Module 1: Infectious Disease (Battle text Chapters: 4, 7, 16, 17, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31)

Infectious Disease Epidemiology - Pathogens, Immunology, Prevention and Control of Infectious Disease, Human Induced Evolution

**Chapter 4 - The Public Health Triad**

1. **Anthropogenic** -- Ideas, actions, products, or effects that are caused or produced by humans.
2. **Anthropozoonosis (pl. anthropozoonoses)** -- Infectious diseases that can be transmitted from humans to animals.
3. **Biodiversity** -- The number, variety, and range of different organisms (and their genes) located within an ecosystem.
4. **Biologically Active Substance (BAS)** -- A substance that has the ability to alter a biological function of an organism.
5. **Biomagnification** -- The accumulation of an element or compound up the food chain.
6. **Conservation medicine** -- A dynamic biological discipline that describes the relationship among human-induced environmental impact, public health, and the conservation of endangered species or ecosystems.
7. **Habitat modification** -- The addition or subtraction of plants, animals, or man-made products to an ecosystem that is performed by humans.
8. **Pathogen** -- An infectious biological agent that causes disease.
9. **Vector-Borne diseases** -- Infectious diseases, both bacterial and viral, that are transmitted via an arthropod.
10. **Virulence** -- Capacity of a pathogen to cause an infection.
11. **Zoonosis (Zoonotic Disease)** -- Infectious disease that can be transmitted from animals to humans (e.g anthrax, plague and tularemia).

**Chapter 16 - Immunizations And Immunity**

1. **Active immunity** -- Adaptive immunity developed after exposure to an infection with a microorganism or following vaccination.
2. **Adaptive immunity** -- An immune response developed following exposure to a foreign agent which results in antigen recognition by T and B lymphocytes with development of specificity and memory.
3. **Adjuvant** -- A substance that enhances an immune response by prolonging exposure to the antigen within the body.
4. **Antibody** -- A protein made in response to exposure to a foreign antigen that can bind to the antigen to facilitate elimination of the antigen.
5. **Antigen** -- A foreign agent that can stimulate an immune response and bind to antibodies and T cells.
6. **Attenuation** -- A process in which a pathogen is altered so it is less virulent.
7. **Cell-mediated immunity** -- Immunity mediated by antigen-specific T lymphocytes and other cells that are involved in protecting against challenges such as intracellular organisms, viruses, and tumor cells.
8. **Contagion** -- The passing of disease or transmission of infection by direct contact, droplet spread, or contaminated matter. Modern terminology prefers communicable disease transmission.
9. **Epitope** -- A small portion of an antigen that can stimulate an immune response and serve as a binding site for antibody.
10. **Herd immunity** -- The ability of a group to resist specific pathogens either through widespread natural exposure or through vaccination.
11. **Humoral immunity** -- Immunity that involves antibody-mediated responses.
12. **Immunity** -- A state of protection from disease created by innate and specific mechanisms.
13. **Immunization** -- Protection of individuals against disease by vaccination.
14. **Incidence** -- The number of specified new events, during a specified period on a specified population.
15. **Passive immunity** -- Immunity acquired by natural or acquired transfer of preformed antibodies.
16. **Prevention** -- Any action to avoid an infectious process. There are three (3) type(s) of preventive activities: primary, which is the avoidance of disease, secondary, which interrupts any disease process before transmission to others is possible, and tertiary, which is the avoidance of disease sequelae or adverse effects of the disease process.
17. **Prodrome** -- Early symptoms indicating development of a disease; in biological terrorism, the most common prodrome is a flu-like illness, with fever, muscle pain, headache, and profound weakness
18. **Toxoid** -- An altered toxin capable of inducing production of antibodies.
19. **Vaccination** -- Injection of a vaccine in order to establish resistance to an infectious disease.
20. **Vaccine** -- A preparation of antigenic material designed to induce an immune response and immunologic memory when injected.

**Chapter 17 - Inflammation: Understanding Its Role In Acute And Chronic Disease**

1. **Abscess** -- An abscess is a localized pocket of suppurative exudate, or pus, and liquifactive necrosis that is entirely within, and surrounded by, tissue of an organ or body cavity.
2. **Cellular exudate** -- An accumulation of protein-rich fluid in an extravascular space or tissue, also referred to as inflammatory edema. When the exudate includes an influx of leukocytes, neutrophils or other leukocytes, it is referred to as a cellular exudate.
3. **Chemotaxis and Chemoattractants** -- In the inflammatory response, chemotaxis describes the ameboid movement of cells, particularly neutrophils, monocytes and macrophages, out of vessels and toward a site of injury in response to a chemo-attractant signal. Chemo-attractant factors include some bacterial products and products released from necrotic cells, fibrinopeptides, C5a derived from activation of the complement cascade (C5a), and factors produced by stimulated macrophages and other cells, including leukotriene B4 and the chemokine interleukin-8 (IL-8).
4. **DALY (Disability Adjusted Life Years)** -- Disability-adjusted life year. DALYs are measured by estimating the number of healthy, productive years of life lost due to morbidity or premature mortality from a disease. The estimates are derived by applying disability “weights” to different conditions and multiplying that weight by the number of years that an infected person is affected by that condition.
5. **Granulation tissue** -- Granulation tissue is the name given to the histological appearance of tissue during the early healing phase of acute inflammation when there is an influx of macrophages and a proliferation of connective tissue cells and matrix disproportionate to the predominance of fibrosis and scar that is seen in the later stages of healing. The new connective tissue is loosely woven and includes many macrophages, proliferating endothelial cells and new blood vessels (angiogenesis) and an increasing number of myofibroblasts producing fine collagen strands.
6. **Granuloma** -- An aggregate of macrophages surrounded by a rim of lymphocytes. Although granulomas can be formed as a nonspecific response to indigestible matter, such as suture material, it is necessary to consider infectious and immune-mediated causes. Immune-stimulated macrophages take on a distinctive appearance referred to as “epithelioid” and may form giant cells with multiple nuclei ringing the periphery of the enlarged macrophage (Langhans giant cell). Tuberculosis is the most likely etiology of the granulomas, if caseous necrosis is seen within the granulomas.
7. **Inflammation** -- A vascular and cellular host response that marshals leukocytes and essential proteins into tissues affected by infection or injury in order to kill or neutralize organisms, contain damage and set in place those factors that can result in healing and repair.
8. **Innate immunity** -- Nonspecific mechanisms involved in the early response to pathogens that lacks specificity and involves anatomic, physiologic, phagocytic, and inflammatory mechanisms. Includes physical barriers such as mucosa or skin; leukocytes such as neutrophils and monocytes in circulation or macrophages in tissue, Natural Killer cells, eosinophils; and many proteins and cytokines such as complement, TNF, IL-1, and many others.
9. **Macrophage activation** -- Macrophages become activated to increase phagocytosis and antimicrobial activity and to synthesize a number of products that have an important role in the inflammatory response, such as the pro-inflammatory cytokines Interleukin-1 (IL-1), Tumor Necrosis Factor–a (TNF-a). Macrophages can be activated by the binding of microbial products, such as endotoxin or double-stranded viral RNA that bind to Toll-like receptors which are constitutively expressed on the plasma membrane. Activation can also be triggered by the binding of opsonins, such as C3b and the Fc fragment of antibodies, and activation can be stimulated by action of cytokines, especially interferon-g.
10. **Opsonin** -- An opsonin is a protein that coats particulate matter in a way that enhances uptake in phagocytic leukocytes through binding of that protein to specific receptors, such as the C3b receptor in the case of complement factor C3b or the Fc receptor in the case of an antibody.
11. **Oxidative stress** -- This is a condition of the cell in which there is an increase in the formation of reactive oxygen species that stresses the cells ability to support its inherent protective mechanisms, resulting in injury to cellular membranes and a stimulation of gene expression that favors the synthesis of pro-inflammatory cytokines, such as Interleukin-1 (IL-1),Tumor Necrosis Factor–a (TNF-a), and other mediators of the inflammatory response.
12. **Phagocytosis and phagosomal antimicrobial activity** -- Describes the process by which neutrophils and macrophages engulf particulate matter, such as microbes, into a vacuole formed by an in-folding of the plasma membrane within the cytoplasm. The vacuole is called a phagosome when cytoplasmic granules containing acid hydrolase enzymes and lysozymes discharge into the vacuole for the purpose of killing of the organism and digesting the protein. A potent mechanism of antimicrobial activity occurs in the phagolysosome in the presence of oxygen when NADPH oxidase is activated at the vacuole surface to result in the oxidation of NADPH and the reduction of oxygen to superoxide. Myeloperoxidase in neutrophils and less so in macrophages can act on the hydrogen peroxide that forms from the dismutation of the superoxide to form hypochlorite, another potent free radical.
13. **Ulcer** -- An ulcer is an area of suppurative exudate (presence of pus) and liquifactive necrosis in a tissue or organ that extends into the body of the organ or tissue, but remains open at an outer or inner surface of that organ or tissue.
14. **Vascular adhesion and leukocyte emigration** -- These terms refer to the binding of leukocytes, most notably neutrophils and monocytes, to vascular endothelial cells in sites of tissue injury. A process that is stimulated by an up-regulation of selectins and integrins that cause adherence of the cell types to one another and hold the leukocytes in place long enough to come under the influence of chemo-attractants eminating from the site of injury. The chemotaxins induce the leukocytes to move in an ameboid fashion between the endothelial cells and out of the vessel into the extravascular connective tissue and toward the site of greatest injury.
15. **Vascular response** -- In acute inflammation, the vascular response refers to the increase of blood flow and permeability that can occur within minutes in an area of injury or infection.
16. **Wound organization** -- Organization of a wound refers to the process of healing through the formation of granulation tissue to the progressive accumulation of fibroblasts, collagen and the formation of scar.

**Chapter 21 - Soil-Transmitted Helminths: Worms – The Most Common Pathogens of Humankind**

1. **Anthelminthic Drugs** -- Drugs used to treat intestinal helminth infections. Albendazole or mebendazole are currently the standard anthelminthic treatments. Although anthelminthic drugs treat current infection, they do not prevent future reinfection.
2. **Definitive Host** -- Location where parasites undergo sexual reproduction.
3. **Iron Deficiency Anemia** -- The intersection of two health conditions: iron deficiency, caused by inadequate iron absorption and/or iron loss, and anemia, which is caused by insufficient circulating red blood cells. Many individuals in the developing world infected with helminth infections suffer from both iron deficiency and anemia.
4. **Larva** -- Immature stage of helminth prior to developing to adult worm.
5. **Mass Drug Administration (MDA)** -- Treating an entire community for a condition, as opposed to only treating infected individuals.
6. **Reinfection Rate** -- Number of times an individual is infected with a disease over a particular time period. In areas endemic with helminth infections, reinfection rates unless interventions, such as regular mass drug administrations, improved sanitation infrastructure, and health education, are implemented.

**Chapter 22 - Malaria: The Challenge Of Scaling-Up Multiple Effective Tools**

1. **Anopheles** -- The genus of mosquito that is capable of transmitting malaria to humans.
2. **Artemisinin-based combination therapy (ACT)** -- Treatment for malaria that combines an artemisinin-based compound with a drug or drugs from a different class. WHO now recommends this drug combination as the first-line treatment for malaria in most regions.
3. **Artemisinins** -- A class of antimalarial drugs developed originally in China, which is derived from the sweet wormwood plant (Artemisia annua).
4. **Erythrocytic cycle** -- The part of the parasite lifecycle in humans that occurs in blood cells.
5. **Exo-erythrocytic cycle** -- The part of the parasite lifecycle in humans that occurs in the liver, prior to release of parasites into the blood stream.
6. **Indoor residual spraying (IRS)** -- The spraying of insecticide on the interior walls of a house, which leaves a residue on the walls that remains for three to six months depending on the housing construction and the type of insecticide used.
7. **Insecticide-treated bed net (ITN)** -- A mosquito net that has been treated with insecticide. Bed nets can be treated by dipping in an insecticide mixture (traditional ITN) or the insecticide can be bound to the fabric, allowing it to remain on the netting for periods of three to five years (long-lasting insecticide-treated net or LLIN).
8. **Intermittent preventive treatment (IPTi/p)** -- Administration of treatment doses of an antimalarial drug or drug combination to persons who do not have the symptoms of malaria in order to prevent the onset of clinical malaria. The ‘i/p’ designation denotes IPT given to infants or pregnant women.
9. **Plasmodium** -- The genus of single-celled parasites that cause malaria. Four species— Plasmodium falciparum, P. vivax, P.ovale, and P. malariae— are the causative agents in human malaria.
10. **Relapse** -- A second parasitemia caused when dormant parasite cells, call hypnozoites, residing in the host’s liver, reactivate weeks to months later and cause a second infection of the blood cells. Relapses only occur with P. vivax and P. ovale.
11. **Severe malaria** -- Symptomatic malaria infection which is complicated by coma or recurrent seizures (i.e. cerebral malaria), severe anemia, respiratory distress, kidney or liver failure, systemic acidosis or other associated life-threatening conditions.
12. **Uncomplicated malaria** -- Symptomatic infection with the malaria parasite manifesting as fever, body aches, headache, diarrhea, and possibly other symptoms not associated with severe illness.

**Chapter 23 - Tuberculosis: The Deadly Comeback Of An Old Infectious Disease**

1. **Active tuberculosis** -- State of people infected with Mycobacterium tuberculosis whose infection is not contained by the immune system and who are sick, frequently symptomatic and very often contagious.
2. **BCG (Bacille de Calmette et Guérin)** -- First vaccine developed for tuberculosis.
3. **Detention** -- TB patients who fail to comply with public health orders and whose movements are restricted to a health facility or hospital (not a prison, see Incarceration).
4. **Directly Observed Therapy (DOT)** -- The World Health Organizations recommended strategy for delivering the basics of TB cure. DOT combines a clinical approach (patients’ drug intake is monitored daily by a nurse or a trained healthcare worker to ensure patient compliance) and a management strategy for public health systems that includes political commitment, maintenance of adequate drug supply and sound recording and reporting systems.
5. **Drug Susceptibility Testing (DST)** -- Determination of the resistance profile of a specific TB strain, usually by culture on media (either solid or liquid) containing the different antibiotics and by monitoring subsequent growth. DST allows for the screening of MDR-TB and XDR-TB strains. DST can be performed for first line or second line drugs.
6. **Extra-pulmonary tuberculosis** -- Active tuberculosis that is localized in an organ other than the lungs.
7. **First line drugs** -- A group of five antibiotics (rifampicin, isoniazid, ethambutol, pyrazinamide and streptomycin) used against tuberculosis that are the most effective and potent treatment options for TB patients.
8. **Incarceration** -- Imprisonment of TB patients who break the law of specific public health orders imposed on them.
9. **Isolation** -- Separation of patients with a communicable disease from non-infected individuals, preventing transmission of infection to others and allowing focused care.
10. **Latent tuberculosis infection** -- State of people infected with Mycobacterium tuberculosis whose infection is contained by the immune system and who are not sick (and therefore not symptomatic) and not contagious.
11. **MDR-TB (Multi drug-resistant tuberculosis)** -- Strain of tuberculosis that is resistant to at least isoniazid and rifampicin, the two most potent first line drugs. MDR-TB strains are more difficult to treat and require the use of second line drugs.
12. **Pulmonary tuberculosis** -- Active tuberculosis that is localized in the lungs.
13. **Quarantine** -- Restriction of contacts between the uninfected and the infected until further assessment concludes the infected individual is not contagious or a danger to the spread of a disease.
14. **Second line drugs** -- Group of antibiotics with anti-TB activity that are less potent than the first line drugs. Treatment with second line drugs is usually the only option for patients with MDR-TB but is expensive, very long (up to 24 months) and has many serious side effects including: depression, psychosis, loss of hearing and convulsions. There are currently six classes of second line drugs: aminoglycosides (amikacin, kanamycin), polypeptides (capreomycin), fluoroquinolones (ciprofloxacin), thioamides (ethionamide), cycloserine and p-aminosalicylic acid (PAS).
15. **Smear Negative** -- Tuberculosis patients suffering from active pulmonary disease who produce, while coughing, less than 5000 bacteria/ml of sputum that cannot be detected by microscopy. Complementary diagnostic tests such as chest X-rays or culture must confirm tuberculosis. Smear negative patients are less infectious than smear positive ones.
16. **Smear positive** -- Tuberculosis patients suffering from active pulmonary disease who can produce, while coughing, more than 5000 bacteria/ml of sputum that can be detected by microscopy. Smear positive patients are the most infectious.
17. **XDR-TB** -- Extensively drug-resistant tuberculosis. A Strain of TB that is at least MDR-TB, and also includes resistance to fluoroquinolone (one class of second-line drugs) and at least one of the second line injectable drugs (such as capreomycin or amikacin). XDR-TB strains are virtually untreatable.

**Chapter 25 - HIV:Biology, Transmission, And Natural History In Humans**

1. **Budding** -- Having the ability to reproduce asexually through the pinching of genetic component of a parent cell.
2. **Capsid** -- A protein shell that covers the nucleic acid component of a virus.
3. **Enzyme-Linked Immunosorbent Assay (ELISA) test** -- One of the most common test used for the detection of HIV antibodies that shows the presence of HIV antibodies in an individuals blood sample.
4. **Integrase** -- An enzyme characteristic to retrovirals that allows viral genetic material to be integrated into the host DNA.
5. **Intracellular** -- Existing within the cell.
6. **Memory Cells** -- A reference to B and T cells that remember a certain antigen after an initial exposure to the antigen.
7. **Retrovirus** -- A family of viruses that contain RNA and replicate through a DNA intermediate.
8. **Reverse Transcriptase** -- A viral enzyme converting the RNA of a virus into double-stranded DNA.
9. **Ribonucleic acid (RNA)** -- A group of nucleic acid that control several forms of cellular activity.
10. **Viremia** -- The presence of a viral load in the blood.

**Chapter 26 - Afterword: The HIV/AIDS Epidemic**

1. **Staphylococcus aureus** -- Gram-positive microorganisms belonging to the genus Staphylococcus. They are the microorganisms involved in MRSA infections.

**Chapter 27 - Methicillin Resistant Staphylococcus Aureus (MRSA): A Deadly Superbug**

1. **Five C’s (MRSA)** -- Certain factors that closely link an occurrence of MRSA in communities commonly known to have outbreaks. The 5 C’s include: Crowding, Contact, Compromised skin, Contaminated items and Cleanliness.
2. **Impetigo** -- A common skin infection characterized by vesicles or pustules that can rupture and have a characteristic “honey yellow” crust that can mimic a herpetic outbreak.
3. **Methicillin Resistant Staphylococcus Aureus (MRSA)** -- Bacterial strains resistant to beta-lactam antibiotics. Benign MRSA infections typically colonize on the skin and mucous membranes but may cause severe infections.
4. **Penicillinase** -- An enzyme that deactivates penicillin.
5. **Surveillance** -- Continuous observation of a testing or procedure.
6. **Systemic Inflammatory Response Syndrome (SIRS)** -- A systemic response to a condition that forms an acute inflammatory response characterized by an occurrence of at least two symptoms.
7. **Toxic Shock Syndrome (TSS)** -- A condition that is often associated with significant morbidity and mortality by inducing an overwhelming host immune response characterized by hypotension, fever, rash, and multi-organ involvement.

**Chapter 29 - Human Papillomavirus (HPV) Infection And Immunization**

1. **Cytotoxic T cells** -- – Cells capable of the destruction of other immune and non-immune cells.
2. **Immune Evasion** -- The capability of invading microorganisms to avoid detection and/or destruction by the immune system.
3. **Oncogenic** -- Leading to the development of cancer.
4. **Papanicolaou (Pap) test** -- Laboratory identification of HPV-infected cervical tissues that may be in neoplastic transformation.
5. **Persistent Infections** -- Infection not cleared by the immune system.
6. **Quadrivalent** -- A vaccine directed against four viral strains.

**Chapter 30 - Helicobacter Infection And Peptic Ulcer**

1. **Endoscopy** -- Visual examination of the inner surface of the esophagus, stomach and/or small bowel performed using a lighted scope passed into the body under sedation.
2. **Epigastrium** -- Area of the abdomen located between the costal margins and the subcostal plane.
3. **Gastritis** -- Inflammation of the lining of the stomach.
4. **Hematemesis** -- The vomiting of blood.
5. **Hematochezia** -- The passage of bloody stools.
6. **Iatrogenic** -- A disease or disorder attributed to medical therapy or intervention.
7. **Mucosal-associated-lymphoid-type (MALT) lymphoma** -- A rare form of lymphoid cancer associated with tissues distributed throughout mucosal linings of the digestive tract.
8. **Vagotomy** -- The surgical division of the vagus nerve designed to reduce stomach acid secretion.

**Chapter 31 - Avian And Seasonal Influenza**

1. **Aerosol Spread** -- Spread of virus in airborne particles less than five micrometers in size that can be carried in the air over long distances, filtered only by a N95 rated mask.
2. **Antigenic Drift** -- Minor genetic changes to circulating influenza viruses that occur seasonally, and cause small, localized outbreaks of varying severity and extent.
3. **Antigenic Shift** -- Major genetic re-assortment between two different influenza A viruses resulting in a pandemic strain.
4. **Avian Influenza** -- A strain of influenza A that infects birds, and could cause severe disease in humans; potentially could cause a pandemic if the virus were to undergo antigenic shift and become easily transmissible from human to human.
5. **Barrier Precautions** -- Use of gloves, gowns and hand washing to prevent contact spread of infections.
6. **Contact Spread** -- Spread of virus via touching a contaminated surface and self-inoculation of mucous membranes.
7. **Containment Strategy** -- Multifaceted plan to control an outbreak of influenza and prevent its further spread.
8. **Culling** -- Depopulation of infected birds from a localized area to prevent spread of avian influenza, and lessening the chance of human disease involvement.
9. **Droplet Spread** -- Spread of virus in airborne particles greater than five micrometers in size that travel only several feet in the air.
10. **Hemagglutinin** -- Surface protein on influenza A that attaches to respiratory tract cells to cause infection; the abbreviation of it and its numbered type is used as a component of the virus name, i.e. "H5".
11. **Influenza** -- Illness caused by any of several types (A, B, and C) of influenza virus, spread by airborne and tactile routes, and causing both upper and lower respiratory disease of varying degrees of severity.
12. **M2 Ion Channel Inhibitors** -- Class of antiviral medications including amantadine and rimantadine, to which greater than 90% of circulating seasonal influenza is resistant.
13. **Neuraminidase** -- Surface protein that releases new viruses from infected cells; the abbreviation of it and its numbered type is used as a component of the virus name, i.e. "N1".
14. **Neuraminidase Inhibitors** -- Class of antiviral medications including oseltamivir and zanamivir.
15. **Pandemic Influenza** -- Influenza virus that has spread to cause epidemic disease on a continental or worldwide level, regardless of source (i.e. avian).
16. **Social Distancing** -- Removal of someone with an easily transmissible infection from normal situations in which they would potentially expose a large number of people, such as work.
17. **Surge Capacity** -- The amount of patients a given medical facility can accommodate in an emergency situation beyond its standard maximum amount, such as in a pandemic.