

HIV INFECTION AND AIDS 2: TRANSMISSION AND DIAGNOSIS

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ABSTRACT Pratt, R.J. (2008) HIV infection and Aids 2: transmission and diagnosis. *Nursing Times*; 104: 41, 28–29. This is a two-part unit on HIV infection and Aids. Part 1 reviewed the evolving global and national epidemiology of HIV infection and Aids. This second part examines routes of transmission, diagnosis and antiretroviral treatment.

HIV is spread by blood, including menstrual blood, semen and pre-ejaculate fluid, vaginal fluids and breast milk. It is not spread by tears, sweat or saliva.

SEXUAL TRANSMISSION

Unprotected, penetrative sexual intercourse remains the means by which most people are exposed to this virus.

Worldwide, heterosexual transmission is the principal way in which people become infected and the predominant transmission pattern in generalised epidemics such as national epidemics in Africa. While vaginal intercourse is the most frequent type of sexual activity, unprotected anal intercourse can also transmit HIV, whether between men or between men and women.

Oral sex may transmit HIV but is generally considered to be a lower-risk activity than vaginal or anal intercourse. However, repeated exposure to semen, pre-ejaculate fluid, vaginal fluids and menstrual blood may increase the risk to the person performing oral sex (Public Health Agency of Canada, 2004). The presence of another sexually transmitted infection, either an inflammatory condition, such as gonorrhoea, or an ulcerative disease such as primary syphilis or genital herpes, significantly facilitates the transmission and acquisition of HIV.

There is extensive high-quality research to show that male circumcision protects against the sexual transmission of HIV from

LEARNING OBJECTIVES

1. Be able to describe how HIV is transmitted from person to person.
2. Know about the tests used to identify infected people.

women to men (World Health Organization, 2007). The penile shaft and outer surface of the foreskin is covered by a tough keratinised, stratified squamous epithelium which provides a barrier against HIV transmission. However, the inner mucosal surface of the foreskin is not keratinised (Barreto et al, 1997) and is richly supplied with Langerhans' cells, which are susceptible to HIV infection (Hussain and Lehner, 1995). During vaginal intercourse, the foreskin is pulled down the penile shaft and the whole inner surface of the foreskin is then exposed to vaginal secretions, providing a large area where HIV transmission can take place (Szabo and Short, 2000). Results of three randomised controlled trials have shown that male circumcision performed by well-trained medical professionals was safe and reduced the risk of acquiring HIV infection by approximately 60% (WHO, 2007).

MOTHER-TO-CHILD TRANSMISSION

Throughout the world, especially in resource-poor regions, mother-to-child transmission (MTCT) is the second most frequent means of person-to-person HIV transmission.

HIV can be transmitted by a woman to her infant during pregnancy, during birth when the infant comes into contact with infected maternal birth fluids, and shortly after birth or during the early months and years of life while the infant is being breastfed. Children are most likely to become infected during the peripartum period (during or shortly after delivery) (Pratt and Pellowe, 2006).

There is a wealth of good-quality research

evidence to show that antenatal screening for HIV infection and a combination of interventions for women found to be infected can significantly reduce the risk of MTCT. These interventions include: antiretroviral treatment for pregnant women (if indicated) or antiretroviral chemoprophylaxis; elective Caesarean section delivery; and modifications in infant feeding practices (Pratt, 2007; Pratt and Pellowe, 2006).

INJECTING DRUG USE

HIV is efficiently transmitted through the sharing of blood-contaminated needles, syringes and injection paraphernalia – a common phenomenon among injecting drug users (IDUs). A systematic review by Mathers et al (2008) suggests that nearly 16 million people might inject drugs worldwide and that three million of these may be infected with HIV. In the UK in 2005, an estimated 156,398 people injected drugs and the prevalence of HIV infection among IDUs in 2006 was estimated to be 2.3%.

Needle and syringe exchange programmes can reduce the transmission of syringe-borne viruses without increasing illicit drug use (Allgeier, 2006; Heimer, 1998).

Drug users are, by and large, sexually active individuals and are often sex workers. Consequently, they may also acquire HIV infection as a result of sexual exposure (Pratt, 2003).

Some non-injectable drugs, such as alcohol, crack cocaine and, more notoriously, flunitrazepam (Rohypnol) or gamma-hydroxybutyrate (GHB), the so-called 'date rape drugs', can render a person incapable of making responsible and safe judgements and result in their risk of sexual exposure to HIV being increased.

HEALTHCARE TRANSMISSION

HIV has been transmitted to patients during healthcare interventions and from infected patients to healthcare workers.

In many parts of the world, patients are at considerable risk of being infected with HIV (and other bloodborne viruses) as a result of



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the following: unsterilised transfusions of contaminated human blood and blood components; transplantation of infected donor organs and tissues; semen donation; and the use of unsterilised HIV-contaminated needles, syringes and other equipment used for invasive procedures.

Healthcare workers are at risk of exposure to bloodborne viruses if they come into contact with patients' blood, other body fluids or moist mucous membranes.

The risk of accidental transmission of HIV to patients or healthcare workers is greatest in resource-impooverished regions where healthcare infrastructures are weak, healthcare practice is poor and unsafe, and affordable and effective healthcare is not readily available.

Standard infection prevention and control precautions are widely used in the UK and other industrialised countries (Pratt et al, 2007; Pratt, 2003). The consistent incorporation of these precautions into everyday clinical practice provides the best available protection to patients and staff against occupational exposure to HIV and other bloodborne viruses.

DIAGNOSIS

There are two major variants of HIV, known as HIV-1 and HIV-2. The former is the dominant Aids-causing virus in the world,

whereas HIV-2 is fairly restricted to the west coast of Africa. Both types of infection are seen in the UK.

The standard diagnostic test for HIV infection throughout the world is the HIV-antibody test. This uses a laboratory technique known as enzyme immunoassay (EIA) to detect HIV-specific antibody G (immunoglobulin G or IgG) in an infected person's blood, saliva or urine. This test is extremely accurate, having a very high degree of sensitivity and specificity.

Most people will develop detectable IgG antibodies (seroconvert) within two to eight weeks (average 25 days) following infection. Virtually all newly infected people will seroconvert by 12 weeks. In the UK, all antibody tests simultaneously test for HIV-1 and HIV-2 IgG. Testing for viral proteins, for example p24, is used to detect early infection as this protein is present in the blood before IgG appears.

Antibody tests are not used to identify infection in newborn infants, as they would detect passively transferred maternal antibodies. Instead, a nucleic-acid amplification test (NAT) known as PCR DNA (polymerase chain reaction DNA), is used.

A variety of rapid tests are available in clinics where the results can be available within 20 minutes. In addition, in the US and some other countries, government-approved self-testing kits for use at home are available.

ANTIRETROVIRAL THERAPY

Unrelenting replication of HIV will eventually cause fatal damage to the immune system.

This can be measured by monitoring the level of specialised immune system cells, the CD4 helper T-lymphocytes. A normal CD4 T-cell count in an adult in the UK is generally around 1,000 cells/mm³. As the CD4 cell count decreases over time, with a corresponding increase in the amount of HIV in the blood (viral load), antiretroviral therapy (ART) is eventually required.

Guidelines in both the UK and the US recommend commencing ART in all people with a CD4 cell count of 350 cells/mm³ or lower (British HIV Association, 2008).

Effective ART has been available in the UK since the early 1990s. The regimen consists of a combination of antiretroviral drugs that either restrain viral enzymes used by HIV to replicate or block cell-surface receptors that HIV uses to attach to and enter cells.

KEY REFERENCES

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Most drugs inhibit HIV from replicating but they do not eliminate the virus from the body. Once these drugs are stopped or the patient becomes resistant to them, the viral load will rebound to pre-treatment high levels, with consequent new damage to an already compromised immune system.

Many different antiretroviral drugs are now available and used in several combinations.

Current UK guidelines recommend the preferential use of efavirenz (Sustiva) with either tenofovir disoproxil with emtricitabine (Truvada) or abacavir with lamivudine (Kivexa) for people starting ART for the first time (BHIVA, 2008).

New antiretroviral drugs, such as the integrase and entry inhibitors, offer an increasingly powerful and effective armoury to depress replication and drive down the viral load below the level of detection.

This has the effect of increasing or, more usually, restoring patients' health and well-being, and decreasing but not eliminating their level of infectiousness to other people. ■

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