Top 10 Global Diseases by Prevalence and Public Health Impact

The following sections describe ten of the most significant diseases worldwide, based on how common they are and their impact on public health. These include a mix of chronic non-communicable diseases (like heart disease, stroke, cancer, and diabetes) and infectious diseases (like HIV/AIDS, tuberculosis, and malaria). For each disease, key symptoms are noted, along with typical treatment approaches and commonly used medications and their side effects. This information is intended for readers with basic medical knowledge and is presented in a clear, continuous narrative style.

Ischemic Heart Disease (Coronary Heart Disease)

Overview: Ischemic heart disease – often manifesting as coronary artery disease – is the **leading cause of death globally**, responsible for an estimated 17.9 million deaths per year (Cardiovascular diseases). It occurs when the coronary arteries that supply the heart muscle become narrowed by atherosclerotic plaque, reducing blood flow. This can lead to chest pain (angina) and, if a vessel becomes completely blocked, a heart attack (myocardial infarction) (Coronary artery disease - Symptoms and causes - Mayo Clinic).

- **Common Symptoms:**
    - Chest pain or pressure (angina), especially with exertion (Coronary artery disease - Symptoms and causes - Mayo Clinic)
    - Shortness of breath, especially during activity (Coronary artery disease - Symptoms and causes - Mayo Clinic)
    - Fatigue or lightheadedness with exertion
    - Heart attack symptoms (acute): intense chest pain often radiating to the arm or jaw, cold sweat, nausea, or fainting (Cardiovascular diseases) (Cardiovascular diseases)

Treatment: Management of heart disease includes lifestyle changes (heart-healthy diet, regular exercise, smoking cessation) and medications to improve blood flow, reduce cardiac workload, and prevent clots (Coronary artery disease - Diagnosis and treatment - Mayo Clinic). In advanced cases, procedures like coronary stenting or bypass surgery may be needed to restore blood supply to the heart. Long-term therapy focuses on controlling risk factors (like high blood pressure, high cholesterol, and diabetes) to prevent disease progression.

- **Common Medications and Side Effects:**
    - **Statins (e.g. atorvastatin):** Cholesterol-lowering drugs that slow plaque buildup (Coronary artery disease - Diagnosis and treatment - Mayo

Clinic). *Side effects:* muscle pain or weakness, and occasionally liver enzyme elevations.

- **Antiplatelet agents (e.g. low-dose aspirin):** Help prevent blood clots to reduce heart attack risk (Coronary artery disease - Diagnosis and treatment - Mayo Clinic). *Side effects:* stomach irritation and increased bleeding risk – daily aspirin use can cause gastrointestinal bleeding (Coronary artery disease - Diagnosis and treatment - Mayo Clinic).
- **Beta-blockers (e.g. metoprolol):** Reduce heart rate and blood pressure to decrease the heart's workload (Coronary artery disease - Diagnosis and treatment - Mayo Clinic). *Side effects:* fatigue, dizziness, and bradycardia (slow heartbeat).
- **Nitroglycerin (sublingual or patch):** A vasodilator that relieves chest pain by widening blood vessels (Coronary artery disease - Diagnosis and treatment - Mayo Clinic). *Side effects:* headaches, low blood pressure, and lightheadedness.

Stroke (Cerebrovascular Disease)

Overview: Stroke is a leading cause of adult disability and one of the top causes of death worldwide (historically the **second-leading cause of death globally** prior to the COVID-19 pandemic) (The top 10 causes of death). A stroke occurs when blood supply to part of the brain is interrupted or a blood vessel in the brain bursts, leading to brain tissue damage. Ischemic strokes (due to blood clots) are most common, while hemorrhagic strokes (due to bleeding) are less common but often more severe. Rapid recognition and treatment of stroke are critical to improving outcomes.

- **Common Symptoms (Sudden Onset):** (Cardiovascular diseases)
  - Weakness or numbness of the face, arm, or leg on one side of the body (Cardiovascular diseases)
  - Drooping of one side of the face or an uneven smile
  - Difficulty speaking or understanding speech (slurred or confused speech) (Cardiovascular diseases)
  - Blurred or lost vision in one or both eyes
  - Dizziness, loss of balance or coordination (Cardiovascular diseases)
  - Severe headache with no known cause (Cardiovascular diseases)

Treatment: A stroke is a medical emergency. For an **ischemic stroke** (blood clot type), the priority is to restore blood flow to the brain. This may involve a clot-busting drug called **tPA (tissue plasminogen activator)** given intravenously within a narrow window

(ideally within 3–4.5 hours of symptom onset) (Stroke - Diagnosis and treatment - Mayo Clinic). Timely tPA can dissolve the clot and significantly improve outcomes, although it carries a risk of bleeding. In some cases, a catheter-based procedure (thrombectomy) is performed to physically remove large clots. For **hemorrhagic stroke**, treatment focuses on controlling bleeding and reducing intracranial pressure (which might involve blood pressure control, reversal of blood thinners, or surgery). After the acute phase, stroke care includes rehabilitation (physical, occupational, speech therapy) and **secondary prevention** to reduce recurrence. Preventive measures include managing risk factors (hypertension, atrial fibrillation, diabetes, high cholesterol) and using medications to prevent new clots.

- **Common Medications and Side Effects:**
    - **Thrombolytics (tPA):** Clot-dissolving drug for ischemic stroke (Stroke - Diagnosis and treatment - Mayo Clinic). *Side effects:* the major risk is hemorrhage (bleeding in the brain or elsewhere), so patients must be screened for bleeding risk before use.
    - **Antiplatelet drugs (e.g. aspirin, clopidogrel):** Often started after an ischemic stroke to prevent new clots. Aspirin helps prevent recurrent strokes but, as noted, can cause gastric upset or bleeding with long-term use (Coronary artery disease - Diagnosis and treatment - Mayo Clinic). Clopidogrel can also cause bleeding or bruising.
    - **Anticoagulants (e.g. warfarin or DOACs):** Used in certain stroke patients (for example, those with atrial fibrillation) to **thin the blood** and prevent clots. *Side effects:* bleeding is the primary concern, and blood levels may need monitoring (for warfarin).
    - **Antihypertensives (e.g. ACE inhibitors, diuretics):** Used to control high blood pressure and reduce future stroke risk. *Side effects:* vary by class (ACE inhibitors can cause cough and low blood pressure; diuretics can cause electrolyte imbalances, etc.).

Lower Respiratory Infections (Pneumonia)

Overview: Lower respiratory tract infections – primarily pneumonia (infection of the lungs) – are the **deadliest communicable diseases worldwide**, remaining a leading cause of death especially in young children and the elderly (The top 10 causes of death) (Children <5 years with diarrhoea receiving oral rehydration therapy (ORT) and continued feeding). These infections can be caused by a variety of organisms, including bacteria (e.g. *Streptococcus pneumoniae*), viruses (such as influenza or respiratory syncytial virus), and sometimes fungi. They often spread via droplets from

coughing or sneezing. Pneumonia leads to inflammation in the air sacs of the lungs, which fill with fluid or pus, causing difficulty in oxygen exchange.

- **Common Symptoms:** (Pneumonia Symptoms and Diagnosis | American Lung Association)
    - Cough producing phlegm (sputum) that may be yellow/green or even blood-tinged (Pneumonia Symptoms and Diagnosis | American Lung Association)
    - Fever, sweating, and shaking chills (Pneumonia Symptoms and Diagnosis | American Lung Association)
    - Shortness of breath and rapid, shallow breathing (Pneumonia Symptoms and Diagnosis | American Lung Association)
    - Sharp chest pain that worsens with deep breaths or coughing (Pneumonia Symptoms and Diagnosis | American Lung Association)
    - Fatigue, low energy, and loss of appetite (Pneumonia Symptoms and Diagnosis | American Lung Association)
    - In elderly patients, confusion or altered mental status can be a sign of infection (Pneumonia Symptoms and Diagnosis | American Lung Association)

Treatment: Treatment depends on the cause of the pneumonia:

- **Bacterial pneumonia** is treated with appropriate antibiotics. It's important to begin antibiotics promptly and complete the full course; patients often begin to feel better within a few days of treatment, but stopping early can lead to recurrence or resistance (Pneumonia Treatment and Recovery | American Lung Association). Common antibiotics for community-acquired pneumonia include amoxicillin or macrolides, among others, chosen based on regional resistance patterns and patient factors.
- **Viral pneumonia** (for example, due to influenza) will not respond to antibiotics. Antiviral medications (such as oseltamivir for influenza) may be used if the infection is caught early (Pneumonia Treatment and Recovery | American Lung Association). Otherwise, treatment is supportive: rest, fluids, and fever reducers. Many viral pneumonias improve on their own with supportive care.
- **Supportive care** for all pneumonias is crucial. This includes ensuring adequate hydration and oxygen therapy for those with trouble breathing. Fever and pain can be managed with medications like acetaminophen or ibuprofen. In severe cases, hospitalization may be required for oxygen support, intravenous fluids, or

even mechanical ventilation. Preventive measures (vaccinations for flu and pneumococcal bacteria) also play a key role in reducing pneumonia incidence.

- **Common Medications and Side Effects:**
    - **Antibiotics (e.g. amoxicillin, azithromycin):** Target bacterial causes of pneumonia (Pneumonia Treatment and Recovery | American Lung Association). *Side effects:* antibiotics can cause diarrhea or gastrointestinal upset by disturbing normal gut flora. Some people may develop allergic reactions (e.g. rash or anaphylaxis with penicillins).
    - **Antivirals (e.g. oseltamivir for influenza):** Can shorten the course of flu-related pneumonia if started early (Pneumonia Treatment and Recovery | American Lung Association). *Side effects:* nausea, vomiting, or headache are relatively common with oseltamivir.
    - **Bronchodilators (e.g. albuterol inhalers):** If wheezing or airway spasms are present, inhaled bronchodilators help open airways. *Side effects:* tremors, jitteriness, or a rapid heartbeat.
    - **Analgesics/antipyretics (e.g. acetaminophen, NSAIDs):** Used to reduce fever, chest pain, and discomfort. *Side effects:* acetaminophen is generally safe but can harm the liver in overdose; NSAIDs like ibuprofen can cause stomach irritation or affect kidney function if used excessively.

Chronic Obstructive Pulmonary Disease (COPD)

Overview: COPD is a group of chronic lung conditions, chiefly emphysema and chronic bronchitis, that result in **persistently obstructed airflow** in the lungs. It is a major cause of illness and death globally (ranked among the top 3–4 causes of death) (The top 10 causes of death). The primary risk factor is long-term cigarette smoking, although air pollution and occupational dust exposure also contribute. In COPD, the airways and air sacs lose their elastic quality and/or become inflamed and clogged with mucus, making it hard to breathe. COPD develops gradually and is largely irreversible, but treatments can help control symptoms and improve quality of life.

- **Common Symptoms:**
    - **Shortness of breath** or feeling a need for air, especially during physical activity (Chronic respiratory diseases). In advanced COPD, breathlessness can even occur at rest.
    - **Chronic cough** that may produce mucus (often called “smoker’s cough”) (Chronic respiratory diseases). The cough is usually worst in the mornings.

- **Sputum production:** Frequent mucus/phlegm in the lungs that requires coughing up (Chronic respiratory diseases).
- Wheezing (a whistling sound when breathing) and chest tightness, especially during flare-ups (exacerbations).
- Fatigue and exercise intolerance (the patient tires easily with activity due to limited airflow).

Treatment: While COPD damage is not curable or fully reversible, **management focuses on symptom control and slowing disease progression**. The single most effective treatment for smokers is smoking cessation – stopping smoking can significantly slow the decline in lung function (Chronic respiratory diseases). Medical treatments include inhaled bronchodilators to open airways and inhaled corticosteroids to reduce inflammation, especially for those with frequent exacerbations (Chronic respiratory diseases) (Chronic respiratory diseases). Pulmonary rehabilitation programs (exercise training, breathing techniques, nutritional advice) can improve patients' functional status. In advanced cases, some patients require supplemental oxygen at home to maintain adequate oxygen levels. During acute COPD exacerbations (often triggered by infections), patients may need short courses of oral steroids and antibiotics. In select severe cases, surgical options like lung volume reduction surgery or lung transplantation are considered.

- **Common Medications and Side Effects:**
  - **Bronchodilators:** Inhaled medications that relax airway muscles. Short-acting beta-2 agonists (e.g. *albuterol/salbutamol*) provide quick relief of acute breathlessness, and long-acting bronchodilators (e.g. *salmeterol* or anticholinergics like *tiotropium*) provide sustained airflow improvement. *Side effects:* with beta-agonists, tremors, palpitations, and mild headache can occur; anticholinergics can cause dry mouth or throat irritation.
  - **Inhaled Corticosteroids (ICS):** e.g. *fluticasone*, often given in combination with long-acting bronchodilators. ICS help reduce airway inflammation and frequency of exacerbations (Chronic respiratory diseases). *Side effects:* hoarse voice and oral thrush (a fungal infection in the mouth) can occur – patients are advised to rinse their mouth after use to prevent this. High-dose or long-term use may carry a small risk of pneumonia or bone density loss.
  - **Phosphodiesterase-4 inhibitors:** e.g. *roflumilast* for severe COPD with chronic bronchitis. *Side effects:* weight loss, nausea, diarrhea, and insomnia can occur.

- **Systemic Corticosteroids (oral/IV):** e.g. prednisone, used short-term during flare-ups. *Side effects:* with short courses, elevated blood sugar, mood changes, and increased appetite; long-term use can cause serious effects (osteoporosis, muscle weakness, susceptibility to infections).
- **Antibiotics:** used during acute exacerbations if a bacterial infection is suspected (e.g. doxycycline or azithromycin for bronchitis). Frequent or prophylactic use of azithromycin in COPD can reduce exacerbations but may lead to antibiotic resistance or hearing loss in some cases.

Lung Cancer

Overview: Lung cancer is the leading cause of cancer-related death worldwide. Trachea, bronchus, and lung cancers together caused about **1.8–1.9 million deaths in 2021**, making lung cancer the sixth leading cause of death globally (The top 10 causes of death). The majority of cases are associated with tobacco smoking, although air pollution, radon exposure, and occupational exposures (asbestos, silica, etc.) are also risk factors. Lung cancer can be broadly divided into **non-small cell lung cancer (NSCLC)** (about 85% of cases) and **small cell lung cancer (SCLC)** (about 15% of cases), with treatment strategies differing between the two. Early-stage lung cancer is often asymptomatic, and many patients are diagnosed at advanced stages when symptoms appear.

- **Common Symptoms:** (Often develop insidiously and may be mistaken for other illnesses) (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment)
  - A cough that does not go away or gets worse over time (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment) (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment)
  - Coughing up blood or blood-streaked sputum (hemoptysis) (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment)
  - Persistent chest pain or discomfort, especially with deep breathing or coughing (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment)
  - Shortness of breath and wheezing (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment)
  - Hoarseness of voice (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment)
  - Unexplained **weight loss** and loss of appetite (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment) (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment)

- Fatigue or weakness
- Recurrent respiratory infections (like repeated episodes of pneumonia or bronchitis in the same area of lung)
- In advanced cases, symptoms of metastasis may appear (e.g. bone pain if spread to bone, headaches or neurologic symptoms if spread to brain).

Treatment: Lung cancer treatment depends on the type and stage. **Surgery** is a cornerstone for early-stage NSCLC – removal of the tumor (lobectomy or pneumonectomy) can be curative if the cancer is localized. **Radiation therapy** is often used for patients who cannot undergo surgery or as an adjunct to surgery (or for palliation in advanced disease). **Chemotherapy** is a mainstay for advanced lung cancer and for virtually all SCLC (which tends to be disseminated at diagnosis) (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment). Modern treatment of lung cancer increasingly uses **targeted therapies** (drugs that target specific genetic mutations in the tumor, such as EGFR inhibitors or ALK inhibitors in NSCLC) and **immunotherapy** (e.g. checkpoint inhibitors like pembrolizumab) to help the patient's immune system attack the cancer. The best approach often involves a combination (e.g. surgery followed by chemo, or chemo with radiation, etc.) depending on disease stage. In recent years, these advances have led to improvements – lung cancer survival is gradually increasing and death rates have begun to decline (Lung Cancer: Types, Stages, Symptoms, Diagnosis & Treatment). Nonetheless, preventing lung cancer (especially by avoiding smoking) and early detection (through screening of high-risk individuals via low-dose CT scans) remain critical public health strategies.

- **Common Medications and Side Effects:**
  - **Cytotoxic Chemotherapy (e.g. platinum-based chemotherapy like *cisplatin* or *carboplatin*, often combined with drugs like *paclitaxel* or *pemetrexed*):** These medicines kill rapidly dividing cells. *Side effects:* Chemotherapy has systemic effects; common side effects include **fatigue**, **hair loss**, easy bruising or bleeding, increased risk of infections (due to low white blood cell counts), anemia, **nausea and vomiting**, loss of appetite, mouth sores, and numbness or tingling in the extremities (neuropathy) (Chemotherapy Side Effects | American Cancer Society). Supportive medications (anti-nausea drugs, growth factors for blood cells) are often used to manage side effects.
  - **Targeted Therapy (e.g. *erlotinib* for EGFR-mutated NSCLC, *crizotinib* for ALK-positive NSCLC):** These drugs specifically block molecular pathways that cancer cells rely on. *Side effects:* Because they target cancer cells more specifically, they often have different and more limited side effects than standard chemo. For instance, EGFR inhibitors

commonly cause a rash and diarrhea; ALK inhibitors may cause nausea, fatigue, or liver enzyme elevations.

- **Immunotherapy (e.g. *pembrolizumab*, *nivolumab*):** Checkpoint inhibitor drugs help the immune system recognize and attack cancer cells. *Side effects:* While many patients tolerate immunotherapy well, some experience immune-related side effects as the immune system can attack normal organs – this can lead to inflammation in the lungs (pneumonitis), skin (rash), colon (colitis causing diarrhea), liver (hepatitis), or endocrine glands (thyroid issues), among others. These reactions often require corticosteroids to manage. More common mild effects include fatigue, rash, or itching.
- **Analgesics and Palliative Medications:** In advanced lung cancer, managing symptoms and maintaining quality of life is key. Pain medications (like opioids for cancer-related pain) and bronchodilators or low-dose morphine (for relief of shortness of breath) may be used. *Side effects:* These are medication-specific (e.g. opioids can cause constipation, drowsiness, nausea). Palliative treatments aim to ease symptoms while balancing side effects to keep the patient comfortable.

Diabetes Mellitus (Type 1 & Type 2)

Overview: Diabetes mellitus is a chronic metabolic disease characterized by elevated blood glucose levels. Over time, uncontrolled diabetes can damage the heart, blood vessels, eyes, kidneys, and nerves (Diabetes). There are two main types: **Type 1 diabetes** (an autoimmune condition where the pancreas produces little or no insulin) and **Type 2 diabetes** (where the body becomes resistant to insulin or doesn't produce enough). Type 2 is by far more common (over 90% of cases) and has risen dramatically worldwide – an estimated *half a billion* people live with diabetes globally (Diabetes) (Diabetes). Key risk factors for type 2 include obesity, sedentary lifestyle, and poor diet, while type 1 often presents in childhood without obvious lifestyle associations. Diabetes is a leading cause of heart disease, stroke, kidney failure, and blindness, making it a top public health priority.

- **Common Symptoms:** (Type 2 diabetes often develops slowly, and symptoms may be mild initially) (Diabetes) (Diabetes: What It Is, Causes, Symptoms, Treatment & Types)
    - **Frequent urination (polyuria)** – high blood sugar causes the kidneys to excrete extra glucose in urine, drawing more water out and increasing urine volume (Diabetes).

- **Excessive thirst (polydipsia)** – due to fluid loss from urination and dehydration (Diabetes) (Diabetes: What It Is, Causes, Symptoms, Treatment & Types).
- **Increased hunger (polyphagia)** – because cells aren't getting enough glucose, the body signals for more food. (This is more pronounced in type 1).
- **Unexplained weight loss** – common in type 1 (due to breakdown of fat/muscle for energy in absence of insulin) and can occur in type 2 as well (Diabetes) (Diabetes: What It Is, Causes, Symptoms, Treatment & Types).
- Fatigue – feeling very tired, because cells cannot efficiently use glucose for energy.
- Blurred vision – high blood sugar can cause lens swelling in the eye.
- Slow-healing sores or frequent infections – high glucose levels impair immune function and wound healing (Diabetes: What It Is, Causes, Symptoms, Treatment & Types). For example, recurrent yeast infections or skin infections can be a sign of diabetes (Diabetes: What It Is, Causes, Symptoms, Treatment & Types).
- Numbness or tingling in hands or feet – a sign of nerve damage (peripheral neuropathy) in long-standing diabetes (Diabetes: What It Is, Causes, Symptoms, Treatment & Types).

Treatment: Managing diabetes centers on controlling blood glucose levels and preventing complications. **Lifestyle modifications** are fundamental for type 2 diabetes: a healthy diet (controlling carbohydrates and portion sizes), regular physical activity, and weight loss can dramatically improve blood sugar control and even send type 2 diabetes into remission in some cases. **Medications** are often needed as well. For type 1 diabetes, **insulin replacement** is required for survival (through injections or an insulin pump) since the body produces little to none. For type 2, first-line medication is usually **metformin**, which reduces liver glucose production and improves insulin sensitivity. As the disease progresses, additional drugs may be added: these can include oral medications like sulfonylureas (which increase insulin release), DPP-4 inhibitors, SGLT2 inhibitors, or GLP-1 receptor agonists, each helping lower glucose through different mechanisms. Eventually, many type 2 diabetics also require insulin to control their blood sugar. In all diabetics, controlling blood pressure and cholesterol is important to reduce cardiovascular risks (Diabetes), and regular screening for complications (eyes, kidneys, feet) is recommended (Diabetes). With effective management, people with

diabetes can live healthy lives, but without treatment, diabetes can lead to serious complications or premature death.

- **Common Medications and Side Effects:**
    - **Insulin:** Essential for type 1 and used in type 2 when needed. Multiple forms exist (rapid-acting, long-acting, etc.). *Side effects:* the chief risk is **hypoglycemia** (low blood sugar) if too much insulin is taken or meals are missed – this can cause sweating, shakiness, confusion, or even loss of consciousness. Weight gain can also occur with insulin therapy.
    - **Metformin:** A first-line oral drug for type 2 diabetes that helps lower glucose production by the liver and improves insulin sensitivity. *Side effects:* gastrointestinal issues are common – up to half of patients may experience nausea, diarrhea, or stomach upset, especially when starting therapy (Metformin-Induced Chronic Diarrhea and Weight Loss After Years of ...) (Metformin Side Effects: Common and Severe - Healthline). These side effects are usually temporary and can be minimized by taking metformin with food and titrating the dose slowly. Metformin generally does *not* cause hypoglycemia when used alone.
    - **Sulfonylureas (e.g. glipizide, glyburide):** Oral medications that stimulate the pancreas to release more insulin. *Side effects:* can cause **hypoglycemia** (especially if a meal is missed or with excessive dosing) because they increase insulin levels regardless of blood sugar. They can also cause weight gain.
    - **SGLT2 Inhibitors (e.g. empagliflozin):** Newer oral drugs that make the kidneys excrete more glucose in urine. *Side effects:* increased urination and thirst, risk of urinary tract or yeast infections (due to high sugar in urine), and, rarely, a risk of a serious genital infection. On the plus side, they may aid weight loss and have cardiovascular benefits.
    - **GLP-1 Receptor Agonists (e.g. liraglutide):** Injectable (or newer oral) drugs that mimic an incretin hormone, helping to increase insulin release and reduce appetite. *Side effects:* mainly gastrointestinal – nausea or vomiting is common initially; they also can lead to weight loss (often seen as a benefit). Rarely, they have been associated with pancreatitis.

Tuberculosis (TB)

Overview: Tuberculosis is a contagious infection caused by the bacterium *Mycobacterium tuberculosis*. It most often affects the lungs (pulmonary TB) but can involve virtually any organ. TB is one of the top infectious disease killers worldwide: each year about 10 million people fall ill with TB and around 1.5 million die from it (

Tuberculosis), making it a leading cause of death from a single infectious agent (and the leading killer of people with HIV) (Tuberculosis). TB spreads through the air when a person with active lung TB coughs or sneezes, releasing microscopic droplets containing the bacteria (Tuberculosis). Not everyone infected becomes ill; many have latent TB infection (bacteria dormant in the body) that can activate later if the immune system weakens. Active TB disease, however, can be devastating if not treated.

- **Common Symptoms:** (usually develop gradually over weeks to months) (Tuberculosis)
    - Persistent **cough** lasting more than 2–3 weeks (Tuberculosis), often productive of sputum. In pulmonary TB, the cough may eventually produce blood-streaked sputum (hemoptysis).
    - Chest pain, especially with coughing or deep breaths (Tuberculosis).
    - **Fever** and chills, often low-grade and in the evening (Tuberculosis).
    - **Night sweats:** drenching sweats during the night that can soak clothing or bedding (Tuberculosis).
    - **Weight loss** and loss of appetite ("consumption") (Tuberculosis).
    - **Fatigue** and weakness (Tuberculosis).
    - Swollen lymph nodes in the neck or elsewhere (if TB has spread, e.g. causing *scrofula* in cervical lymph nodes).
    - Extrapulmonary TB symptoms vary by site – e.g., TB of the spine (Pott's disease) causes back pain; TB meningitis causes headaches and confusion.

Treatment: TB is curable with proper antibiotics. Standard treatment for active TB disease is a **6-month course of multiple antibiotics** given in combination (Tuberculosis). The typical first-line regimen includes four drugs for the first 2 months (intensive phase) – usually **Isoniazid (INH)**, **Rifampicin (RIF)**, **Pyrazinamide (PZA)**, and **Ethambutol** – followed by at least two of those drugs (commonly INH and RIF) for an additional 4 months (continuation phase) (Tuberculosis). This combination therapy is crucial to fully eradicate the bacteria and prevent the development of drug resistance. Patients often receive therapy under Directly Observed Treatment (DOT) programs to ensure adherence, because missing doses or stopping early can lead to drug-resistant TB. If TB is caused by a drug-resistant strain (MDR-TB or XDR-TB), treatment is more prolonged (12–20 months or more) and involves second-line drugs that can have more side effects. Alongside antibiotics, patients are advised to eat a nutritious diet and may need vitamin B6 supplements (with isoniazid) to prevent nerve side effects. After a few

weeks of effective treatment, most patients are no longer infectious and begin to feel better, but it's vital to continue medications for the full duration to cure the disease.

- **Common Medications and Side Effects:** (First-line anti-TB drugs) (Adverse Events During Treatment | TB | CDC) (Adverse Events During Treatment | TB | CDC)
    - **Isoniazid (INH):** An important TB drug. *Side effects:* can cause liver inflammation – patients are monitored for hepatitis symptoms like loss of appetite, nausea, dark urine, or jaundice (Adverse Events During Treatment | TB | CDC). It can also cause peripheral neuropathy (tingling or numbness in hands/feet) (Adverse Events During Treatment | TB | CDC), so vitamin B6 (pyridoxine) is given to help prevent nerve damage.
    - **Rifampicin (RIF):** A key TB antibiotic. *Side effects:* **orange discoloration of body fluids** (tears, urine, sweat) is very characteristic and harmless (Adverse Events During Treatment | TB | CDC), but patients are warned as it can stain contact lenses or clothing. Rifampicin can also reduce the effectiveness of many other drugs (it induces liver enzymes) (Adverse Events During Treatment | TB | CDC), leading to drug interactions (for example, it can interfere with birth control pills). Liver toxicity is also a risk with rifampicin, and flu-like symptoms can occur in some.
    - **Pyrazinamide:** *Side effects:* can also cause liver toxicity and sometimes painful **joint aches** or flares of gout by raising uric acid levels.
    - **Ethambutol:** *Side effects:* the main concern is **optic neuritis** – damage to the optic nerve causing blurred vision or color-vision changes (Adverse Events During Treatment | TB | CDC). Vision testing is recommended during therapy.
    - **Streptomycin:** (an older injectable drug, now second-line in many places) *Side effects:* can cause ear and kidney toxicity – specifically, hearing loss or balance problems due to inner ear damage.
    - Patients on TB treatment are closely monitored. They should report any symptoms of medicine toxicity, such as persistent nausea, vomiting, abdominal pain, strange fatigue, bruising, or vision changes (Adverse Events During Treatment | TB | CDC). Regular liver function tests are done because of the multiple drugs with liver side effects. Despite these risks, most people complete TB therapy successfully, and curing TB not only restores the patient's health but also prevents spread to others.

HIV/AIDS

Overview: Human Immunodeficiency Virus (HIV) is a virus that attacks the body's immune system, specifically CD4 T-lymphocytes (helper T cells). If untreated, HIV infection progresses over a number of years to **Acquired Immunodeficiency Syndrome (AIDS)**, defined by extremely low CD4 counts or certain opportunistic infections/cancers. Since its emergence, HIV/AIDS has caused a global pandemic; tens of millions of people have died. Today, around 38 million people live with HIV. Thanks to modern treatment, HIV is now considered a manageable chronic condition rather than the uniformly fatal diagnosis it once was (HIV and AIDS). HIV spreads through certain body fluids: most commonly via unprotected sexual contact, sharing needles in injection drug use, and from mother to child during birth or breastfeeding (HIV and AIDS). It does *not* spread through casual contact.

After initial infection, HIV replicates and gradually destroys immune cells, leading to vulnerability to other infections. The global public health impact of HIV has been enormous, but ongoing efforts in prevention (education, condom use, needle exchange, etc.), testing, and treatment (antiretroviral therapy) have greatly improved outcomes. Many countries have seen significant declines in AIDS-related deaths. Still, HIV remains a major public health issue, particularly in sub-Saharan Africa and among key populations worldwide.

- **Common Symptoms: HIV symptoms vary by stage of infection**. Many people experience a brief acute illness 2–6 weeks after contracting HIV – often a flu-like syndrome – then no symptoms for years, followed by symptoms of immune suppression as CD4 counts fall.
    - **Acute HIV infection (seroconversion)**: Often presents with fever, sore throat, headache, swollen lymph nodes, rash, muscle/joint aches, and general malaise (HIV and AIDS). These symptoms last for days to a few weeks and are often mistaken for influenza or mono.
    - **Latent stage:** After the initial burst, HIV may not cause noticeable symptoms for a long period (clinical latency). During this time, the virus is active in lymph nodes, and the person is infectious, but they may feel well. Without treatment, this stage averages ~8–10 years.
    - **Chronic HIV/early AIDS:** As the immune system weakens, general symptoms appear: persistent generalized **lymph node enlargement** (swollen glands in neck, armpits, groin) (HIV and AIDS), chronic **fevers** and night sweats, constant fatigue, **weight loss** and wasting, and chronic diarrhea (HIV and AIDS).
    - **AIDS (advanced stage):** Characterized by severe immune deficiency (CD4 count <200 cells/μL or defining illnesses). Patients develop **opportunistic infections** and cancers that a healthy immune system

would normally control (HIV and AIDS). Common examples include: tuberculosis (worldwide, TB is a leading cause of death in HIV patients) (Tuberculosis), **Pneumocystis pneumonia** (causing progressive shortness of breath and dry cough), **esophageal candidiasis** (thrush that extends down the throat causing pain swallowing), **Cryptococcal meningitis** (causing headaches and confusion), **Toxoplasmosis** of the brain (causing seizures), chronic diarrhea from parasites, **Kaposi's sarcoma** (a cancer causing purple skin lesions), and **lymphomas** (HIV and AIDS). These illnesses are often the tell-tale signs of AIDS in an untreated person.

Treatment: There is **no cure** for HIV, but it can be effectively controlled. Modern **antiretroviral therapy (ART)** involves combinations of medications that suppress the virus's replication. By taking a daily regimen of HIV medicines, a person can achieve an undetectable viral load, meaning the virus is so low that it cannot be measured in blood and **cannot cause ongoing immune damage or be transmitted to others** (Undetectable = Untransmittable) (HIV and AIDS) (Treating HIV | HIV | CDC). ART typically includes at least **3 drugs from at least 2 classes** of antiretrovirals to ensure robust control of the virus and prevent it from developing resistance. Examples: a common regimen may include two nucleoside reverse transcriptase inhibitors (NRTIs) plus either an integrase inhibitor or a protease inhibitor. Treatment is recommended for all individuals with HIV, regardless of CD4 count, and should be started as early as possible after diagnosis. With lifelong ART and medical care, people with HIV can expect near-normal life expectancy and can live healthy lives (HIV and AIDS). HIV treatment also includes prophylaxis for opportunistic infections when CD4 counts are low (e.g., trimethoprim-sulfamethoxazole to prevent Pneumocystis pneumonia). Preventive measures like safe sex practices, needle safety, and now **pre-exposure prophylaxis (PrEP)** for high-risk HIV-negative individuals further help control the epidemic.

- **Common Medications (ART) and Side Effects:**
  Modern HIV regimens often come co-formulated as a single pill once daily, which improves adherence. Classes include NRTIs (like tenofovir, emtricitabine), NNRTIs (efavirenz, etc.), protease inhibitors (lopinavir, atazanavir), integrase inhibitors (dolutegravir, bictegravir), and entry inhibitors. These medications have transformed HIV care, and newer drugs are generally better tolerated than older ones (HIV Medicines and Side Effects | NIH) (HIV Medicines and Side Effects | NIH). However, side effects can still occur:
    - **Short-term side effects (common):** When starting ART, people may experience **nausea**, gastrointestinal upset, **fatigue**, headaches, or **difficulty sleeping** as their body adapts (HIV Medicines and Side Effects |

NIH) (Treating HIV | HIV | CDC). For example, some regimens cause vivid dreams or insomnia (efavirenz is known for this), and some can cause mild dizziness. These side effects are usually manageable and often subside in a few weeks.

- **Long-term or chronic side effects:** Some antiretrovirals can affect metabolism or organ health if used for many years. For instance, older protease inhibitors could cause elevated cholesterol and triglycerides (increasing cardiovascular risk), and some NRTIs (like older drug AZT) could cause anemia or lipodystrophy (body fat redistribution). Newer agents have much lower risk of these issues. Certain drugs (like tenofovir) in rare cases can affect kidney function or bone mineral density after long use. *Hepatotoxicity* (liver damage) is a potential side effect for a few drugs, so liver enzymes are monitored (Side Effects of HIV Medicines - HIVinfo).
- **Specific examples:**
  - *Dolutegravir* (an integrase inhibitor) is generally well-tolerated; main side effects can be insomnia or weight gain in some patients.
  - *Efavirenz* (an older NNRTI) can cause neuropsychiatric side effects – vivid dreams, dizziness, mood changes – so it's being used less now.
  - *Tenofovir* (an NRTI) – the newer TAF formulation has minimal issues, but the older TDF form at high doses could, over time, impact kidneys or bones slightly.
- Despite the potential for side effects, the **benefits of ART far outweigh the risks** (HIV Medicines and Side Effects | NIH). Many side effects are mild or can be managed by adjusting the regimen. It's crucial for patients to communicate with their healthcare providers; often another combination can be found if one regimen is not well-tolerated. The goal is to achieve full viral suppression with minimal side effects, which is possible for the vast majority of patients today.

Diarrheal Diseases

Overview: Diarrheal diseases refer to gastrointestinal infections that cause loose, watery stools three or more times a day. They are a leading cause of illness and death, particularly in young children in low-income countries. Globally, diarrheal disease is a major killer of children under 5, accounting for about 9% of under-5 child deaths (approximately half a million child deaths per year) (Children <5 years with diarrhoea receiving oral rehydration therapy (ORT) and continued feeding). Common causes

include viruses (like rotavirus, norovirus), bacteria (such as *Escherichia coli*, *Vibrio cholerae*, *Shigella*, *Salmonella*), and parasites (e.g. *Giardia*, *Cryptosporidium*). These pathogens are often transmitted via contaminated water or food, or by poor sanitation and hygiene. The primary danger of acute diarrhea is **dehydration** – significant fluid and electrolyte loss that can be fatal if not corrected.

- **Common Symptoms:**
    - **Frequent loose, watery diarrhea** – the hallmark symptom. In infections like cholera, stools can be very profuse (so-called "rice-water" stools in cholera, which are pale and watery).
    - **Vomiting** – often present, especially in viral gastroenteritis (like rotavirus or norovirus). Vomiting can exacerbate dehydration and make rehydration more challenging.
    - **Fever** – may occur, more commonly with invasive bacterial infections or some viruses.
    - **Abdominal cramping** and pain.
    - **Signs of dehydration:** thirst, dry mouth, reduced urine output or dark concentrated urine, fatigue or lethargy, sunken eyes, in babies a sunken fontanelle, and loss of skin turgor. Severe dehydration leads to dizziness, low blood pressure, rapid pulse, and can progress to shock. In small children, irritability or drowsiness is a red flag for dehydration.

Treatment: The cornerstone of treatment for diarrheal disease is **rehydration**. The World Health Organization recommends **Oral Rehydration Salts (ORS)** solutions for mild to moderate dehydration. ORS is a precise mixture of clean water, salts, and sugar that promotes efficient absorption of fluids in the intestines. It has been a revolutionary therapy – *ORS alone can prevent about 93% of deaths due to diarrhea* (Children <5 years with diarrhoea receiving oral rehydration therapy (ORT) and continued feeding). In practice, this means giving frequent small sips of ORS solution (or even homemade salt-sugar solutions) to replace fluids as they're lost. **Zinc supplementation** is also recommended for children with diarrhea, as it can reduce the duration and severity by improving intestinal healing; zinc can further decrease child diarrhea mortality by about 23% (Children <5 years with diarrhoea receiving oral rehydration therapy (ORT) and continued feeding). For severe dehydration or if the patient cannot drink (due to vomiting or lethargy), **intravenous fluids** are required.

Most diarrheal episodes are self-limiting and resolve in a few days with rehydration and supportive care. **Continued feeding** (or breastfeeding for infants) during diarrhea is encouraged to prevent malnutrition – children should resume their normal diet as soon as they are able to eat, even during the illness.

Specific therapies:

- **Antibiotics:** These are only indicated for certain bacterial diarrheas. For example, antibiotics (like azithromycin or fluoroquinolones) are used for cholera or severe dysentery (bloody diarrhea caused by *Shigella*), and metronidazole is used for parasitic diarrhea like amoebic dysentery. However, most diarrheas (especially viral ones) do not need antibiotics. Overuse of antibiotics can disrupt gut flora and promote resistance, so they are reserved for cases where benefits outweigh risks (e.g., laboratory-confirmed bacterial infections or very severe illness).
- **Antimotility agents:** Medications like loperamide (Imodium) can reduce stool frequency but are **generally not recommended in young children or in cases of bloody diarrhea or high fever**, because slowing gut movement in certain infections can worsen outcomes or cause complications. In adults with non-bloody diarrhea (like traveler's diarrhea), loperamide can be used cautiously for comfort, alongside rehydration and appropriate antibiotics if indicated.
- **Probiotics:** Some evidence suggests probiotics may shorten the duration of some diarrheal illnesses by restoring healthy gut bacteria, though this is an adjunctive measure.

Preventing diarrheal diseases is a major public health focus: measures include ensuring access to clean **water**, improved **sanitation**, handwashing with soap, breastfeeding infants (which reduces exposure to contaminated water/foods), and **rotavirus vaccination** (which has significantly reduced severe diarrhea hospitalizations in countries that have introduced it).

- **Common Treatments and Side Effects:**
    - **Oral Rehydration Solution (ORS):** The gold standard therapy. *Side effects:* ORS is very safe – when properly mixed, it has no side effects aside from possibly inducing some nausea if taken too quickly in large amounts. It's essentially a balanced fluid; giving it too concentrated (too much powder) could potentially cause hypernatremia, which is why careful preparation is important.
    - **Zinc supplements (10–20 mg daily during diarrhea for children):** Helps gut recovery. *Side effects:* can cause some nausea or bad taste; sometimes leads to vomiting if taken on an empty stomach, so it's often given with food.
    - **Antibiotics (when indicated, e.g. ciprofloxacin or azithromycin for severe bacterial diarrhea, or metronidazole for Giardia):** *Side effects:* antibiotics can cause stomach upset, and broad-spectrum ones may

themselves cause diarrhea by disturbing normal flora (antibiotic-associated diarrhea or C. difficile infection). Specific ones: fluoroquinolones can cause tendonitis (rare in short course) and shouldn't be used in young children; metronidazole can leave a metallic taste and cause nausea.

- **Loperamide:** An over-the-counter antimotility drug (for adults). *Side effects:* can cause constipation or abdominal cramping; if improperly used in severe infections, it can lead to toxic megacolon (a very serious complication), hence it's contraindicated in those situations.
- **Nutrition and vitamin A:** In malnourished children, vitamin A supplementation during or after diarrheal illness is recommended to help gut and immune recovery; it also reduces mortality. *Side effects:* high-dose vitamin A can cause temporary headache or nausea, but given appropriately it's safe.

Malaria

Overview: Malaria is a life-threatening mosquito-borne disease caused by *Plasmodium* parasites. There are five species that infect humans, with *Plasmodium falciparum* being the most dangerous and common in Africa, and *P. vivax* more common in Asia and Latin America. Malaria remains one of the world's most significant infectious diseases, with roughly 247 million cases and over 600,000 deaths in 2021 according to WHO estimates (Malaria). Young children in sub-Saharan Africa account for the majority of malaria deaths (Malaria). The parasite is transmitted via the bite of an infected female *Anopheles* mosquito. Once in the human bloodstream, the parasites travel to the liver, multiply, and then infect red blood cells. The cyclic bursting of red blood cells by parasites causes the classic symptoms of malaria and can lead to anemia and organ damage.

- **Common Symptoms:** Malaria is characterized by **fever bouts** and flu-like illness. Symptoms typically begin 1–2 weeks after an infective mosquito bite (but can be longer for some species) (Malaria). Early signs may be mild and hard to distinguish from other viral illnesses (Malaria).
    - **Fever with chills and sweats:** Patients often experience episodes of high fever accompanied by shaking chills, followed by profuse sweating as the fever falls. These fever paroxysms can come in cycles (every 48 hours in *P. vivax/ovale*, every 72 hours in *P. malariae*, and often irregularly in *P. falciparum*).
    - **Headache** – often severe.
    - **Muscle and joint aches.**

- **General malaise and fatigue.**
- **Nausea and vomiting** – especially in children.
- In **severe malaria** (usually *P. falciparum*), serious complications may develop: **cerebral malaria** (confusion, seizures, coma due to brain involvement), severe **anemia** (from destruction of red blood cells) (Malaria), respiratory distress (rapid breathing from metabolic acidosis) (Malaria), kidney failure, or multi-organ failure (Malaria). These are medical emergencies and can be rapidly fatal without intensive care. Children may present with convulsions or coma; pregnant women are also at high risk for severe disease.

Treatment: Malaria is preventable and curable with prompt treatment (Malaria). The World Health Organization recommends treating *P. falciparum* malaria with **artemisinin-based combination therapies (ACTs)** as first-line (Malaria). An example of an ACT is artemether-lumefantrine: artemisinin derivatives act rapidly to reduce parasite load, and the partner drug clears the remaining parasites and prevents resistance. For *P. vivax* and *P. ovale* malaria, which have dormant liver stages, treatment includes an ACT plus a 14-day course of primaquine (or single-dose tafenoquine) to eradicate liver hypnozoites and prevent relapse. **Severe malaria** (e.g., *P. falciparum* with complications) is treated with intravenous artesunate (or quinine in some settings) urgently, followed by a full course of oral ACT. It's critical that malaria treatment begins as soon as possible – ideally within 24 hours of fever onset for *P. falciparum* – to prevent progression to severe disease (Case Management: Diagnosis & Treatment | Malaria - CDC).

Supportive care is also important: management of fever (antipyretics like paracetamol), fluids for dehydration, blood transfusions if severe anemia, and managing complications (like anticonvulsants for seizures). In endemic regions, people often develop partial immunity over time, so adults may experience milder illness; nonetheless, treatment is still needed to cure the infection and prevent transmission. Preventive measures include sleeping under insecticide-treated bed nets, indoor residual spraying, and chemoprophylaxis (anti-malarial pills taken by travelers or high-risk groups to prevent malaria). Additionally, new malaria vaccines are emerging as preventive tools in children.

- **Common Medications and Side Effects:**
  - **ACTs (e.g. artemether-lumefantrine, artesunate-mefloquine):** These combination therapies are highly effective against *P. falciparum*. *Side effects:* generally well-tolerated. Artemisinin derivatives can cause transient nausea, dizziness, or headache (Artemisinin - Wikipedia) (Artemisinin - Wikipedia). They may also temporarily lower blood counts

or cause mild liver enzyme elevations, but serious side effects are rare. Mefloquine (in some ACTs) can cause vivid dreams or insomnia and, rarely, neuropsychiatric effects.

- **Chloroquine:** Formerly the go-to drug for malaria, now only useful in regions with chloroquine-sensitive parasites (still effective for *P. vivax* in some areas). *Side effects:* itching (particularly in people of African descent), headache, blurred vision, and in long-term high doses, a risk of retinal toxicity. Most *P. falciparum* is now resistant to chloroquine, so it's not widely used for that species.
- **Quinine:** An older medication used IV for severe malaria (where artesunate is unavailable) or orally for resistant cases. *Side effects:* quinine commonly causes a constellation of symptoms called "cinchonism" – ringing in the ears (tinnitus), headache, nausea, and visual disturbances. It can also cause low blood sugar and, in high doses, heart rhythm disturbances. Patients need monitoring when on IV quinine.
- **Primaquine:** Used to clear liver stages of *P. vivax/ovale* (radical cure) and also as a gametocidal drug to prevent transmission. *Side effects:* can cause hemolytic anemia in people with G6PD deficiency (so screening for that enzyme is done before prescribing). Some experience stomach upset; taking it with food helps.
- **Doxycycline:** Sometimes used for prevention (prophylaxis for travelers) or in combination treatment. *Side effects:* sun-sensitivity (easy sunburn), stomach upset, and cannot be used in young children or pregnant women.
- **Potential severe reactions:** A rare but serious complication of anti-malarials is an allergic reaction. Also, a fraction of patients on artesunate can develop post-treatment hemolysis (delayed anemia), which should be monitored.

Overall, when treated properly with modern anti-malarial medications, most patients recover fully from malaria. Access to prompt diagnosis and treatment is crucial, as is preventive strategy implementation, to reduce the burden of this ancient disease on global health.

Each of these diseases poses significant challenges, but global efforts in prevention, early detection, and effective treatment are ongoing. By understanding symptoms and treatment options – and using medications wisely while managing their side effects –

healthcare providers and patients can work together to reduce the impact of these top 10 diseases on communities worldwide.