**A COMPREHENSIVE REVIEW OF SEXUALLY TRANSMITTED DISEASES (STDS) AND PREVENTION STRATEGIES**

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**ABSERCT**

Sexually transmitted infections (STDs) continue to be a major global public health concern, impacting millions of people each year. The development of effective preventive measures is essential to reducing the transmission of these illnesses. The main strategies for avoiding sexually transmitted infections are described in this abstract, with a focus on the value of research, education, and behavioral and medicinal therapies.

**Keyword :- SDT Prevention, Public Health, Education**

**INTRODUCTION**

Sexual contact is the primary method of transmission for illnesses commonly referred to as sexually transmitted diseases (STDs) or sexually transmitted infections (STIs). This encompasses oral, anal, and vaginal sex. Although STDs can afflict persons of all ages and backgrounds, young people who are sexually active are more likely to get them. Untreated STDs can have serious side effects, such as increased risk of HIV transmission, malignancy, infertility, and chronic discomfort. For the sake of public health, it is essential to comprehend STDs, how they spread, how to avoid them, and how to cure them.

**CHLAMYDIA**

The bacterium Chlamydia trachomatis is the cause of one of the most prevalent sexually transmitted illnesses (STIs), chlamydia. If left untreated, it can cause major reproductive issues as well as other health concerns and impact both men and women. The infection is more common in young people and those who engage in sexual activity. A prevalent sexually transmitted infection is chlamydia (kluh-MID-e-uh).   
Infections known as sexually transmitted diseases are mostly contracted through genital or body fluid contact. Sexually transmitted illnesses, often known as STIs, STDs, or venereal disease, are brought on by bacteria, viruses, or parasites.The Chlamydia trachomatis (truh-KOH-muh-tis) bacteria is the cause of chlamydia and can be transmitted by anal, vaginal, or oral intercourse.Due to the fact that many people do not experience symptoms like genital discomfort and vaginal or penile discharge, you may be unaware that you have chlamydia.

**Causative Agent**

* **Bacterium**: *Chlamydia trachomatis* is an obligate intracellular pathogen, meaning it only replicates within human cells.

**Transmission**

* **Sexual Contact**: Transmitted through vaginal, anal, and oral sex.
* **Non-Sexual Routes**: Rare, but can include transmission from mother to newborn during childbirth, leading to neonatal conjunctivitis or pneumonia.

**Symptoms**

Chlamydia is often asymptomatic, especially in women, which can delay diagnosis and treatment.

**In Women**:

* Abnormal vaginal discharge
* Burning sensation during urination
* Pain during intercourse
* Bleeding between periods or after sex
* Lower abdominal pain

**In Men**:

* Discharge from the penis
* Burning sensation during urination
* Pain and swelling in one or both testicles (less common)

**Complications**

* **Pelvic inflammatory disease, also called PID.** PID is an infection of the uterus and fallopian tubes. Severe infections might require care in the hospital. PID can damage the fallopian tubes, ovaries and uterus, including the cervix.
* **Infection near the testicles.** A chlamydia infection can inflame the coiled tube located beside each testicle, called the epididymis. The infection can result in fever, scrotal pain and swelling.
* **Prostate gland infection.** Rarely, the chlamydia bacteria can spread to the prostate gland. Prostatitis can cause pain during or after sex, fever and chills, painful urination, and lower back pain.
* **Infections in newborns.** The chlamydia infection can pass from the vaginal canal to your child during delivery, causing pneumonia or a serious eye infection.
* **Ectopic pregnancy.** This occurs when a fertilized egg implants and grows outside of the uterus, usually in a fallopian tube. The egg needs to be removed to prevent life-threatening complications, such as a burst tube. A chlamydia infection increases this risk.
* **Infertility.** Chlamydia infections can cause scarring and obstruction in the fallopian tubes, which might lead to infertility.
* **Reactive arthritis.** People who have Chlamydia trachomatis are at higher risk of developing reactive arthritis, also known as Reiter syndrome. This condition typically affects the joints, eyes and urethra — the tube that carries urine from the bladder to outside of your body.

**Diagnosis**

* **Nucleic Acid Amplification Tests (NAATs)**: The most sensitive tests, using urine samples or swabs from the cervix, urethra, throat, or rectum.
* **Culture Tests**: Less common but can be used in specific cases.

**Treatment**

* **Antibiotics**: The infection is typically treated with antibiotics such as azithromycin or doxycycline.
* **Partner Notification and Treatment**: Essential to prevent re-infection and further spread.

**Prevention**

* **Use condoms.** Use a male latex condom or a female polyurethane condom during each sexual contact. Condoms used properly during every sexual encounter lower but don't eliminate the risk of infection.
* **Limit your number of sex partners.** Having multiple sex partners puts you at a high risk of contracting chlamydia and other sexually transmitted infections.
* **Get regular screenings.** If you're sexually active, particularly if you have multiple partners, talk with your healthcare professional about how often you should be screened for chlamydia and other sexually transmitted infections.

**GONORRHEA**

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The bacteria Neisseria gonorrhoeae is the source of the widespread sexually transmitted infection (STI) gonorrhea. It usually affects the throat, cervix, rectum, and urethra and can infect men and women. Particularly among young individuals aged 15 to 24, gonorrhea is common. A sexually transmitted infection, commonly known as an STD, gonorrhea is brought on by germs. Infections known as sexually transmitted diseases are mostly contracted through genital or body fluid contact. Sexually transmitted illnesses, often known as STIs, STDs, or venereal disease, are brought on by bacteria, viruses, or parasites.

The urethra, rectum, female reproductive tract, mouth, throat, or eyes can all get infected with gonorrhea germs. The most frequent ways that gonorrhea is transmitted are through anal, oral, or vaginal intercourse. However, the illness can spread to infants following childbirth. Gonorrhea typically damages the eyes in infants.Going without sex and avoiding sexual activities stop gonorrhea from spreading. When engaging in sexual activity, using a condom can help stop the spread of gonorrhea. The chance of contracting an infection is also reduced when two people are in a mutually monogamous relationship, where they exclusively have sex with one another and neither partner is diseased.

**Causative Agent**

* **Bacterium**: *Neisseria gonorrhoeae*, a gram-negative diplococcus.

**Transmission**

* **Sexual Contact**: Transmitted through vaginal, anal, and oral sex.
* **Non-Sexual Routes**: Rarely, can be transmitted from mother to baby during childbirth, causing neonatal conjunctivitis (ophthalmia neonatorum).

**Symptoms**

Many people with gonorrhea do not have any symptoms, especially women, which can lead to delayed diagnosis and treatment.

**In Women**:

* Increased vaginal discharge
* Painful urination
* Vaginal bleeding between periods
* Painful intercourse
* Pelvic or abdominal pain

**In Men**:

* White, yellow, or green urethral discharge
* Painful urination
* Painful or swollen testicles (less common)

**In Both Genders**:

* Rectal infections can cause discharge, anal itching, soreness, bleeding, or painful bowel movements.
* Throat infections (pharyngeal gonorrhea) can cause a sore throat, but are often asymptomatic.

**Complications**

Untreated gonorrhea can lead to major complications, such as:

* **Infertility in women.** Gonorrhea can spread into the uterus and fallopian tubes, causing pelvic inflammatory disease (PID). PID can result in scarring of the tubes, greater risk of pregnancy complications and infertility. PID requires immediate treatment.
* **Infertility in men.** Gonorrhea can cause inflammation in epididymis, the coiled tube above and behind the testicles that stores and transports sperm. This inflammation is known as epididymitis and without treatment it can lead to infertility.
* **Infection that spreads to the joints and other areas of the body.** The bacterium that causes gonorrhea can spread through the bloodstream and infect other parts of the body, including joints. Fever, rash, skin sores, joint pain, swelling and stiffness are possible results.
* **Increased risk of HIV/AIDS.** Having gonorrhea makes you more susceptible to infection with human immunodeficiency virus (HIV), the virus that leads to AIDS. People who have both gonorrhea and HIV can pass both diseases more readily to their partners.
* **Complications in babies.** Babies who get gonorrhea during birth can develop blindness, sores on the scalp and infections.

**Diagnosis**

* **Nucleic Acid Amplification Tests (NAATs)**: The most sensitive and commonly used tests, using urine samples or swabs from the cervix, urethra, throat, or rectum.
* **Culture Tests**: Used to determine antibiotic susceptibility, particularly in cases of suspected antibiotic resistance.
* **Gram Stain**: Can be used for a quick preliminary diagnosis in men with urethral discharge.

**Treatment**

* **Antibiotics**: Typically, a dual therapy is recommended due to increasing antibiotic resistance. Current CDC guidelines (as of 2023) recommend:
  + **Ceftriaxone** 500 mg intramuscularly as a single dose (for patients weighing less than 150 kg).
  + For possible co-infection with chlamydia, doxycycline 100 mg orally twice daily for 7 days is recommended if chlamydial infection has not been excluded.
* **Partner Notification and Treatment**: Essential to prevent re-infection and further spread.

**Prevention**

* **Use a condom if you have sex.** Not having sex and avoiding sexual activity is the surest way to prevent gonorrhea. But if you choose to have sex, use a condom during any type of sexual contact, including anal sex, oral sex or vaginal sex.
* **Limit your number of sex partners.** Being in a monogamous relationship in which neither partner has sex with anyone else can lower your risk.
* **Be sure you and your partner are tested for sexually transmitted infections.** Before you have sex, get tested and share the results with each other.
* **Don't have sex with someone who appears to have a sexually transmitted infection.** If someone has symptoms of a sexually transmitted infection, such as burning during urination or a genital rash or sore, don't have sex with that person.
* **Consider regular gonorrhea screening.** Annual screening is recommended for sexually active women younger than 25 and for older women at increased risk of infection. This includes women who have new sex partners, more than one sex partner, sex partners with other partners, or sex partners who have sexually transmitted infections

**Explanation of Infection Sites and Complications**

* **Rectum.** Symptoms include anal itching, pus-like discharge from the rectum, spots of bright red blood on toilet tissue and having to strain during bowel movements.
* **Eyes.** Gonorrhea that affects the eyes can cause eye pain, sensitivity to light, and pus-like discharge from one or both eyes.
* **Throat.** Symptoms of a throat infection might include a sore throat and swollen lymph nodes in the neck.
* **Joints.** If one or more joints become infected by the affected joints might be warm, red, swollen and extremely painful, especially during movement. This condition is known as septic arthritis.

**SYPHILIS**

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A sexually transmitted infection (STI) called syphilis is brought on by the bacteria Treponema pallidum. It is a multistage, intricate illness with a wide range of clinical symptoms. If syphilis is not treated, it can cause serious health problems that impact many organs and systems throughout the body. Bacteria create the illness known as syphilis. Sexual intercourse is how HPV spreads most frequently. The illness usually begins as a painless sore that develops on the mouth, genitalia, or rectum. It is through direct touch with these sores that syphilis is transmitted from person to person. In addition, it can be transferred to a child during pregnancy, delivery, and occasionally via nursing.

The syphilis germs can remain in the body for several years after infection without producing any symptoms. However, the infection can reactivate. Syphilis can harm the heart, brain, or other organs if left untreated. It may endanger your life. It is possible to treat early syphilis with a single dose of the antibiotic penicillin. For this reason, it's critical to schedule a medical examination as soon as you have any syphilis symptoms. The initial prenatal visit should include a syphilis test for all expectant mothers.

**Causative Agent**

* **Bacterium**: *Treponema pallidum*, a spirochete bacterium characterized by its corkscrew shape, which allows it to move in a distinctive, rotating manner.

**Transmission**

* **Sexual Contact**: Direct contact with a syphilitic sore (chancre) during vaginal, anal, or oral sex.
* **Non-Sexual Routes**:
  + Vertical transmission from mother to fetus during pregnancy, leading to congenital syphilis.
  + Rarely through blood transfusions or direct contact with infectious lesions.

**Stages and Symptoms**

Syphilis develops in stages. The symptoms vary with each stage. But the stages may overlap. And the symptoms don't always happen in the same order. You may be infected with syphilis bacteria without noticing any symptoms for years.

**Primary syphilis**

The first symptom of syphilis is a small sore called a chancre (SHANG-kur). The sore is often painless. It appears at the spot where the bacteria entered your body. Most people with syphilis develop only one chancre. Some people get more than one.

The chancre often forms about three weeks after you come in contact with syphilis bacteria. Many people who have syphilis don't notice the chancre. That's because it's usually painless. It also may be hidden within the vagina or rectum. The chancre heals on its own within 3 to 6 weeks.

**Secondary syphilis**

You may get a rash while the first chancre heals or a few weeks after it heals.

A rash caused by syphilis:

* Often is not itchy.
* May look rough, red or reddish-brown.
* Might be so faint that it's hard to see.

The rash often starts on the trunk of the body. That includes the chest, stomach area, pelvis and back. In time, it also could appear on the limbs, the palms of the hands and the soles of the feet.

Along with the rash, you may have symptoms such as:

* Wartlike sores in the mouth or genital area.
* Hair loss.
* Muscle aches.
* Fever.
* Sore throat.
* Tiredness, also called fatigue.
* Weight loss
* Swollen lymph nodes.

Symptoms of secondary syphilis may go away on their own. But without treatment, they could come and go for months or years.

**Latent syphilis**

If you aren't treated for syphilis, the disease moves from the secondary stage to the latent stage. This also is called the hidden stage because you have no symptoms. The latent stage can last for years. Your symptoms may never come back. But without treatment, the disease might lead to major health problems, also called complications.

**Tertiary syphilis**

After the latent stage, up to 30% to 40% of people with syphilis who don't get treatment have complications known as tertiary syphilis. Another name for it is late syphilis.

The disease may damage the:

* Brain.
* Nerves.
* Eyes.
* Heart.
* Blood vessels.
* Liver.
* Bones and joints.

These problems may happen many years after the original, untreated infection.

**Syphilis that spreads**

At any stage, untreated syphilis can affect the brain, spinal cord, eyes and other body parts. This can cause serious or life-threatening health problems.

**Congenital syphilis**

Pregnant people who have syphilis can pass the disease to their babies. Unborn babies can become infected through the organ that provides nutrients and oxygen in the womb, called the placenta. Infection also can happen during birth.

Newborns with congenital syphilis might have no symptoms. But without fast treatment, some babies might get:

* Sores and rashes on the skin.
* Fever.
* A type of discolored skin and eyes, called jaundice.
* Not enough red blood cells, called anemia.
* Swollen spleen and liver.
* Sneezing or stuffed, drippy nose, called rhinitis.
* Bone changes.

Later symptoms may include deafness, teeth problems and saddle nose, a condition in which the bridge of the nose collapses.Babies with syphilis also can be born too early. They may die in the womb before birth. Or they could die after birth.

**Serologic Tests**: Blood tests are the most common method for diagnosing syphilis.

* + **Nontreponemal Tests**: Rapid plasma reagin (RPR) and Venereal Disease Research Laboratory (VDRL) tests. These tests are used for screening and to monitor treatment response.
  + **Treponemal Tests**: Fluorescent treponemal antibody absorption (FTA-ABS) test and Treponema pallidum particle agglutination assay (TPPA). These tests are used to confirm the diagnosis.
* **Darkfield Microscopy**: Used to directly visualize *Treponema pallidum* from a chancre or other lesion.
* **Lumbar Puncture**: Performed if neurosyphilis is suspected, to analyze cerebrospinal fluid (CSF).

Without treatment, syphilis can lead to damage throughout the body. Syphilis also raises the risk of HIV infection and can cause problems during pregnancy. Treatment can help prevent damage. But it can't repair or reverse damage that's already happened.

**Small bumps or tumors**

Rarely in the late stage of syphilis, bumps called gummas can form on the skin, bones, liver or any other organ. Most often, gummas go away after treatment with medicine called antibiotics.

**Neurological problems**

Syphilis can cause many problems with the brain, its covering or the spinal cord. These issues include:

* Headache.
* Stroke.
* Meningitis, a disease that inflames the protective layers of tissue around the brain and spinal cord.
* Confusion, personality changes or trouble focusing.
* Symptoms that mimic dementia, such as loss of memory, judgment and decision-making skills.
* Not being able to move certain body parts, called paralysis.
* Trouble getting or keeping an erection, called erectile dysfunction.
* Bladder problems.

**Eye problems**

Disease that spreads to the eye is called ocular syphilis. It can cause:

* Eye pain or redness.
* Vision changes.
* Blindness.

**Ear problems**

Disease that spreads to the ear is called otosyphilis. Symptoms can include:

* Hearing loss.
* Ringing in the ears, called tinnitus.
* Feeling like you or the world around you is spinning, called vertigo.

**Heart and blood vessel problems**

These may include bulging and swelling of the aorta — the body's major artery — and other blood vessels. Syphilis also may damage heart valves.

**HIV infection**

Syphilis sores on the genitals raise the risk of catching or spreading HIV through sex. A syphilis sore can bleed easily. This provides an easy way for HIV to enter the bloodstream during sex.

**Pregnancy and childbirth complications**

If you're pregnant, you could pass syphilis to your unborn baby. Congenital syphilis greatly raises the risk of miscarriage, stillbirth or your newborn's death within a few days after birth.

**Treatment**

* **Primary, Secondary, and Early Latent Syphilis**:
  + **First-line Treatment**: Benzathine penicillin G, a single intramuscular injection.
  + **Alternative for Penicillin Allergy**: Doxycycline or tetracycline for 14 days.
* **Late Latent and Tertiary Syphilis**:
  + **First-line Treatment**: Benzathine penicillin G, three intramuscular injections at weekly intervals.
  + **Alternative for Penicillin Allergy**: Doxycycline or tetracycline for 28 days.
* **Neurosyphilis**:
  + **First-line Treatment**: Aqueous crystalline penicillin G administered intravenously for 10-14 days.
  + **Alternative for Penicillin Allergy**: Ceftriaxone may be used, although penicillin desensitization is preferred.

**Prevention**

* **Have safe sex or no sex.** The only certain way to avoid contact with syphilis bacteria is not to have sex. This is called abstinence. If a person is sexually active, safer sex means a long-term relationship in which you and your partner have sex only with each other, and neither of you is infected. Before you have sex with someone new, you should both get tested for syphilis and other sexually transmitted infections (STIs).
* **Use a latex condom.** Condoms can lower your risk of getting or spreading syphilis. But condoms work only if they cover an infected person's syphilis sores. Other types of birth control do not lower your risk of syphilis.
* **Be careful with alcohol and stay away from street drugs.** Drinking too much alcohol or taking drugs can get in the way of your judgment. Either can lead to unsafe sex.
* **Do not douche.** It can remove some of the healthy bacteria that's usually in the vagina. And that might raise your risk of getting STIs.
* **Breastfeed with caution.** Syphilis can pass from a parent to a baby during breastfeeding if sores are on one or both breasts. This can happen when the baby or pumping equipment touches a sore. To keep that from happening, pump or hand-express breastmilk from the breast with sores. Do so until the sores heal. If your pump touches a sore, get rid of the milk you just pumped.

**Diagram of Syphilis Progression**

Below is a diagram illustrating the progression of syphilis through its stages:

**Explanation of the Diagram:**

**Explanation of the Diagram:**

1. **Primary Stage**: Characterized by a chancre at the site of infection.
2. **Secondary Stage**: Includes skin rashes and mucous membrane lesions.
3. **Latent Stage**: No symptoms, but infection is present.
4. **Tertiary Stage**: Severe complications affecting various organs.

**HUMAN PAPILLOMAVIRUS (HPV)**

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Human Papillomavirus (HPV) is a group of more than 200 related viruses, with more than 40 strains transmitted through direct sexual contact. HPV is the most common sexually transmitted infection (STI) worldwide, affecting both men and women. Certain strains of HPV are associated with various cancers, while others cause benign conditions like genital warts.

**Types and Strains of HPV**

* **Low-Risk HPV**: Strains that typically cause benign conditions such as genital warts (e.g., HPV-6 and HPV-11).
* **High-Risk HPV**: Strains that are associated with cancers of the cervix, vulva, vagina, penis, anus, and oropharynx (e.g., HPV-16 and HPV-18).

**Transmission**

* **Sexual Contact**: Through vaginal, anal, and oral sex, and genital-to-genital contact.
* **Non-Sexual Routes**: Rarely, through vertical transmission from mother to baby during childbirth, leading to respiratory papillomatosis.

**Symptoms and Manifestations**

Most HPV infections are asymptomatic and clear on their own within two years. However, persistent infections with certain strains can lead to more serious health conditions.

**Benign Conditions**:

* **Genital Warts**: Small bumps or groups of bumps in the genital area, which can be raised, flat, or cauliflower-shaped.
* **Respiratory Papillomatosis**: Warts in the respiratory tract, particularly the larynx, which can cause breathing difficulties.

**Cancer-Associated Conditions**:

* **Cervical Cancer**: Most common HPV-related cancer, primarily caused by HPV-16 and HPV-18.
* **Other Anogenital Cancers**: Including cancers of the vulva, vagina, penis, and anus.
* **Oropharyngeal Cancer**: Affects the base of the tongue, tonsils, and throat.

**Diagnosis**

* **Cervical Cancer Screening (Pap Test and HPV Test)**: Detects precancerous changes in the cervix. Pap tests identify abnormal cells, while HPV tests detect the presence of high-risk HPV DNA.
* **Visual Examination**: Used to diagnose genital warts.
* **Biopsy**: Performed if precancerous or cancerous changes are suspected in tissues.

**Treatment**

There is no cure for HPV itself, but the health problems it causes can be treated.

**For Genital Warts**:

* **Topical Treatments**: Prescription creams and ointments (e.g., imiquimod, podophyllin, and sinecatechins).
* **Cryotherapy**: Freezing off warts with liquid nitrogen.
* **Surgical Removal**: Cutting away warts.
* **Electrocautery**: Burning off warts with an electrical current.
* **Laser Therapy**: Using light to remove warts.

**For Precancerous Lesions**:

* **Cryotherapy**: Freezing abnormal cells.
* **Loop Electrosurgical Excision Procedure (LEEP)**: Removing abnormal tissue with an electrical loop.
* **Conization**: Removing a cone-shaped section of abnormal tissue.

**For Cancers**:

* **Surgery**: Removal of the tumor.
* **Radiation Therapy**: Using high-energy radiation to kill cancer cells.
* **Chemotherapy**: Using drugs to kill cancer cells.
* **Targeted Therapy**: Drugs that target specific pathways involved in cancer growth.

**Prevention**

* **Vaccination**: HPV vaccines are highly effective in preventing infections with the most common cancer-causing and wart-causing strains.
  + **Gardasil**: Protects against HPV-6, HPV-11, HPV-16, and HPV-18.
  + **Gardasil 9**: Protects against nine HPV strains (HPV-6, HPV-11, HPV-16, HPV-18, HPV-31, HPV-33, HPV-45, HPV-52, and HPV-58).
  + **Cervarix**: Protects against HPV-16 and HPV-18.
* **Regular Screening**: Pap tests and HPV tests for women to detect precancerous changes.
* **Condom Use**: Reduces the risk of HPV transmission but is not 100% effective because HPV can infect areas not covered by a condom.
* **Education and Awareness**: Promoting safe sexual practices and the importance of vaccination and regular screening.

**Explanation of the Diagram:**

1. **HPV Infection**: Through sexual contact, HPV infects epithelial cells.
2. **Possible Outcomes**:
   * Spontaneous clearance of the virus.
   * Persistent infection leading to genital warts (low-risk HPV) or cancer (high-risk HPV).
3. **Prevention**:
   * Vaccination before exposure to HPV.
   * Regular cervical screening to detect precancerous changes.
   * Condom use to reduce risk of transmission.

**HUMAN IMMUNODEFICIENCY VIRUS(HIV)**

The virus known as HIV targets the body's immune system, particularly the CD4 cells (T cells), which are essential for battling infections. The most severe stage of HIV infection, acquired immunodeficiency syndrome (AIDS), can result from HIV infection if treatment is not received. HIV cannot be cured at this time, but it may be managed with the right medical attention. AIDS, also known as acquired immunodeficiency syndrome, is a persistent illness. HIV, commonly known as the human immunodeficiency virus, is the cause of it. HIV weakens the immune system, making the body less capable of fending off illness and infection. It may take years for HIV to impair immune function to the point where AIDS develops if treatment is not received. Because of therapy, the majority of Americans don't get AIDS

HIV may spread during intercourse without the use of a condom or other contact with genitalia. An infection of this kind is referred to as a sexually transmitted infection, or STI. HIV can also transmitted through blood contact, such as sharing syringes or needles. HIV can also be passed from an untreated individual to a kid through pregnancy, delivery, or nursing.HIV/AIDS cannot be cured. However, medications can manage the infection and prevent the illness from worsening. Worldwide AIDS fatalities have decreased as a result of antiviral therapies for HIV. There is continuous work to increase access to HIV/AIDS prevention and treatment in low-resource nations.

**Causative Agent**

* **Virus**: HIV is a retrovirus belonging to the family Retroviridae and the genus Lentivirus. It has two main types: HIV-1 (most common worldwide) and HIV-2 (mainly found in West Africa).

**Transmission**

* **Sexual Contact**: Through unprotected vaginal, anal, and oral sex with an infected person.
* **Blood**: Sharing needles, syringes, or other drug injection equipment; receiving contaminated blood transfusions, blood products, or organ/tissue transplants.
* **Mother-to-Child**: During pregnancy, childbirth, or breastfeeding.
* **Occupational Exposure**: Healthcare workers exposed to infected blood or body fluids.

**Primary infection, also called acute HIV**

Some people infected by HIV get a flu-like illness within 2 to 4 weeks after the virus enters the body. This stage may last a few days to several weeks. Some people have no symptoms during this stage.

Possible symptoms include:

* Fever.
* Headache.
* Muscle aches and joint pain.
* Rash.
* Sore throat and painful mouth sores.
* Swollen lymph glands, also called nodes, mainly on the neck.
* Diarrhea.
* Weight loss.
* Cough.
* Night sweats.

These symptoms can be so mild that you might not notice them. However, the amount of virus in your bloodstream, called viral load, is high at this time. As a result, the infection spreads to others more easily during primary infection than during the next stage.

**Clinical latent infection, also called chronic HIV**

In this stage of infection, HIV is still in the body and cells of the immune system, called white blood cells. But during this time, many people don't have symptoms or the infections that HIV can cause.

This stage can last for many years for people who aren't getting antiretroviral therapy, also called ART. Some people get more-severe disease much sooner.

**Symptomatic HIV infection**

As the virus continues to multiply and destroy immune cells, you may get mild infections or long-term symptoms such as:

* Fever.
* Fatigue.
* Swollen lymph glands, which are often one of the first symptoms of HIV infection.
* Diarrhea.
* Weight loss.
* Oral yeast infection, also called thrush.
* Shingles, also called herpes zoster.
* Pneumonia.

**Progression to AIDS**

Better antiviral treatments have greatly decreased deaths from AIDS worldwide. Thanks to these lifesaving treatments, most people with HIV in the U.S. today don't get AIDS. Untreated, HIV most often turns into AIDS in about 8 to 10 years.

Having AIDS means your immune system is very damaged. People with AIDS are more likely to develop diseases they wouldn't get if they had healthy immune systems. These are called opportunistic infections or opportunistic cancers. Some people get opportunistic infections during the acute stage of the disease.

The symptoms of some of these infections may include:

* Sweats.
* Chills.
* Fever that keeps coming back.
* Ongoing diarrhea.
* Swollen lymph glands.
* Constant white spots or lesions on the tongue or in the mouth.
* Constant fatigue.
* Weakness.
* Rapid weight loss.
* Skin rashes or bumps.

**Diagnosis**

* **HIV Tests**:
  + **Antibody Tests**: Detect antibodies to HIV in blood or oral fluids. Most rapid tests and home tests are antibody tests.
  + **Antigen/Antibody Tests**: Detect both HIV antibodies and antigens (p24). These tests can detect HIV earlier than antibody tests.
  + **Nucleic Acid Tests (NATs)**: Detect the virus itself and are used for early detection or when acute HIV infection is suspected.
* **CD4 Count**: Measures the number of CD4 cells in the blood, used to monitor immune function.
* **Viral Load Test**: Measures the amount of HIV in the blood, used to monitor the effectiveness of treatment.

**Treatment**

* **Antiretroviral Therapy (ART)**: The standard treatment for HIV, involving a combination of HIV medicines (usually three or more) to control the virus. ART helps maintain a low viral load, keeps the immune system functioning, and reduces the risk of transmission.
* **Opportunistic Infection Management**: Prophylaxis and treatment for opportunistic infections and HIV-related complications.

**Infections common to HIV/AIDS**

* **Pneumocystis pneumonia, also called PCP.** This fungal infection can cause severe illness. It doesn't happen as often in the U.S. because of treatments for HIV/AIDS. But PCP is still the most common cause of pneumonia in people infected with HIV.
* **Candidiasis, also called thrush.** Candidiasis is a common HIV-related infection. It causes a thick, white coating on the mouth, tongue, esophagus or vagina.
* **Tuberculosis, also called TB.** TB is a common opportunistic infection linked to HIV. Worldwide, TB is a leading cause of death among people with AIDS. It's less common in the U.S. thanks to the wide use of HIV medicines.
* **Cytomegalovirus.** This common herpes virus is passed in body fluids such as saliva, blood, urine, semen and breast milk. A healthy immune system makes the virus inactive, but it stays in the body. If the immune system weakens, the virus becomes active, causing damage to the eyes, digestive system, lungs or other organs.
* **Cryptococcal meningitis.** Meningitis is swelling and irritation, called inflammation, of the membranes and fluid around the brain and spinal cord, called meninges. Cryptococcal meningitis is a common central nervous system infection linked to HIV. A fungus found in soil causes it.
* **Toxoplasmosis.** This infection is caused by Toxoplasma gondii, a parasite spread primarily by cats. Infected cats pass the parasites in their stools. The parasites then can spread to other animals and humans.

Toxoplasmosis can cause heart disease. Seizures happen when it spreads to the brain. And it can be fatal.

**Cancers common to HIV/AIDS**

* **Lymphoma.** This cancer starts in the white blood cells. The most common early sign is painless swelling of the lymph nodes most often in the neck, armpit or groin.
* **Kaposi sarcoma.** This is a tumor of the blood vessel walls. Kaposi sarcoma most often appears as pink, red or purple sores called lesions on the skin and in the mouth in people with white skin. In people with Black or brown skin, the lesions may look dark brown or black. Kaposi sarcoma also can affect the internal organs, including the lungs and organs in the digestive system.
* **Human papillomavirus (HPV)-related cancers.** These are cancers caused by HPV infection. They include anal, oral and cervical cancers.

**Other complications**

* **Wasting syndrome.** Untreated HIV/AIDS can cause a great deal of weight loss. Diarrhea, weakness and fever often happen with the weight loss.
* **Brain and nervous system, called neurological, complications.** HIV can cause neurological symptoms such as confusion, forgetfulness, depression, anxiety and difficulty walking. HIV-associated neurological conditions can range from mild symptoms of behavior changes and reduced mental functioning to severe dementia causing weakness and not being able to function.
* **Kidney disease.** HIV-associated nephropathy (HIVAN) is swelling and irritation, called inflammation, of the tiny filters in the kidneys. These filters remove excess fluid and waste from the blood and pass them to the urine. Kidney disease most often affects Black and Hispanic people.
* **Liver disease.** Liver disease also is a major complication, mainly in people who also have hepatitis B or hepatitis C.

## Prevention

There's no vaccine to prevent HIV infection and no cure for HIV/AIDS. But you can protect yourself nd others from infection.

To help prevent the spread of HIV:

* **Consider pre exposure prophylaxis, also called PrEP.** There are two PrEP medicines taken by mouth, also called oral, and one PrEP medicine given in the form of a shot, called injectable. The oral medicines are emtricitabine-tenofovir disoproxil fumarate (Truvada) and emtricitabine-tenofovir alafenamide fumarate (Descovy). The injectable medicine is called cabotegravir (Apretude). PrEP can reduce the risk of sexually transmitted HIV infection in people at very high risk.PrEP can reduce the risk of getting HIV from sex by about 99% and from injecting drugs by at least 74%, according to the Centers for Disease Control and Prevention. Descovy hasn't been studied in people who have sex by having a penis put into their vaginas, called receptive vaginal sex.

Cabotegravir (Apretude) is the first U.S. Food and Drug Administration-approved PrEP that can be given as a shot to reduce the risk of sexually transmitted HIV infection in people at very high risk. A healthcare professional gives the shot. After two once-monthly shots, Apretude is given every two months. The shot is an option in place of a daily PrEP pill.Your healthcare professional prescribes these medicines to prevent HIV only to people who don't already have HIV infection. You need an HIV test before you start taking any PrEP. You need to take the test every three months for the pills or before each shot for as long as you take PrEP.

You need to take the pills every day or closely follow the shot schedule. You still need to practice safe sex to protect against other STIs. If you have hepatitis B, you should see an infectious disease or liver specialist before beginning PrEP therapy.

* **Use treatment as prevention, also called TasP.** If you have HIV, taking HIV medicines can keep your partner from getting infected with the virus. If your blood tests show no virus, that means your viral load can't be detected. Then you won't transmit the virus to anyone else through sex.

If you use TasP, you must take your medicines exactly as prescribed and get regular checkups.

* **Use post-exposure prophylaxis, also called PEP, if you've been exposed to HIV.**If you think you've been exposed through sex, through needles or in the workplace, contact your healthcare professional or go to an emergency room. Taking PEP as soon as you can within the first 72 hours can greatly reduce your risk of getting HIV. You need to take the medicine for 28 days.
* **Use a new condom every time you have anal or vaginal sex.** Both male and female condoms are available. If you use a lubricant, make sure it's water based. Oil-based lubricants can weaken condoms and cause them to break.During oral sex, use a cut-open condom or a piece of medical-grade latex called a dental dam without a lubricant.
* **Tell your sexual partners you have HIV.** It's important to tell all your current and past sexual partners that you're HIV positive. They need to be tested.
* **Use clean needles.** If you use needles to inject illicit drugs, make sure the needles are sterile. Don't share them. Use needle-exchange programs in your community. Seek help for your drug use.
* **If you're pregnant, get medical care right away.** You can pass HIV to your baby. But if you get treatment during pregnancy, you can lessen your baby's risk greatly.
* **Consider male circumcision.** Studies show that removing the foreskin from the penis, called circumcision, can help reduce the risk of getting HIV infection.

**Explanation of the Diagram:**

1. **Binding and Fusion**: HIV binds to the CD4 receptor and co-receptors on the surface of a T cell and fuses with the cell membrane.
2. **Reverse Transcription**: HIV RNA is converted into DNA by the enzyme reverse transcriptase.
3. **Integration**: The viral DNA is integrated into the host cell’s DNA by the enzyme integrase.
4. **Replication**: The virus uses the host cell’s machinery to produce viral RNA and proteins.
5. **Assembly**: New viral particles are assembled.
6. **Budding and Maturation**: The new virus particles bud off from the host cell, and the enzyme protease processes viral proteins to create mature, infectious virus particles.

**HEPETITIS B & C**

Two different viruses that can result in serious liver illnesses and inflammation of the liver are the hepatitis B virus (HBV) and the hepatitis C virus (HCV). Acute and chronic infections can result from both viruses; persistent infections carry a substantial danger to long-term health, including cirrhosis of the liver, liver failure, and hepatocellular carcinoma (liver cancer). In order to manage and prevent hepatitis B and C infections, it is crucial to comprehend the routes of transmission, preventative measures, and accessible therapies. An illness caused by a virus called hepatitis C results in inflammation, or swelling of the liver. Liver damage from hepatitis C can be quite significant. Blood that carries the hepatitis C virus (HCV) in it can be shared by coming into contact with it.Most patients with a continuous hepatitis C infection, often known as a chronic infection, respond well to therapy with more recent antiviral medications. These medicines often can cure chronic hepatitis C.But many people with hepatitis C don't know they have it. That's mainly because symptoms can take decades to appear. So, the U.S. Preventive Services Task Force recommends that all adults ages 18 to 79 years be screened for hepatitis C

#### Hepatitis B (HBV)

##### Transmission:

* **Perinatal**: Mother-to-child transmission during childbirth.
* **Parenteral**: Exposure to infected blood or body fluids through injection drug use, needlestick injuries, or unsafe medical procedures.
* **Sexual Contact**: Unprotected sexual contact with an infected person.
* **Vertical Transmission**: From mother to child during pregnancy.

##### **Symptoms**:

* **Acute Hepatitis B**: Symptoms may include fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, clay-colored stools, joint pain, and jaundice.
* **Chronic Hepatitis B**: Often asymptomatic but can lead to cirrhosis, liver failure, and liver cancer over time.

##### **Diagnosis**:

* **Hepatitis B Surface Antigen (HBsAg)**: Detects presence of the virus in the blood, indicating acute or chronic infection.
* **Liver Function Tests (LFTs)**: Measure levels of liver enzymes and assess liver function.
* **Hepatitis B DNA Test**: Measures viral load and assesses disease progression.
* **Liver Biopsy**: Determines extent of liver damage and presence of fibrosis or cirrhosis.

##### **Treatment**:

* **Antiviral Medications**: Drugs such as interferon-alpha, pegylated interferon-alpha, and nucleoside or nucleotide analogues (e.g., entecavir, tenofovir) can suppress viral replication and reduce liver damage.
* **Liver Transplantation**: For patients with end-stage liver disease or liver cancer.

#### *Hepatitis C (HCV)*

##### **Transmission:**

* **Parenteral**: Most common mode, through exposure to infected blood or blood products, sharing needles or syringes, or unsafe medical procedures.
* **Perinatal**: Mother-to-child transmission during childbirth, although less common than with hepatitis B.
* **Sexual Contact**: Less efficient mode of transmission compared to hepatitis B, but still possible, especially among individuals with multiple sexual partners**.**

##### **Symptoms:**

Every long-term hepatitis C infection starts with what's called an acute phase. Acute hepatitis C usually isn't diagnosed because it rarely causes symptoms. When there are symptoms in this phase, they may include jaundice, fatigue, nausea, fever and muscle aches.

Long-term infection with the hepatitis C virus is called chronic hepatitis C. Chronic hepatitis C usually has no symptoms for many years. Symptoms appear only after the virus damages the liver enough to cause them.

**Symptoms can include:**

* Bleeding easily.
* Bruising easily.
* Fatigue.
* Not wanting to eat.
* Yellowing of the skin, called jaundice. This might show up more in white people. Also, yellowing of the whites of the eyes in white, Black and brown people.
* Dark-colored urine.
* Itchy skin.
* Fluid buildup in the stomach area, called ascites.
* Swelling in the legs.
* Weight loss.
* Confusion, drowsiness and slurred speech, called hepatic encephalopathy.
* Spiderlike blood vessels on the skin, called spider angiomas.

Acute hepatitis C infection doesn't always become chronic. Some people clear the infection from their bodies after the acute phase. This is called spontaneous viral clearance. Antiviral therapy also helps clear acute hepatitis C.

##### **Diagnosis**:

* **Hepatitis C Antibody Test**: Detects antibodies to HCV in the blood, indicating past or current infection.
* **HCV RNA Test (PCR)**: Measures viral load and confirms active infection.
* **Liver Function Tests (LFTs)**: Assess liver enzymes and liver function.

##### **Treatment**:

* **Direct-Acting Antiviral (DAA) Medications**: Highly effective and well-tolerated drugs that target specific steps in the HCV lifecycle, leading to cure rates exceeding 95%.
* **Liver Transplantation**: For patients with end-stage liver disease or liver cancer.

#### Prevention Strategies for Hepatitis B and C

##### ***Hepatitis B:***

* **Vaccination**: Safe and effective vaccine available to prevent hepatitis B infection.
* **Safe Injection Practices**: Proper sterilization of medical equipment and use of sterile needles and syringes.
* **Prevent Perinatal Transmission**: Screening pregnant women for HBsAg and providing antiviral treatment and vaccination to newborns born to HBsAg-positive mothers.

##### ***Hepatitis*** C:

* **Needle Exchange Programs**: Providing clean needles and syringes to reduce the risk of blood-borne transmission among injection drug users.
* **Screening and Testing**: Identifying individuals at risk for HCV infection and providing access to testing and treatment.
* **Blood Safety Measures**: Ensuring the safety of blood transfusions and blood products through rigorous screening and testing protocols.

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