A 3D illustration of a blood vessel. The vessel is shown as a large, reddish-brown tube on the left side. Inside the vessel, there are numerous red blood cells (biconcave discs) and white blood cells (spherical cells with granules). A large, green, spherical virus particle with a textured surface and a central core is prominent in the lower right quadrant. The background is a dark red color, suggesting the interior of the blood vessel.

Infectious Diseases transmitted from Blood Transfusion, Organ Transplant and IV Drug Use

by

Janeth Rud

Introduction

Donor-derived transmission of infection to recipients of blood and organs is uncommon but potentially life-threatening.



Donor

Disease

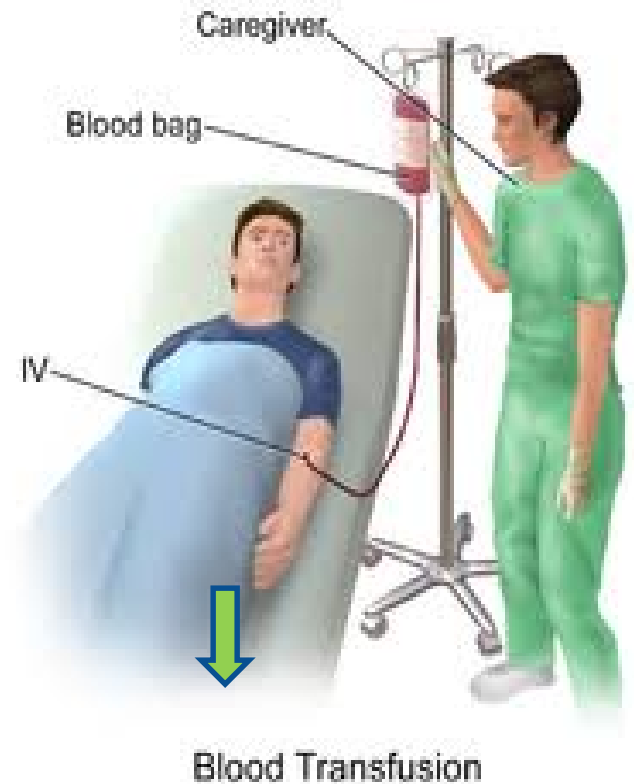
Recipient

What is Blood Transfusion?

Blood Transfusion is the transfer of blood or blood products from one person (donor) into another person's bloodstream (recipient).

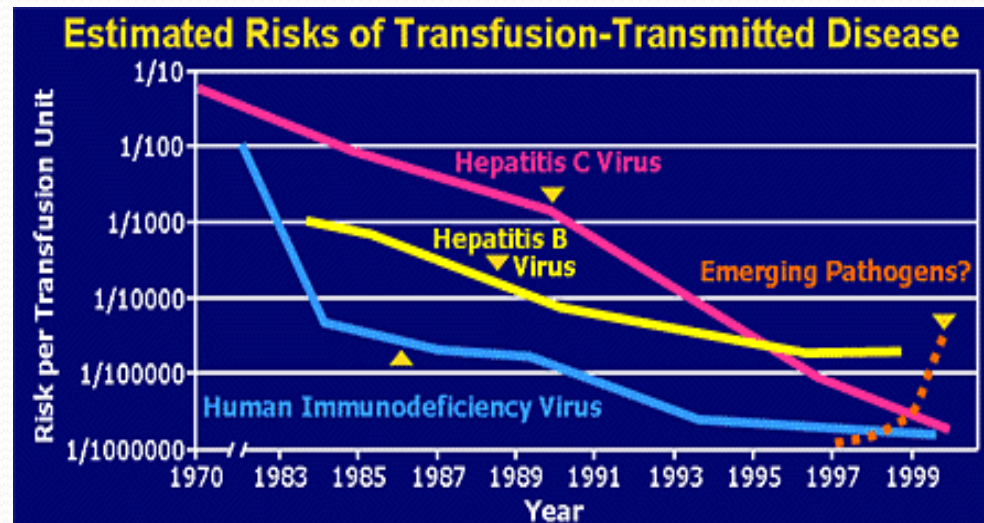
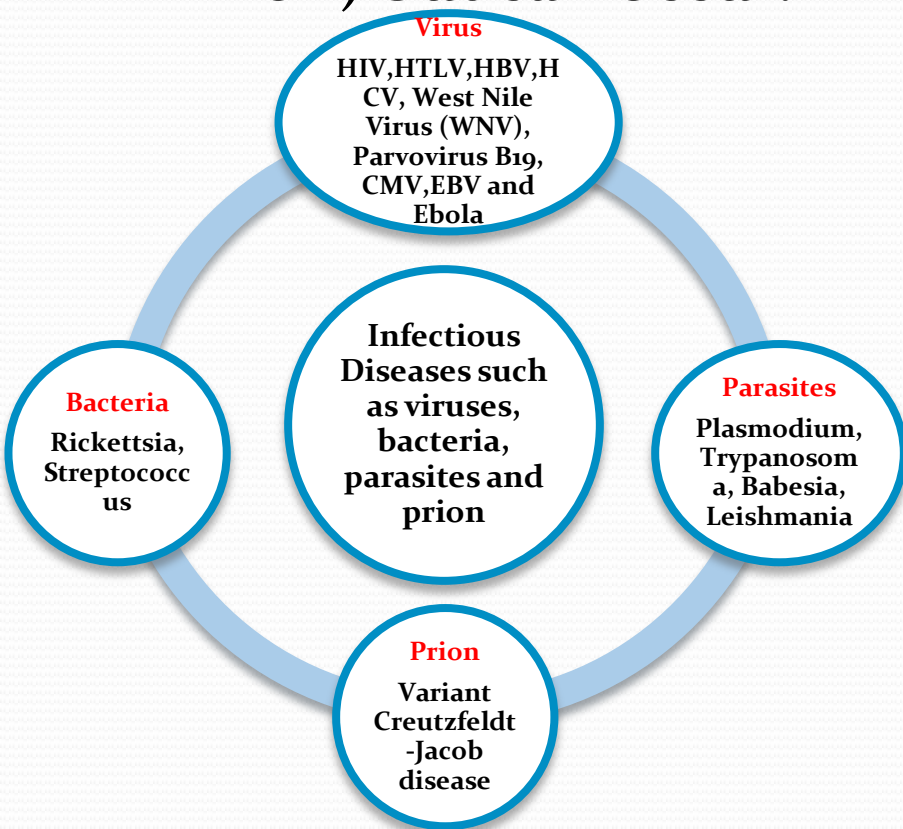
Sources of Blood Transfusion:

- **Autologous** transfusion of your own blood
- **Direct Donor Blood** allows the patient to receive blood from known donors such as family, relatives and friends
- **Blood Banks** collect, test and store blood



What diseases are transmitted by blood transfusion?

Infection from a blood transfusion is very low (varies with the infectious agent from 1 in a thousand to 1 in a million) but can occur.



The dramatic decrease in risk of transfusion-transmitted viral disease was accomplished by conversion from paid to volunteer whole blood donors in the 1970s. Increased direct questioning of donors regarding risks for the viruses and increased testing of collected donor blood for antibodies, antigens, and nucleic acid of these viruses starting in the 1970s. Risk of hepatitis B may decrease further with universal childhood vaccination. Not shown in the graph are the rare risks of other transmissible diseases. The dashed line indicates the unknown risks, if any, of new viruses and other potentially emerging pathogens, such as prions that cause new variant Creutzfeldt-Jacob disease.

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Human Immunodeficiency Virus (HIV)

HIV is a virus that attacks the immune system which is our body's natural defense against infections.

Screening procedure

Window period of infection

HIV infection may escape by current screening assays

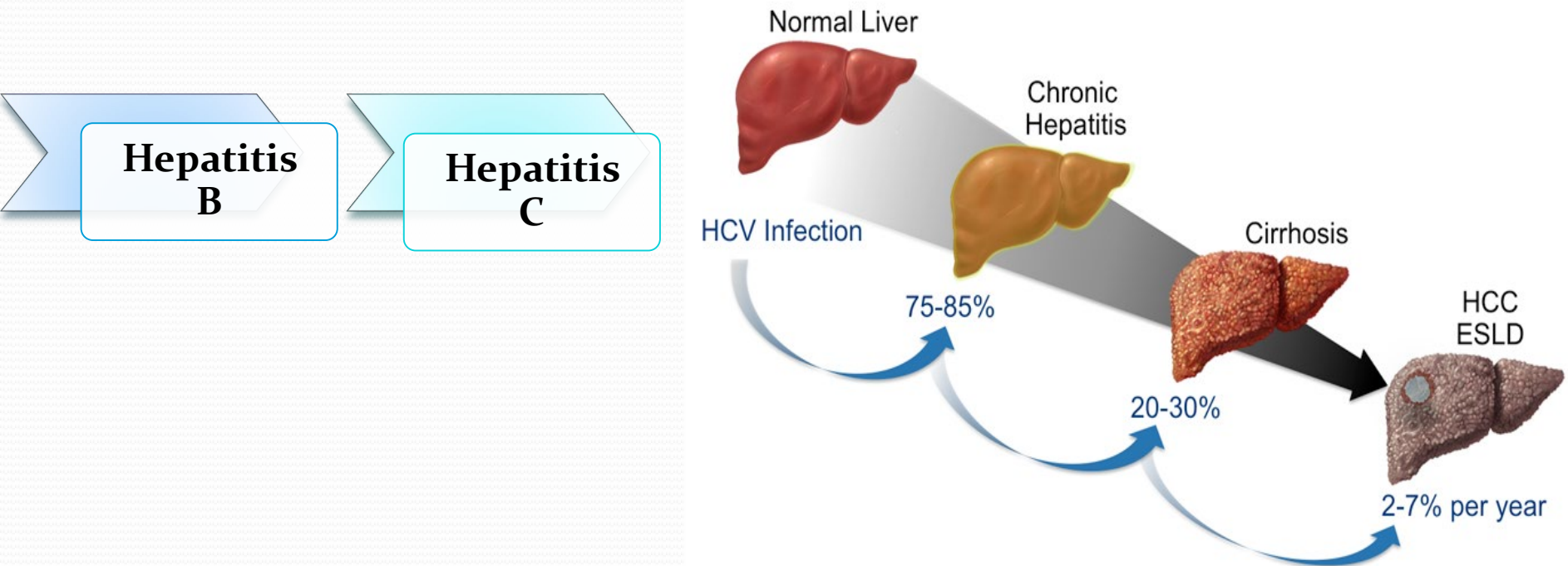
HIV Transmission Risk

Exposure Route	HIV Transmission
Blood transfusion	90-95%
Perinatal	20-40%
Sexual intercourse	0.1 to 1%
Vaginal	0.05-0.1%
Anal	0.065-0.5%
Oral	0.005-0.01%
Injecting drugs use	0.67%
Needle stick exposure	0.3%
Mucous membrane splash to eye, oro-nasal	0.09%

Hepatitis Viruses

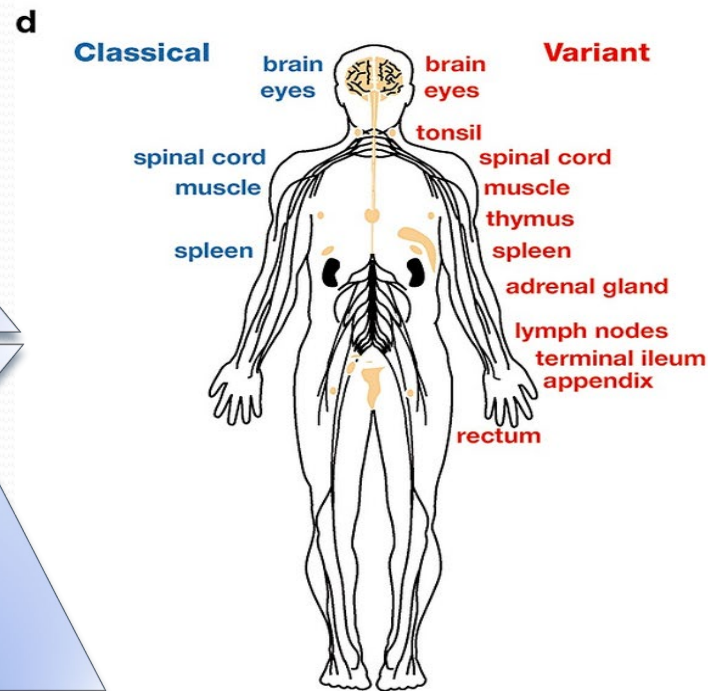
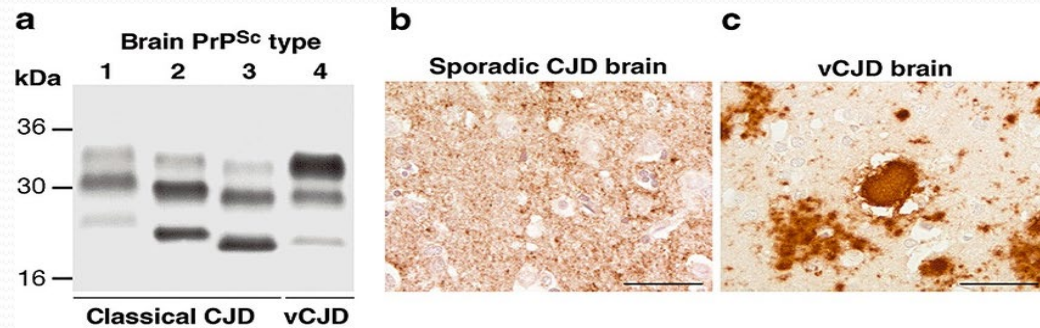
HBV and **HCV** are both serious infections that attack the liver and lead to inflammation.

❑ It is spread when infected body fluids enter the body of a person who is not infected.



Variant Creutzfeldt-Jakob Disease

- A human version of *Mad Cow Disease*
- It is very rare yet a fatal brain disorder.



Associated Symptoms

Personality changes

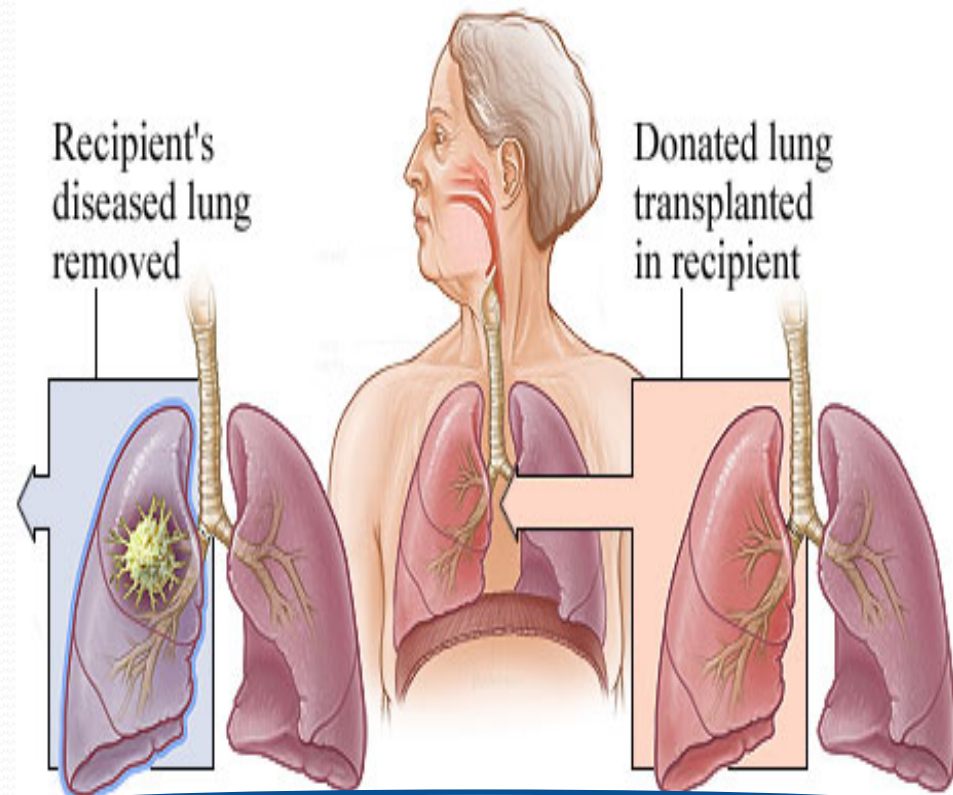
Memory loss

Impaired thinking

What is an Organ Transplant?

Organ transplant

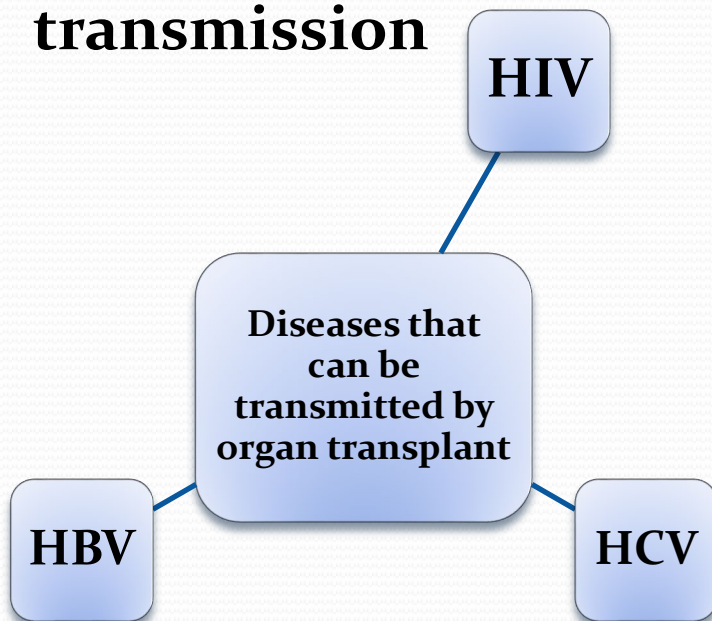
is a surgical operation in which a failing or damaged organ in human body is removed and replaced with a functioning one.



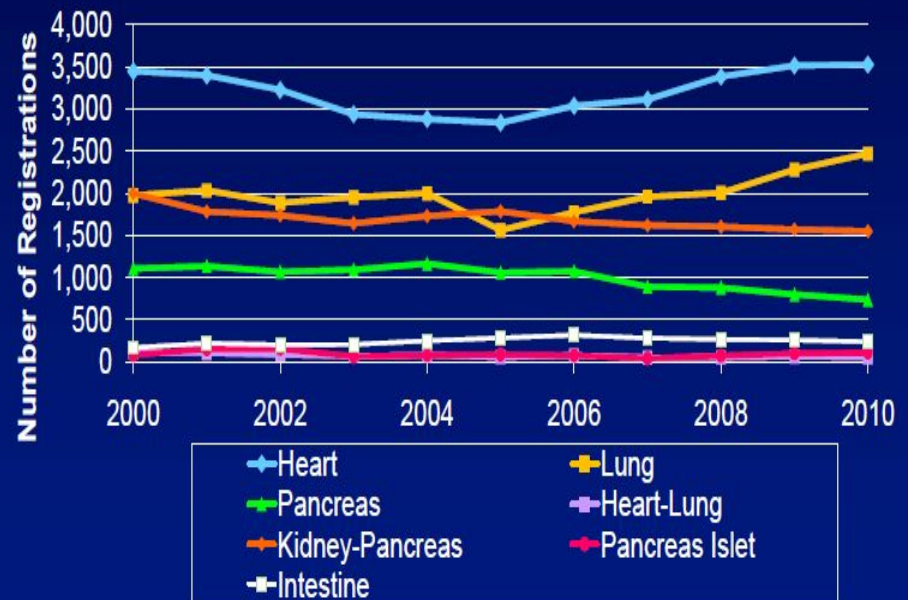
List of organs that can be transplanted: heart, kidney, liver, lung, pancreas and intestine

Organ transplant

- Organ transplantation can be challenging
- Limited availability
- Potential risk of infectious disease transmission



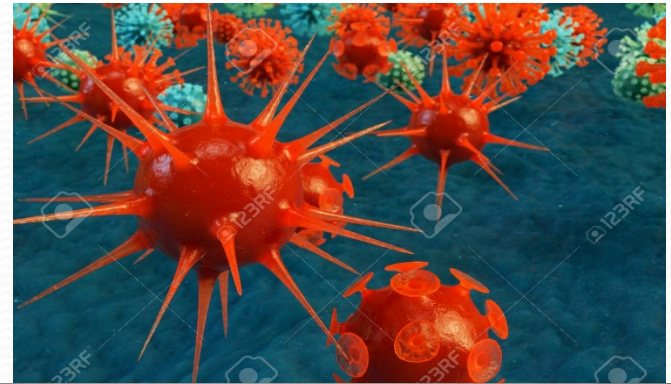
Waiting List Additions 2000-2010 U.S.



Factors involved in transmission of infection in human allograft

Virulence

the pathogenicity of an organism



Graft

viability, receptors for organism and processing

Medical Staff

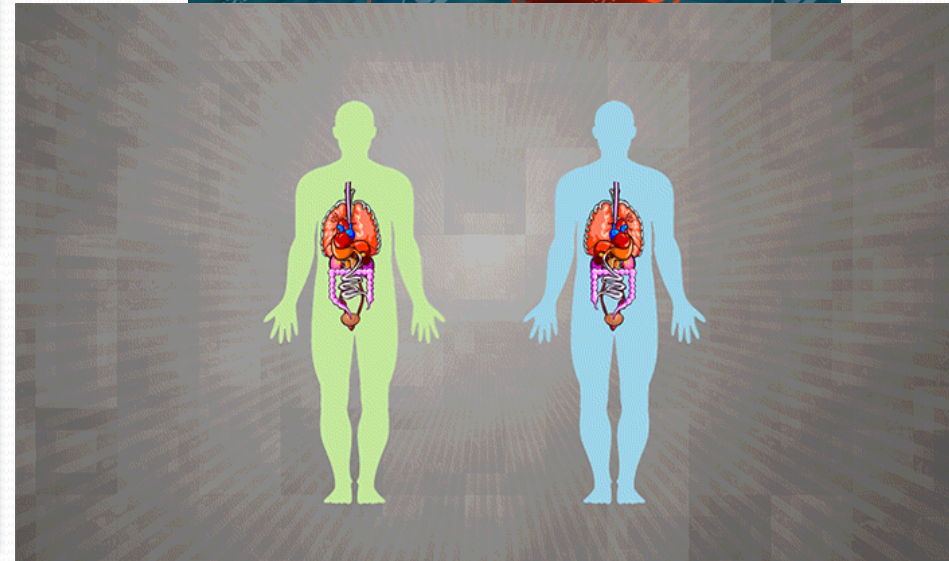
clinical experience and comprehension

Epidemiology

donor exposure

Host

immune status and general health



Intravenous (IV) Drug Use

Intravenous Drug Use involves injecting a substance into a vein using a syringe

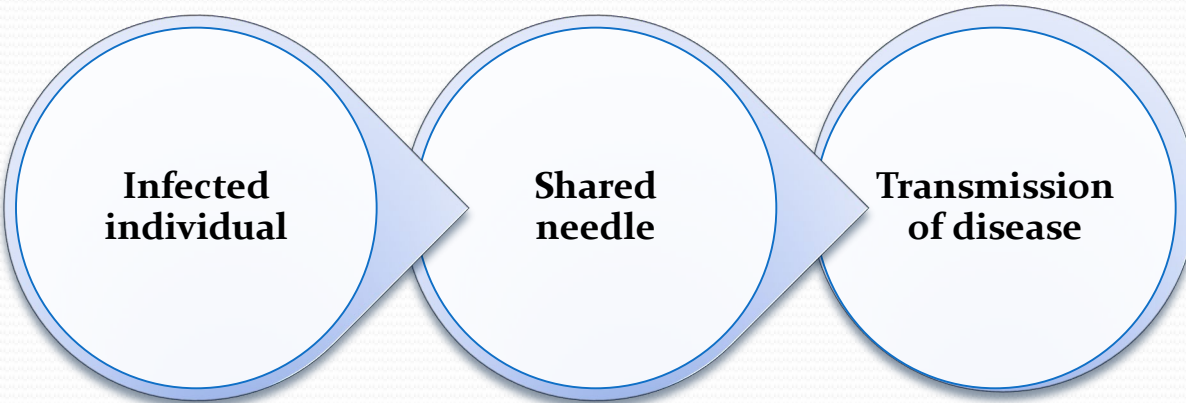
Injecting drugs exposes the user to an increased risk of acquiring various infections and the transmission of certain blood-borne diseases.

Blood-borne infections such as **HIV** and **Hepatitis C** are most common when users share needles and other paraphernalia.



Drug Use and blood-born disease

The epidemic of injecting drug use and blood-borne disease threaten both public health and social structure.



Some drugs commonly abused intravenously

Heroin

Cocaine

Methamphetamine

Risk in Blood Transfusion and Organ Transplantation

Infected people cannot be organ-donors or blood donors because the infections will be transferred to the recipients. If the infection is found before transfusion/transplantation, that blood or organ cannot be used.



**Responsibility/
Liability of the
Hospital**

- Errors in collection, processing, storage and issue of blood
- Selecting the right donor

**Transplant
Malpractice
lawsuit**

- In 2007, 4 Chicago patients were infected with HIV by organ transplantation



Blood should be properly tested transferring it to another patient for possible HIV infection

How to prevent the transmission of diseases?

Donors medical history

To ensure that recipients receive the safest possible blood products

Screening tests

Test for infections in donor's blood

Hospital safety risk management

Infection control, clinical practices and care must be strictly implemented

Blood-Borne Diseases

Blood-borne pathogens are microbes such as viruses or bacteria that are carried in human blood

Conclusion

- Donor evaluation, laboratory screening tests and pathogen inactivation procedures are considered critical tools to reduce the risk, but do not completely eliminate the risk.
- The risk of being infected by contaminated blood is lower compared to thirty years ago.
- Advances in infectious disease testing continue to improve the safety of blood supply. A considerable improvement is due to the introduction of modern tests such as **Nucleic Acid Testing** (NAT).
- Reduction in the risk of disease transmission is based on further viral screening studies.

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