

Infection Control Occupational Health and Surgical Scrub Manual

All health care providers need to know and follow, basic infection prevention and control principles in order to work safely and to protect the patients (and ourselves) from acquiring an infection.

The infection prevention and control material contained in this module was developed by the Infection Prevention and Control Department at Capital Health for use in Capital Health facilities.

Other institutions will require that you follow similar principles of practice, but terminology may differ. The following section will provide a general overview of several infection prevention and control concepts vital to your role as a physician.

Basic infection prevention and control is founded on four inter-related concepts:

- The Chain of Infection
- Routes of Transmission
- Routine Practices
- Additional Precautions

The goal is to prevent healthcare-associated infections (HAIs). Healthcare-associated infections are infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting (CDC, 2010).

The Chain of Infection:

Understanding this chain must precede the breaking of its links, which leads to infection prevention.

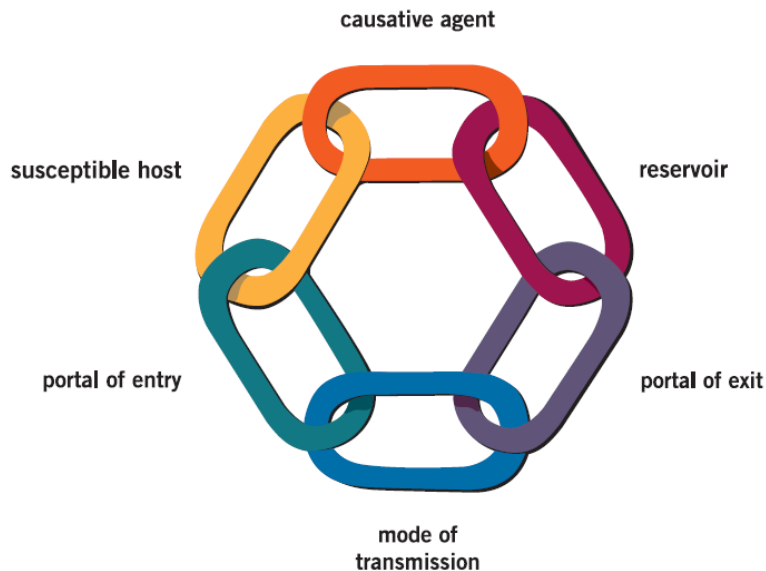


Image: Capital Health Infection Control Department (2008)

Causative Agent - Biological agents capable of causing disease; such as bacteria, viruses, fungi, protozoa.

Reservoir - A place in which an infectious agent can survive, but may or may not multiply. Common reservoirs in the healthcare setting may include patients, healthcare personnel, healthcare equipment and the environment.

Portal of Exit – The path by which the infectious agent leaves the reservoir such as the respiratory tract, genitourinary tract, gastrointestinal tract, skin/mucous membranes and blood.

Mode of Transmission – The method by which the microorganism reaches a susceptible host. This is discussed in more detail in the next section.

Portal of Entry – The means by which an infectious agent enters the susceptible host. Some examples of portals of entry include: the respiratory tract, gastrointestinal tract, skin/mucous membranes or parenteral (percutaneous via the blood).

Susceptible Host – Individual susceptible to a certain disease.

Control of infectious diseases involves breaking the chain of infection by altering the host, the environment or the agent.

Principles of Transmission of Microorganisms (diagram page 7)

In hospital epidemiology, routes of transmission of infectious agents have been classified as contact, droplet, airborne, common vehicle and vector borne. **Contact transmission is the most common route of transmission of microbes from symptomatic or asymptomatic patients in the healthcare setting.** On pediatric wards, droplet transmission is also very common. Airborne and common vehicle transmission occur less frequently, and vector borne transmissions are rare.

A. Contact Transmission

Direct contact transmission occurs when transfer of microorganisms results from direct physical contact between an infected or colonized individual and a susceptible host (body surface to body surface). Rarely is direct patient-to-patient contact an issue.

Indirect contact transmission involves passive transfer of microorganisms to a susceptible host via an intermediate object, such as hands that are not properly cleaned between patient contacts, or contaminated medical supplies, diagnostic and therapeutic instruments or other inanimate objects in the patient's immediate environment.

The nature of healthcare is such that its providers and equipment are constantly moving from one patient to another. **Therefore, two main “vehicles” involved in the process of cross-contamination (the passing of microorganisms between patients) and health care-associated transmission are contaminated hands and contaminated equipment.**

Droplet Transmission is a form of contact transmission but requires special considerations. Droplet transmission refers to large droplets, 5 µm in diameter, generated from the respiratory tract of the source patient during speaking, coughing or sneezing for example. These droplets are propelled a short distance, about 2 m, through the air and are deposited on the nasal or oral mucosa of the new host. Organisms expelled in large droplets, especially respiratory viruses, remain viable in droplets that settle on objects in the immediate environment of the patient. These may be then picked up from environmental surfaces on the hands and deposited to the mucous membranes in this manner.

B. Airborne Transmission

Airborne Transmission refers to dissemination of microorganisms by aerosolization. Organisms are contained in droplet nuclei (the small airborne particles, < 5 µm, that result from evaporation of large droplets) or in dust particles containing skin squames and other debris that remain suspended in the air for long periods of time. Such microorganisms are widely dispersed by air currents and inhaled by susceptible hosts who may be some distance away from the source patient, even in different rooms or hospital wards. Control of airborne transmission is the most difficult, as it requires control of air flow through special ventilation systems (negative pressure rooms).

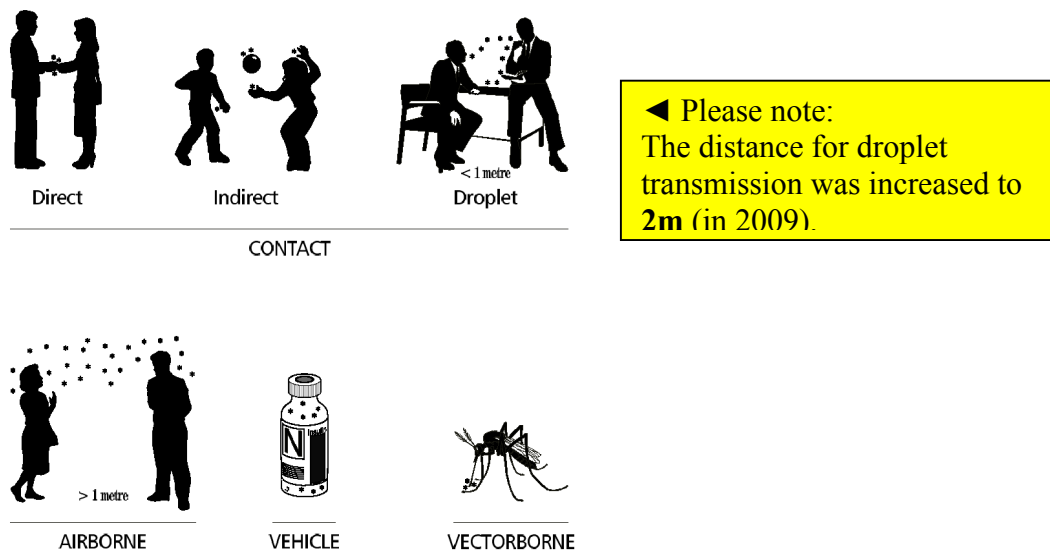
C. Common Vehicle Transmission

Common Vehicle Transmission refers to a single contaminated source such as food, medication, water, intravenous fluid, or equipment which serves to transmit infection to multiple hosts.

D. Vector borne Transmission

Vector borne transmission refers to transmission by insect vectors and is prevented by appropriate hospital construction and maintenance, closed or screened windows, and proper housekeeping.

FIGURE 1: How Microorganisms Are Acquired



Source: Health Canada (1999)

The Concept of Routine Practices

The concept of Routine Practices evolved from, and is based upon, a number of related isolation systems that were developed to assist physicians and other caregivers to prevent disease transmission in the health care setting. These systems independently dealt with specific issues.

For example:

1. Universal Precautions – (1985) developed to assist health care providers respond to the HIV/AIDS epidemic. They dealt specifically with the risk to health care workers posed by blood borne pathogens. Refer to the Occupational Health section of this module for more information.
2. Body Substance Isolation – (1987) developed to assist health care providers in dealing with moist and potentially infectious body substances.
3. Standard Precautions – (1996) developed as an amalgam of UP and BSI. Standard Precautions are American (CDC) guidelines for patient contact in the acute care setting.

In 1999, Health Canada issued a comprehensive document that addressed proper technique in all areas of the continuum of care. Canada Communicable Disease Report, July 1999, Supplement, Infection Control Guidelines, [Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care]. See references. Pages: 33 to 51 (Recommendations for Acute Care Facilities) are recommended reading.

The need for a thoughtful, systematic approach to patient interaction in your practice is based upon the ubiquity of microorganisms and the absolute need, wherever possible, to prevent cross-contamination between patients.

In Canada there are approximately 220,000 nosocomial infections (healthcare-associated) with in excess of 8000 deaths per year (Zoutman et al., 2003). *Routine Practices* are part of the foundation of the practice of medicine necessary to preserve patient safety and “*first, do no harm!*”

Routine Practices employ the use of:

Review the Four Moments for hand Hygiene Video:

Hand washing/hand antisepsis – is a critical component of patient and health care provider safety and is the corner stone of infection prevention and control.

- Hands contaminated with transient bacteria are a primary means for transmission of infection.
- Hands without healthy skin are more susceptible to becoming colonized with transient bacteria.
- Health care providers need to clearly understand when and how to perform hand hygiene.
- Improved hand hygiene practices have been associated with reduced healthcare-associated infection rates.

Note: Hand Hygiene Handout page 14 & 15

PPE- Risk Assessment

When caring for patients, it is important to conduct a risk assessment before patient contact. Ask yourself “what type of interaction am I going to have with this patient and what is the likelihood that I will be exposed to their blood or body fluids, or that my clothing will become contaminated?” Based on this risk assessment choose the appropriate personal protective equipment.

Gloves should be worn to protect the hands of the health care worker; not as a substitute for hand hygiene.

- Clean, non-sterile gloves are worn for contact with blood, body fluids, secretions and excretions, mucous membranes, specimens, draining wounds or non-intact skin, for handling items visibly soiled with blood, body fluids, secretions or excretions, and when the healthcare worker has open skin lesions on the hands.
- When indicated, gloves should be put on directly before contact with the patient or beginning the task requiring gloves.
- Gloves should be changed between care activities and/or procedures with the same patient to prevent cross-contamination of body sites with the patient's own microorganisms.
- Gloves should be removed immediately after care is delivered and hands cleaned before touching clean environmental surfaces.
- Single-use gloves should not be reused or washed.

Masks, eye protection, face shields should be worn, where appropriate, to protect the mucous membranes of the eyes, nose and mouth during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions such as during deliveries, cystoscopy, surgery, trauma resuscitation etc.

- Full eyeglasses with side shields and a mask provide a minimal degree of protection. Full-face shields provide maximal protection.
- Contact lenses do not provide eye protection.
- Prescription eyeglasses with typical small frames do not provide adequate protection.

The routine use of **gowns** is not recommended, however, they should be worn to protect uncovered skin and prevent soiling of clothing during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions.

- Surgical scrubs and lab coats do not provide adequate protection in such circumstances. Fluid resistant gowns or plastic aprons should be worn.
- Fluid resistant sleeves, leggings, hats and shoe covers may be worn for additional protection in certain circumstances and should be removed immediately if penetrated by blood or body fluids. Do so in a manner that avoids contact with the face and place the items in a designated container. If this is not possible, the item may be cut off with scissors. All used or contaminated items must be handled with gloves and disposed of in a designated container.

Accommodation – generally, single rooms are not required for routine patient care. In the acute care setting, patients who visibly soil the environment or for whom appropriate hygiene cannot be maintained should be placed in single rooms; with dedicated toileting facilities. An example of this would be patients with explosive fecal incontinence or patients with draining wounds who are unable to keep their dressings in place.

Patient care equipment – whenever possible, dedicated equipment (that will not be shared between patients) is preferable, especially in the ICU setting. Reusable equipment that has come in contact with a patient must be cleaned and reprocessed before use in the care of another patient. Health care providers are responsible to clean and disinfect personal stethoscopes between patient uses. Pre-moistened disinfectant wipes are provided in clinical areas for this purpose.

Equipment that is routinely shared should be cleaned between patients and a routine cleaning schedule should be established and monitored. Also, any equipment that is visibly soiled should be cleaned and handled in a safe manner to prevent exposure to microbes or contamination of the clothing or environment. Commodes, like toilets, should be cleaned regularly and when soiled and bedpans should be reserved for use by a single patient and labelled appropriately.

Medical Sharps

Used “sharps” must be handled with care to prevent injuries during disposal or reprocessing and disposable sharps should be discarded immediately at point of use in designated sharps containers.

- Recapping of needles constitutes the highest risk activity for most health care workers and is therefore to be avoided in most circumstances.
- If needle recapping is unavoidable, it should be performed using either a protective recapping device or one handed ‘scooping’ technique.
- Sharps should not be directly passed from one person to another. Indirect transfer by first placing the item in a metal bowl or tray is preferred.
- Many safety and shielding devices are now available to reduce the risk of injury from contaminated sharps, i.e. needles. These devices should be used whenever possible.

Other PPE– Mouthpieces, resuscitation bags or other ventilation devices should be used during resuscitation efforts.

Environmental controls – Healthcare facility staff have established procedures for routine cleaning and appropriate disinfection of environmental surfaces and patient furniture/equipment.

- Spills or contamination of medical equipment should be identified and dealt with as soon as possible.
- Spills of blood or body fluids must be decontaminated. Appropriate protective apparel including gloves must be worn. Following the removal of gross spillage, the area must be cleaned with a suitable disinfectant, usually sodium hypochlorite (Javex 1:10 dilution) solution allowing for a ten-minute contact time. All materials must be disposed of in appropriate containers.
- Non-disposable equipment contaminated with blood or body fluids i.e. blood pressure cuffs, should be cleaned of gross soiling and may be sent to the Sterile Processing department for further processing.

The term Routine Practices was chosen to stress that this level of care should be provided for “all patients at all times.”

Additional Precautions:

All policies are available for review here <http://policy.cdha.nshealth.ca/>

Additional Precautions:

Additional Precautions are necessary for certain microbes when Routine Practices are not sufficient to contain them or for certain epidemiologically significant organisms.

Additional Precautions implemented at Capital Health include:

- Contact Measures
- Enteric Measures
- Strict Isolation
- Respiratory Isolation
 - Droplet Precautions
 - Airborne precautions

Complete policies may be accessed via the Capital Health Intranet. It is recommended that you read the policies relating to the additional precautions listed above. All health care providers and physicians are expected to be knowledgeable and comply with Infection Prevention and Control policies.

Below is a brief summary of each policy:

Contact Measures – are used for various clinical situations and may be indicated for certain “contact spread” microorganisms when Routine Practices are not sufficient to control transmission.

Examples include:

- if the microorganism has a low infective dose
- if the microorganism may be transmitted from the source patient's intact skin
- if there is potential for widespread environmental contamination

A lime green “Contact Measures” sign is placed on the cover of the patient’s chart and over the head of the patient’s bed. Gloves must be worn when in contact with the patient or the patient’s environment, gowns are to be worn if contamination of clothing is likely, and dedicated equipment (such as blood pressure cuff, stethoscope & commode) is to be used for this patient only and thoroughly cleaned and disinfected before being used with another patient.

Enteric Measures – All patients with diarrhea, whether or not a diagnosis is known, will be managed using Enteric Measures. This is done to minimize transmission of potentially infectious diarrhea. Diarrhea is defined as the acute onset of new diarrhea (three or more loose stools in a 24-hour period) and no likely non-infectious cause (i.e. a pre-existing condition such as Crohns or colitis).

Infectious diarrhea is primarily transmitted via the fecal oral route. Environmental contamination plays a significant role in this type of transmission and increases the potential for cross-contamination to other patients. This is especially true in the case of *Clostridium difficile*; in which bacterial spores can survive in the environment for prolonged periods of time. Enteric Measures must be maintained until diarrhea is resolved.

Components of Enteric Measures include wearing gloves when in contact with the patient or their bed space, protecting clothing from soiling, environmental cleaning and containment measures. An orange Enteric Measures sign is placed above the head of the patient's bed and on the chart cover. A dedicated commode is used only for this patient and it is labelled as such.

Strict Isolation – is used to provide physical barriers that will confine and contain antibiotic resistant organisms (MRSA and VRE) and other epidemiologically significant microbes.

Everyone (including visitors) who enters a Strict Isolation room must wear gloves, a gown, and a mask for patients with MRSA. Signage is placed on the chart cover and on either side of the door frame. A stocked isolation cart is located outside the Strict Isolation room. Personal protective equipment is donned **outside** the Strict Isolation room but **removed and discarded prior to leaving this room.**

Dedicated equipment is provided and kept in the Strict Isolation room. Any equipment to be removed from the Strict Isolation room requires cleaning and disinfection.

Patient movement in and out of the Strict Isolation room is allowed **only** for medical or therapeutic reasons.

Respiratory Isolation – is used to prevent the transmission of microorganisms that are sneezed, coughed, or breathed into the environment. In the case of Airborne Precautions, aerosolization of infectious fluid from vesicles (such as chickenpox or shingles) may also occur.

Droplet Precautions – those entering the patient's environment wear a surgical mask and possibly eye protection. Signage is placed over the bed and on the chart cover. Droplet precautions may be paired with Contact Measures.

Airborne Precautions – patients are placed in a negative pressure room with the door /window closed and an N-95 respirator must usually be worn by those who enter. This requires fit testing to determine the correct respirator for your face shape. Airborne Precautions signage is placed on the closed door and the chart cover.

Any member of the health care team may initiate Additional Precautions, but only a member of the Infection Prevention and Control department may discontinue Additional Precautions once they are instituted. This is often done in consultation with the clinical team.

Antibiotic Resistant microOrganisms (ARO) in a nutshell...

AROs are sometimes referred to as “superbugs” in the media. This is very misleading. MRSA and VRE are bacteria that have resistance to certain types of antibiotics.

Methicillin Resistant Staphylococcus aureus (MRSA) - *Staphylococcus aureus* is a common skin bacterium that many people carry as part of their normal flora. MRSA is a type of *Staphylococcus aureus* that has become resistant to many of the antibiotics previously used to treat infections caused by it. MRSA is not normal flora.

Vancomycin Resistant Enterococcus (VRE) – *Enterococci* are common bowel bacteria. VRE is a type of enterococcus that has resistance to the antibiotic vancomycin.

Attempts are made to prevent the spread of these bacteria because infections caused by them are more difficult to treat (due to limited antibiotic choices) and the resulting increased patient morbidity and mortality. Transmission of ARO between patients in the acute care setting is well documented and a major concern for Canadian hospitals.

ARO acquisition risk factors:

- Frequent; multiple antibiotic use
- Prolonged; frequent hospitalizations
- ICU/burn unit admissions
- Advanced age
- Non-intact skin
- Multiple invasive procedures or devices
- Immunosuppression
- Close proximity to a colonized patient

Health care providers who follow posted procedures and keep their hands clean are not at increased risk for acquiring these bacteria. The greater risk is that an ARO will be spread to another patient.

Both MRSA and VRE are spread primarily by indirect contact (contaminated hands and equipment).

All patients are screened for ARO risk factors on admission to Capital Health facilities.

Common Terminology

Carrier – a patient who has had a record of a positive culture for MRSA and/or VRE and requires **Strict Isolation** to prevent transmission of the organism to another patient.

Contact – a patient who has been in contact with a carrier of MRSA or VRE (roommate or floor mate) and requires testing to see if they have acquired the ARO. This patient requires **Contact Measures** until testing is completed.

Colonization – denotes the presence of a microorganism in the absence of symptoms or deep tissue invasion.

Infection – refers to a condition in a host resulting from the presence and invasion of microorganisms. It implies the recovery of an organism from a normally sterile body site or the production of an inflammatory response.

Colonization with an ARO is more frequent than disease, and widespread transmission may have occurred by the time an ARO outbreak is recognized.

The judicious use of existing antibiotics and the integration of “Routine Practices” into your daily patient contact allow the practicing physician to minimize the impact of AROs.

Infection Prevention and Control Practitioners are available to answer your questions.
We may be contacted by calling 473-2659 (main office).



Capital Health
Infection Control

Hand areas
most frequently missed



Hand Hygiene

Alcohol Hand Sanitizer - use routinely when hands do not look soiled or wet.
It is important to cover all surfaces of hands, fingers, thumbs and wrists.

The following steps should take about 30 seconds.

1. Apply the product into the cupped palm of one hand.
2. Rub fingertips, nails and backs of fingers of each hand in the product.
3. Rub palms together.

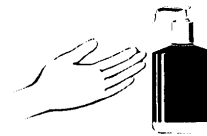


Refer to the directions from the manufacturer for correct amount of product.

4. Rub between interlaced fingers.
5. Rub backs and sides of hands.
6. Rub thumbs and web spaces.



7. Rub wrists.
8. Continue to rub until hands are dry.
9. Your hands are now clean and safe.



Use a water based moisturizer throughout the day (such as before breaks or at home) to keep your skin healthy.

Hand Washing - wash with soap and water when hands look soiled or are wet.

It is important to cover all surfaces of hands, fingers, thumbs and wrists.

1. Wet hands with warm, running water. Leave the water running.
2. Apply one pump of soap.
3. Rub palms together to make a good lather.

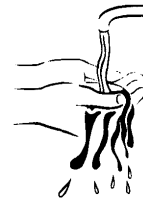
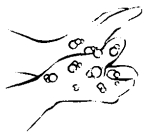


The following steps should take about 15-20 seconds.

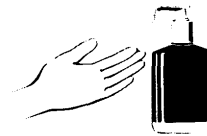
4. Rub between interlaced fingers.
5. Rub backs and sides of hands.
6. Rub fingertips and nails.



7. Rub thumbs and web spaces.
8. Rub wrists.
9. Rinse well under running water.



10. Pat hands dry with single use paper towel.
11. Turn off taps with paper towel.
12. Your hands are now clean and safe.



Use a water based moisturizer throughout the day (such as before breaks or at home) to keep your skin healthy.

Occupational Health Universal Precautions
Focusing on Blood Borne Pathogens

In performing a medical procedure, the practitioner is often placed at risk for exposure to blood borne pathogens such as Human Immunodeficiency Virus (HIV) or Hepatitis B/C. In addition, body fluids / secretions may be contaminated with bacteria which rarely pose a threat to the health care worker but may be passed on to other patients by the health care worker. Because a medical history and physical examination cannot reliably identify patients infected or colonized with such pathogens, Universal Precautions are applied during contact with all patients.

Warning labels which identifying specific blood borne pathogens should not be used and should never be used for the selective application of precautions during medical procedures.

Precautions should be applied to potential contact with any of the following body fluids, which may pose a risk for infection with a blood borne pathogen:

**Blood or Serum or Plasma
Human Tissue
Cerebrospinal Fluid
Synovial Fluid
Peritoneal or Pleural Fluid
Pericardial Fluid
Amniotic Fluid
Semen
Vaginal Secretions
Any Bodily Fluid visibly contaminated with blood**

Precautions also apply to the following, which may be colonized with bacteria that can be transmitted to other patients:

**Vomit
Feces
Urine
Saliva
Respiratory Secretions**

In addition to Routine Practices, other preventative measures may be implemented to minimize the risk of a blood borne pathogen exposure:

- Avoid using sharp instruments when other methods will suffice e.g. use of electrocautery in place of sharp dissection with a scalpel, use of stapling devices instead of sutures.
- Avoid contact with sharp items within the surgical field such as spicules of bone or wire sutures.
- Use correct surgical techniques. **Never retract or hold tissue with the fingers - use an appropriate instrument.** Use forceps to load needles into needle drivers.
- Do not use your fingers to locate or guide a suture needle. Avoid 'blind palpation' when sharps are in the field.
- Make use of new technologies, as they become available e.g. new 'blunt suture needles'.

Exposure to Blood Borne Pathogens

Potential exposure to blood borne pathogens includes the following:

- Percutaneous injury with a contaminated object i.e. Needle Stick or Scalpel Cut
- Contact with non - intact skin or mucous membranes. This includes unhealed lacerations, dermatitis, hangnails etc.
- Blood/ body fluid exposure over a large area of intact skin.

Exposure does not include the following:

- Routine contact with patients or their personal effects.
- Routine handling of medical equipment, food trays etc.

The risk of sero-conversion from needle stick injury is felt to be dependant upon the:

- **Type and size of needle (Hollow > Solid)**
- **Depth of injury**
- **Volume of inoculum (i.e. Injections)**
- **Number of infectious particles**
- **Susceptibility of the exposed individual**

In the event of an exposure to infectious body fluids from a known, potential or unknown source, some general principles should be followed:

- The wound or affected skin should be immediately and thoroughly washed with soap and water. If the injury is by needle stick or laceration, bleeding from the site should be encouraged. Any affected mucous membranes should be irrigated with large amounts of saline or tap water.
- Report immediately to the hospital occupational health office or the Emergency Department. They will require information regarding the exposure including the HIV, HBV and HCV status of the source patient, if known.
- The tetanus status of the affected HCW must be determined historically. If there has been no Tetanus booster within the preceding 10 years, Td/ Dtap 0.5 ml should be administered intramuscularly.

The following gives more detailed information regarding each of the three major pathogens. An algorithm for all exposures is included at the end of this section.

Human Immunodeficiency Virus (HIV)

Although tens of thousands of Health Care Workers (HCW) have been infected with HIV, only a small proportion occur as a result of occupational exposure. The vast majority of these occupational exposures were the result of hollow needle stick injuries. Only ~ 10 % were the result of mucous membrane or cutaneous exposure. The overall risk of sero conversion for HIV associated needle stick is ~ 0.3 % and for mucous membrane or non intact skin is 0.09%. The risk of sero-conversion following exposure to a known HIV positive source is related to:

1. The amount of blood to which the HCW was exposed i.e. the device being visibly contaminated with blood or having been previously placed in a vein or artery.
2. The depth of the wound - deeper wounds and wounds which bleed spontaneously carry higher risk.
3. The stage of illness of the source patient - patients in pre-terminal state and patients with acute, symptomatic HIV being highest risk.
4. Whether post exposure prophylaxis is initiated.

The risk of HIV sero-conversion through mucous membrane exposure is low, estimated at ~ 0.09% per episode based on limited data. Overall, the risk of HIV to the health care worker is much less than that associated with Hepatitis B and C.

Following a suspected HIV exposure:

- The exposed HCW should contact the hospital occupational health office or Emergency Department.
- If the infectious status of the source patient is not known, the occupational health office will make arrangements for the Attending Physician to order the blood work and obtain the patient's consent.
- An assessment of the risk of the exposure will be made.
- Based on the above information, counseling will be offered. This may include a recommendation for baseline HIV testing with retesting at three and six months. Advice regarding sex, workplace and lifestyle precautions will be available.
- The major decision following known or suspected exposure to HIV will involve the use of post-exposure prophylaxis (PEP).

There is ample evidence to suggest that prompt post-exposure prophylaxis with antiretroviral agents, significantly reduces the risk of HIV sero-conversion in Health Care Workers who have been exposed to HIV contaminated body fluids. **(See Morbidity and Mortality Weekly Reports, Vol 47/No. RR-7, May 15 1998.)**

Current recommendations for post-exposure prophylaxis are based on exposure to a known HIV positive source. However, many HCW exposures are to an unknown source or a patient with unknown HIV status.

If the source is known to be HIV positive, risk may be stratified:

- Highest Risk Exposures (high viral load, deep injection) are treated with triple therapy (Zidovudine, Lamivudine and Lopinavir-Ritonavir (Kaletra))
- Lower Risk Exposures are offered Zidovudine +/- Lamivudine.

If the source is unknown or the source serology is pending, decisions to use post-exposure prophylaxis must be made on an individual basis, taking into account:

- The type and source of exposure (if known)
- Local prevalence of HIV
- Side effect profiles of the medication
- The HCW's wishes

PEP is most effective when started within two hours of exposure. It is therefore imperative not to delay seeking care following an exposure. PEP may be somewhat effective even days or weeks following exposure - therefore PEP is not contraindicated even when presentation is delayed. If the HCW accepts post exposure prophylaxis (PEP), HIV testing by code number is recommended at one year as well as at 0, 3 and 6 months and **CBC, DIFF, ALT, AST, and CK testing is recommended at 2 and 4 weeks. A consult with an Infectious Diseases Physician should be sought if PEP is instituted.**

Hepatitis B Virus (HBV)

HBV is a DNA Virus, which consists of an internal core of DNA and Protein (HbeAg) and an external layer of lipid and protein (HB Surface Ag). The incubation period between exposure and onset of illness is 2 to 6 months with up to 50% of adults and 10% of children manifesting evidence of an acute illness at that time. Approximately one percent will go on to fulminant hepatic failure. The illness is self-limited in the majority of patients with clearing of the virus and subsequent immunity. Up to 10% of patients will develop persistent chronic or active hepatitis with associated infectious risk to others. These patients retain a significant risk of subsequent cirrhosis and hepatocellular carcinoma.

HBV tends to be a hardy organism and may remain infectious in dried blood and on environmental surfaces. Patients who are HbeAg Positive have higher viral titre and are therefore the most infectious. The risk of sero conversion following a single parenteral exposure is ~ **30%** following a cutaneous hollow needle exposure. Mucocutaneous exposures also carry a high risk of sero conversion.

Immunization of 'at risk' health care workers with **Hepatitis B Vaccine** remains the single most effective means of preventing transmission. Approximately 90 % of people receiving the full three-dose course of vaccine develop immunity. It is recommended that all 'at risk' HCW's receive this vaccine. HCWs should know their post vaccine HepB antibody titre (HBsAb).

Following a Suspected HBV Exposure

- In the case of a significant exposure, it is recommended that the status of the source patient be determined if possible. If this cannot be determined within 48 hours, then the HCW will be treated in the same fashion as for a known Hep B +ve or unknown source.
- If the HCW has previously received Hep B Vaccine and the surface antibody titre (HBsAb) is known to be positive, no further action other than as determined by the HIV and Hep C protocols, If known to be a vaccine non-responder the HBIG is offered. A non-responder is defined as a person who has had 2 complete sets of Hepatitis B vaccine and still does not show immunity to Hepatitis B by serology.
- If the HCW has previously received the Hep B Vaccine and was not previously tested, the surface antibody titre (HBsAb) should be measured, If positive, no further treatment is required other than as determined by the HIV and Hep C protocols. If negative, the HCW is offered the Hepatitis B Immune Globulin and the Hep B vaccine.
- If the HCW has not been previously immunized, the full course of Hep B Vaccine should be initiated. A dose of Hep B Immune Globulin (HBIG - antibodies derived from pooled donors), 0.06 ml/kg is also recommended to provide passive immunity to infection. The first dose of HBIG is most effective if administered within 48 hours of exposure but may provide protection up to a week later. Susceptible, exposed HCWs should have baseline liver function tests and Hep B serology. This blood work is repeated at 6 months or if the HCW becomes symptomatic for hepatitis.
- Some institutions choose to stratify the risk of needle sticks from an unknown source i.e. Needle stick through a bag of garbage. They will define source areas of the institution as 'high', 'moderate' or 'low' risk and treat exposed HCWs accordingly.

Hepatitis C Virus

Hepatitis C virus is an RNA virus, first definitively identified in 1989. HCV is the pathogen responsible for the majority of parenterally transmitted Non A Non B hepatitis cases. The incubation period following exposure is ~ 7 weeks. Fewer than 25 % of patients infected will develop clinical signs of the disease. However, virtually all of those symptomatic patients will go on to develop chronic hepatitis with persistent viremia. Up to 25 % of patients will go on to develop cirrhosis after many years.

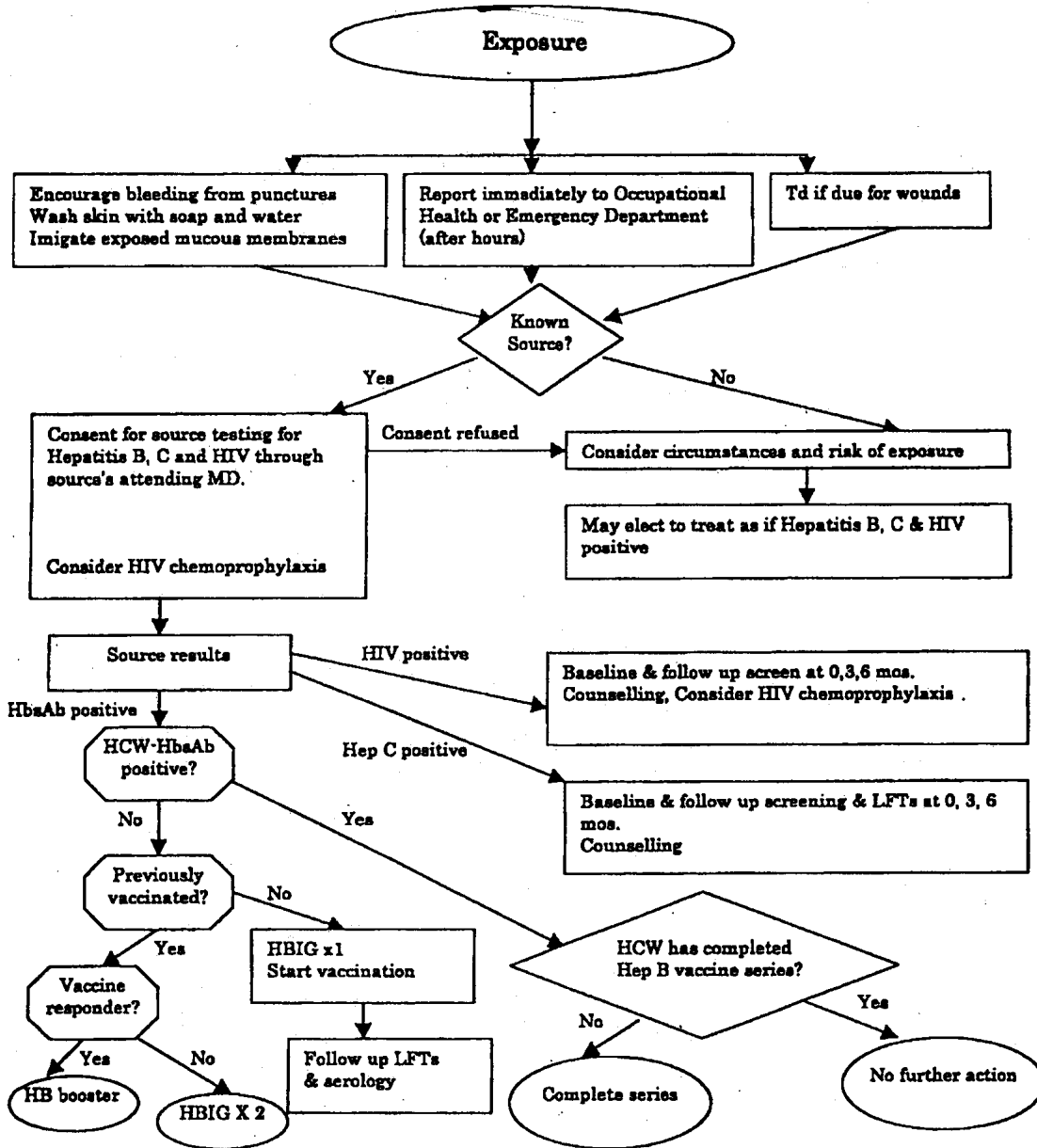
Hep C virus is less hardy than Hep B and does not survive long in serum stored at room temperature or on environmental surfaces. The risk of transmission following a needle stick from an infected source is estimated at ~ 1.8 %. However, an inoculum as small as 0.1ml of blood can transmit the disease.

A number of serum markers for Hep C are currently available yet all have their limitations. Approximately 10% of patients known to be Hep C positive by other methods will test negative with the current assays. Conversely, there is a high incidence of false positive screening results in low risk populations.

To date, there is no effective vaccine against Hep C infection. Following significant exposure to body fluids of an individual, an attempt should be made to determine the Hep C status of the source. In the case of an unknown or known positive source, the HCW should have blood drawn for Hep C serology in addition to any blood work dictated by the HIV / HBV protocols. If the source is Hep C positive, aminotransferase (Alt) testing at 0 & 6 months should be done. **Most institutions do not offer immunization with immune globulin because there is no current evidence to indicate a benefit.** Intervention is limited to following the HCW's serology and liver function tests.

**Suggested Protocol Following Exposure to Blood Potentially Infected
With HIV/Hep B/Hep C**

EXPOSURE TO BLOOD AND BODY



HCW = Health Care Worker
HBIG = Hepatitis B Immune Globulin

Td = Tetanus Diphtheria Vaccination
LFT = Liver Function Tests

Hand Washing and Field Preparation

Definitions:

Surgical Asepsis encompasses techniques designed to prevent the inoculation of microorganisms into a surgical wound. This is accomplished through the use of sterile instruments, gowns and gloves as well as through methods of reducing the microbial content of the patient's and health care worker's skin.

Sterilization is the process of eliminating all living microorganisms (including bacteria, viruses and spores) from a surface or object.

Antiseptics are chemical agents, which kill microorganisms or inhibit their growth while in contact with the microorganism. The term antiseptic is reserved for agents, which are used on the human body.

Disinfectants are chemical agents, which kill microorganisms on inanimate objects or surfaces.

An antiseptic agent may be a disinfecting agent which has been diluted and rendered safe for use on living tissues.

Hand Washing and Antisepsis:

The Health Care Worker's (HCW's) skin is generally inhabited by a combination of normal 'resident' bacteria plus other "transient" and more pathogenic organisms. The latter are often acquired through work in the hospital environment. 'Resident' bacteria include coagulase negative staphylococci and well as anaerobic diptheroids such as *P. acnes*. These organisms are always present on the surface of human skin as well as in glands and follicles. They may be temporarily, but not permanently, reduced by hand washing. Transient organisms such as *S. aureus* or gram negative enterobacteriaceae are generally pathogenic and may be drug resistant. **The primary goal of hand washing prior to any procedure is the eradication of pathogenic transient bacteria.**

Effective antiseptic hand washing may be accomplished through the use of a number of agents.

Alcohols as a group are effective antiseptics with activity against both gram positive and negative bacteria. They are ineffective against spores and though their overall activity is short lived, when properly applied, they can have a significant effect on the reduction of skin flora. They are used in many minor procedures where temporary elimination of skin pathogens is required i.e. drawing blood and may be used in patients who have hypersensitivities to other agents. The use of alcohol-based waterless hand antiseptics has eclipsed hand washing in the clinical setting due to its efficacy and convenience. Some formulations are acceptable for surgical antisepsis as an inter-operative scrub and as a preoperative scrub when preceded by hand washing for the removal of foreign matter.

Iodophors are organic complexes of iodine combined with detergents which enhance their antibacterial action. They are effective against both gram positive and negative bacteria but do not kill spores. Once rinsed from the skin, iodophores do not maintain any bactericidal activity. The most common agent of this type in Canada is Povidone - Iodine (Betadine). It is available in a 10% solution.

Chlorhexidine Gluconate is effective against gram positive and negative bacteria. It is ineffective against spores but is fungicidal. It is combined in various concentrations with a detergent and alcohol solution to provide a hand washing agent, surgical scrub and surgical skin preparation. It has some residual effect with repeated application or friction.

Hexachlorophene (pHisoHex) is a bisphenol solution which is used as a surgical scrub and skin cleansing agent. It is effective against gram positive organisms but less so against gram negatives. It offers the advantage of persistent antibacterial action between washings. It can be toxic to newborn infants and its use is contraindicated in that setting.

Hydrogen Peroxide in a 3 % aqueous solution has a brief bactericidal activity but is less effective than other agents. Its use is limited.

Disinfection and Sterilization:

Inanimate objects may be sterilized (rid of all microorganisms) by both physical and chemical means. The most common method is exposure to **steam under pressure** in an autoclave. The elevated temperatures kill all microorganisms including spores. The time required for sterilization varies with the type and size of equipment/bundle.

Chemical sterilization can employ a bath of disinfectant such as glutaraldehyde and is rarely used. Various methods of **gas sterilization** exist, the most common employing ethylene oxide. This process takes longer than physical methods but is useful for heat sensitive equipment.

Preparation of a Sterile Field:

Prior to performing a surgical procedure through intact skin, aseptic preparation of the area should be undertaken. As stated above, it is practically impossible to completely disinfect living skin of all microorganisms. The goal is to kill all transient organisms on the skin surface and adequately suppress resident micro organisms for the duration of the procedure. This is usually accomplished using one or more of the agents mentioned in the preceding section.

In general, the following steps are followed:

Best practice is for non-sterile personnel to perform the patient skin prep.

- Don clean gloves

- In an area separate from the sterile field, sponges soaked with antiseptic solution are picked up with a sterile instrument such as a sponge forcep, 2/3 down the sponge. Dab any excess solution from one sponge onto the other. Sponges must not be wet to the point where they cause spills or drips.
- Chlorhexidine Gluconate (CHG) 2% and Isopropyl alcohol 70%- To be used for intact skin only.
The field area is cleansed from the incision site outward. For an abdominal prep, prep the umbilicus first to prevent debris from the contaminated site splashing onto the freshly prepped area- change sponge.
Use repeated back and forth motion for at least 30 seconds on dry skin and 2 minutes for moist skin. Allow the product to completely dry- do not allow pooling of the product. Do not blot or wipe away product. Ensure any antiseptic soaked materials (drip pad) are removed prior to draping. Solution contains alcohol and gives off flammable vapours- do not drape or use ignition source until solution is completely dry!
Not to be used on mucous membranes, can cause corneal irritation and is neurotoxic and can cause permanent damage to the inner ear.
- Povidone/Iodine 10%-
Use a circular motion starting from the center outward. (clean area to less clean area) The sponge is not to back track over an already prepped area. Exception- for an abdominal prep, prep the umbilicus first to prevent debris from the contaminated site splashing onto the freshly prepped area- change sponge.
- When preparing a vertical surface, drips should not be allowed to run downwards from the periphery through an already cleansed area. This process is generally performed at least twice, depending on the agent being used.
- In any cases where a perineal prep is required (mucous membranes)
Povidone/iodine is the preferred choice (less irritating to the mucous membranes)
Prep the perineal area first- discard the sponge and stick.
If the abdomen is also being prepped, use Povidone/iodine to prep the abdomen.
Prep the umbilicus first- discard sponge
Prep the abdomen in the usual manner.
- Used non radiopaque prep sponges are discarded in the OR garbage and instruments are discarded on the case cart. If prep sponges are radiopaque and counted in the surgical count, care must be taken not to place these in the OR garbage.
- Once prepped, the area is draped either with liquid resistant paper or cloth drapes. Care must be taken not to contaminate the field or the operator while placing these drapes.

- In the modern operating room, special drapes containing an adherent plastic window may be used. The surgical incision may be made through the window, further reducing the risk of contamination by resident skin flora.

Wound Cleansing:

A distinction must be made between the cleansing of intact skin prior to a surgical incision and the cleansing of an open wound. Intact skin may be cleansed in an aseptic manner with essentially all the agents listed in the earlier section. These agents may also be used for cleansing the skin surrounding a wound, however, they are toxic to tissues and tissue defences when used in open wounds. The following are some general principles of wound cleansing which apply specifically to open wounds.

- The quality of mechanical cleansing is of paramount importance in preventing wound infections.
- Any obviously dead or devitalized tissue should first be removed from the wound with a sharp blade. While this is comparatively easy in areas which are not of cosmetic importance (i.e. the trunk or proximal extremities). Great care must be exercised when debriding the face or hands. These areas should be left to an expert.
- Contaminating materials such as dirt should be removed with forceps.
- The preferred method of mechanical cleansing is irrigation under pressure with saline. While this is often done in the Operating Room with a special irrigation setup, it can be accomplished in the outpatient setting using a large syringe and the Teflon catheter portion of a 20g IV cannula.

In general, the larger the volume of saline the better. Protect yourself from spray and splatter by wearing a protective face shield.

- Mechanical scrubbing of wounds with surgical sponges etc. is best avoided as this results in further tissue damage.
- Alternate irrigation solutions such as dilute povidone-iodine or antibiotics have been used without apparent damage to tissues or tissue defenses. Saline, however remains a cheaper and equally effective solution.

Aseptic Technique – Traffic, movement in the surgical suite and management of Sterile Fields and sterile personnel

Aseptic Technique denotes a group of principles and practices designed to ensure that sterile materials and surgical fields remain sterile or “maximally free of microorganisms”.

The following are some general principles of Aseptic Technique:

1. Traffic in/out of the OR theater should be kept to a minimum.
2. All materials within a sterile field must be sterile.
3. Sterile persons and items must only contact other sterile areas. Unsterile persons and items must only contact other unsterile areas.
4. If an unsterile object touches or passes over a sterile field, the field is no longer considered sterile.
5. The edges of sterile containers/packages are not considered sterile once the package is opened.
6. Gowns are considered sterile only in front, from the waist or surgical field to chest level and from two inches above the elbow to the cuff.
7. Sterile tables are only considered sterile at the tabletop level.
8. If the wrapping of a sterile package is perforated or permeated by liquid, it is no longer considered sterile.
9. Items of doubtful sterility should be considered unsterile- **If in doubt-throw it out!**

Areas of the OR environment

There are three distinct areas of the OR environment- unrestricted, semi restricted and restricted.

Unrestricted areas allow personnel to be in their street clothes, have food or drink (may include eating areas) and provides for a changing area.

Semi restricted areas- OR attire is required

- includes areas that support the OR, for example, clean and sterile storage areas, corridors leading to the theaters, outer corridor, etc.

Restricted areas- OR attire and facemask are required

includes any area where scrub personnel are present and/or sterile supplies are open, for example, a theater with a case in progress, scrub sink area while a surgical scrub is in progress, area adjacent to the flash sterilizer when unwrapped sterile goods are being removed and transported to a theater, etc (AORN 2005, p 483).

OR and Scrub Dress Attire

OR Dress attire- Nonsterile apparel items designated for the OR practice setting that includes the two piece pantsuit, cover jackets, head/beard coverings, shoe covers or designated OR shoes, masks in restricted areas, protective eye wear and other protective barriers. No jewellery, rings, watches, chains, ear rings or other visible piercings.

OR attire is to be donned as close to the time entering the semi restricted area as possible (not to be worn from home or from site to site).

OR attire is to be changed daily or when soiled, contaminated or wet during the day.

Surgical Scrub attire- OR attire (minus cover jackets) and including scrub gown, surgical gloves, masks, shoe covers or designated shoes, protective eye wear. Surgical attire is to be changed **after each patient** except the pant suit, designated shoes and head covering. Pant suit and head covering are to be changed if they become soiled, contaminated or wet.

Sterile Personnel- scrub team- surgeon, assistant(s), scrub nurse, resident, RN First Assist, clerks, GPs, observers

Because skin cannot, for practical purposes, be cleansed of all micro organisms (even through a surgical scrub), it is not considered sterile. Therefore, the first step in ensuring the sterile handling of medical materials is to provide a sterile barrier, i.e. Sterile Gown and Gloves.

While gowned and gloved, personnel are only considered sterile from the front waist or surgical field to chest level and from two inches above the elbow down. Any contact with other areas i.e. Adjusting your own mask or glasses, hands under armpit or behind back, is considered a break in sterile technique and needs to be corrected. Be honest, the only person that will be hurt if you try to hide a break in technique will be the patient! **Use your surgical conscience.**

Once gowned and gloved, any movement away from the sterile field must be avoided as this increases the risk for contamination of both the person and the field. **Sterile personnel must pass each other front-to-front or back-to-back** in order to prevent contamination. Sterile personnel must always face the sterile field; never stand backwards against the field, your back is not sterile. Never lean on a sterile field, remember there is a patient under the drapes with nerves and sensitive pressure points.

Hands must be visible above the waist / table top level. While walking or standing, keep your elbows slightly bent and your hands elevated in front of you where they can be seen.

Unnecessary talking should be limited in the operating room. Masks do not provide absolute protection against the spread of micro organisms on respiratory droplets.

Handling Sterile Tables and Materials

Tables must be wiped clean and dry prior to placing sterile trays or packages upon them. This will reduce the possibility of the sterile package being contaminated by a mechanical perforation or liquid strike (soak) through.

Sterile draped tables are only considered sterile on the tabletop surface. Sterile personnel may only move a mobile stand or table by grasping its top. An alternate method is to enlist the assistance of a non-sterile person who will reach under the drapes, below the level of the tabletop.

Non-sterile personnel must not reach over a sterile field. If this happens the field is considered contaminated and is discarded.

In some institutions the practice is to follow an **Event Related Policy**. This means that the handling and storage of sterile materials must be such that they are not damaged and the integrity of the packaging determines the maintained sterility, not a date in time or expiry date. An **Event occurs** when materials become wet, or are inadvertently stored in an improper location (the window sill), or they are dropped on the floor. Packaged sterile materials which are dropped on the floor may suffer invisible penetrations of their wrapping.

In any of the above situations, the items are considered unsterile and cannot be used. Sterile packages must be checked for the integrity of the packaging and seal prior to use. *Packages which are not properly sealed or which have questionable integrity must be discarded.*

Opened sterile packages or bottles must only be used for a single patient. They may not be retained for a second case, even if unused.

Additional sterile materials are transferred to the sterile personnel or field by the non-sterile personnel. Non sterile personnel are the circulating nurse, anesthesiologist or anyone not 'scrubbed'. The preferred method for transferring items to the sterile field is for the non-sterile personnel to open the sterile package away from the sterile field and present it in a fashion which allows the sterile personnel to remove it without contamination and place it on the sterile field.

Flipping sterile materials out of their packaging onto the sterile field is not recommended as this increases air turbulence and increases the risk of the item becoming contaminated or damaged.

The Surgical Scrub

The surgical scrub is the process of removing as many micro-organisms as possible from the hands and arms before participating in surgery. Micro-organisms are ubiquitous in nature and are naturally present in and on our bodies. There are two types of micro-organisms that inhabit the skin:

Transient: organisms acquired by direct contact that are usually removed by thorough washing with soap or detergent and water.

Resident (Normal): organisms below the skin surface in hair follicles and in sebaceous or sweat glands. They are more adherent and therefore more resistant to removal. Their growth is inhibited by the chemical phase of the surgical scrub.

In freeing the skin of as many organisms as possible, two processes are utilized:

Mechanical: removes transient organisms with friction.

Chemical: reduces resident flora with a microbicidal or antiseptic agent.

The Purpose of the Surgical Scrub

1. To minimize the number of micro-organisms on the skin.
2. To minimize the population of micro-organisms during the operative procedure through suppression of growth.
3. To reduce the hazard of microbial contamination of the operative wound by skin flora.

The Surgical Scrub Procedure

Important Points to Remember

- Wear eye protection for every surgery
- Remove **all** jewelry
- Nail polish and artificial nails are not permitted in the OR environment.
- Prior to any surgical scrub, inspect hands and arms to ensure the skin is intact.
- Keep fingernails short and clean.

- Keep hands and arms **ELEVATED**, away from the body and in the visual field.
- Avoid splashing the scrub attire. Do not lean on the sink.

Prior to scrubbing:

Inspect oneself in the mirror to ensure all hair is covered, mask and proper eye protection is in place. Give the circulating nurse (unsterile personnel) in the OR your gloves or glove size.

Three scrub methods: ***Time Method***
 Brush-Stroke Method
 Manorapid® Rub

All techniques require the same initial ‘hands to arms’ wash procedure. Hands and arms are washed first with soap and water to remove gross contamination and transient flora. Nails are cleaned under running water, using disposable nail cleaners. After rinsing, the selected scrub procedure is performed, using either an antimicrobial waterless rub or a disposable sponge brush (pre-packaged).

The protocol for each scrub method shall be standardized and based on manufacturer’s written instructions.

Time Method

In brief, the time method scrub entails scrubbing the anatomical area with a sponge impregnated with chemical antimicrobials, for a specific period of time with special emphasis on the fingers and hands. Each manufacturer of scrub brush products will have instructions for use of their product. Look for posted instructions in the institution where you are working.

The following steps describe the 6 minute timed surgical hand scrub at the QEII:

1. Open scrub package and use the provided nail stick to clean nails in step 2.
2. Following initial hand- arm wash with soap and water, clean the nails with a nail stick and rinse arms up to the elbows with running water.
3. Pick up the sponge and discard package in the garbage.
4. Apply scrub solution from the sponge side and work up a lather.
5. Scrub for 3 minutes as follows: with the brush side of the product, scrub nails, cuticles and interdigital spaces of each hand. With sponge side, scrub the hands and forearms.

6. Rinse thoroughly with warm water. Repeat the scrub, using the sponge side only for an additional 3 minutes. Add water as necessary to provide the desired level of suds.
7. Hold hands higher than the elbows during entire scrub, until hands are dried. Hands must be held higher than the elbows at all times during the scrub, to allow water to drip from the clean finger tips down the arms and then flow off the elbows. Avoid splashing water onto the scrub suit. Do not lean against the sink.
8. Dispose of sponge/brush in garbage - not in the sink.
9. Rinse hands and arms thoroughly. Rinsing of hands and arms proceeds from the fingertips to elbow, rinsing one arm at a time. Keep hands above elbows and travel in one direction through the water. Turn the water off - being careful not to contaminate the hands. Some scrub sinks have automatic sensors which turn the water off for you.
10. If, at anytime during the scrub, you touch any unsterile surface to contaminate yourself, the entire scrub must be started over from step 3.
11. ***Keep hands elevated and in front of the body with elbows slightly flexed, taking care not to touch your scrubs, walls, doors with your hands or arms*** and proceed to the theater to dry hands using a sterile towel. This technique will prevent inadvertent contamination.

Stroke-Count Method

The difference between counted and timed scrubs is that the stroke-count method is completed according to a specific number of strokes rather than a specific period of time. There are various formulas for the stroke-count method. This is related to the disinfectant/detergent used- follow the manufacturers' recommendations. The following is one example (equals about 5 minute timed scrub). QEII does not have a counted stroke method for their current scrub products.

1. Following initial hand- arm wash, clean the nails with a nail stick and rinse arms up to the elbows with running water.
2. Hold hands higher than the elbows during entire scrub, until hands are dried. Hands must be held higher than the elbows at all times during the scrub, to allow water to drip from the clean finger tips down the arms and then flow off the elbows. Avoid splashing water onto the scrub suit. Do not lean against the sink.
3. (Begin counting of strokes at this point). Starting at the fingertips, scrub nails with brush for 20 strokes each hand.
4. Scrub all sides of each digit (4 planes), including the web space between them, 10 strokes each plane = 40 strokes per finger. Repeat for second hand.

5. Scrub palm of hand, including wrist, for 30 strokes.
6. Scrub back of hand, including wrist, for 30 strokes. Repeat step 5 & 6 for second hand.
7. Scrub arm with small overlapping circles from wrist (3 sections / 4 planes each), stopping at one brush-width above the elbow. Each of the three sections has 20 strokes. Repeat for second arm.
8. Rinse hands and arms thoroughly. Rinsing of hands and arms proceeds from the fingertips to elbow, rinsing one arm at a time. Keep hands above elbows and travel in one direction through the water. Turn the water off - being careful not to contaminate the hands. Some scrub sinks have automatic sensors which turn the water off for you.
9. If, at anytime during the scrub, you touch any unsterile surface to contaminate yourself, the entire scrub must be started over from step 3.
10. ***Keep hands elevated and in front of the body with elbows slightly flexed, taking care not to touch your scrubs, walls, doors with your hands or arms*** and proceed to the theater to dry hands using a sterile towel. This technique will prevent inadvertent contamination.

Drying the hands after the timed or counted scrub, is achieved by using a sterile towel. This towel is carefully removed from the sterile field or handed to you by the scrub nurse. It is important to avoid dripping water from your hands and arms onto the sterile gown or field. The sterile towel is picked up by grasping a corner of the towel with one hand. The sterile towel is lifted from the sterile gown and allowed to unfold to its full length (do not shake). It is recommended that the scrub personnel lean slightly forward and arms be fully extended to prevent touching the unsterile attire with the sterile towel, as drying the hands begins. Hands must be thoroughly dried, using one hand with the towel to dry the other hand. The towel is then advanced up the arm, drying each area with a rotating motion and taking care not to retrace an area. The towel is reversed and the other arm is dried in the same fashion. Discard the towel using minimal handling.

Another method for surgical scrub is to use a waterless or water reduced method. There are a variety of products on the market, follow manufacturer's written instructions for each product. Below is an example of a waterless scrub being used at the Capital District.

Manorapid® Rub Method **For Pre-Operative Surgical Hand Disinfection**

The difference between this method of hand washing and the timed or counted surgical scrub is that Manorapid® is an alcohol based hand rub and water is used only for the initial hand wash.

Dermotan: A neutral soap, recommended by the manufacturer, to be used for initial hand washing prior to surgical Manorapid® rub procedure.

Manorapid®: 70% Isopropyl Alcohol Hand Antiseptic

PROCEDURE:

Step 1 (1 minute):

- Wash hands for a minimum of 1 minute with water and Dermotan soap. Wet hands with water and use only 1 pump of soap to avoid too sudsy a soap film on your hands. Concentrate on your nails, fingers and forearms. Use a nail stick available in the box by the scrub sink to clean under fingernails.
- Completely dry your hands and forearms with paper towel. Dry thoroughly so that there is no remaining water that could dilute the alcohol.

Step 2 (1 - 1½ minutes):

- Cup one of your hands under the dispenser and, using your elbow, dispense a measure (4-5 pumps) of Manorapid®.
- Dip all of your opposing fingers into the solution once; then transfer the Manorapid® to the other hand. Scrub fingers.
- Use the remaining Manorapid® to rub all areas of your hands, extending to the wrist. This should take about 1 - 1½ minutes.

Step 3 (1 - 1½ minutes):

- Cup your hand under the dispenser again and, using your elbow, dispense another measure (4-5 pumps) of Manorapid® into your cupped hands. Wash up your arms as far as your elbows. This should take another 1-1½ minutes.

Step 4

- Dispense a 3rd measure (2-3 pumps) into your hands and rub hands while moving into the OR.
- The Manorapid® Rub Procedure should take about 3 minutes total.
- Wait until your hands are completely dry prior to gowning and gloving.



Manorapid® can also be used for a general hygienic hand disinfection. When hands are not visibly soiled, it can be used as a 30-second hand rub as an adjunct to the usual rules for hand washing in health care.

Gowning and Gloving

There are two barriers that prevent the transfer of micro-organisms from personnel to patient and vice versa:

1. Gowns
2. Gloves

Gowns should be impervious to the transmission of micro-organisms. They should be composed of materials which prevent liquid penetration and be resistant to abrasions, tears and punctures. The fabric of the gown should be non-glare and the colour should minimize distortion from reflected light. The material of gowns should also meet the National Fire Protection standards.

Gowns should be comfortable to wear, not restrict physical movement and have a wraparound design. The gowns should be composed of an impervious material in the front from the waist to the shoulders and sleeves below the elbow. The stockinette cuffs on the sleeves should fit snugly and be fully enclosed beneath sterile gloves.

Gloves should be checked frequently for perforations and tears. If gloves become contaminated, torn, or sustain a pinhole, the gloves should be changed as soon as possible, depending on the situation

Gowning

The following steps describe the procedure for gowning:

1. Discard the drying towel if applicable.
2. The gown is picked up from the gown table as one unit (be sure to pick up both sides), or it is presented to you by the scrub person.
3. The gown is grasped firmly at the neckline and it is allowed to unfold completely without touching any unsterile objects - Do not shake.

4. Hands are kept on the inside of the gown and the person identifies the armholes and inserts both arms simultaneously.
5. If the gown is presented by the scrub person place arms in the armholes and shrug into the gown. Be aware not to touch any unsterile items or body parts.
6. When donning a surgical gown, sterile ties located at the back of the gown must not flip to unsterile areas. Careful donning of the gown should prevent contamination of the gown.
7. The circulating nurse will pull the gown up and over the shoulders of the scrub person and secure the gown ties.
8. Closed Glove technique - the scrub person does not extend their hands through the cuff of the gown until the gloves are on.
9. Assisted gloving- the scrub person extends arms through the cuff of the gown to allow gloving.

Remember - You cannot touch the front of your gown, ties or any sterile areas until gloves have been donned.

Gloving - Assisted Glove Technique (Majority of the time)

Gowned and gloved scrub personnel assist the scrubbed person in gloving:

1. Sterile glove is grasped by the gowned and gloved scrub person, under the cuff with the palm facing the scrubbed person.
2. The thumb of the glove is aligned with the scrubbed person's thumb.
3. The cuff is stretched open using both hands keeping your sterile thumbs away from the glove interior.
4. The stretched glove is then pulled over the fingers, palm of the scrubbed person's hand and the stockinette cuff of the gown.
5. When the second glove is presented for donning, the scrubbed person should assist with their gloved hand by grasping the glove under the cuff and stretching the opening to allow for easier donning of the second glove.
6. Use a continuous downward and across movement, not going below waist level. DO NOT pull back your unsterile hand as you risk contaminating both the scrub person and yourself. When both gloves are on you can adjust/fix fingers in the holes. Caution is to be taken to prevent uncovering the stockinette cuff.
7. If the glove is contaminated during the surgical procedure, the unsterile circulator will remove the glove **without** pulling the stockinette cuff down over your hand. A new glove is applied by another scrubbed person.

Gloving - Closed Glove Technique

Closed gloving is a practiced technique, which requires confidence to safely perform. Closed gloving starts with the scrubbed hands remaining in the sterile gown sleeves. One of the enclosed hands grasps the glove by the folded cuff. The glove's thumb is aligned with the enclosed thumb of the appropriate hand and the inferior side of the glove cuff is grasped by the enclosed thumb. The opposite enclosed hand grasps the glove and stretches it up and over the stockinette cuff of the gown. The hand is advanced through the stockinette cuff and into the glove. The opposite hand is gloved in the same manner.

There are three ways to wrap the gown following gloving:

1. Use the prepackage card which is attached to the disposable gown tie.
2. Use a sterile instrument at the end of the gown tie.
3. Use the sterile glove wrapper by folding it around the end of the gown tie.

The card, instrument or wrapper is given to the unsterile circulator. The scrubbed person pivots away from the circulator to facilitate gowning. Regardless of which method is used to wrap the gown, the circulator must exercise caution. Careful handling will prevent contamination of the tie. The tie is then grasped and tied by the scrubbed person while the circulator discards the contaminated item used to hold the tie.

If other scrubbed personnel are present, they may assist the scrubbed person by grasping the tie with a sterile gloved hand. No need for the tag, instrument or wrapper.

- At the conclusion of gowning and gloving, the surgical team may approach the sterile field and begin the skin prep and draping procedure

Occasionally, the gown is contaminated by a hand coming through the gown cuff before gloving. **The gloving procedure must be completed before re-gowning.** In this case, the gown is removed first, then the gloves. The circulator removes the gown and gloves.

If the gown is contaminated during the procedure, step away from the sterile field. The circulator will untie the gown. The contaminated person grasps the front of the gown at chest level and shrugs out of the gown. The gown and the sleeves are inverted as the gown is removed and discarded. There are two ways to remove gloves: (1) the scrub person can remove them by using a glove to glove and skin to skin technique, or (2) the circulator can remove the gloves by using a barrier glove to grasp the previously sterile external side of the glove and removing it with one smooth action. **If contamination occurs on the arms or the hands, the surgical scrub must be repeated prior to regowning and gloving.**

Removing Soiled Gown, Gloves and Mask

The scrubbed person must first wipe their gloves with a clean, wet sponge or towel and then release the gown waist tie. The circulator will release the back ties of the gown and drape the gown over one shoulder seam. The front of the gown is grasped and the gown/sleeve brought forward and off over the gloved hand. The gown is turned inside out and drawn over the other gloved hand. Keep the soiled gown away from your body while you fold it inside out then discard it. Gloves are removed as previously described (glove to glove, skin to skin). The mask is removed by untying the strings. It is not proper technique to touch the outside of the mask itself. It harbours many microorganisms

- Never reach to your neck or back to untie your gown with dirty gloves on and gloves are never removed prior to the surgical gown.

Remember to wash your hands following any surgical procedure.

Develop your surgical conscience:

- Recognize errors in technique and take corrective action immediately!
- Always act as you would if the patient were you, or a close family member.
- We don't always see breaks in technique, so if you are in doubt, take corrective action and err on the side of caution!