozoa that can be passed on to others.
- **Infection:** Occurs when an infectious agent enters the body and begins to reproduce; may or may not lead to disease.
- **Pathogen:** An infectious agent that causes disease.
- **Host:** An organism infected by another organism.
- **Virulence:** The relative ability of an agent to cause rapid and severe disease in host.

Phases of infectious disease

1. **Incubation period:** time between infection and the appearance of signs and symptoms.

2. **Prodromal phase:** mild, nonspecific symptoms that signal onset of some diseases.
3. **Clinical phase:** a person experiences typical signs and symptoms of disease.
4. **Decline phase**: subsidence of symptoms.
5. **Recovery phase:** symptoms have disappeared, tissue heal and the body regains strength.

Classification of disease

- **By duration**

*Acute: develop and runs its course rapidly

*Chronic: develops more slowly and it usually less severe may persist for a long, indefinite period of time.

*Latent: characterized by periods of no symptoms between outbreaks of illness.

- **By location**

*Local: confined to a specific area of the body

*Systemic: a generalized illness that infect most of the body

- **By timing**

*Primary: initial infection in the previously healthy person

*Secondary: infection that occurs in a person weakened by primary infection

Table 14.10 Modes of Disease Transmission

Mode of Transmission	Diseases Spread Include:
Contact Transmission	
Direct Contact: e.g., handshaking, kissing, sexual intercourse, bites	Cutaneous anthrax, genital warts, gonorrhea, herpes, rabies, staphylococcal infections, syphilis
Indirect Contact: e.g., drinking glasses, toothbrushes, toys, punctures	Common cold, enterovirus infections, influenza, measles, Q fever, pneumonia, tetanus
Droplet transmission: e.g., droplets from sneezing (within 1 meter)	Whooping cough, streptococcal pharyngitis (strep throat)
Vehicle Transmission	
Airborne: e.g., dust particles	Chickenpox, coccidiomycosis, histoplasmosis, influenza, measles, pulmonary anthrax, tuberculosis
Waterborne: e.g., streams, swimming pools	*Campylobacter* infections, cholera, *Giardia* diarrhea
Foodborne: e.g., poultry, seafood, meat	Food poisoning (botulism, staphylococcal); hepatitis A, listeriosis, tapeworms, toxoplasmosis, typhoid fever
Vector Transmission	
Mechanical: e.g., (on insect bodies) flies, roaches	*E. coli* diarrhea, salmonellosis, trachoma
Biological: e.g., lice, mites, mosquitoes, ticks	Chagas' disease, Lyme disease, malaria, plague, Rocky Mountain spotted fever, typhus fever, yellow fever

Diseases

- Genetic
- Biological
- Physical
- chemical

Epidemics of, Plague in India, Avian (H5N1) influenza in Hong Kong, Ebola haemorrhagic fever in central Africa, Nipah virus (niv) infection in Malaysia and Singapore required national and international response.

Plaque: Also called as Black Death

- ***Yersinia pestis* causes plague. Transmitted from rodents to human by aerosols or fleabites.**
- There are two main clinical forms of plague infection: bubonic and pneumonic.
- Bubonic plague is the most common form and is characterized by painful swollen lymph nodes or 'buboes'.
- The lymph node then becomes inflamed, tense and painful, and is called a ‘bubo’.
- Inflamed lymph nodes can turn into open sores filled with pus.
- **Pneumonic** plague, or lung-based plague, is the most virulent form of plague.

Anthrax

- *Bacillus anthracis* causes anthrax in human.
- These are prevalent in animals having contact with spore-contaminated soil.
- Human in contact through exposure to contaminated animal products or powdered spores (called as a biologic weapon) suffer from anthrax.
- 3 major syndromes:

- Cutaneous: painless, pruritic papules that become edematous vesicles (lymphadenopathy & lymphangitis) followed by a black eschar.
- Inhalation: flu like symptoms rapidly leads to sepsis, shock, and frequently death.
- GI: by eating contaminated meat, causes severe, bloody diarrhoea and often death.

Small pox

- acute contagious disease caused by the ***Variola***virus
- **high fever which may be recurrent.**
- **malaise** (general feeling of unwellness)
- **widespread skin rash** – flat spots which change into raised bumps then firm fluid filled blisters which then scab

- **severe headache.**
- **backache**.
- **abdominal pain.**
- **vomiting.**
- **diarrhoea.**

Influenza

- Acute contagious disease caused by influenza virus.
- Causes respiratory tract infection but symptoms throughout the body.
- Seasonal causes epidemics with low fatality. More deadly during pandemics and occur several times.
- Rapid onset, chills, fever, malaise/fatigue, headache, sore throat, cough, nasal congestion, & GI symptoms

Viral Haemorrhagic Fever

- Viral haemorrhagic (hem-uh-RAJ-ik) fevers are infectious diseases. Cause severe, life-threatening illness.
- They can damage the walls of tiny blood vessels, making them leak, and can hamper the blood's ability to clot internal bleeding.

➢ Early signs and symptoms can include:
Fever, Fatigue, weakness or general feeling of being unwell, Dizziness, Musde, bone or joint aches, Nausea and vomiting, Diarrhoea
Some viral haemorrhagic fevers include:

1. Dengue
2. Ebola
3. Lassa
4. Marburg
5. Yellow fever

➢ Severe symptoms include:
Bleeding under the skin, in internal organs, or from the mouth, eyes or ears, Nervous system malfunctions, Coma, Delirium, major organ failure.

Tularaemia

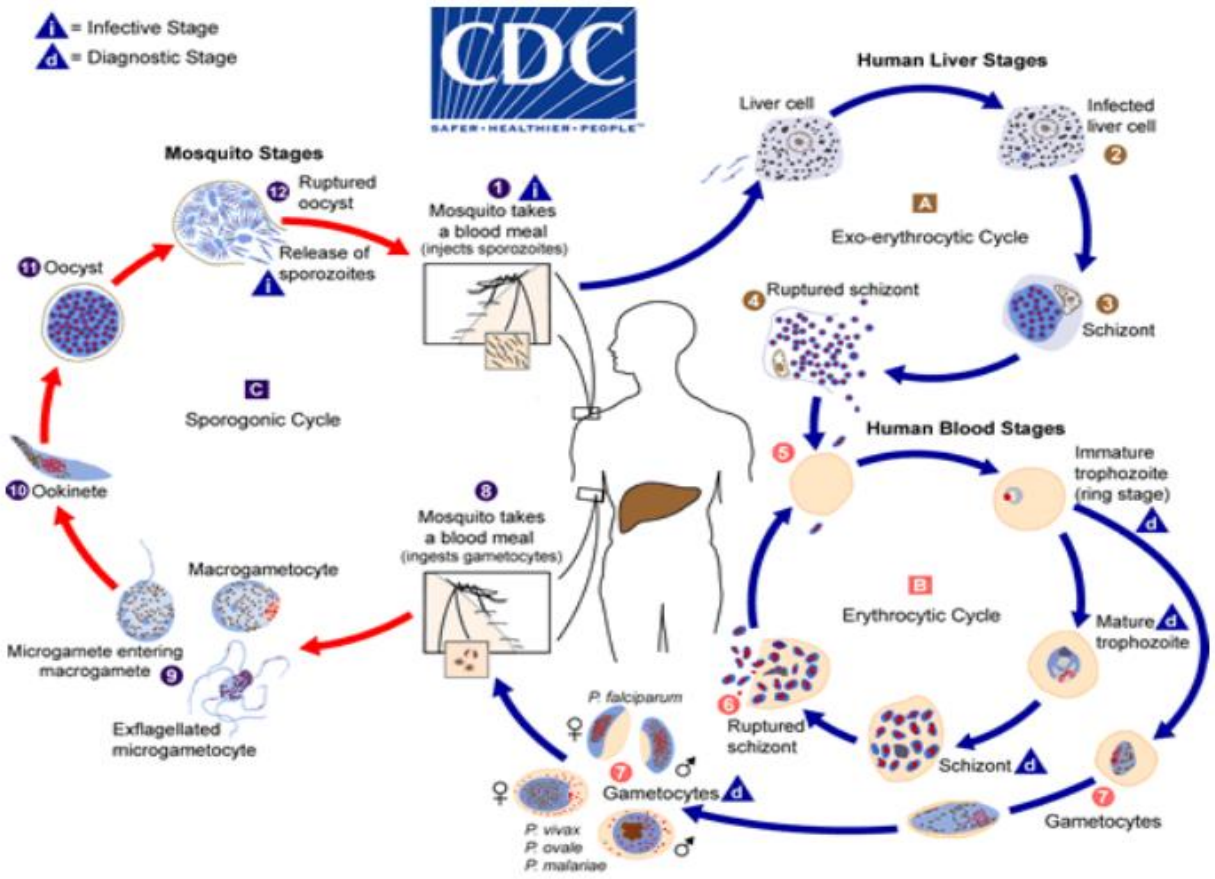
- Tularaemia, also known as “rabbit fever,” is a disease caused by the bacterium ***Francisella tularensis*****.**
- Tularaemia is typically found in animals, especially rodents, rabbits, and hares. Tularaemia is usually a rural disease and has been reported in all U.S. states except Hawaii.
- Symptoms: Rapid onset, fever, dyspnoea, headache, malaise, cough, haemoptysis (coughing up blood).

Botulism

- ***Clostridium botulinum*** is a bacterium that produces dangerous toxins (botulinum toxins) under low-oxygen conditions.
- Botulinum toxins block nerve functions and can lead to respiratory and muscular paralysis.
- Foodborne botulism is a serious, potentially fatal disease.
- Improperly processed food, homemade canned, preserved or fermented foodstuffs are a common source of foodborne botulism.
  Symptoms: fatigue, weakness, blurred vision, difficulty in swallowing and speaking, descending muscle paralysis and respiratory failure.

Malaria

- ***Plasmodium falciparum*** causes severe malaria.
- ***Plasmodium vivax, Plasmodium ovale, and Plasmodium malariae are*** the various types of disease-causing vectors.
- Malaria infection begins when an infected f**emale *Anopheles* mosquito** bites a person, injecting *Plasmodium* parasites, in the form of sporozoites into the bloodstream.
- The **sporozoites** pass quickly into the **human liver.**
- The sporozoites multiply asexually in the liver cells over the next 7 to 10 days, causing no symptoms.
- In an animal model, the parasites, in the form of **merozoites** are released from the **l**iver cells in vesicles, **passes through the heart, lungs, and settle within lung capillaries.**
- The vesicles disintegrate, free the merozoites to enter the blood phase of their development.
- In the bloodstream, the merozoites invade red blood cells **(erythroctes)** and multiply again until the cells burst. Then they invade more erythrocytes. This cycle is repeated, causing fever each time parasites break free and invade blood cells.
- Some of the infected blood cells leave the cycle of asexual multiplication. Instead of replicating, the merozoites in these cells develop into sexual forms of the parasite, called gametocytes that circulate in the blood stream.
- When a mosquito bites an infected human, it ingests the gametocytes, which develop further into mature sex cells called gametes.
- The fertilized female gametes develop into actively moving ookinetes that burrow through the **mosquito's midgut wall and form oocytes on the exterior surface.**
- Inside the oocyst, thousands of active sporozoites develop. The oocyst eventually bursts, releasing sporozoites into the body cavity that **travel to the mosquito's salivary glands.**
- **The cycle of human infection begins again when the mosquito bites another person.**



Bioterrorism acts and their functions

ACTS	COUNTRY	YEAR	FUNCTIONS
The Pandemic and All-Hazards Preparedness Act (PAHPA)	United States	2006	Improve the nation's public health, medical preparedness and response capabilities in emergencies.
Public Readiness and Emergency Preparedness Act (PREP Act)	United States	2005	Protects from liability claims arising from administration, vaccine manufacturers, distributors, program planners, and qualified persons involved in the administration.
Biodefense and Pandemic Vaccine and Drug Development Act	United States	2005	Provides incentives for domestic manufacturing of vaccines and broad liability protections to the companies.
The Project Bioshield Act	United States	2004	Provides permanent funding for the procurement of medical countermeasures during emergencies.
Public Health Security and Bioterrorism Preparedness and Response Act (Bioterrorism Act)	United States	2002	Issue regulations on enhancing controls on dangerous biological agents and toxins, protecting safety and security of food and drug supply, drinking water Security and safety.
Homeland Security Act	United States	2002	Create the Department of Homeland Security (DHS), that prevent or minimize damage and assist in recovery for terrorist attacks
USA Patriot Act	United States	2001	Uniting and strengthening America by providing appropriate tools required to intercept and obstruct terrorism
Chemical and Biological Weapons Control Act	United States	1991	Strengthen efforts to control chemical and biological agents, precursors, and equipment.

Disease Management

The condition of being sound in body, mind or spirit, Factors influencing health:

1. Genetic disorders- deficiencies a child born with & deficiencies/ defect child inherit
2. Infections
3. Life style- food & water, rest & exercise, habits

especially freedom from physical disease or pain- Health

Any condition which interferes with normal functioning of the body and impairs the health- Disease

Types of Diseases:

I. Congenital Disease- inborn disease & genetically inherited

II. Acquired Disease- after birth & non- inheritable

Congenital Disease:

1. Disease due to gene mutation. Eg.- Haemophilia, Color blindness
2. Disease due to chromosomal mutation Eg.- Down's syndrome, Klinefelter's syndrome

Acquired Disease:

1. Communicable or infectious diseases- air, water, food, physical contact or vectors (Bacteria, Virus, Protozoa, Helminth, Fungus etc.)
2. Non- communicable or non- infectious diseases- Deficiency disease (Diabetes), Degenerative (Arthritis), Cancerous & Allergic diseases (Asthma)

- Disease management is a system of coordinated heath care interventions and communications for defined patient populations with conditions where self-care efforts can be implemented.
- Disease management empowers individuals, working with other health care providers to manage their disease and prevent complications.
- Improvements in quality of care and patient outcomes should be the primary indicator of successful disease management.

Infectious diseases can be caused by:

- Bacteria. These one-cell organisms are responsible for illnesses such as strep throat, urinary tract infections and tuberculosis.
- Viruses. Even smaller than bacteria, viruses cause a multitude of diseases ranging from the common cold to AIDS.
- Fungi.

Parasites.

Common Infectious Diseases

- Chickenpox.
- Common cold
- Diphtheria.
- Giardiasis.
- HIV/AIDS.
- Influenza (flu)

Lifestyle diseases are ailments that are primarily based on the day to day habits of people.

Lifestyle diseases include

- atherosclerosis

- heart disease
- stroke
- obesity
- type 2 diabetes
- hypertension
- diseases associated with smoking and alcohol and drug abuse
- colon cancer, and
  premature mortality

  A **chronic disease affects** every aspect of a person's life.
  This can include physical and mental health, family, social life, finances, and employment.
  Chronic diseases can also shorten a person's life.
  Conditions such as asthma and diabetes require regular monitoring to prevent the disorders from progressing to life-threatening levels.
  Chronic disease management, therefore, is **essential** to both improving health outcomes of poor individuals and containing costs in health care system.
  Diseases can be grouped as:

1. Food & water borne diseases
2. Air borne diseases
3. Vector borne diseases

Food & water borne diseases:

- Proper personal hygiene includes keeping the body clean; consumption of clean drinking water, food, vegetables, fruits, etc.
- Proper public hygiene which includes proper disposal of waste and excreta; periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks and observing standard practices of hygiene in public catering.
- Eg.- Typhoid (*Salmonella typhii*), Amoebiasis (*Amoeba*) and Ascariasis (*Ascaris*)

Air borne diseases:

- Close contact with infected person & their belongings should be avoided
- Personal hygiene is also very important to prevent diseases
- Eg.- Pneumonia and Common cold

Vector borne diseases:

- Controlling or eliminating the vectors and their breeding places.
- Avoiding stagnation of water in and around residential areas, regular cleaning of household coolers, use of mosquito nets
- Introducing fishes like *Gambusia* in ponds that feed on mosquito larvae, spraying of insecticides in ditches, drainage areas and swamps, etc.
- Doors and windows- wire mesh to prevent the entry of mosquitoes.
- *Aedes & Culex* mosquitoes, Houseflies
  Malaria, Filariasis, Dengue and Chikungunya

Prevention or control of Diseases

- Infectious diseases can be prevented through maintenance of personal and public hygiene

10 steps for coping with a chronic condition

- Get a prescription for information.
- Make your doctor a partner in care.

- Build a team.
- Coordinate your care.
- Make a healthy investment in yourself.
- Make it a family affair.
- Manage your medications.
  Beware of depression.

Vaccines and immunisation

- Diseases can be now prevented- vaccines and immunisation
- A **vaccine** is a biological preparation that provides active acquired immunity to a particular infectious disease.
- **Vaccines** - eradicate smallpox, polio, diphtheria, pneumonia and tetanus
- Through Biotechnology we can make available newer and safer vaccines.
- Discovery of antibiotics and various other drugs has also enabled us to effectively treat infectious diseases.

Immunity

- The foreign agents could be pathogens or any foreign substance that could cause disease in host, The overall ability of host to fight against disease causing organism-**Immunity**
- **Types of Immunity**
- **Innate Immunity**
- **Acquired Immunity**
- **Innate Immunity-** which is present from the time of birth & is not pathogen specific
- **Acquired Immunity-** not from time of birth & is pathogen specific; Immunity is conferred based on memory that immune system has for that pathogen

Principle- "property of 'memory' of the immune system"

Vaccination

Antigenic proteins of pathogen or **activated/weakened pathogen**

(vaccine) are introduced into the body.

- The antibodies produced in the body against these antigens would

  neutralise the pathogenic agents during actual infection.
- The vaccines also generate memory – B and T-cells that recognize the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies.
- Recombinant DNA technology- antigenic polypeptides of pathogen are

  produced in bacteria or yeast.
- Vaccines produced using this approach allow large scale production and hence greater availability for immunisation, e.g., hepatitis B vaccine produced from yeast.
- Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease.
- Two Types:

1. **Active Immunisation-** Slow immune response- infected from mild dosage of dead / pretreated live microbe. Eg.- Measles, Mumps, Rubella etc.
2. **Passive Immunisation-** Quick immune response

- Direct injection of preformed antibodies (Eg. Tetanus), or antitoxin - a preparation containing antibodies to the toxin (Eg. Snakebites)
- Snakebites, the injection which is given to the patients, contain preformed antibodies against the snake venom- Passive Immunisation

Allergy: Is hypersensitivity disorder of immune system in which exaggerated response of the immune takes place to certain antigens present in the environment

- Substance which induces allergy- **Allergen** (mites in dust, pollens,

  animal dander)

- Antibodies produced- IgE type etc.
- Symptoms: Sneezing, watery eyes, running nose and difficulty in breathing.
- Reason: Release of chemicals like **histamine** and **serotonin** from

  the mast cells

- Diagnosis: Injecting small dosage of possible allergens & reactions are observed
- Drugs **anti-histamine, adrenalin and steroids-** quickly reduce the

  symptoms of allergy

- Protected environment- lowered immunity thus more & more people are now sensitive to allergens
- **Acquired Immuno Deficiency Syndrome**

  Acquired Immuno Deficiency Syndrome- disease caused due to deficiency of immune system

- Disease/ syndrome- acquired during the lifetime of an individual indicating that it is not a congenital disease
- First reported in 1981 & last twenty-five years- 25 million persons were killed

  Causative organism: -

- **Human Immuno deficiency Virus (HIV)- retrovirus**, i.e. RNA virus having RNA genome enclosed by protein coat

  Modes of Transmission of HIV infection:

(a) sexual contact with infected person

(b) by transfusion of contaminated blood and blood products

(c) by sharing infected needles as in the case of intravenous drug abusers

(d) from infected mother to her child through placenta

- Individuals with multiple sexual partners, drug addicts who take drugs intravenously, individuals who require repeated blood transfusions and children born to an HIV infected mother- high chance of AIDS

  It takes few months to few years (5- 10 years)- between infection &

  appearance of AIDS symptoms

Symptoms:

- HIV attacks Helper T lymphocyte- reduction of Helper T lymphocyte which cause severe **Cellular immuno- deficiency**
- Bouts of fever, Diarrhoea & Weight loss
- Highly susceptible to *Mycobacterium,* viruses, fungi, parasites like *Toxoplasma*
- Infected person becomes opportunistic to infections

Diagnosis & Treatment:

- Diagnostic test for AIDS- **enzyme linked immuno-sorbent assay** (ELISA)
- Treatment of AIDS with **anti-retroviral drugs-** partially effective
- Drugs can only prolong the life of the patient but cannot prevent death, which is inevitable.

Prevention of AIDS:

- Educating people to generate awareness among them
- National AIDS Control Organization (NACO) and
- other non-governmental organization (NGOs)
- WHO has started a number of programs to prevent the spreading of HIV infection which includes- Making blood (from blood banks) safe from HIV, ensuring the use of only disposable needles and syringes in public and private hospitals and clinics, free distribution of condoms, controlling drug abuse, advocating safe sex and promoting regular check-ups for HIV in susceptible populations
- Infection with HIV or having AIDS is something that should not be hidden – since then, the infection may spread to many more people

Cancer

- Cancer also known as a malignant tumour, is a group of diseases involving abnormal **cell growth** with the potential to invade or spread to other parts of the body
- Considered as one major cause of death all over world
- Due to its severity process of Oncogenic transformation of cells, its treatment and control requires most intense areas of research in biology and medicine
- Cancer can be induced by external factors- **Carcinogens**

Causes of Cancer:

Normal cells transformed into cancerous neoplastic cells by physical, chemical and biological agents. These agents are called**carcinogen.**

Physical agents: ionizing radiation like X-rays, gamma rays non- ionizing radiations like UV-rays.

Chemical agents: Tobacco smoke, sodium azaide, Methyl ethane

sulphonate.

Biological agents:

- Cancer causing viruses called **oncogenic viruses** have a gene called **viral oncogenes,** induce transformation of neoplastic cells.
- **Cellular oncogenes** (c-onc) or **proto-oncogenes** in normal cells, when activated lead to oncogenic transformation of the normal cells

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Mechanism to transformation to cancerous cell:

- Cell growth and differentiation is highly controlled and regulated which is lacked in cancerous cell
- Normal cell shows a property- **Contact inhibition-** inhibitsuncontrolled growth
- Cancer cells appears to have lost this property. As a result of this, cancerous cells just continue to divide giving rise to masses of cells called **tumors**.

TYPES OF TUMOR
Benign tumors:

- Normally remain confined to their original location
- Do not spread to other location.
- Cause little damage

Malignant tumours:

- Mass of proliferating cells called **neoplastic** or tumour cells.

- These cells grow very rapidly.
- Invade and damage surrounding tissues.
- These cells actively divide and grow; they also starve the normal cells.
- Cancerous cells escape from the site of origin and moves to distant place by blood, wherever they get lodged make the normal cell cancerous. This property is called **metastasis.**

- **Four main types of cancer are:**
- **Carcinomas**. A **carcinoma** begins in the skin or the tissue that covers the surface of internal organs and glands.
- **Sarcomas**. A **sarcoma** begins in the tissues that support and connect the body.
- **Leukaemia's**. **Leukaemia** is a cancer of the blood.
- **Lymphomas** and **Myelomas,** Cancer of immune system

Detection of Cancer:

Biopsy and histopathological study-

a) tissue and blood and bone marrow tests for increased cell counts (leukaemia's);

b) Biopsy of a piece of the suspected tissue cut into thin sections is stained and examined under microscope (histopathological studies) by a pathologist

Radiography like X-rays, CT (computerized tomography)

a) used to detect cancers of the internal organs

b) Computed tomography uses X-rays to generate a three- dimensional image of the internals of an object

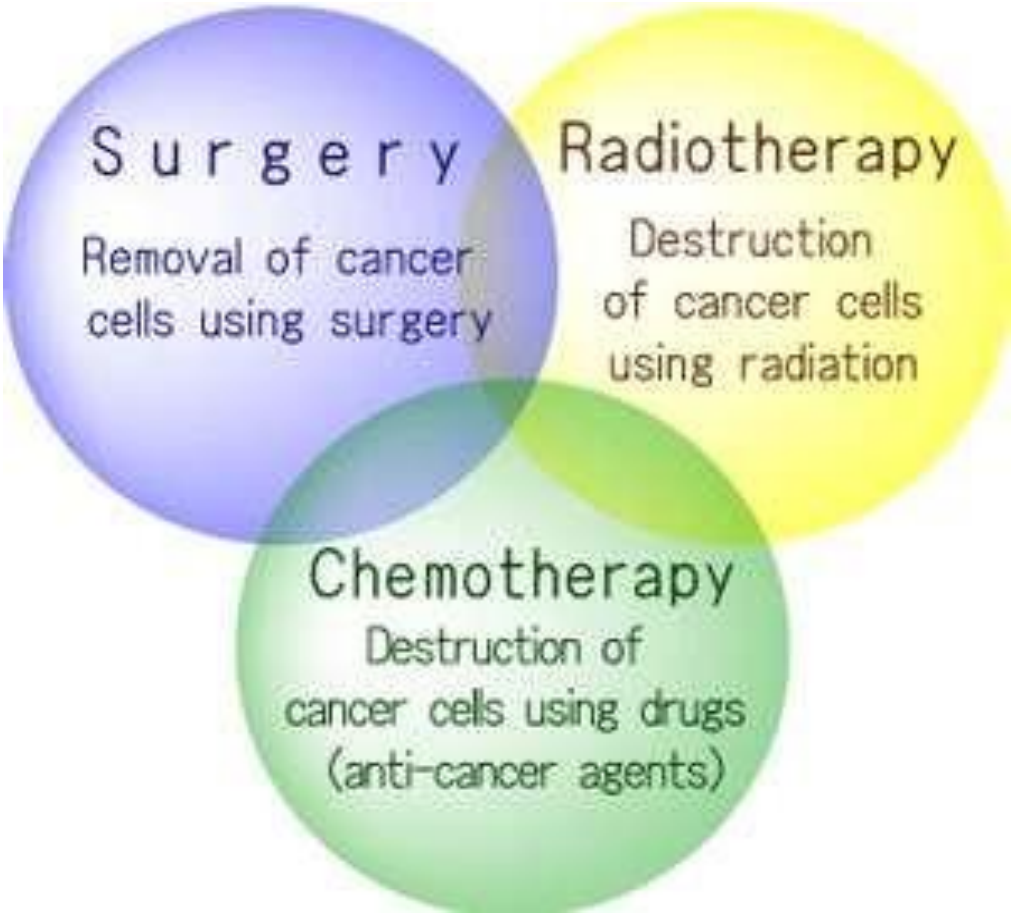
MRI (magnetic resonance Imaging):

a) uses strong magnetic fields and non-ionising radiations to accurately detect pathological and physiological changes in the living tissue

Antibodies against cancer-specific antigen:

a) Antibodies against cancer-specific antigens are used for detectionof certain cancers genes-person is advised to prevent exposure.

Treatment



Introduction to Telemedicine

TELEMEDICINE

World Health Organization defines telemedicine as

'The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities.'

TELEHEALTH

'The delivery and facilitation of health and health-related services including medical care, provider and patient education, health information services, and self-care via telecommunications and digital communication technologies.'

Who can be associated with Telemedicine system?

REGISTERED MEDICAL PRACTITIONER

'A Registered Medical Practitioner [RMP] is a person who is enrolled in the State Medical Register or the Indian Medical Register under the Indian Medical Council Act 1956.' [IMC Act, 1956].

- Patient management approach combining various information technologies for monitoring patients at distance.
- Information technology application domains in health care include telemedicine and home telecare.

Chronic health conditions such as *pulmonary conditions, diabetes, hypertension, and cardiovascular diseases, which are preventable or highly treatable.*

•These individuals account for the vast majority of all healthcare spending — funds that could be saved with better preventative care and disease management.

- *Telepsychiatry, teleradiology, teledermatology, and teleophthalmology.*

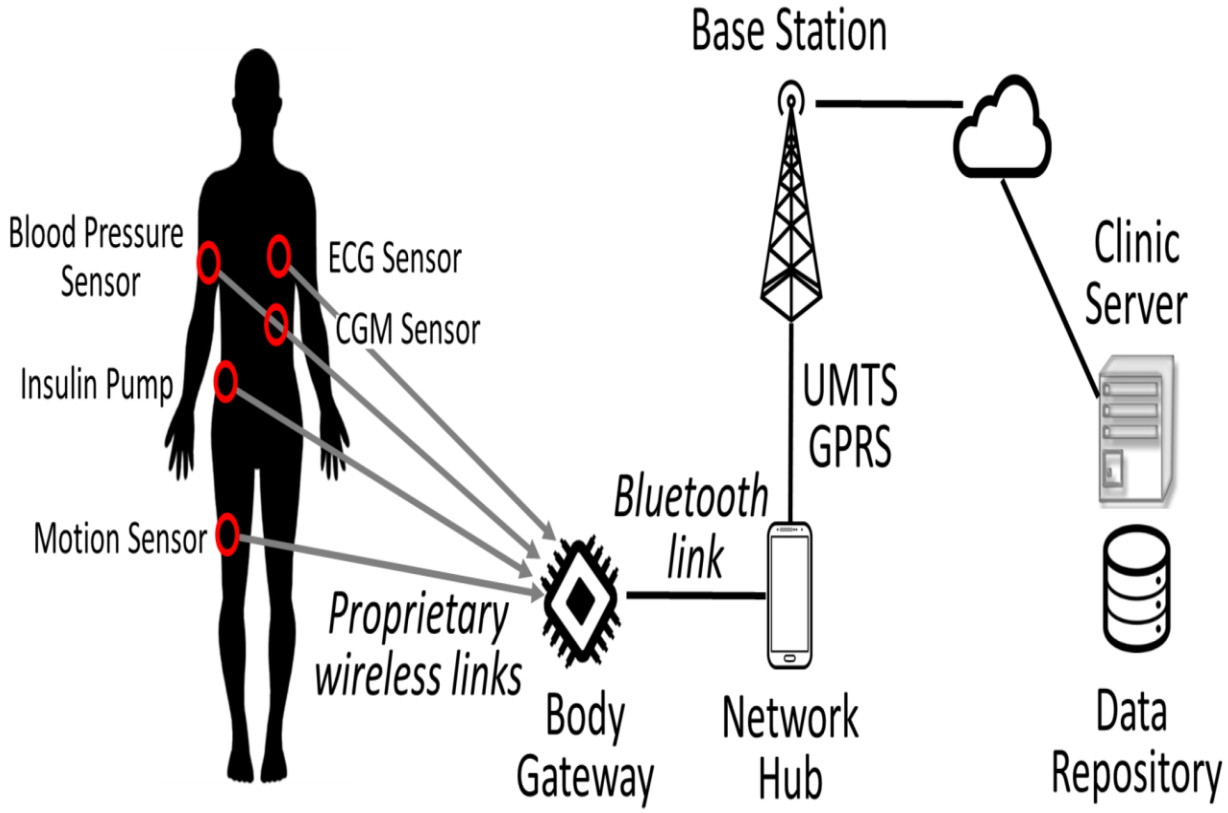
•Provides specialist consultation to distant communities, *rather than to provide a tool for self-management of chronic disease.*

Home telecare- focused on providing care in a home setting with the primary intent of supporting the patient rather than the health professionals.

•Home telemonitoring is used in a more restrictive sense and encompasses the use of audio, video, and other telecommunication technologies to monitor patient status at a distance

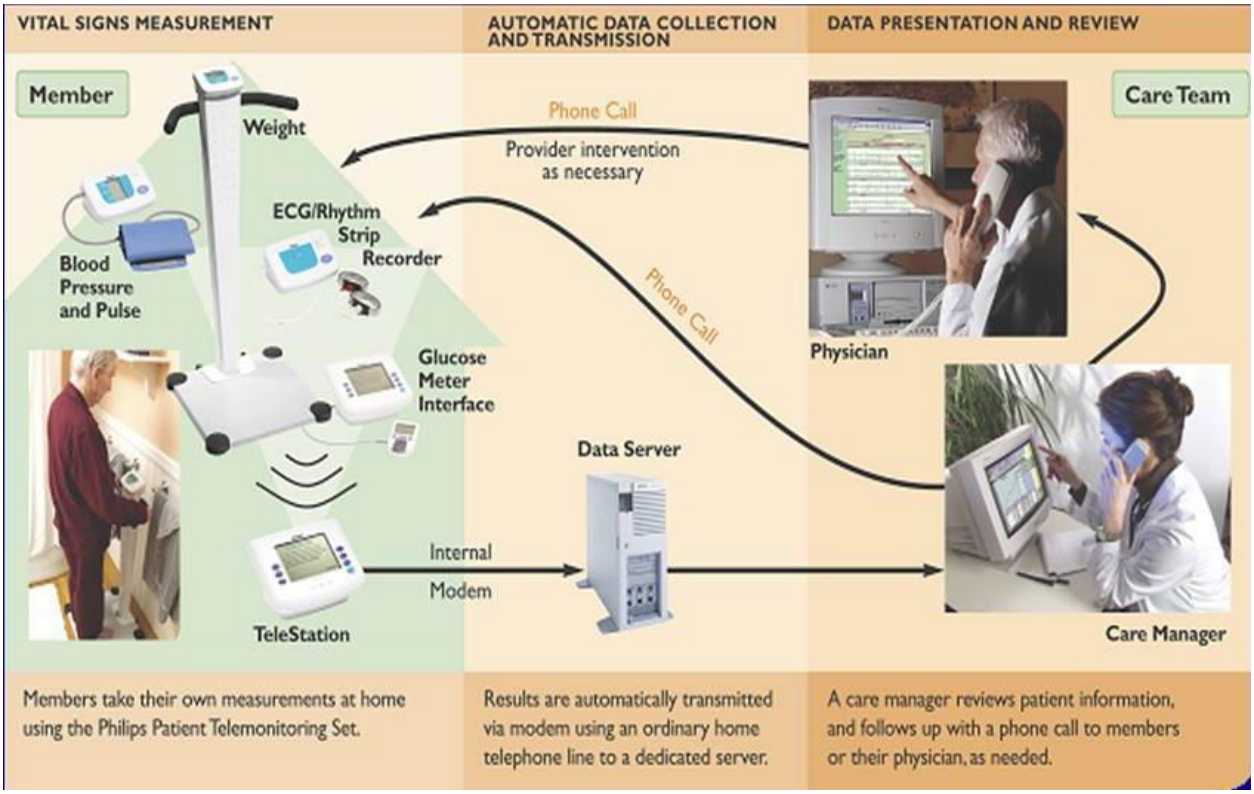
Tools for Telemedicine

Telephone, video, devices connected over LAN, WAN, Internet, mobile or landline phones, Chat Platforms like WhatsApp, Facebook Messenger etc., or Mobile App or internet based digital platforms for telemedicine or data transmission systems like Skype/ email/ fax etc.



Telemedicine applications can be classified into four basic types

1. mode of communication
2. timing of the information transmitted
3. the purpose of the consultation and
4. the interaction between the individuals involved—be it RMP-to-patient / caregiver, or RMP to RMP.



Advantages

•Real-time data

•Decreased hospitalizations

•Actionable alerts

•Early identifications can be reported

•Client satisfaction

Disadvantages

•Reducing the number of complications remains inconsistent across chronic illnesses

•Very few have reported resulting changes in medication regimens and quality of life

•Clinical effects reported in several cardiac studies were often minimal and inconclusive.

Telemedicine in Karnataka

•Karnataka introduced the Telemedicine Network Project in 2001 and the project was initiated by the Indian Space Research Organisation (ISRO).

•The first phase of the project was rolled out in the district hospitals of Mandya, Chitradurga, Chamarajnagar, Tumkur, Chikmagalur, Karwar, Shimoga, and Gadag.

•At the taluk level, hospitals offering telemedicine services during the first phase were Sagara, Maddur, and Yadgir.

•Expert medical advice was given by specialists from St. John's Medical College and Hospital, NIMHANS, Jayadeva Institute of Cardiology, Narayana Hrudayalaya, in Bangalore while from Mysore, it was JSS hospital that offered the service

The telemedicine project in Karnataka is coordinated by the Karnataka State Remote Sensing Applications Centre (KSRSAC) which uses the Indian Remote Sensing Satellite for monitoring and managing resources.

•Under the telemedicine project, hospitals in remote locations are connected to super-speciality hospitals from major cities via INSAT satellites thereby establishing a link between the patients and the specialised medical experts.

•The telemedicine system is a customised software that is integrated with the computer hardware and diagnostic instruments which in turn is joined to the Very Small Aperture Terminal (VSAT) at every location.

Intellectual Property Rights

- The word **property** is defined in the concise oxford dictionary as something owned, a possession, especially a house, land, etc. and the right to possession, use etc.
- In **Jurisprudence** the term **property** is a very complex term having different aspects which commonly includes all **legal rights, proprietary rights, and corporeal property.**
- Intellectual property means such rights recognized by law which result from **Intellectual creativity or Intellectual activity in the fields of literature, art, science and industry.**

Intellectual process

- Anything someone thinks through the application of his/her mind is collectively known as intellectual process which is the cause of creativity and inventions in this world.
- Intellectual property rights are such rights which are given to persons **who are the authors or creators of the new and original literary and artistic works such as books, articles , other writings ,paintings , musical compositions, sculpture , films and computer programs by application of their creativity process and intellect**.
- WIPO (World Intellectual Property Organization) was established by the WIPO Convention in 1967
- The WIPO is a **specialized agency of** the United Nations.
- It **promotes the protection of IP** throughout the world.

- Its headquarters are in Geneva, Switzerland

Types of property:

- Movable Property; Car, Pen, Furniture, Dress
- Immovable Property; Land, Building
- Intellectual Property; Literary works, inventions

IP as a property

- Can be sold
- Can be bought
- Can be lease or rent
- Can pass under a will
- Can be assigned

NECESSITY OF IPR PROTECTION

Intellectual property rights protection is necessary due to following reasons:

- Encouragement to creativity by ensuring its reward
- Innovations in technology
- Protection of users and consumers
- Transfer of technology to less developed nations and countries of the world
- IPR are given to such individuals to compensate for their efforts during such creative process and their investments.
- These rights are given for a certain period of time and after which general public have the right to get freely benefitted and use subsequently.
- All the creations are used by human beings for their enjoyment and benefit and due to that reason, they have social applications in economic and social terms like financial gains and reputation.
- Pirates and imitators are not only depriving the intellectual property right- holders from their legal rights but also looting the users and consumers of such products and goods which are not original or produced by the real producers.
- Encouragement to creativity by ensuring its reward

The role of IP as intangible property provides:

- Economic rights of creators
- Commercial exploitation of owner of IP

- Capital expenditure
- Transfer of technology
- Cultural development

TYPES/TOOLs OF IPRs

- Patents.
- Trademarks.
- Copyrights and related rights.
- Geographical Indications.
- Industrial Designs.
- Trade Secrets.
- Layout Design for Integrated Circuits.
- Protection of New Plant Variety.

Patent

The word *patent originates from the Latin* ***patere, which means "to*** lay open" (i.e., to make available for public inspection).

- A patent is an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem.
- It provides protection for the invention to the owner of the patent.
- The protection is granted for a limited period, i.e., 20 years.
- Patent protection means that the invention cannot be commercially made, used, distributed or sold without the patent owner's consent.
- In principle, the patent owner has the exclusive right to prevent or stop others from commercially exploiting the patented invention.

  Patents are territorial rights. In general, the exclusive rights are only applicable in the country or region in which a patent has been filed and granted, in accordance with the law of that country or region.

What kinds of inventions can be protected?

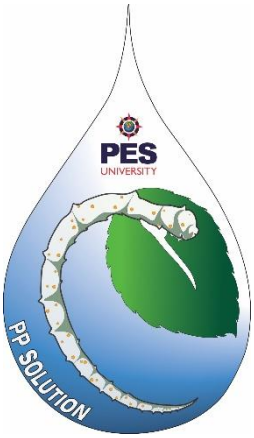
- Patents may be granted for inventions in any field of technology, from an everyday kitchen utensil to a nanotechnology chip.
- An invention can be a product – such as a chemical compound, or a process, for example – or a process for producing a specific chemical compound.

- Many products in fact contain a number of inventions. For example, a laptop computer can involve hundreds of inventions, working together.

Apple's 'rubber-banding' patent win stands – Samsung denied new trial

Trademarks

- A trademark is a distinctive sign that identifies certain goods or services as those produced or provided by a specific person or enterprise.
- It may be one or a combination of words, letters, and numerals.
- They may consist of drawings, symbols, 3D signs such as the shape and packaging of goods, audible signs such as music or vocal sounds, fragrances, or colours used as distinguishing features.
- The initial term of registration is for 10 years; thereafter it may be renewed from time to time.



Trade Mark:

Application No.: 3296219

Dated June 28, 2016 in Class 1

Trademarks

- In principle, a trademark registration will confer an exclusive right to the use of the registered trademark.
- This implies that the trademark can be exclusively used by its owner, or licensed to another party for use in return for payment.
- Registration provides legal certainty and reinforces the position of the right holder, for example, in case of litigation.
- A word or a combination of words, letters, and numerals can perfectly constitute a trademark.
- But trademarks may also consist of drawings, symbols, three-dimensional features such as the shape and packaging of goods, non-visible signs such as sounds or fragrances, or color shades used as distinguishing features – the possibilities are almost limitless
- Trademark rights are private rights and protection is enforced through court orders.

Copyrights and related rights

- Copyright is a legal term describing rights given to creators for their literary and artistic works.
- The kinds of works covered by copyright include:
  - literary works such as novels, poems, plays, reference works, newspapers and computer programs; databases; films, musical compositions, and choreography; artistic works such as paintings, drawings, photographs and sculpture; architecture; and advertisements, maps and technical drawings.

Geographical Indications (GI)

- GI are signs used on goods that have a specific geographical origin and possess qualities or a reputation that are due to that place of origin.
- Agricultural products typically have qualities that derive from their place of production and are influenced by specific local factors, such as climate and soil.
    - Ex: Basmati rice, Darjeeling tea

Industrial Designs

- Industrial designs refer to creative activity, which result in the ornamental or formal appearance of a product, and design right refers to a novel or original design that is accorded to the proprietor of a validly registered design.
- Industrial designs are an element of intellectual property.
- Three-dimensional product (Ex. Shape of a Coca-Cola bottle)
- Two-dimensional product (Ex. Check pattern of burberry)

Trade Secrets

- It may be confidential business information that provides an enterprise a competitive edge may be considered a trade secret.
- Usually these are manufacturing or industrial secrets and commercial secrets.
- These include sales methods, distribution methods, consumer profiles, advertising strategies, lists of suppliers and clients, and manufacturing processes.
- Contrary to patents, trade secrets are protected without registration.

Layout Design for Integrated Circuits

- Semiconductor Integrated Circuit means a product having transistors and other circuitry elements, which are inseparably formed on a semiconductor material or an insulating material or inside the semiconductor material and designed to perform an electronic circuitry function.
- The initial term of registration is for 10 years; thereafter it may be renewed from time to time.

Protection of New Plant Variety

- The objective of this act is to recognize the role of farmers as cultivators and conservers and the contribution of traditional, rural and tribal communities to the country's agro biodiversity by rewarding them for their contribution and to stimulate investment for R & D for the development new plant varieties to facilitate the growth of the seed industry.

IP Evolution

INTELLECT – PROPERTY – RIGHT

Idea → Expression → COPYRIGHT

Idea → Innovation → Invention → PATENT

Idea → Quality + Identity → TRADEMARK

Idea → Appearance → DESIGN

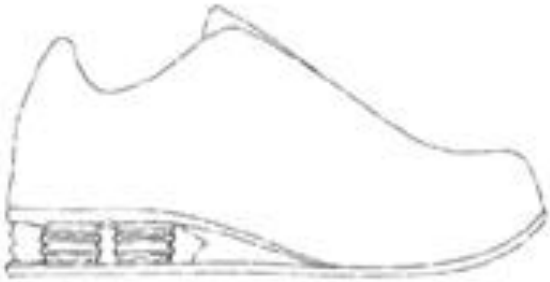
Idea → Keep Confidential, No Disclosure → TRADE SECRETS

Remedies for Infringement

- Administrative(copyright board)
- Civil Proceedings(starts from district court)
- Criminal remedies
- Penalties and Punishments
- First offence –six months imprisonment and Rs.50,000/-fine(Section 63)
- Second offence –one year imprisonment and Rs.1,00,000/-fine(Section 63 A)
- Maximum –three years imprisonment and Rs.2,00,000/-fine

Nike has sued Wal-Mart for design patent infringement asserting infringement of Pat Nos. D498,914

- **Chart 1: Images Depicting Infringement of NIKE Design Patent D498,914 by the Wal-Mart Shoe**

D498,914	Wal-Mart Shoe
 FIG. 4	

- "Infringement" of a patent occurs when a competitor makes, uses, sells, offers to sell or imports an embodiment of the invention **without the permission** of the patent owner.