Introduction to HIV & AIDS

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Slide 1

Topics covered

- Basic terms and definitions
- Stages of HIV infection
- How HIV is transmitted
- How HIV infection can be avoided
- A short history of the HIV pandemic
Slide 2

Test your knowledge

- Having HIV means you have AIDS  □ true □ false
- Having AIDS means you have HIV  □ true □ false
- Having HIV means you are ill, or look ill  □ true □ false
- HIV can pass through a condom  □ true □ false
- You can get HIV by caring for people with AIDS  □ true □ false
- Most people get HIV through sex  □ true □ false
- All babies born to mothers with HIV will get HIV  □ true □ false
- HIV drug therapy reduces the risk of getting AIDS  □ true □ false

Ways to use this quiz during training

This quiz can be used in several different ways.

Facilitators should tell the trainees that the idea is not to get the answers right but to stimulate later discussion.

Trainees can simply answer the questions themselves and compare them against things they learn later.

They can discuss the answers in small groups but the facilitator can tell the whole group that s/he will not give the answers immediately as they should become clear during the training session. Or they can give the answers but say the reasons for them will become clear later.

Or an experienced facilitator can use the answers to stimulate group discussion, which can be used to dictate the pace and content of the session. In this case the facilitator could bring up specific slides as topics are raised, but need to make sure that all topics are covered.
What is HIV?

**HIV**

Human Immunodeficiency Virus

**Human** = transmitted between people

**Immunodeficiency** = destroys the body’s ability to fight disease

**Virus** = a tiny germ or infectious agent passed between people

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Human = transmitted between humans, not transmitted from animals. HIV is caught passed on from human to human. It is not transmitted via bites from mosquitoes, bats or any other species, or from close contact with animals.

It does appear to have come from Chimpanzees originally, possibly around 1930. Possibly due to infection in hunters butchering chimpanzees for bushmeat. A virus called SIV which common in chimpanzees, but which does not cause disease, adapted to reproduce – and cause disease – in humans. That was HIV-1. A different monkey virus became HIV-2, a less virulent immunodeficiency virus which is only common in west Africa.

But the point is that HIV is now an exclusively human infection.

Immunodeficiency. The body has a complex array of defences against invading germs and foreign substances. These defences are collectively called the Immune System. HIV slowly causes the immune system to become deficient. This means less efficient at fighting diseases, until the body reaches a point when it cannot defend itself against illnesses that would not normally trouble people. When this happens, the collection of illnesses that result is caused AIDS.

HIV does this because it infects and destroys a particular part of the immune system – the T-cells and in particular the CD4 or T-helper cells. These cells direct the operation of other parts of the immune system and without them it cannot fight diseases efficiently. It is as if HIV kills off the immune system’s commanding officers or recruits them to its own side.

Virus. A virus is an extremely small germ or microbe, much smaller than the bacteria or parasites that cause diseases like TB or malaria. Other familiar viruses are the ones that cause colds, flu, hepatitis, some kinds of diarrhoea, plus lethal but thankfully rare ones like SARS and Ebola. Certain kinds of cancer are also caused by viruses.

A virus is a very simple organism – the simplest and smallest thing that can still be called ‘alive’. It only does one thing – it copies itself.

To do this, it has to get inside the cells that make up the tissues of your body. It then hijacks the normal machinery cells use to grow and divide to produce millions of new copies of the virus. It is like an invading force of robots taking over a manufacturing plant and using it to make new robots.
What is AIDS?

**Acquired** means it is an infection, caught from another person. There are other rare forms of immune deficiency that are inborn, passed on from the family line or due to chance. Some drugs can suppress the immune system and are sometimes used to stop transplant rejection or control illnesses like lupus that are caused by an over-active immune system.

Milder types of immune deficiency can be caused by stress, worry, fatigue, poor nutrition, drink and drug use, and other illnesses. But these are temporary, can be corrected by removing stress and improving nutrition, and are far less severe than the immune deficiency seen in AIDS.

**Immune Deficiency** – see above. The profound immune deficiency seen in AIDS develops over a period of time ranging from 3-15 years or even longer. See next slide for more details.

The time taken to reach this stage depends on factors like how much HIV you were originally infected with, whether it is a virulent or mild strain, whether your body is able to mount an efficient defence against it, and also – importantly – your general state of health.

**Syndrome** – a syndrome is a characteristic collection of illnesses that when they are seen together suggest a common cause. HIV causes little illness directly. When you catch it you may get a temporary flu-like illness. And long-term HIV infection can damage the brain, nervous system and guts. But in general AIDS is a characteristic collection of illnesses caused by other germs that the body has lost the ability to fight.

AIDS may present in all sorts of different ways. The common factor is that the body has lost its ability to fight infection.

See next slide for more details
Stages of HIV infection

1. HIV antibody positive – newly infected
2. Asymptomatic HIV infection
3. Symptomatic HIV infection
4. AIDS diagnosis

Stages of HIV disease (WHO clinical stages)

These are also called ‘Stages 1-4’ of HIV infection.

**Stage 1:** Soon after infection with HIV (one to two months) you may experience a feverish illness accompanied by symptoms that can include sore throat, ulcers in the mouth, rash, weight loss and loss of appetite. This illness is called a seroconversion illness because it happens at the same time as antibodies to HIV begin to appear in the blood. A person is said to seroconvert from HIV-negative to HIV-positive at this time.

People with HIV are probably at their most infectious in the period before antibodies appear.

60-90 days after infection antibodies to HIV are detectable in the vast majority of people infected with the virus. If an HIV test is carried out less than two to three months after a potential exposure to the virus the result may not be accurate.

**Stage 2:** A long period of asymptomatic infection follows. Importantly, during the period of asymptomatic HIV infection you will usually **neither look nor feel ill.** On average it takes around 9 years for an individual to progress from infection with HIV to AIDS but a small minority can develop AIDS very quickly, within one to three years. During stage 2 HIV infection minor symptoms may trouble people, including skin rashes, fungal infections of the toenails, cracking at the corner of the mouth and severe itchy eruptions of the skin as a result of insect bites. Recurrent ear, nose and throat infections may also be a problem.
Stages of HIV infection (2)

1. HIV antibody positive – newly infected
2. Asymptomatic HIV infection
3. Symptomatic HIV infection
4. AIDS diagnosis

Symptomatic HIV infection (Stage 3)

Before the development of AIDS-defining illnesses people with HIV may experience a long period of declining health. During stage 3 individuals might be expected to develop some or all of these symptoms:

- Oral thrush
- Vaginal thrush
- Chronic diarrhoea that has lasted at least one month
- Serious bacterial infections of the lungs, infections of wounds that will not go away without antibiotic treatment
- TB
- White furry patches on the side of the tongue (oral hairy leucoplakia)
- A feverish state for much of the time in the past month
- Weight loss of at least 10% of the body weight

At this stage, people with HIV infection are likely to be spending much more time in bed than usual, but will be able to go about their normal lives for at least half the days in the previous month.
How badly affected does your immune system have to be before you get AIDS?

One definition is the **CD4 count**. This measures the amount of T-helper or CD4 cells you have in your blood. Healthy people may have anything between 500 and 1500 CD4 cells in a small amount of blood. If you have below 200, this is one definition of AIDS, and is usually seen as an indication that the person should start anti-HIV therapy – if it is available.

Once the CD4 cell count falls below 200 cells the risk of opportunistic infections increases.

Particular illness like PCP pneumonia are **‘Aids defining’** meaning if you have the illness and **have HIV** then you are regarded as having AIDS. Certain less serious illnesses, or milder versions of AIDS-defining illnesses, may be seen before the person develops AIDS. These include weight loss, skin infections, diarrhoea, fungal infections like candida (thrush) and some viral illnesses like shingles and herpes.

The **time** taken to develop symptomatic HIV infection or AIDS depends on factors like how much HIV you were originally infected with, whether it is an aggressive or mild strain, whether your body is able to mount an efficient defence against it, and also – importantly – your general state of health. People tend to reach the AIDS stage faster in developing countries. This may be to do with the properties of different strains of HIV but is more likely to do with poor nutrition and infection with other diseases. A few people with HIV (1-2%) seem to be able to fight it off for much longer without getting ill.

The illnesses characteristic of AIDS vary from place to place. In the developed world the most common illnesses – or the ones that used to be seen before HIV therapy came along – were a type of pneumonia called PCP (Pneumocystis carinii pneumonia) and a skin cancer called Kaposi’s sarcoma. In developing countries tuberculosis – TB – is the most common AIDS-defining illness. You can of course get TB without having HIV but people with immune deficiency are far more likely to get it. Other common illnesses are cryptococcal meningitis, candida (thrush) of the throat and illnesses that cause diarrhoea and severe weight loss.
What is AIDS?

To summarise:
- HIV is the tiny virus (‘germ’) that is transmitted
- In most cases it goes on to cause illness (3-15 years)
- AIDS is the collection of illnesses people develop
- You can have HIV without having AIDS. Many people with HIV look, and are, fit and healthy.
- You can’t have AIDS without having caught HIV
- People talk about ‘HIV/AIDS’ as if they were the same thing. They're not. Infection with HIV means you might get ill. Having AIDS generally means you are ill.
How HIV is transmitted

The most important ways in which HIV is transmitted are:

- Sexual intercourse without a condom between a person with HIV and a person without HIV
- Introduction of blood containing HIV into the body via:
  - Needles or syringes containing blood that have been used in hospitals or to inject drugs
  - Blood transfusion which has not been screened for HIV

Viral load testing during treatment

**Sexual intercourse** without a condom between a person with HIV and a person without HIV – HIV is present in a man’s semen and a woman’s vaginal fluid. Use of a condom through sexual intercourse prevents transmission of HIV.

HIV can also be transmitted through **anal intercourse** – sex during which the penis is inserted into the anus (back passage). This form of intercourse is commonly practiced between men and women all over the world, often as a form of birth control. Anal intercourse is also practiced by men who have sex with men and is the way in which the virus is transmitted between men. The risk of HIV transmission from the active partner by this route is very high because bleeding is likely during anal intercourse. Anal intercourse is probably the highest risk sexual activity.

HIV can be transmitted if **fresh blood** is introduced into your body, either through injecting equipment that has just been used on someone else or through a blood transfusion that has not been screened for HIV.

Injecting equipment such as needles and syringes should never be re-used in hospitals or clinics, and cutting instruments used in surgery or circumcision, for example, should be sterilised with boiling water before use on another person.

**Injecting drugs users** should avoid sharing injecting equipment – the highest risk comes from blood taken up into the syringe and needle.

**Blood transfusions** which are not screened (i.e. come from a donor who has not been tested for HIV antibodies and/or who may have had a risk exposure within the previous three months) may also be a route of transmission.
Log scale

HIV transmission from mother to child is the final, important route of transmission.

HIV can be transmitted during pregnancy in the womb.

The virus is most likely to be transmitted from mother to child during childbirth, due to presence of blood in the birth canal. Several factors increase the risk, including long labour and high levels of virus in the mother’s blood.

The virus can also be transmitted in breast milk throughout the breastfeeding period. The risk is increased if the mother has advanced HIV disease (CD4 count below 200).
If a person has been infected with HIV, the virus is most likely to be found in:

- Blood
- Semen – it may also be present in the fluid which leaks from the penis before ejaculation. HIV may be present in semen even when a man is receiving ARV treatment. Sexually transmitted infections such as gonorrhoea increase the amount of HIV in a man’s semen.
- Vaginal fluid – the virus reaches its highest levels in vaginal fluid just before menstruation because the female hormones which trigger ovulation and menstruation also increase HIV production from cells in the vagina and the cervix (neck of the womb).
- Breast milk – the virus is present in breast milk and is transmitted to infants during breastfeeding – the longer a child is breastfed, the greater the risk of transmission. Women with more advanced disease (CD4 cell count below 200 cells) are also more likely to transmit HIV.
HIV is present in very small quantities that are highly unlikely to be infectious in:

- **Saliva** – this contains a number of natural defences against HIV that reduce the chance of the virus getting into the bloodstream, or living in the saliva if a person is infected with HIV through some other route. These include antibodies that can be found with a saliva-based antibody test. These defences also mean that the virus cannot live easily in saliva and so cannot be passed on through kissing, using the same plates or cups as people with HIV or eating the same food.

- **Tears** – it is very difficult to find HIV in tears

- **Blister fluid** – the same applies to fluid from blisters

- **Urine** – Although HIV antibodies are detectable in urine, it has never been possible to isolate HIV capable of infecting others from the urine of people with HIV. Using the same lavatory as a person with HIV does not pose a risk.

- **Faeces** – It has never been possible to isolate infectious HIV from faeces. Using the same lavatory as people with HIV does not pose a risk. Caring for people with HIV who are suffering from diarrhoea or incontinence does not pose a risk.
How HIV is NOT transmitted

- Ways you CAN'T catch HIV...
  - Through unbroken, healthy skin or a healthy mouth
  - Caring for people with AIDS or HIV
  - By breathing it in
  - Kissing
  - Mouth to mouth resuscitation
  - Through a properly-used condom
  - From mosquitoes or other animals
  - Caring for people with AIDS or HIV
  - Sharing plates, cups, knives, towels etc
  - Sharing toilets

Through unbroken skin: Unbroken skin means unwounded or without other conditions that might cause broken skin such as eczema. HIV cannot pass through the skin or through the lining of the mouth if it is unbroken.

Caring for people with HIV: This is also the reason why you can’t get HIV from simply caring for a person with the infection, or from sharing knives, cups, towels or the toilet with them. HIV is not easily spread. It is not like easily-transmitted germs that can be breathed in (such as cold and influenza viruses and the TB bacterium) or transmitted through touch (like food poisoning bacteria). It has to be transported straight from inside one person’s body, in a fresh (not dried) infectious body fluid, to the inside of another person’s body. Rare situations where doctors have caught it from patients, or vice versa, are covered later.

Kissing: HIV has been found in saliva, but only in a few samples and not in enough quantity to be infectious. There are substances in saliva that kill HIV.

Properly-used condom: means keeping it on from the moment of insertion to the moment of withdrawal. Putting it on halfway through but before ejaculation is not safe. Remember that condoms can split if not enough lubricant or if oil-based lubricant is used. HIV cannot pass through the rubber of a condom.
How HIV is NOT transmitted (2)

- HIV is not transmitted by mosquitoes or other insects that draw blood

Mosquitoes. Mosquitoes can transmit malaria because the malaria parasite can reproduce in mosquitoes as well as humans, and indeed does so in enormous quantities in the mosquito’s gut. When the mosquito bites it injects the malaria parasite along with its saliva.

But HIV is not an insect virus and cannot reproduce inside mosquitoes. They do not suck blood from one person and inject it into another. The only HIV is a minuscule quantity that could possibly be carried around on the mosquito’s proboscis – and this a) will certainly not contain enough HIV to cause an infection b) will die rapidly on exposure to air.
You don't get HIV just by...

- HIV infection in itself is not caused by
  - Being gay
  - Being a prostitute
  - Being a drug user
  - Being a prisoner
  - Having a lot of sex partners
  - Being an ‘immoral person’
  - Being poor
- These sorts of people may be more likely to catch HIV because they may be more likely to do certain risky things – or do them more often.
- But it isn’t who you are, it’s what you do that counts

If you are a gay man, a prostitute, and intravenous drug user, have been in prison, have had lots of sex partners and so on there is what scientists call an association between being one of those types of people and being HIV positive. This is because you are more likely to have done things that expose you to HIV.

However being one of the above types of people does not cause you to have HIV. The majority of gay men in Europe and North America, for instance, do not have HIV. Having a lot of sex partners does not mean you will have HIV. There are people who are HIV negative despite having a lot of partners – possibly because they have always used condoms, possibly because they have a degree of natural resistance to catching HIV, sometimes through sheer luck.

Equally there are people with HIV who have caught it through their one and only sexual experience. It is estimated, for instance, that 80-90% of HIV positive women in India have caught HIV from their first and only sexual partner – their boyfriend or husband.
Conditions for HIV transmission

- HIV is only transmitted:
  - QUANTITY: If there is enough HIV in the body fluid
  - QUALITY: If the HIV is still infectious
  - ROUTE: If there is a way for it to get into the body

Quantity

Only certain body fluids have enough HIV in them to be infectious. These are blood, men’s semen and pre-seminal fluid (‘pre-cum’), women’s vaginal secretions, and breast milk. There is also HIV in fluids you are less likely to come into contact with such as pus and cerebro-spinal fluid (the fluid surrounding the brain and spinal cord).

There is not enough HIV to be infectious in: saliva, tears, sweat, urine, faeces, vomit, or the fluid in blisters.

A person has to have enough HIV even in blood, semen and so on to be infectious. The amount of HIV in these fluids is usually much lower if the person is on successful anti-retroviral therapy.

On the other hand there may be much more HIV in their body fluids than average if they:

- Are in the first few months of infection
- Are sick with AIDS
- Via their semen or vaginal fluid if they have certain sexually transmitted diseases such as herpes or gonorrhoea (even if they have no detectable HIV in their blood)

Quality

HIV can survive in dried blood, but there has never been a case of infection through used medical equipment or old blood. It has to be fresh.

HIV is easily destroyed by heat (over 60°C), acids or alkalis, and bleach

Route

HIV has to get into the body. It can get through fresh wounds (especially ones you might not notice inside body cavities) or by being injected.

In sex, HIV is actively carried into the body by cells that line the vagina, rectum, urethra and the inside of the foreskin. The rectum and gut are particularly full of these cells which is why anal sex is such a good transmitter. Equally, circumcised men are generally less likely to catch HIV than uncircumcised men (only about 25% as likely) if they are having sex with women, or probably if they are the insertive (‘active’) partner with a man.

Some people are more vulnerable to HIV infection than others. As well as uncircumcised men, young women under 20 are more likely to catch HIV than older women. The high rates of HIV infection in Africa and some other countries are thought to be largely due to women having sex at an early age.
### How HIV is transmitted

- **The bottom line:** most people with HIV in the world have caught it through sexual intercourse with an HIV positive person.
  - This means vaginal or anal sex without using a condom
- **The other common ways are:**
  - From mother to baby: in the womb, during birth, or through breast milk
  - Sharing needles to inject drugs
  - Through blood transfusions that contain HIV
  - Through unsterilised medical needles

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People can become infected with HIV by the following routes:

**Sexual intercourse between a man and a woman** - through semen or vaginal fluid or blood during vaginal intercourse. This is the predominant mode of infection in Africa and most developing countries and is fast becoming the primary mode in some developed countries, such as the USA.

**Anal intercourse between a man and a woman** - through semen or blood. This is an under-researched area, but about 12-25% of heterosexuals in the USA and UK, for instance, have had anal intercourse, and it may be a significant risk factor.

**Anal intercourse between men**, through semen or blood. This is still the most common mode of infection in certain developed countries and in some others such as certain countries in Latin America.

Although both are high-risk activities, because the lining or the rectum is particularly absorbent and easily damaged, and because blood as well as semen is more likely to be around, anal sex in most situations is even riskier than vaginal sex. This is true for both the active and the passive partner, but as with vaginal sex, the receptive (passive) partner is especially vulnerable.

**In the womb** or during birth (approximately 12-17% of babies born to HIV positive mothers get HIV this way)

**Breast feeding** (approximately another 9-17% of babies get HIV through breast feeding)

…Therefore even in developing countries more than two-thirds of babies born to mothers with HIV do NOT get HIV.

**Sharing of syringes** or other injecting equipment. This is still the predominant mode of transmission in some countries that have early epidemics, such as Russia.

**Blood transfusion** in countries that do not have reliable procedures for ensuring safe blood supply

**Unsterilised needles:** the WHO estimates that 2.5% of HIV infections in developing countries are due to injections given with unsterilised medical needles.
How HIV is rarely transmitted

HIV may also be transmitted occasionally through the following routes:

- Oral sex (especially if ejaculation occurs in the mouth)
- Organ donations from HIV-infected people (e.g., kidneys)
- Through medical accidents such as injuries with hypodermic needles
- Surgery and dentistry (when instruments are not sterilised)
- Semen in the eye – one case reported

**Oral sex:** Reliable statistics are very hard to come by, because most people do not only have oral sex. Some surveys that reported relatively high estimates (6-8%) of HIV infections from oral sex between men later found that 50% or more of the people surveyed later admitted they had actually had anal sex. The best estimate we can arrive at is that about 1-3% of HIV infections passed on between men are during oral sex (from the insertive to the receptive partner, i.e., to the person ‘doing it’). The same would apply to men passing it to women. Most cases of transmission appear to have been caused where semen was taken into the mouth.

We don’t have enough data to estimate the figures from women to men, but it is unlikely to be more than this, and may be less.

In all case the person ‘having it done to them’ is at no risk.

**Medical accidents** There have been at least 286 documented cases where HIV was definitely or probably transmitted from a patient to a medical worker through accidental injury with a needle, scalpel etc.

**Surgery and dentistry** There have only been seven cases ever reported of HIV transmission from an HIV positive medical worker to a patient. Six of these were from one dentist to his patients, and the circumstances under which this happened, or if it happened at all, are disputed.
Sexually transmitted diseases: certain STDs such as gonorrhoea and herpes are estimated to make people between five and eight times more infectious than average. This comes from surveys in both the USA and Africa.

Primary infection: As above, people in early infection (in about the first 3-4 months) may be ten times as infectious as people in chronic infection. One recent survey suggested that up to half of all infections in Africa might be passed on by people in early infection.

People in late stage AIDS are also five to eight times as infectious as people in the asymptomatic phase of infection - but are of course less likely to be having sex.

Young women are more vulnerable because the mucous membranes lining their cervix and vagina are thinner, especially at certain times of the month, and they may bleed more easily during sex.

HIV therapy: a survey in San Francisco estimated that since combination therapy was widely introduced, gay men with HIV are on average, as a group only one-third as infectious as they were – but this said nothing about the infectiousness of each individual. And because the amount of unprotected sex in this community had increased, it has not translated into a fall in new cases of HIV. Remember some people (about 12%) can have HIV in their semen or vaginal fluid even if they do not have detectable HIV in their blood.

Repeated exposure increases what are initially small chances of infection from one exposure to near-certainties.

Drug-resistant HIV: About a quarter of HIV transmitted in the US and UK is resistant to one or more HIV drugs, though transmission of multi-drug-resistant virus is still quite rare (about 1-2%).

Superinfection: One US study estimated that up to 4% of HIV positive gay men in the USA were being infected with second or subsequent strains of HIV per year. Another found that infection with more than one strain of HIV (either simultaneously or successively) was a predictor of faster progression to AIDS.
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Test your knowledge again

1. Arrange these risks from the riskiest to the least risky:
   - Unprotected vaginal sex with an HIV positive person
   - Unprotected anal sex with an HIV positive person
   - Unprotected oral sex with an HIV positive person

2. Name two things that may make HIV positive people more infectious

3. About what proportion of babies in developing countries get HIV from their HIV positive mothers?

4. Name two things that may cause condoms to break

5. How many documented cases are there of HIV being passed from a doctor or a dentist to a patient?

6. Name one thing that might make a woman more vulnerable to HIV infection

7. Name two things that might make a man more vulnerable to HIV infection

Answers:

1. In the absence of other factors anal sex is most risky; vaginal sex quite risky; oral sex not very risky.

2. The two answers we’re looking for are being in early infection (or, alternatively, in late stage AIDS); and having certain STDs.

3. No more than one-third of babies.

4. Not using enough lubricant, and using an oil-based lubricant. Other things such as not putting them on properly or the man losing his erection may make them fall off, but not break.

5. Six, maximum.

6. Being young. Having an STD would also count. Answers like ‘being raped’ are not in this slide set – but may also be true.

7. Being uncircumcised – and having anal sex with an HIV positive person. ‘Being gay’ is not in itself true and gives the trainer a second chance to explain the difference between being a kind of person and having a risk behaviour.