Prevention of hepatitis & AIDS in surgery

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Background

- Transmission of HBV, HCV & HIV is a well-documented occupational hazard for HCWs.
- Transmission has been reported from patient to HCW, from HCW to patient, & from patient to patient.
- HBV is more efficiently transmitted than HCV or HIV, esp. if the source is positive for HBeAg, a marker for increased infectivity.
  - When HBeAg is present, HBV is 100 times more likely than HIV to be transmitted after a percutaneous (PC) exposure.
- HCV, while less infectious than HBV, is six times more likely than HIV to be transmitted after a PC exposure.

Transmission In Health Care Settings

Patient-to-HCW transmission

- Blood is the single most important source for HBV, HCV, & HIV.
- Prevention of transmission is best done by preventing PC injuries during medical procedures.
- Hepatitis B vaccination.

Hepatitis B Virus

- Risk of infection is mainly related to the degree of contact with blood in the work place.
- Risk of transmission after a PC exposure to infected blood is;
  - 30% if the source is positive for HBeAg
  - less than 6% if the source is HBeAg-negative.

- **Principal modes of nosocomial HBV transmission**
  - direct percutaneous inoculation of blood or body fluids containing HBV via needle-stick or other injuries from sharp instruments.
  - direct inoculation of blood or body fluids containing HBV onto mucosa, cutaneous scratches, abrasions, burns or other lesions.
  - indirect inoculation of HBV from environmental surfaces contaminated with blood or body fluids onto mucosa, cutaneous scratches, abrasions, burns or other lesions.

Hepatitis C Virus

- Transmission occurs mainly thru large or repeated direct PC exposures to blood.
- Risk of transmission after a PC exposure to anti-HCV positive blood is 1.8%.
- No reported infections associated with intact skin exposures.
- There are reported cases of HCV transmission from a blood splash to the conjunctiva.

Human Immunodeficiency Virus

The risk of transmission depends on;

- prevalence of HIV infection among the patients,
- nature & frequency of occupational exposures to blood or other body fluids,
- risk of HIV transmission from a single exposure.
  - Greatest with PC injection of blood or exposure of an open wound to blood.
  - The risk is approximately 0.3%.

- **Several factors increases the risk;**
  - Deep injury.
  - Injection of a large quantity of blood.
  - Injury with a hollow needle.
  - Injury while inserting a needle into a vein or artery.
  - Blood of a person in the advanced stages of AIDS.
- **Other modes of transmission;**
  - mucosal exposure to contaminated blood.
  - non-intact skin exposure to blood
  - HIV-infected body fluids other than blood, eg cerebrospinal, synovial, pleural, peritoneal, pericardial, & amniotic fluids.

HCW-to-patient transmission

- Majority of HCWs infected with a bloodborne virus do not pose a risk to patients, b/c they do not perform activities where transmission can occur.
- 3 conditions are necessary to pose a risk ;
  1. HCW must be viremic.
  2. HCW must be injured or have a condition (e.g. weeping dermatitis) that allows direct exposure of his/her blood or other infectious body fluids.
  3. HCW's blood or infectious body fluid must gain direct access to a patient's wound, traumatized tissue, mucosa, or similar portal of entry.

Patient-to-patient transmission

- Improper use of needles, syringes, & multi-dose vials can result in patient-to-patient transmission of bloodborne pathogens.
  - HBV & HCV transmission between patients in hemodialysis centers.

Minimizing The Risk Of Bloodborne Pathogen Transmission

Preventing transmission from patients to HCWs

Employer responsibilities

- Every medical setup should have an occupational health plan for the prevention and treatment of exposures to bloodborne pathogens.
  - This includes surgeons and their staffs, who perform procedures that put them at risk for contact with a patient's blood or other potentially infected body fluids.
- All HCWs who may be exposed to blood or other body fluids should receive the hepatitis B vaccination series.

- Comprehensive training program for HCWs is important.
- Training should include;
  - general information about bloodborne pathogens,
  - mechanisms of transmission,
  - methods to prevent exposure to blood and other potentially contaminated fluids, and
  - ways to implement those methods during various procedures.

Patient history & serological testing

- A complete medical history of each patient should be taken prior to surgery.
- Direct questions should be asked to help assess patient's HBV, HCV, & HIV infection statuses.
- General areas of risk include:
  - history of injecting drug use,
  - high-risk sexual behaviors, & sexually transmitted diseases,
  - blood transfusions, & artificial insemination,
  - tissue transplants, & hepatitis.
- Serological testing may be useful.

Recommendations for safety during procedures & examinations

- Hand washing with either plain or antimicrobial soap before & immediately after each patient encounter.
  - gloves are not a substitute for hand washing.
- Gloves should be worn during any procedure that may result in contact with a patient's blood or other body fluids.
  - This is particularly important for surgical staffs, as frequent scrubbing may cause abrasions on the skin.
  - Gloves should also be worn when handling needles or other sharp instruments.
  - Double gloving is recommended.

- Proper surgical garb must be worn during any surgical procedure.
  - Appropriate footwear.
  - Appropriate surgical gown.
  - Double gloves.
    - outer pair should be changed at least every two hours to prevent skin exposure from perforations that may occur in the gloves with use over time.
    - When necessary, consider the use of reinforced or cloth gloves that offer a greater amount of protection.
  - Head covers and facemasks.
    - Facemasks should be changed if they become splattered or moist.
  - Protective eyewear.
    - Goggles are better than eyeglasses, but face shields offer the greatest level of protection.

- Sharp instruments should always be handled carefully.
  - Recapping of needles and resheathing of scalpel blades by hand should be avoided.
  - Sharp instruments should not be passed from hand to hand, but on intermediate trays and should be announced when they are being passed.
- No-touch suturing techniques should be used whenever possible.
  - Sutures should not be tied with the suture needle in the surgeon's hand.
  - Blunt suture needles are recommended when their use is technically feasible.
  - Two surgeons should not suture the same wound simultaneously.

- At the completion of the case, the surgeon should take care not to contaminate areas outside surgical field with blood.
  - Outer pairs of gloves should be removed & the dressing applied with the inner pair of clean gloves.
  - Next, the contaminated drapes should be removed and discarded into an appropriate biohazard container.
  - Surgeon should then remove the surgical gown and gloves.
  - Clean, non-sterile gloves should be used to handle any operating equipment that is not grossly contaminated. Afterwards, these gloves should be removed and the hands washed.
  - All contaminated clothing should be removed in a manner that avoids contact with the blood.
  - Care must be taken not to contaminate other areas with bloody shoe covers, gloves or scrub clothes.

- All contaminated materials resulting from a procedure should be placed in appropriate biohazard bags or containers and discarded.
  - Instruments and other reusable equipment should be appropriately disinfected and sterilized..

Preventing transmission from HCWs to patients

- HCWs are encouraged to know their own HBV, HCV, and HIV infection statuses.
- HCWs who have pre-existing conditions, such as exudative lesions or weeping dermatitis, should refrain from direct patient care.
- If a member of a surgical team sustains an injury during a procedure, the instrument responsible should be removed from the surgical field without being reused on the patient until appropriately re-sterilized.

- Risk for transmission of HBV & HIV to patients is greatest during certain "exposure-prone" procedures;
  - "palpation of a needle tip in a body cavity or the simultaneous presence of a HCW's fingers and a needle or other sharp object in a poorly visualized or highly confined anatomic site".
- HCWs who are positive for HIV or HBeAg should not perform exposure-prone procedures, unless they have obtained expert counsel regarding the circumstances under which they may perform such procedures.
- HCWs should inform patients of their infection status before conducting exposure-prone procedures.

- HCW-to-patient transmission of HBV mainly occurred during invasive procedures performed by HBeAg positive HCWs.
  - However, HBeAg-positive HCWs should not be restricted from performing non-invasive procedures.
- Currently, there are no recommendations that restrict professional activities of HCWs infected with HCV.
  - They should always follow strict aseptic technique and vigorously adhere to universal precautions.
  - They should seek medical evaluation and treatment to prevent chronic liver disease.
- HIV carries a lower risk of transmission than HBV or HCV.
  - HIV-infected HCWs should not perform exposure-prone procedures until they have sought counsel from an expert panel and been advised under what circumstances they may perform such procedures.

Preventing transmission from patient to patient

- Consistent adherence to standard infection control practices.
- Disposable equipment should not be reused between patients.
- Instruments and other reusable equipment should be reprocessed, which includes cleaning and disinfection or sterilization as appropriate.
- Since HBV can remain infective in dry blood for up to one week, the health care environment should be kept clean and disinfected for the safety of both patients and HCWs.

Additional Areas Of Risk For Patients

Blood Transfusions

- A potential for HBV, HCV, & HIV transmission exists whenever allogenic blood is used.
  - All donations of whole blood, plasma, & other components be subjected to serological testing for HBsAg, HCV antibody & antibodies to HIV.
- The option to use autologous blood should be made available, and utilized, when it is medically feasible.
  - Additionally, cell-saver should be utilized when its use is medically appropriate.

Bone & Soft-Tissue Transplants

- Bone grafts may be autografts or allografts.
  - autografts does not pose a risk.
- HBV, HCV and HIV can be transmitted through musculoskeletal allografts.
- For cadaveric specimens, secondary sterilization of the tissue by ionizing radiation can be used to increase the safety of the allograft.
  - allograft's biologic effectiveness may be reduced.
- In the case of living donors, donor screening should include a comprehensive social and medical history, physical examination, and serologic testing for HBsAg, HCV, and HIV.

Managing Exposures To Bloodborne Pathogens

- Incidents should be reported immediately to the management. This should includes;
  - the activity in which the HCW was engaged in at the time of the incident,
  - the extent to which safe practices and protective equipment were used,
  - a description of the exposure source, and
  - details of the exposure such as mode, volume and type of fluid involved, as well as the severity of the exposure.
- Both the source patient and exposed HCW should be tested for HBsAg, HCV antibody, and HIV antibody.
  - If the source cannot be identified, decisions regarding appropriate follow-up should be individualized.

Immediate treatment

- Contaminated skin should be washed immediately with soap and water.
  - If it is not possible to leave the area (e.g. during surgery), circulating personnel should clean the contaminated skin.
  - If the skin is cut or punctured, care must be taken not to expose the patient to the HCW's blood, gloves should be removed and the wound washed with soap and water.
  - Exposed mucosa should be flushed with water.
- Serological testing and the initial risk assessment should be conducted and postexposure treatment administered.

Postexposure Prophylaxis

Hepatitis B Virus

- Mainstay is the hepatitis B vaccine.
- Addition of a single dose of hepatitis B immune globulin (HBIG) is also recommended, if it can be given within seven days of exposure.
  - However, it is preferable to give the HBIG within 24 hours of the exposure.
- In previously vaccinated patients, postexposure blood tests should ensure that the individual's HBV antibody levels are appropriate.

Hepatitis C Virus

- Currently there is no postexposure prophylaxis.
- Exposed individual should be tested and monitored for evidence of seroconversion so that treatment for chronic liver disease can be initiated as soon as possible.
- Interferon treatment begun early in the course of HCV infection is associated with a higher rate of resolved infection.
- Combination of interferon + ribavirin is more effective than interferon alone, in the treatment of chronic HCV infection.

Human Immunodeficiency Virus

- PEP includes,
  - a basic regimen, consisting of zidovudine or lamivudine, or
  - an enhanced regimen, which is the basic regimen + a protease inhibitor, indinavir or nelfinavir, for higher risk exposures.
- PEP should be started promptly, preferably within a few hours of exposure, and given for four weeks, if tolerated.

Thank you!