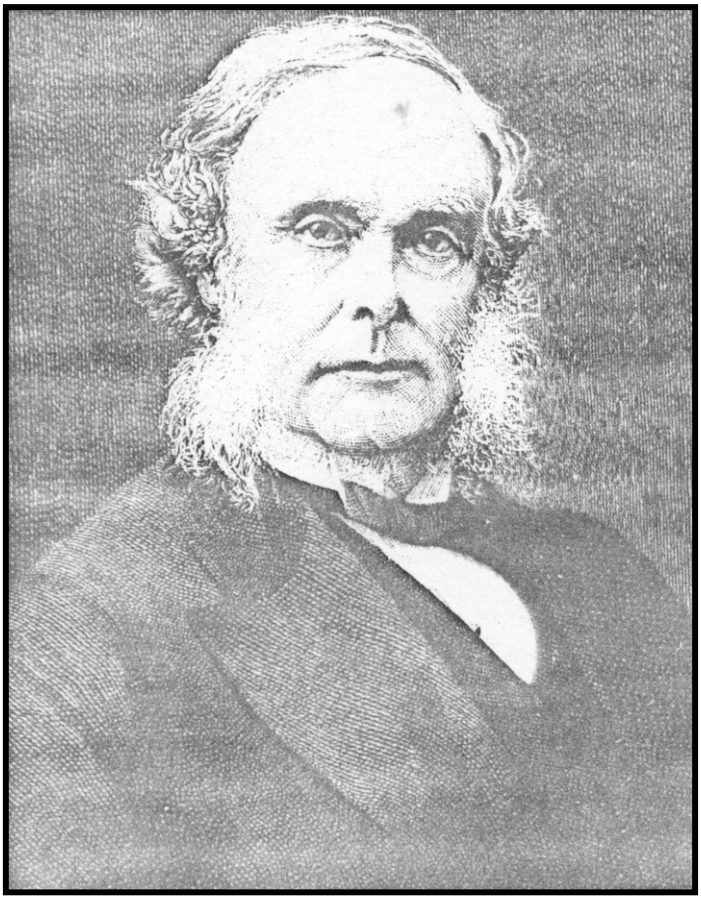
TECHNICAL SKILLS CORE CURRICULUM

ASEPTIC TECHNIQUE



Joseph Lister. Late 19th century Engraving.

LORNE E. ROTSTEIN, MD, FRCSC, FACS
AUGUST 1998
REVISED 1999
REVISED 2002
REVISED 2006

ASEPTIC TECHNIQUE

Introduction

This session is focused on the technical skills required to produce and maintain a sterile, aseptic operative field, safe patient positioning, and instrument identification.

Prerequisite knowledge:

- Principles of asepsis
- Surgical scrub

Objectives:

At the end of this session the resident will be able to perform:

1. Sterile gloving technique using the open method.
2. Sterile gloving technique using the closed method.
3. Correct prepping and draping for maintaining a sterile field.
4. Removal of dirty gown, gloves, and mask.
5. Identification of common instruments.

References:

The College of Physicians and Surgeons of Ontario. Infection Control in the Physician's Office, 1999.

Lloyd AT. Positioning for Surgery: A Review of the Physiology and Complications. Advances in Anaesthesia, 1998, vol 15: 309-337.

Gruendemann BJ, Meeker MH. Alexander's Care of The Patient in Surgery, 8th ed. The C.V. Mosby Company, St. Louis, Missouri, 1987.

Lab Set-Up and Models

Gowning and Gloving

Prepping and Draping

Head and Neck Prepping

PRINCIPLES OF ASEPTIC TECHNIQUE

Aseptic: the complete absence of living microorganisms

Methods to achieve sterility or asepsis:
→ Chemical methods (i.e. gas sterilization)
→ Physical methods (i.e. autoclaving)

Aseptic technique is based on the fundamental principle that infection is introduced into the body from the outside. Therefore, perform all procedures using a method that prevents the introduction of bacteria into a surgical wound.

1. **The procedure must be done in a sterile field from which all bacteria have been excluded, if possible.** The inadvertent use of unsterile items may introduce contaminants into the wound. Items of uncertain sterility must be considered unsterile. Any item that falls on the floor or into any area of questionable cleanliness must be considered unsterile. The circulating nurse should check the package integrity, the expiration date, and the chemical process indicator before dispensing a sterile item.

2. **Gowns worn by the surgical team are considered sterile at the front, from chest to the level of the sterile field.** The sleeves are also considered sterile from 2 inches above the elbow to the stockinet cuff. The cuff should be considered unsterile because it tends to collect moisture and is not an effective bacterial barrier. Therefore, the sleeve cuffs should always be covered by sterile gloves. Other areas of the gown that must be considered unsterile are the neckline, shoulders, areas under the arms, and back. These areas may become contaminated by perspiration or by collar and shoulder surfaces rubbing together during head and neck movements. The back of the gown is not sterile because it cannot be observed by the scrubbed person and protected from contamination.

3. **Sterile drapes are used to create a sterile field.** Only the top surface of a draped table is considered sterile. Although a bacterial barrier may be draped over the sides of a table, the sides cannot be considered sterile. Any item that extends beyond the sterile boundary is considered contaminated and cannot be brought back onto the sterile field. A contaminated item must be lifted clear of the operative field without contacting the sterile surface and must be dropped with minimum handling to an unsterile person, area, or receptacle. Interpretation of sterile areas versus unsterile areas on a draped patient requires astute observation and use of good judgment.

4. **Items should be dispensed to a sterile field by methods that preserve the sterility of the items and the integrity of the sterile field.** After a sterile package or container is opened, the edges are considered unsterile. Sterile and unsterile boundaries are often intangible. A 1-inch safety margin is usually considered standard on package wrappers, whereas the sterile boundary on a wrapper used to drape a table is at the table edge. On peel-back packages, the inner edge of the heat seal is the line of

demarcation. The edge of a bottle cap is considered contaminated once the cap has been removed from the bottle. The sterility of the bottle contents cannot be ensured if the cap is replaced on the bottle.

5. **Motions of the surgical team are from sterile to sterile areas and from unsterile to unsterile areas**. Scrubbed persons stay close to the sterile field. If they change positions, they turn face-to-face or back-to-back while maintaining a safe distance between. Accidental contamination is a threat to any scrubbed person who wanders into a traffic pathway or out of the clean area of the operating room. Approach sterile areas facing them and never walk between two sterile fields. Keeping sterile areas in view during movement around the area and maintaining at least a 1-foot distance from sterile fields help to prevent accidental contamination. All perioperative personnel must maintain a vigilant watch over sterile areas and point out any contamination immediately.

6. **Whenever a sterile barrier is permeated, it must be considered contaminated.** This principle applies to packaging materials as well as to draping and gowning materials. Obvious contamination occurs from direct contact between sterile and unsterile objects. Other less apparent modes of contamination are the filtration of airborne microorganisms through materials, the passage of liquids through materials and the undetected perforations in materials. When moisture soaks through a drape, gown, or package, *strike-through* occurs, and the item must be considered contaminated. Potential contaminants can be curtailed by the use of effective barrier materials, the characteristics of which are discussed later in this chapter.

7. Preparation of sterile set-ups hours before needed and the subsequent covering of these set-ups with sterile sheets are not recommended for two reasons: 1) the set-ups are usually left unguarded and thus become prey to sources of contamination and 2) removal of the cover sheets without contaminating the sterile set-ups is extremely difficult. **Therefore, sterile fields should be prepared as close as possible to the scheduled time of use**.

Patient Positioning

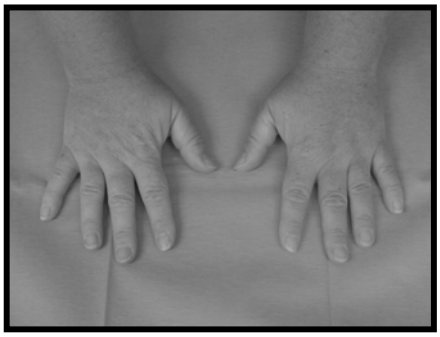
Patient positioning should:

- Ensure optimum exposure and access to the operative site.
- Sustain body alignment.
- Maximize circulatory and respiratory function.
- Not compromise neuromuscular structures.

OR Attire

Comfortable closed in shoes (Preferably OR dedicated)

Hint: Eat breakfast, and use restroom before the session begins!

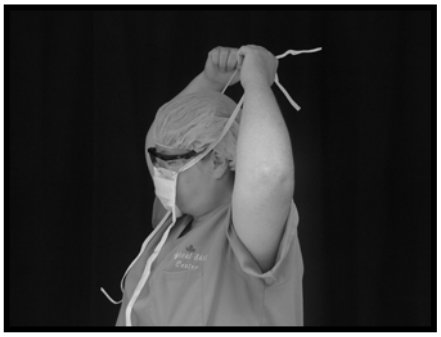


No jewellery or nail polish

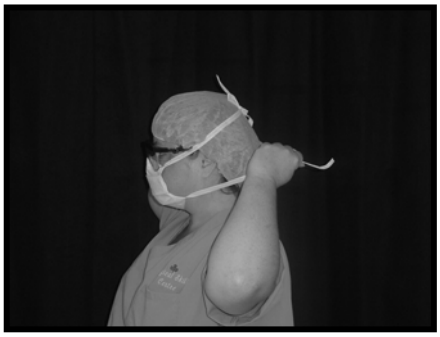
Short, clean nails

Hair tucked in

Protective eyeware



Duckbill mask facing out.



Mask tied securely.

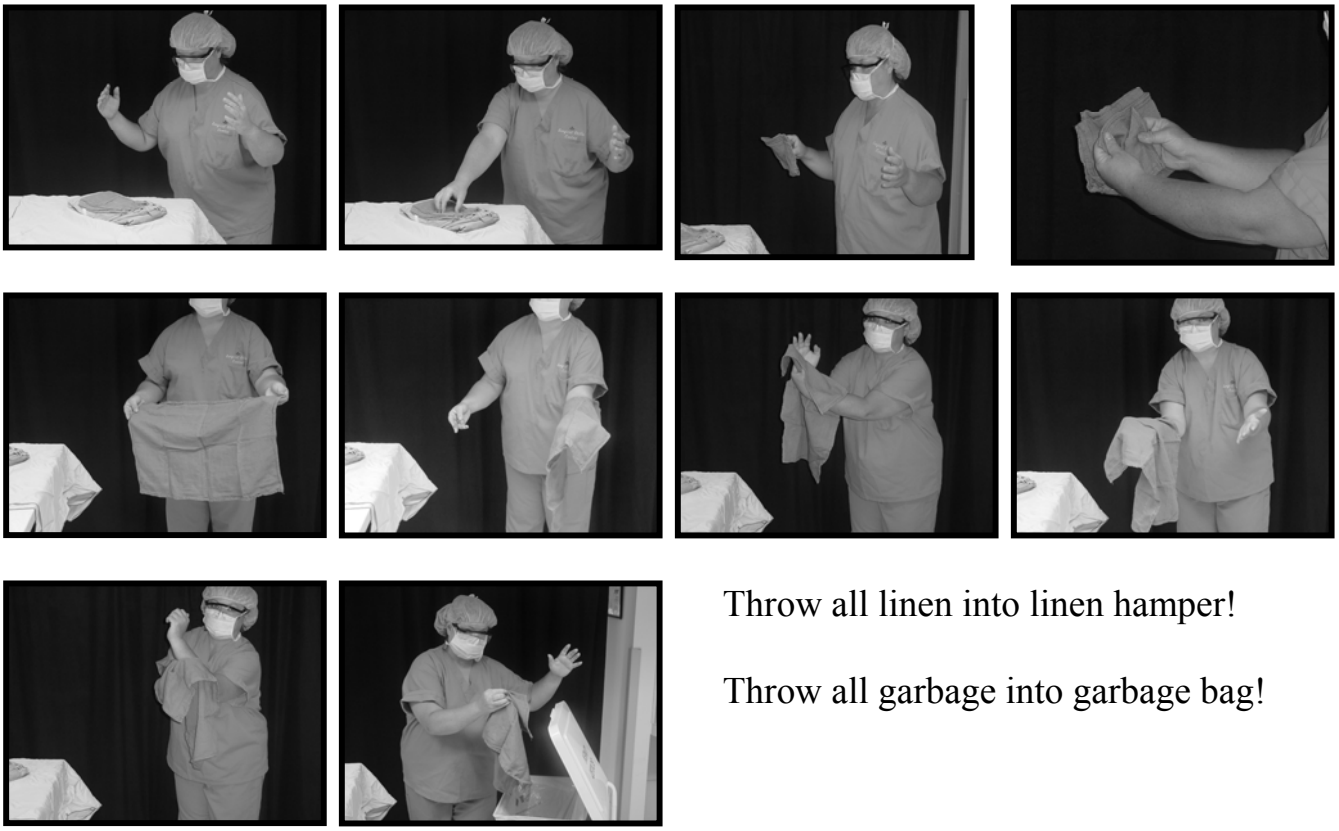
Ready for the OR!

Review of Surgical Scrub

1. Scrub time - 5 min. for first scrub of the day and 3 min. for each subsequent scrub
2. Hands and forearms are to be held out from scrub clothes
3. Hands to be at higher level than elbows at all times
4. Scrub solution is applied to hands
5. Each nail is cleaned under running water with nail stick
6. Each nail is scrubbed against palm of opposite hand
7. Each finger is then scrubbed on all 4 sides - 5 strokes/side
8. Back of hand and palm is scrubbed from base of fingers to wrist
9. Small overlapping circles are used to scrub from wrist to 2 inches above elbow
10. Hands and forearms are rinsed from finger-tip to elbow

Hand Drying

1. Drying towel is lifted up and away from the sterile field without dripping water into that field
2. Bend forward at the waist, fingers and hand are dried thoroughly, then the same part of towel is used to dry remainder of the forearm
3. The other end of the towel is then used to dry the other hand and forearm



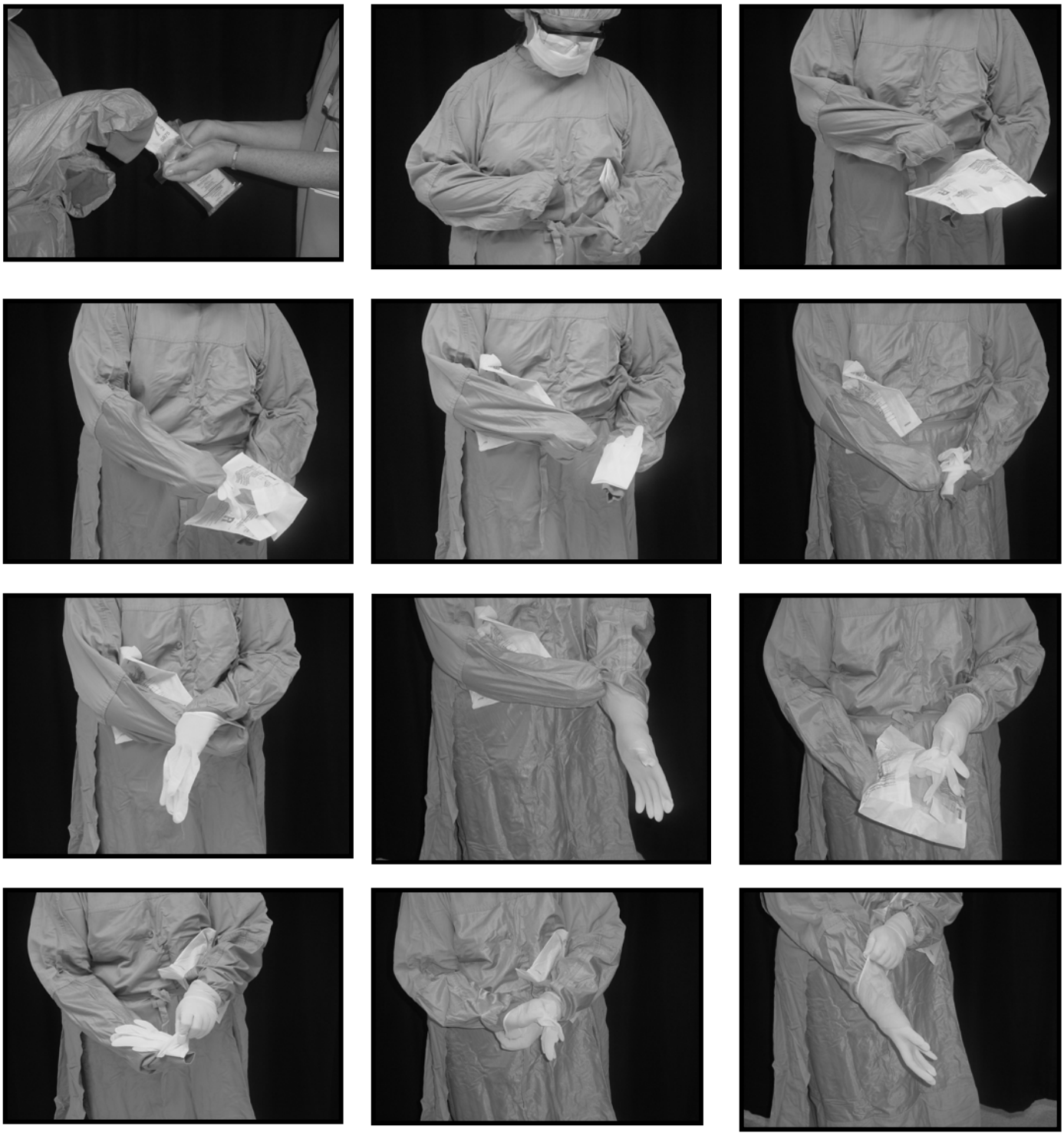
Throw all linen into linen hamper!

Throw all garbage into garbage bag!

Gowning and Gloving

1. The sterile gown is lifted out of its sterile wrapper without contamination.
2. The individual then moves into an area where the gown may be opened without contamination of self or gown.
3. The gown is held away from the body and unfolded so that the inside is toward the wearer.
4. The hands are slipped into the gown while keeping them away from the body and at shoulder level.
5. The hands are advanced up the sleeves of the gown to the proximal end of the cuffs.
6. "Gloving" is performed by the closed or open method.
7. The surgeon then hands the sterile right tab of the gown to the scrub nurse, turns left 280^{O} and then takes back this tab. He/she then ties this to the other sterile tab to wrap the gown.

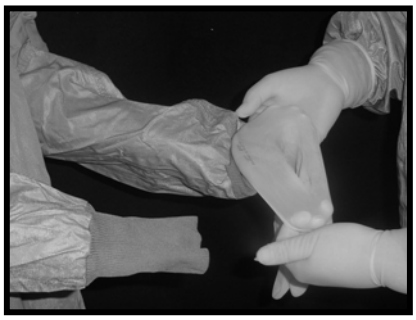
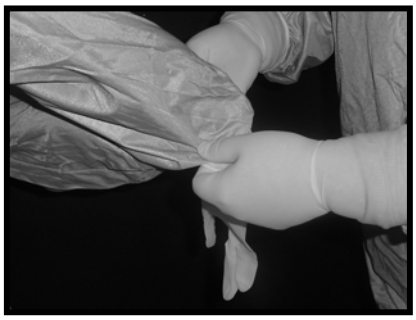
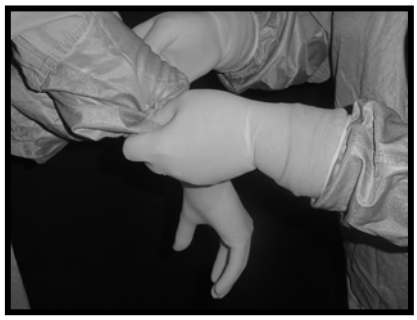
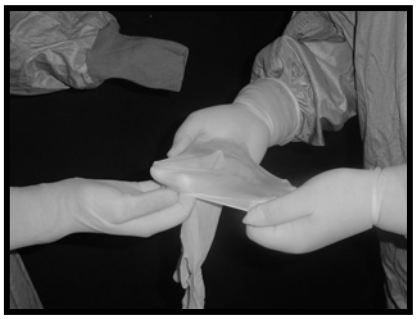
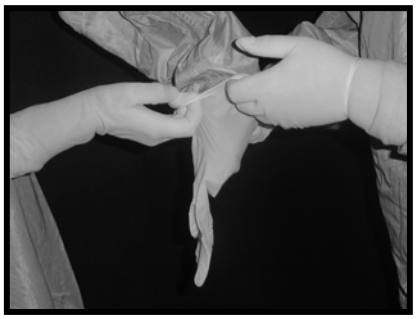
Gloving - Closed Method



Gloving - Open Method

In this technique, the scrub nurse assists the scrubbed individual with gloving:

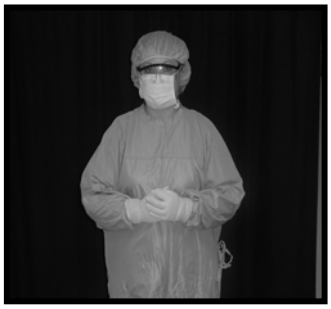
1. The glove (right first) is grasped under the everted cuff by the scrub nurse
2. The palm of the glove is turned towards your hand so that the thumb of the glove is opposite your thumb.
3. The cuff is stretched by the scrub nurse to open the glove widely.
4. Insert your right hand into the glove while pulling up on the palm side of the everted cuff of the glove with your left hand, which is still in the sleeve of the gown
5. Do the same with your left hand
6. Adjust the cuffs and ensure that they are fully covered by your gloves

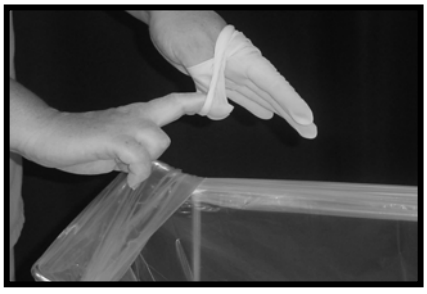

Removal of Dirty Gown, Gloves and Mask

This is recommended to prevent contact with soiled outer layer of gown, gloves and mask.

1. The waist tie of the gown is untied by the surgeon.
2. The surgeon turns away from the circulating nurse to allow him/her to undo the back closures of the gown.
3. The surgeon then grasps a shoulder of the gown and pulls it inside out off one gloved arm, pulls that sleeve off leaving the glove on, but with the cuff now everted.
4. This step is repeated with the other arm.
5. The gown is pulled off completely, held away from the body, and placed into the appropriate linen container.
6. The gloved fingers of one hand are placed under the everted cuff of the contralateral glove. The glove is pulled off and inverted at the same time.
7. The everted cuff on the remaining glove is then grasped with the bare free fingers of the other hand and is pulled off in the same way.
8. The surgeon then goes back to the scrub area and removes his/her mask, taking care to touch only the ties at the back. (A new mask should be worn for each case.)
9. The hands and arms should then be washed carefully.





Antiseptics

Antiseptic: Agent applied to living tissue

Disinfectant: Agent applied to inanimate surface

1. Chlorhexidine Gluconate, 4% wv (HibitaneR, SolvahexTM, Clenz 4 Chlorhexidine) Acetate and Diacetate, 2% (NolvasanR)

- Broadest spectrum
- Better residual activity than iodophors
- Occasional skin sensitivity (mucous membranes)

2. Iodophors (BetadineR, DuraprepR)

- Excellent spectrum, contains iodine
- Less residual activity than Chlorhexidine
- Partially inactivated by organic debris
- Occasional skin sensitivity

3. Isopropyl Alcohol 70% (or Ethyl Alcohol 90%)

- Protein coagulant
- Degreases skin
- Ineffective against spores

4. Hexachlorophene PhisohexR (no longer recommended)

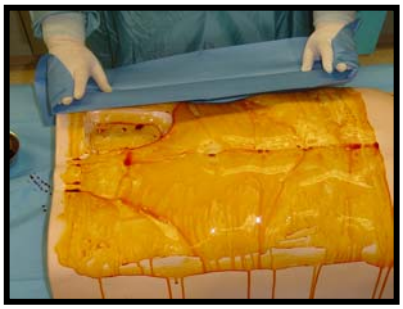
- Very potent against Gram positive bacteria (e.g., Staphylococcus)
- Poor effect against enteric bacteria (Gram negative)
- Inactivated by organic debris and alcohol
- Long residual action

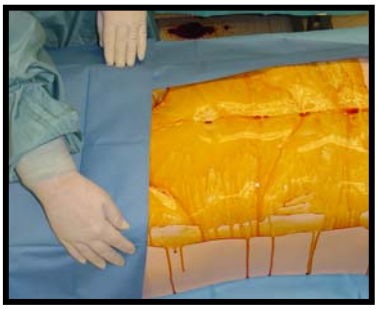
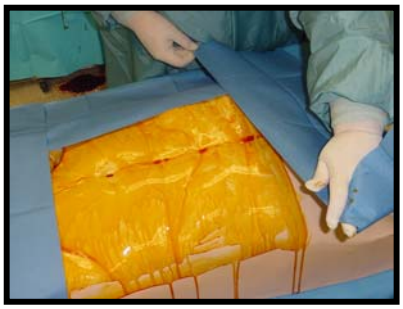
Skin Preparation

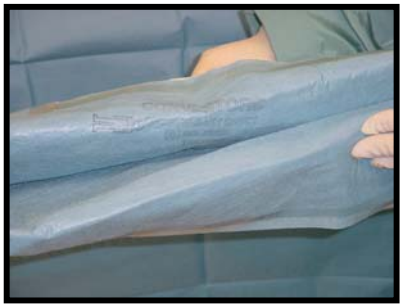
1. A scrub detergent and/or solution of proviodine are usually used to clean all surface dirt.
2. A sterile towel is placed over the cleaned field to dry the area.
3. The towel is removed from end to end rather than being lifted up from the center.
4. A non-detergent antiseptic, non-alcoholic iodophor is then painted on, leaving a thin film of iodophor on the skin. This is done from the center of the field, working outwards.



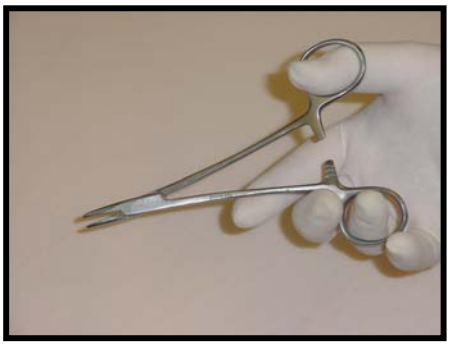
5. After the antiseptic solution on the skin has been allowed to dry, sterile drapes or towels are placed around the field and are held in place by self-adhesive or by the use of towel clips.



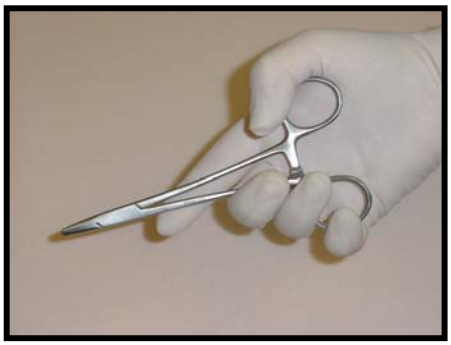




Instrument Handling

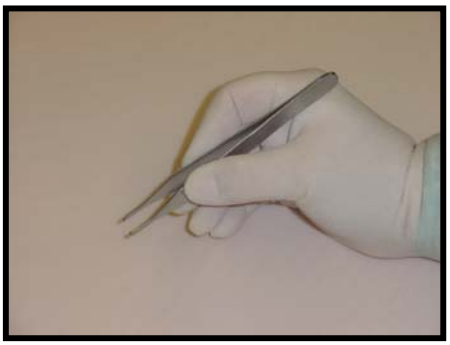


The thumb and ring finger are inserted into the rings of the scissors while the index and middle finger are used to guide the instrument.

The instrument should remain at the tips of the fingers for maximum control.



This is an alternate way to hold a needle driver, called palming.



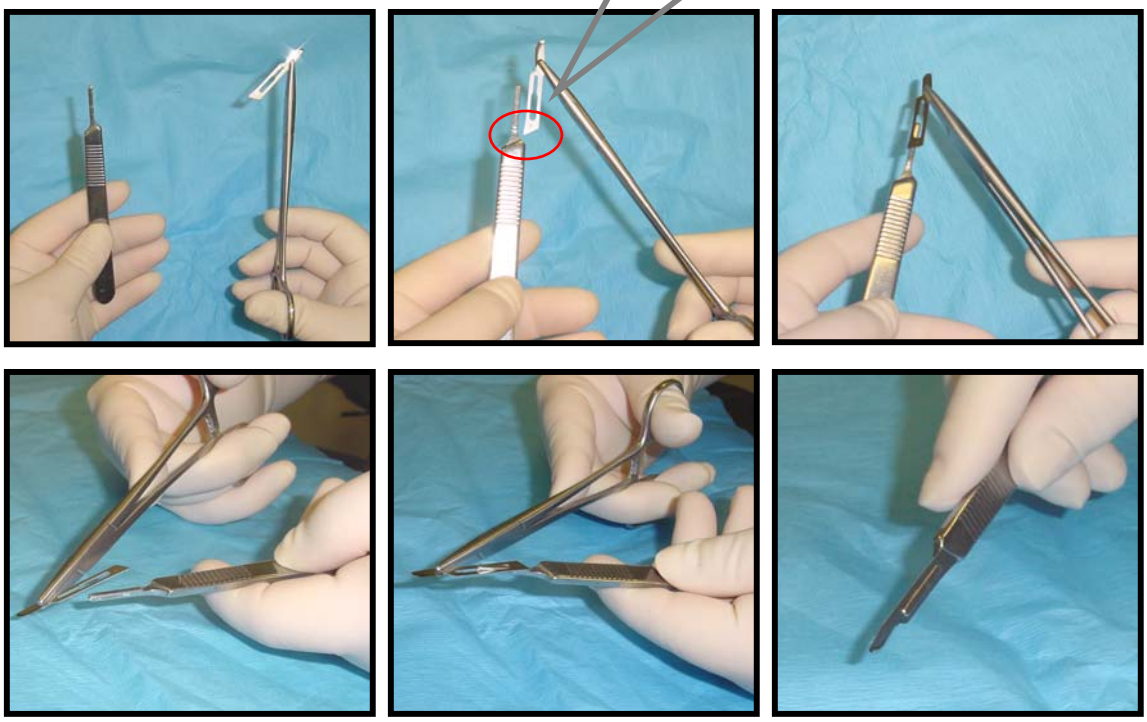
THUMB forceps are held like a pencil.

The scalpel is held with thumb, middle and ring finger while the index finger is placed on the upper edge to help guide the scalpel.

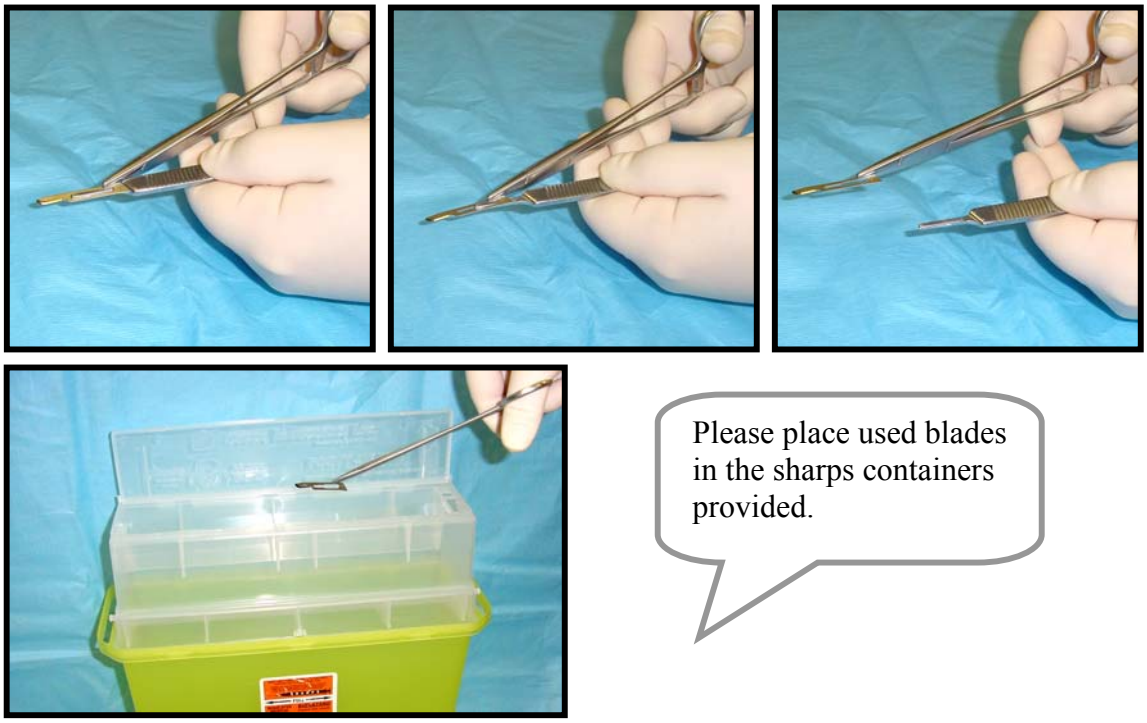
Long gentle cutting strokes are less traumatic to tissue than short chopping motions.

The scalpel should never be used in a "stabbing" motion.

Loading a Knife Handle



Blade Removal



Basic Instruments

1. Crile Hemostat ("Snap")

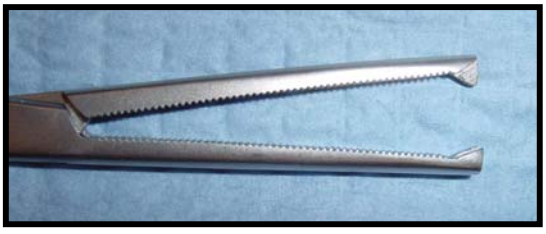
- Used for grasping tissue/vessels to be tied off
- Atraumatic, non-toothed, ratcheted handle
- Tissue must be grasped near the tip of the instrument to prevent slippage
- Held between the thumb and fourth finger
- Available as curved or straight.
- Also used for blunt dissection


2. Kelly Clamp

- Similar uses as the crile/snap but larger, heavier gauge instrument
- To be used for larger tissue pedicles and/or larger vessels.


3. Kocher Clamp

- Large, straight-toothed tissue clamp with ratcheted handle
- Traumatic instrument generally used to clamp transected bowel or to hold tissue, which is to be discarded.

Tissue Forceps

1. Non-Toothed

- For fine manipulation of tissues and application of traction and dissection
- Held between thumb and index finger, usually in the non-dominant hand

2. Toothed forceps

- Firmer grip required for application of counter traction in dense tissues or tissue to be discarded

3. Sponge or Ovum forceps

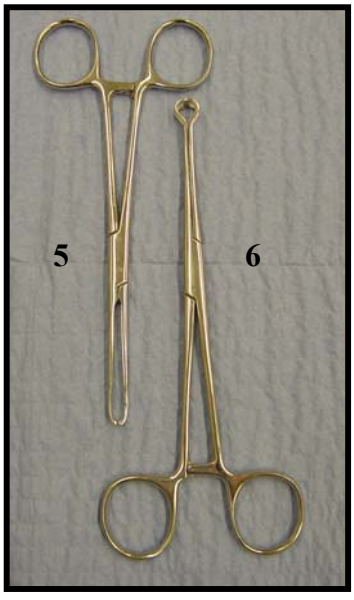
- Usually only used for holding gauze sponges (i.e. skin prep).

4. Towel Clamps

- Not frequently used because most current drapes are paper and have an adhesive strip to place on the patient for draping purposes

5/6. Allis and Babcock Intestinal Forceps

- Used for grasping intestine
- Allis have a firmer hold but are more traumatic than babcocks
- Usually applied with only one ratchet rather than the full ratchet.



7. Bonnie Forceps

- Strong hold on tissue
- Often used for orthopaedic surgery

8. Debakey Forceps

- Used in vascular and general surgery

9. Cooley's Forceps

- Used in vascular and general surgery

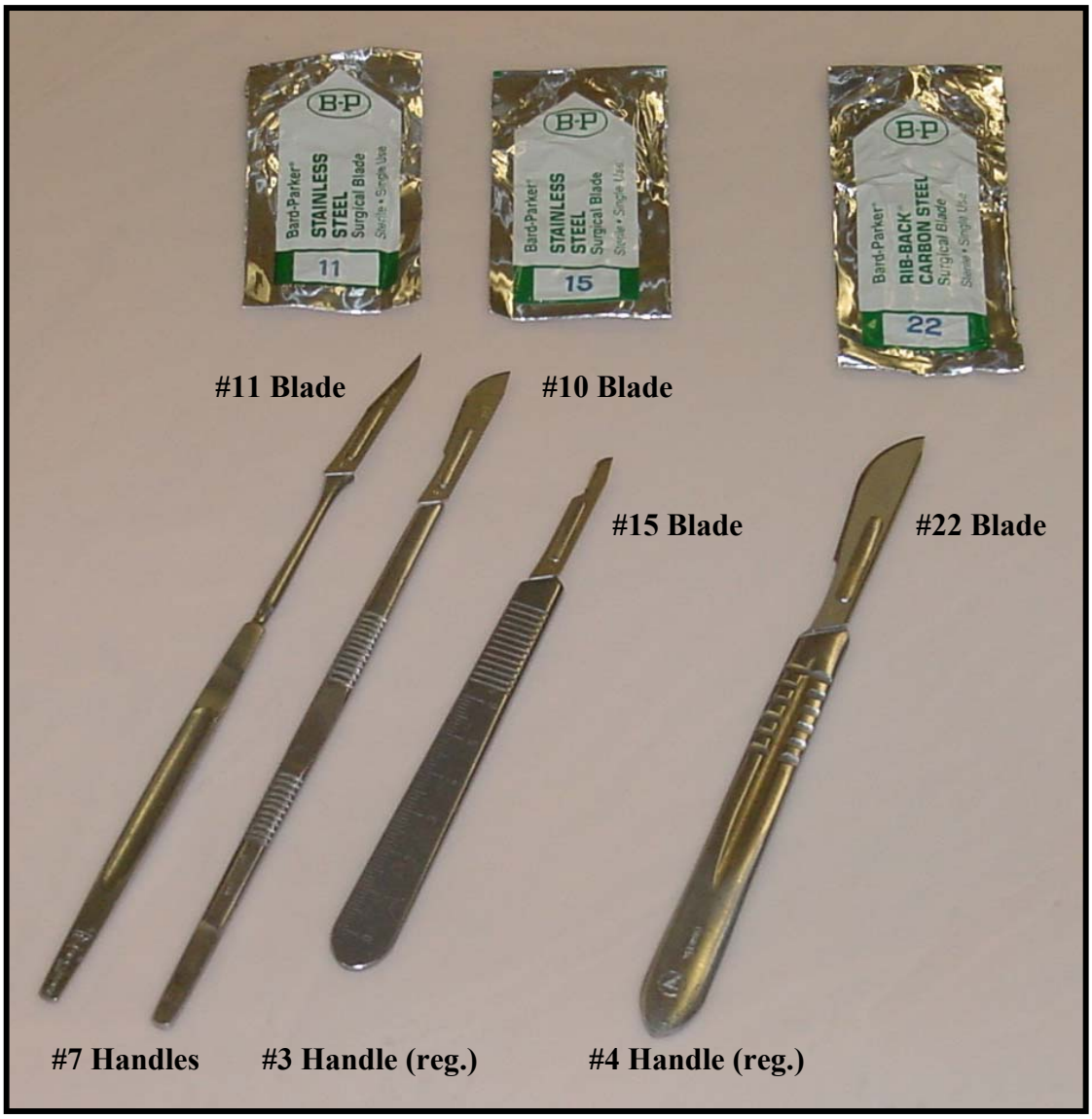
10. Russian Forceps

- Used in OB/Gynae surgery

Scalpel Blades and Handles

Basic Scalpel Handle with disposable blades can be held like a pen or held underhand depending on the user's preference. Practice attaching and removing blades is required.

Blade Handle	Blades that will fit
#7 & #3 Handle - Regular or Long	#10, #11, #15
#4 Handle – Regular or Long	#20, #22



Scissors

1. Mayo Scissors - Straight

- For cutting heavy sutures, NOT tissue
- Held with thumb and fourth finger by the dominant hand to cut
- Scissors need to shear. Therefore in addition to closing the blades, practice pushing out with the thumb and in with the fourth finger while closing the scissor to increase apposition of the blades.
  Left handed users: the opposite technique must be used

2. Mayo Scissors - Curved

- For cutting heavy suture and thick dense tissue, NOT for tissue dissection

3. Metzenbaum Scissors

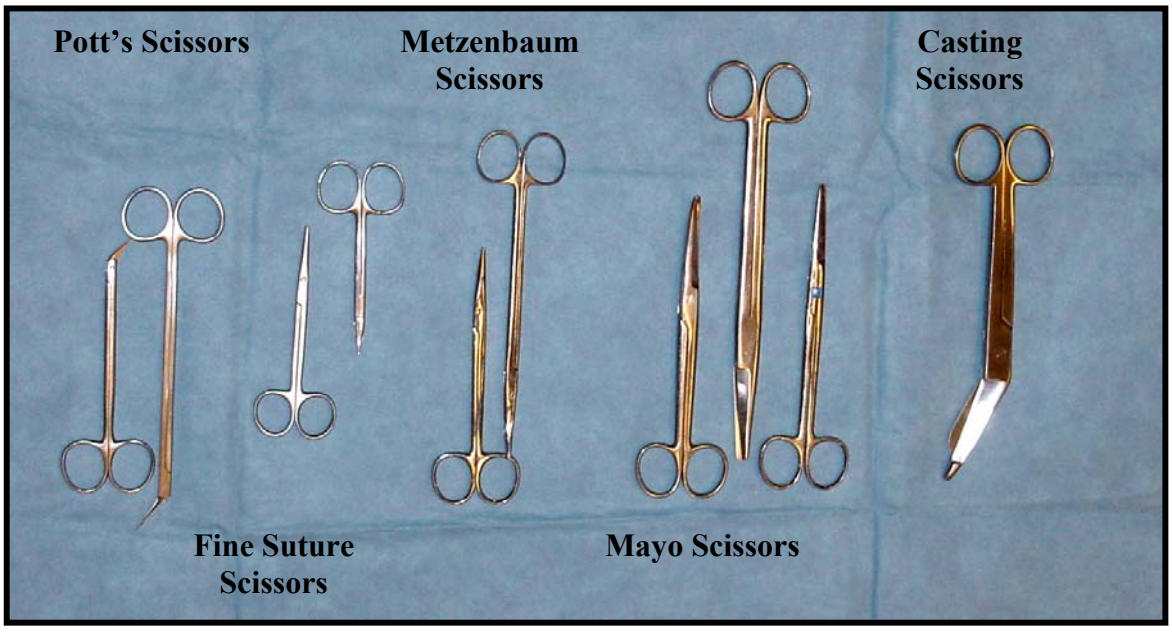
- Most commonly used instrument in surgery
- For fine dissection, cutting and spreading of tissues, NOT for cutting sutures.

4. Fine Suture Scissors

- For cutting fine sutures, NOT for cutting heavy sutures
- Technique similar as for Mayo scissors, only smaller

5. Pott's Scissors

- For performing arteriotomy or venotomy



Needle Holders

1. Heavy tipped

- Use with heavy suture and/or large size needles.
- Hold between the thumb and fourth finger of your dominant hand.
- Manipulate by using pronation and supination of the wrist, practice with various sutures.

2. Fine Tipped

Vascular or Ryder Needle Driver

- For fine, vascular sutures (4-0 to 5-0)

3. Spring Action Lock / Castroviejo Needle Driver

- Generally used for microsurgery (7-0 suture or finer)
- Ratchet locks and opens alternatively with each squeeze of the handles
- Hold like a pen between thumb and first finger
- Manipulation is a combination of fine hand movement and pronation/supination of the wrist

4. Regular Needle Driver

- Use with relatively fine suture (3-0 to 6-0)
- Action is the same as for heavy driver

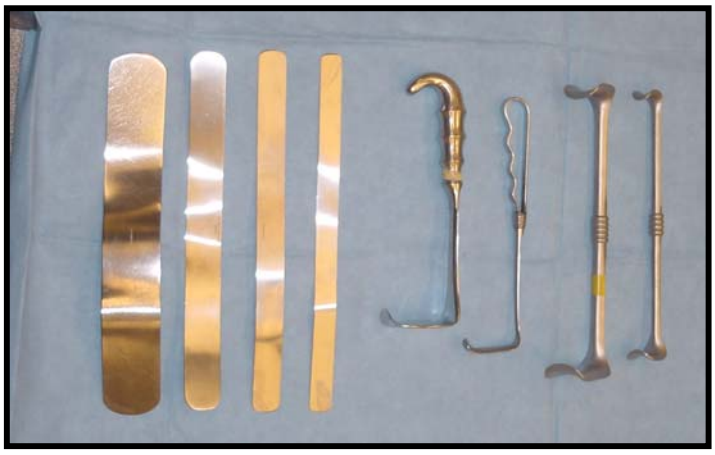
NOTE: Do not try to use these with heavy needles as the jaws of the instrument will be damaged. This will not be recognized by the OR cleaning staff so you will eventually get these damaged forceps back in your set up. Try to use them with a fine needle and have it spin around in the jaws!

Exploratory Instruments for Laparotomy - Retractors

1. Malleable retractor

Can be bent into appropriate shape for each use. Often bent into an arc and placed into peritoneal cavity apex cephalad, to retract bowel while operating in the pelvis

Other Retractors



2. Jackson Retractor

3. Double-Armed Jackson Retractor

4. Ribbon Retractor

5. Right-Angle Retractor

6. Rake Retractor

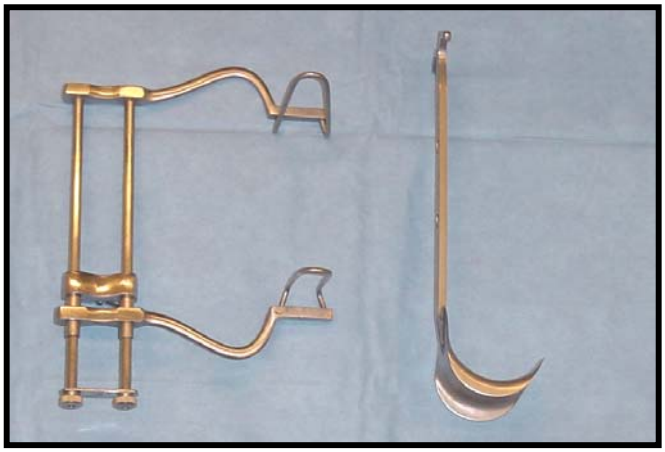
7. Hook Retractor

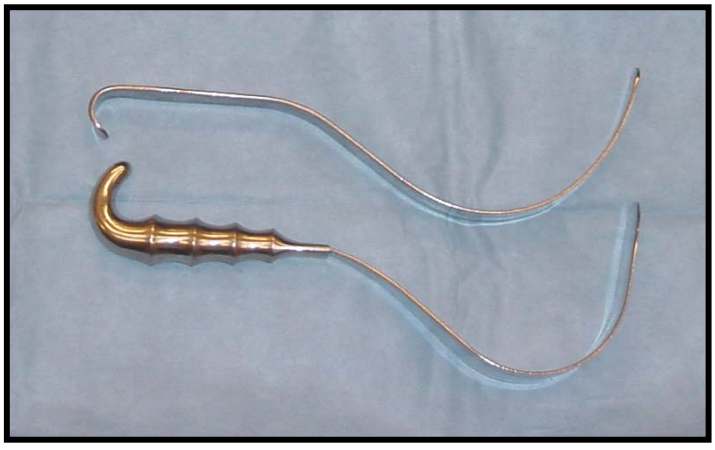
8. Miller-Senn / Army Navy Retractor

9. Balfour Self-Retaining Retractor

10. Deaver Retractor

11. Herrington Retractor





Accessory Items

1. Frazier Suction Tip

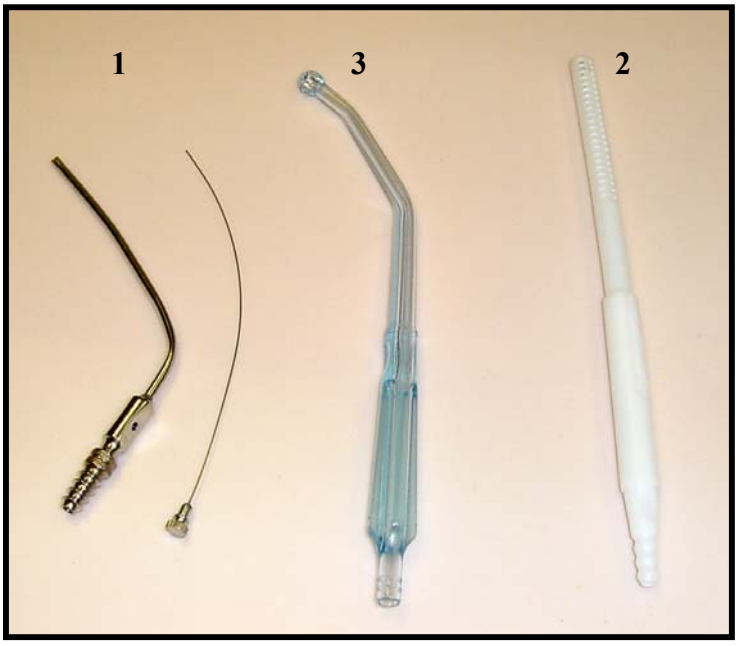
- Available in multiple sizes
- Used extensively in nasal, cranial & spinal surgery
- The angle allows for easy visualization of the tip by the operator
- Thumb hole controls the amount of suction
- Metal construction allows the instrument to be used for suction and cautery at the same time

2. Poole Suction

- Used for intra-abdominal suction and multiple small holes
- Intestine or omentum less likely to get sucked up than with the yankauer tip
- Blunt end is atraumatic
- 2 pieces to the suction tip; tube and sheath over top
- Current models usually made of polyethylene and are disposable

3. Yankauer "tonsil" Suction

- Used for surface suction rather than intra-peritoneal, as bowel can inadvertently get sucked up and injured
- Used for pharyngo-laryngeal suction by anaesthesia
- Shape designed for suction of pharynx-larynx



INFECTION CONTROL *in the* PHYSICIAN'S OFFICE

JANUARY 1999

THE COLLEGE OF PHYSICIANS AND SURGEONS OF ONTARIO

PREFACE

Infection control is a discipline integral to the practice of medicine. At all levels of operation, the tenets of infection control minimize the risk of infection. In a physician's office, just as in a hospital or at a community public health level, infection can spread unnecessarily, and guidelines must be in place to prevent this from occurring. The advent of the AIDS epidemic has been instrumental in elevating the profile and practice of infection control in a health care setting. The general move toward quality management in medicine has provided further opportunity to educate health care workers and reinforce the most basic concepts of infection control.

This 1999 update includes changes and additions to the original 1995 infection control publication.

We hope that this guide will be a useful tool, a handy reference to provide you with a framework and practical information to prevent the transmission of infection to patients, visitors, health care workers and other employees associated with your clinical practice.

Anne Matlow, M.D., M.Sc., FRCPC

Acknowledgements

In 1993, the College of Physicians and Surgeons of Ontario asked that a team of outside experts be assembled to draw up infection control guidelines specifically designed to meet the needs of physicians in their offices. The College felt that there was an information gap in this area and accepted responsibility for drafting a set of practical infection control guidelines. The first edition was published in 1995.

The College is grateful for the work of the original team which researched, wrote and assembled the 1995 guidelines: Anne Matlow, M.D., M.Sc., FRCPC; Henry Wu, M.D., B.Sc; Carol Goldman, R.N., B.Sc.N., C.I.C; and Arthur Franklin, B.Sc., Ph.D.

The College would also like to thank Dr. Matlow and Carol Goldman for their ongoing efforts in providing the updates and additions for this edition. Dr. Matlow has been a microbiologist and member of the infection control team at Toronto's Hospital for Sick Children since 1989, and is currently the Director of Infection Control at HSC. Prior to that, she was on staff in the Division of Infectious Diseases and the Department of Internal Medicine at the Wellesley Hospital in Toronto where she chaired the Infection Control Committee. Currently, Dr. Matlow is an Associate Professor in the departments of Laboratory Medicine and Pathobiology, Medicine and Paediatrics at the University of Toronto.

Carol Goldman is an Infection Control Practitioner at the Hospital for Sick Children in Toronto. She has been active in preparing infection control guidelines at both the provincial and federal level.

Infection Control in the Physician's Office, 1999 edition, is being sent to all physicians in Ontario as an insert in *Members' Dialogue*, the official publication of the College.

The entire text of this publication is also available on the College's website: www.cpso.on.ca and through the CPSO's fax-on-demand service, CPSO INFOFAX, by calling 1-888-820-2776.

Table of Contents

A doctor's office is a dynamic environment consisting of health care workers and patients in a physical space that must ensure safety to all involved. Many patients seek attention for the management of communicable diseases and, therefore, the doctor's waiting room and examining rooms are places where infection can spread.

Equipment used in the office, whether disposable or not, can serve as a vehicle for the spread of infection. Most often, however, the human element (patient/family member/ physician/office worker) is responsible as the primary source with unwashed, colonized hands as the vehicle. The purpose of this guide is to provide you with the information necessary to minimize the spread of infection in your office.

GUIDELINES FOR HEALTH CARE PRACTICE

i) Routine Infection Prevention Practices

The most important and frequent mode of spread of infections is by direct or indirect contact transmission. Although all the practices recommended in this guide are intended to prevent transmission of infection in your office, the following three are highlighted up front and considered essential:

1. Hand washing
2. Practising universal precautions / body substance precautions
3. Ensuring safe handling of sharps

Hand washing is the single most important measure for the prevention of infection.

WHEN SHOULD YOU WASH?

- Before and after contact with patients, body substances or specimens, contaminated or soiled items (i.e. waste, linen, countertops, etc.).
- Between 'clean' and 'dirty' procedures on the same patient.
- After removing gloves.
- Before and after performing invasive procedures.
- After using the washroom.
- When hands are visibly soiled.

WHAT SOAP SHOULD YOU USE?

For routine procedures, plain, mild liquid hand soap is adequate. Antimicrobial soaps are recommended for use after examining a patient with antibiotic resistant organisms (e.g., MRSA, VRE), and when performing invasive procedures. Soaps containing emollients are available. The emollient helps prevent drying and cracking of the skin. Self-contained disposable liquid soap containers are recommended and should be used wherever possible. The use of bar soap is discouraged because organisms can grow on the soap, and in the pooled water that collects under the soap. Waterless alcohol-based antiseptic hand rubs are available and are convenient to use if hands are not visibly soiled.

Hand lotion to prevent dry or cracked skin should be available for staff. Disposable pump-type containers are recommended.

There are many agents available as antimicrobial hand washing soaps. These agents include:

- ➤ Chlorhexidine gluconate 2%
- ➤ Triclosan 0.3%
- ➤ Parachlorometaxylenol (PCMX) 1%

Higher concentrations of some agents are prepared as surgical hand washing agents.

HOW SHOULD YOU WASH?

For routine hand washing, hands should be thoroughly covered with soap and vigorously rubbed together for 10 seconds, covering all surfaces of hands and fingers. Hands should then be rinsed well with running water, and dried.

Before performing more invasive office procedures, e.g., incision and drainage of a superficial abscess, a one minute hand wash using an antimicrobial soap is recommended:

1. Wash hands, and up to two inches above wrists thoroughly.
2. Clean under nails. A disposable manicure stick can be used; nailbrushes are NOT recommended as they can become contaminated and damage the skin around the nails.
3. Nails should be short enough to allow thorough cleaning underneath and not cause glove tears.
4. Rinse off soap and dry hands well.

Sinks should be located as close as possible to the examining room and specimen collection area. If there are no foot or elbow operated faucets, taps should be turned off with the aid of a paper towel in order not to recontaminate the hands.

Reference: Larson EL et al. APIC Guideline for hand washing and hand antisepsis in health care settings AJIC 1995; 23: 251-269

PRACTISING UNIVERSAL PRECAUTIONS/BODY SUBSTANCE PRECAUTIONS

With the advent of HIV and an appreciation of the long-recognized risk of health care workers acquiring hepatitis B, recommendations to prevent the transmission of blood-borne pathogens in the health care setting were developed.

UNIVERSAL PRECAUTIONS was the first precautionary measure introduced; it acknowledged that *blood and certain body fluids can be* infected and can transmit blood-borne pathogens (e.g., hepatitis B, HIV). BODY SUBSTANCE PRECAUTIONS took the principle one step further, stating that *all body substances* may be infectious (e.g., stool can contain salmonella), so precautions should be taken for contact with any body substance. Common to all programs, is that ALL patients can harbour blood-borne infections, whether symptomatic or not; therefore, a consistent approach for the handling of blood, body substances, non-intact skin, and mucous membranes from all patients is recommended. The use of gloves and other barrier precautions form the basis of these practices. Appropriate handling of sharps and waste disposal, reprocessing of medical equipment, as well as immunization of health care workers with hepatitis B vaccine, are further extensions of these programs, and will be discussed in other sections of this guide.

Universal Precautions (UP): UP is a system of practice that requires health care workers to consider blood and other certain body fluids (semen, vaginal secretions, cerebrospinal, peritoneal, pericardial and amniotic fluids) of all patients to be infectious for blood-borne pathogens, and to use protective barriers and workplace practices to reduce the risk of exposure. UP do not apply to faeces, nasal secretions, sputum, sweat, tears, urine, saliva and vomitus, unless there is visible blood in them.

Body Substance Precautions (BSP): BSP is a system of practice that requires all health care workers to consider all body substances (blood, body fluids, secretions, excretions, drainage) from all patients as potentially infectious. It is a practice designed to prevent transmission of blood-borne and nonblood-borne (e.g., fecal pathogens) infectious agents alike. BSP requires that health care workers assess the degree of exposure they anticipate to body substances, mucous membranes or non-intact skin and use protective barriers and workplace practices to reduce the risk of exposure.

GLOVES PROTECT HEALTH CARE PERSONNEL AND PATIENTS

Gloves should be worn for any contact with patients or contaminated articles when direct exposure to blood, body fluids, mucous membranes, non-intact skin or undiagnosed rashes is anticipated.

Non-sterile latex and vinyl gloves, in all appropriate sizes, should be readily available in patient care areas and utility rooms for routine use. Gloves that are more fitted are recommended for use in procedures which require tactile sensation. Sterile gloves should be used when the situation demands, e.g., invasive procedures.

Allergic reactions have been reported with the use of latex gloves, and consideration must be given to this when purchasing gloves. Hypoallergenic gloves or glove liners are available for use if allergies are known.

Gloves must be used once and discarded after each patient and/or procedure. Hands should be washed after glove removal.

Gloves do not replace hand washing

OTHER BARRIER PRECAUTIONS

Additional protective wear such as gowns, plastic aprons, masks and eye shields are necessary when secretions, blood, or body fluids are likely to soil skin, eyes, mouth or the clothing of the worker. Disposable cardiopulmonary resuscitation devices or pocket masks must be made available.

ENSURING SAFE HANDLING OF SHARPS

In the health care setting blood borne infections are usually transmitted by sharps injuries. Most injuries happen after use, before or during disposal.

The following practices will minimize the risk of sharps injuries:

- Do not recap needles. If recapping is necessary, use a one-handed method of recapping. Mechanical devices designed for holding the needle sheath are available and can be used in the physician's office to reduce the likelihood of injury.
- Discard sharps at point of use in a designated sharps container.
- Each person using a sharp must dispose of it him/herself.
- Pass needles in a manner to avoid injuries.

ABOUT SHARPS CONTAINERS

A dedicated, puncture-resistant, tamper-resistant, leakproof container which is impenetrable by sharps, under normal circumstances, should be available. It should have a carrying handle plus a tight-fitting lid, bear a clearly identifiable biological hazard label and be designed so that used sharps can be dropped in with one hand. It should be easily accessible and located as close as possible to the designated "point of use" area. It should not be filled with disinfectant, or filled to the top with sharps. When it is filled to three-quarter capacity, the lid should be closed securely, and the container promptly removed and replaced. Used sharps are considered biomedical waste. See Section 5: Waste Disposal, for appropriate disposal of sharps containers.

ii) Special Office Considerations for Airborne Infections

We have already addressed principles basic to infection control and to preventing the spread of infections through the contact mode of transmission. Some patients, however, may harbour infections transmissible by the airborne route, and these patients require special attention and precautions. It is important to have a high index of suspicion for these illnesses when assessing a patient with compatible symptoms in order that appropriate infection control measures can be applied.

AIRBORNE DISEASES

In these diseases the infectious organism enters the body through small droplets or droplet nuclei inspired into the respiratory tract. Many outbreaks have occurred where people have had no closer contact than sharing the same room air for short periods of time. For this reason, consider making special arrangements for patients with these diseases:

1. Make every effort to see these patients at the end of the day if clinical status allows.
2. Quickly triage the patient out of common waiting areas; move this patient to an examining room as quickly as possible.
3. Close the door and try to ensure that visitors or health care workers do not enter the room unless they are immune to the disease (where immunity is an issue).

Routine housekeeping measures as per Section 4 of this manual are all that are required in these situations.

AIRBORNE DISEASES

DISEASES	PRECAUTIONS
Chickenpox (varicella) Disseminated Herpes zoster* Measles (rubeola) Rubella	Non-immune people should avoid contact *(see immunization section)*
Tuberculosis (pulmonary or laryngeal)	An appropriate mask** should be used by staff in contact with an infectious or potentially infectious patient. The patient should wear a surgical mask. A work-up for TB should be initiated.

*Dermatomal Herpes zoster (shingles) poses little or no risk to the non-immune health care worker if the lesions can be covered (e.g., thoracic shingles). On the other hand, exposed lesions, such as when a patient disrobes, or if the lesions cannot be covered (e.g., trigeminal shingles lesions) may pose a risk to the non-immune personnel.

**A personal protective respiratory device, (PPRD), which is a tight-fitting mask that can filter particles one micron in size to 95% efficiency should be worn by health care workers.

iii) Special Office Considerations for Antibiotic-Resistant Organisms

Colonization and infection with strains of bacteria which are resistant to a multitude of commonly used antibiotics is causing a problem for all health care facilities, both acute and long term care. The highest risk for acquisition of an antibiotic resistant organism such as Methicillin resistant *Staphylococcus aureus* (MRSA) or vancomycin resistant *enterococcus* (VRE) is having been hospitalized in either an acute care or long term care facility. These patients may require follow-up or routine care in a physician's office. It is therefore important to recognize that these organisms can be transmitted and that precautions are required to minimize their spread.

Tag the charts of those patients with antibiotic resistant organisms to facilitate recognition on subsequent visits.

Methicillin Resistant Staphylococcus Aureus (MRSA)

S. aureus is a gram positive bacterium and is a common cause of serious bacterial infections.

S. aureus is part of the normal flora of human beings, colonizing the nose and skin of 10-40% of the population. MRSA are resistant to all penicillins and cephalosporins. Vancomycin is the only antibiotic to which MRSA remain reliably susceptible.

S. aureus is spread by contact usually on the hands of health care providers. The following precautions are recommended for managing patients in the office who are known to be colonized with MRSA:

1. Quickly triage the patient out of common waiting areas; move this patient to an examining room as quickly as possible.
2. Wear gloves and mask when entering the room. Masks are used to prevent nasal self-inoculation.
3. Wipe all equipment such as stethoscopes, thermometers, blood pressure cuffs, vacutainers, tourniquets, etc. with the disinfectant used in the office or with 70% alcohol.
4. A special housekeeping protocol is not required after the patient leaves the room. Regular disposal of masks and gloves is sufficient.
5. Wash hands thoroughly before leaving the room and again outside the room, as an added safety measure. The use of an antimicrobial soap is recommended. Alternatively, applying an alcohol based handrub after using regular soap would be very effective.

Eradication of colonization of MRSA is widely practised. An infection control practitioner, or an infection diseases physician from an institution of your choice can be contacted to discuss strategies for eradication therapy.

Vancomycin Resistant Enterococcus (VRE)

Enterococci constitute part of the normal flora of the human intestine. The major concerns with VRE are the limited number of therapeutic options, and the potential for the resistance gene to spread to other organisms.

VRE is spread by contact, usually on the hands of health care providers, but it is also very likely to be spread by contaminated patient care equipment or environmental surfaces. The following precautions are recommended for managing patients in the office who are known to be colonized with VRE:

1. Quickly triage the patient out of common waiting areas; move this patient to an examining room as quickly as possible.
2. Wear gloves and gown when entering the room. Remove barriers when leaving the room. Regular disposal of gloves and gowns should be followed.
3. Cover surfaces which will not be touched or used in the examination to limit contact with environmental surfaces.
4. After the patient leaves, wash all environmental surfaces touched and exposed with the disinfectant used in the office. Special attention must be paid to door handles, light switches and surfaces that are commonly touched by health care worker and patient alike. Wear gloves and gown to clean surfaces.
5. Wipe all equipment in the room such as stethoscopes, thermometers, and blood pressure cuffs with the disinfectant used in the office or with 70% alcohol. Discard all disposable items such as tourniquets and vacutainers. Attention must be paid to knobs, buttons and on/off switches of equipment. Wear gloves and gown to wipe equipment.
6. Wash hands thoroughly before leaving the room and again outside the room as an added safety measure. The use of an antimicrobial soap is recommended. Alternatively, applying an alcohol based handrub after using regular soap would be very effective.

iv) Immunization of Medical Office Workers

Medical office workers will be exposed to communicable diseases, and thus, immunity to diseases preventable by vaccines should be ensured. All employees in the medical office should have their immunization status reviewed at the time of employment; if documentation of immunity is unavailable and immune status is unsure, immunization should be offered. For a disease such as chicken pox, it is important that the employee know his/her status so that appropriate precautions can be taken if contact with an infectious patient occurs at work or at home.

Schedules and indications for vaccines available for medical office workers are as follows:

POLIOMYELITIS: All medical office workers in close contact with individuals who may be excreting wild or vaccine strains of polio virus should have completed a primary course of immunization against polio virus. If a primary course has not been completed, the series should be completed with IPV (inactivated polio vaccine) regardless of the time interval since the last inoculation.

MEASLES: Vaccination against measles (rubeola) is recommended for all adults born after 1957 who do not have a documented record of measles immunization or who are known to be seronegative.

RUBELLA: Female office workers of child bearing age should be immune to rubella. Those without documented immunity should be vaccinated with MMR (measles, mumps, rubella) vaccine unless there are contraindications. Females should avoid pregnancy for three months after vaccination. Vaccination should also be offered to susceptible individuals of either sex, who may, through close contact, expose pregnant women to rubella.

INFLUENZA: All health care workers who have extensive contact with high risk patients (e.g., chronic cardiac or pulmonary disease, residents of chronic care facilities, people 65 years of age or over, patients with chronic metabolic or immunodeficiency disorders, children and adolescents treated for long periods of time with acetylsalicylic acid), or who have a high risk condition themselves should be given annual influenza immunization.

HEPATITIS B (HBV): Immunization against HBV is recommended for all health care workers who may be exposed to blood, blood products, or sharps injuries. Procedures for health care workers who have sustained a percutaneous or mucous membrane exposure to blood are outlined in Section 6 of this manual.

TETANUS AND DIPHTHERIA TOXOIDS: This vaccine should be routinely given once every ten years to all adults who have received a basic immunization series unless a significant exposure necessitates earlier administration. Further details are available in the Canadian Immunization Guide, 5th edition 1998.

PNEUMOCOCCAL VACCINE: Indications for pneumococcal vaccine are irrespective of occupation. For adults they include, persons 65 years of age and over, adults with asplenia, splenic dysfunction or sickle-cell disease, and adults with the following conditions: chronic cardiorespiratory disease, cirrhosis, alcoholism, chronic renal disease, nephrotic syndrome, diabetes mellitus, chronic cerebrospinal fluid leak, HIV infections and other conditions associated with immunosuppression.

TUBERCULIN SKIN TESTING: Tuberculin testing using the two-step skin test is recommended for all health care workers at the beginning of their employment. Persons who are known tuberculin positive, or who test positive with the two-step method should have medical follow-up to rule out active disease. Routine follow-up skin testing is not indicated in the health care setting except under the following circumstances:

a) exposure to known case of tuberculosis.

b) clinical symptoms suggesting active tuberculosis, or

c) annually if workers are at risk of contact with patients or specimens with tuberculosis.

The local Medical Officer of Health can advise on the need for routine skin testing, which depends on the prevalence of tuberculosis in the community.

GENERAL COMMENTS: Vaccination and immune status records should be kept on all workers in the health care facility. Further details are available in the Canadian Immunization Guide.

Two-Step Tuberculin Skin Test: An initial tuberculin skin test (Mantoux, 5TU PPD) is given. If the test result is 0 - 9 mm. of induration, a second test is given in the opposite arm at least one week and no more than three weeks after the first. The results of the second test should be used as the baseline test in determining treatment and follow-up of these persons. A skin test result of 10 mm. or more of induration is considered to be significant. For individuals who are known to be HIV positive, or household contacts of a patient with infectious tuberculosis, 5mm. or more of induration is considered significant.

REFERENCES

1. Canadian Immunization Guide, Fourth Edition, 1993.
2. Public Hospitals Act, 1990, Revised Statutes of Ontario: Regulation 965.

v) Personnel Health

THE HEALTH CARE WORKER ACQUIRING DISEASE

Those working in an office setting are usually concerned about contracting illnesses from patients. You should be able to minimize such occurrences by practising the principles discussed in this manual, including:

1. Hand washing before and after each patient contact.
2. Practising universal precautions/body substance precautions.
3. Ensuring adequate and appropriate immunization of all employees.
4. Washing and/or disinfecting your office space and medical equipment appropriately.
5. Not recapping needles.
6. Discarding sharps promptly at point of use.

Unique situations that might warrant particular attention by a health care worker include:

A. DERMATITIS

The protective skin barrier is broken in people with chapped hands or eczema, and puts one at increased risk of acquiring and transmitting infection through this exposed area. Practise good skin care and cover any dermatitis with occlusive bandages. Wear gloves if you anticipate exposure to blood or other body fluids.

B. IMMUNOCOMPROMISED STAFF

Recognize that immunocompromised staff are at increased risk of acquiring, or may have more severe consequences from acquiring infection from patients. Where feasible, tailor job description and exposures accordingly.

THE HEALTH CARE WORKER WITH A COMMUNICABLE DISEASE

BLOOD-BORNE INFECTIONS

a) Hepatitis B Virus (HBV) and Human Immunodeficiency Virus (HIV)

Health Canada has recommended that health care workers infected with hepatitis B or HIV should voluntarily seek medical evaluation and advice regarding the potential for transmission of the infection to patients. Confidentiality according to current legislation must be ensured. Although initial medical evaluation of the infected health care worker is the responsibility of the health care worker's primary care physician, consultations with infectious diseases experts, provincial licensing bodies and professional associations are encouraged. An infected health care worker should seek medical care and counselling from a qualified colleague. Physicians at risk of contracting HIV or HBV, through personal risk factors or occupational exposure, are encouraged to seek voluntary testing. The College will participate in developing a province-wide expert advisory committee to review scientific evidence and advise primary care physicians on appropriate procedures to be followed to minimize any risk of transmission within the infected doctor's practice.

b) Hepatitis C Virus (HCV)

Hepatitis C is another blood-borne virus that can be transmitted percutaneously. The risk of an infected health care worker transmitting HCV to patients is not known. Although there are no specific recommendations that an infected health care worker seek medical advice as outlined above, it may be prudent to do so.

OTHER INFECTIONS

It is beyond the scope of this manual to review all infectious diseases, but a brief comment on the common ones will capture general principles:

a) The Common Cold: Rhinoviruses are contagious through both droplets and contaminated hands, e.g., after blowing your nose or sneezing. Wash your hands after any contact with nasal secretions. Avoid seeing immunocompromised patients during this time.

b) Herpes Simplex Virus Infections:

i) The cold sore: Fresh lesions contain numerous infectious particles of *Herpes simplex* virus. If possible, keep the lesion covered during patient visits, especially when seeing immunocompromised patients. Avoid touching your face and wash your hands frequently.

ii) Herpetic whitlow (herpetic finger infection): Herpetic whitlow may present as single or multiple vesicular skin lesions, or as a swollen discoloured area resembling a paronychia. It should not be incised. All persons with herpetic whitlow MUST be excluded from direct patient contact until the lesion is resolved.

iii) Shingles: A susceptible patient exposed to a health care worker with shingles may get chicken pox. Dermatomal zoster is much less infectious than chicken pox and the risk of transmission is minimized if the lesions are covered. Health care workers may work, in most cases, if the lesions can be covered and good hand washing technique is used. Health care workers with shingles must not work with high risk patients (e.g., newborns, immunocompromised patients) until lesions are crusted.

c) Tuberculosis:

Persons with drug-susceptible *Mycobacterium tuberculosis* are usually non-infectious after two weeks of compliant and appropriate therapy. Health care workers and office workers with pulmonary or laryngeal tuberculosis should be excluded from work until appropriate treatment is instituted, cough is resolved and three consecutive sputum specimens collected on different days have smears negative for acid-fast bacilli. Health care workers with extrapulmonary or extralaryngeal tuberculosis do not usually require work restrictions.

Contact the local Medical Officer of Health or your local public health unit for more information.

REFERENCES

1. Centers for Disease Control and Prevention, Guidelines for Preventing the *Transmission of Mycobacterium tuberculosis in Health-Care Facilities*; 1994. MMWR 1994;43 (No. RR-13).

2. Ad Hoc Committee Guidelines for preventing the transmission of tuberculosis in Canadian health care facilities and other institutional settings, 1996.

3. Health Canada. Preventing the transmission of blood borne pathogens in health care and public service settings. Canada Communicable Diseases Report, 1997; 2353: 1 - 42

4. Standards Committee, Canadian Thoracic Society. Canadian Tuberculosis Standards. Canadian Lung Association, 1996.

DISINFECTION AND STERILIZATION OF MEDICAL INSTRUMENTS

i) General Principles

Medical instruments must be cleaned, and then either disinfected or sterilized after each use. There are practical general guidelines as to how medical instruments should be processed, and the manufacturer's guidelines for specific instruments should also be consulted.

Spaulding was the first to categorize medical instruments according to how they are used, namely 'critical', 'semi-critical' or 'noncritical', and this classification determines their reprocessing.

SPAULDING'S CLASSIFICATION OF MEDICAL INSTRUMENTS *(modified)*

CLASS	USE	REPROCESSING *(minimum requirement)*
Critical	Enters sterile body site or vascular system.	Cleaning followed by sterilization
Semi-Critical	Comes in contact with intact mucous membranes or non-intact skin.*	Cleaning followed by high level disinfection
Non-Critical	Comes in contact with intact skin.	Cleaning followed by low or intermediate level disinfection.**

*Non-intact skin was not included in Spaulding's original description.

**For some instruments, intermediate level disinfection may suffice, e.g., thermometers, ear syringe nozzle.

ii) Cleaning of Instruments, Sterilization and Disinfection

Table 1 on page 24 outlines suggested decontamination procedures for selected office instruments. The availability and utilization of institutional central sterilization departments by some physicians may influence the choice of reprocessing for some critical and semi-critical items.

Thorough cleaning of instruments to mechanically remove all organic material is of the utmost importance prior to either sterilization or disinfection.

Instruments should be cleaned as soon as possible after use so that organic material will not dry. Organic material interferes with the sterilization or disinfection process and must therefore be removed before disinfection or sterilization procedures are initiated.

Factors which interfere with sterilization and disinfection include:

- organic material, such as mucus, blood, pus, faeces, saliva, etc.
- nature of the microbial contamination and the number of organisms present
- incorrect dilution (improper mixing) of the disinfectant
- inadequate exposure (contact) time between instruments and sterilant/disinfectant
- in-use dilution of the sterilant/disinfectant, e.g., addition of wet instruments
- loss of strength due to expired date
- inadequate penetration of the sterilant/disinfectant into the instrument, e.g., channelled scopes
- incorrect pH or temperature of the disinfectant
- water hardness
- incompatible detergents
- presence of materials such as rubber and plastic

TABLE 1 - SUGGESTED DECONTAMINATION PROCEDURES FOR SELECTED OFFICE INSTRUMENTS

Instrument or item	Category	Requirements	Suggested Procedure
Foot care instruments	C	ST	Sterilize with heat (in autoclave or hot-air oven).
Surgical instruments	C	ST	Sterilize with heat (in autoclave or hot-air oven).
Acupuncture needle	C	ST	Sterilize with heat; disposables preferred.
Neurologic test pin	C	ST	Sterilize with heat; disposables preferred.
Stitch cutter	C	ST	Sterilize with heat; disposables preferred.
Electrocautery tip for use on skin			
Needle electrode (for electrodessication)	C	ST	Sterilize with heat.
Kimura spatula	C	ST	Sterilize with heat; disposable spatula preferred.
Vaginal speculum (metal) and/or teneculum	C	ST	Sterilize with heat; disposable specula available.
Pessary and diaphragm fitting ring	C	ST	Sterilize with heat.
Anal/nasal speculum	SC	HLD	Sterilize with heat; boil for 20 minutes.
Tonometer, contact lenses	SC	HLD	Immerse in 1:50 dilution household bleach for 20 minutes. Rinse in water and dry well.
Rigid metal sigmoidoscope, proctoscope, nasal endoscope, laryngoscope and laryngoscope blades	SC	HLD	Clean all surfaces and all channels carefully; sterilize with heat; boil for 20 minutes.
Flexible fiberoptic endoscopes (i.e., gastrointestinal, bronchoscopic, nasal)	SC	HLD	Clean all surfaces and all channels carefully; immerse in 2% glutaraldehyde for >20 minutes. Rinse well with water (preferably sterile), then 70% alcohol and hang to dry. Accessories (brushes, biopsy forceps) must be sterilized with heat.
Thermometer (glass)	SC	ILD	Immerse in 70% to 90% ethyl alcohol for 20 minutes; consider disposables, sheaths, or electronic thermometers.
Laryngeal mirror	SC	HLD	Sterilize with heat; boil 20 minutes.
Ear speculum, ear cleaning equipment, ear curettes	SC	HLD/ILD	Sterilize with heat; boil 20 minutes. Immerse in chlorine 1:100 (if plastic), or alcohol (70%-90% ethyl) for 20 minutes.
Peak Flow Meters	SC	HLD	Use disposable mouthpiece. Clean whole instrument in hot water and mild detergent and disinfect by immersion in 1:50 dilution household bleach for 20 minutes. Rinse in tap water.
Stethoscope, bandage scissors	NC	ILD/LLD	Wipe with alcohol after use (stethoscope: diaphragm and bell).
Blood pressure cuff, reflex hammers	NC	ILD/LLD	Wash with an iodophor, phenolic or quaternary ammonium compound (quat).
Baby scales and/or work surfaces	NC	ILD/LLD	Wash with an iodophor, phenolic or quat. If faecally contaminated, phenolic preferred.

C=Critical Item, SC=Semi-critical Item, NC=Non-critical Item, ST=Sterilization, HLD=High-level disinfection, ILD=Intermediate-level disinfection, LLD=Low-level disinfection.
*All instrument surfaces must be in contact with disinfection or sterilization process (i.e., scissors, forceps, and channels must be open).
*Any scopes with bulbs should have the bulb and/or light source removed before reprocessing.

Adopted with permission from *The Prevention of Cross-Infection in the Physician's Office* pp. 10-11, 1992 The College of Physicians and Surgeons of British Columbia

HOW DO YOU CLEAN THE INSTRUMENT?

Instruments should be cleaned manually as soon as possible after use with plain soap and water or alternatively by ultrasonic machines according to the manufacturer's guidelines.

Enzymatic detergent preparations containing various proteinases and propylene glycol are also available to enhance the cleaning procedure.

PROCEDURES FOR STERILIZING INSTRUMENTS

iii) Sterilization

Sterilization completely kills all forms of microbial life including the most resistant forms, e.g., bacterial spores.

Instruments that are considered to be critical items require sterilization using techniques such as autoclaving, dry heat or gas sterilization. It is essential that instruments be thoroughly cleaned prior to sterilization. The following methods are easy and safe procedures for sterilizing instruments in a physician's office. It is important that the timer be set only after the appropriate target temperature has been reached:

GUIDELINES FOR STERILIZATION

Procedure	Exposure Time	Temperature
1. STEAM AUTOCLAVE		
Unwrapped instruments	20 minutes	121-132°C
Small wrapped packs	30 minutes	121-132°C

Small autoclaves, similar in size to microwave ovens, are ideal for office use. Distilled water is recommended as the water source to prevent scale deposits on the instruments. It should be noted that microwave ovens are NOT appropriate for sterilization.

Unwrapped instruments should be used immediately or aseptically placed in a sterile container. "Flash sterilization" or rapid steam sterilization is not an acceptable option for routine sterilization in the outpatient setting.

2. HOT-AIR OVEN	1 hour	170°C

Only items that cannot be sterilized by autoclaving should be considered for hot-air oven sterilization. Powders, oils and creams are examples of items for which dry heat sterilization is recommended.

MONITORING THE STERILIZATION PROCESS

It is imperative that the sterilization process be monitored to ensure that the process has been suitably accomplished.

Manual indicators on the machines, such as time, temperature and pressure gauges, must be observed and recorded.

Chemical indicators, such as tape which changes colour, are useful for distinguishing between processed and unprocessed items. Chemical indicators do not, however, imply that sterilization has taken place. Tapes are usually placed on wrapped products but preferably should be placed on a card inserted into the centre of the pack.

Biological indicators must be used to ensure that sterilization has occurred. This type of monitoring should be done at least weekly in both steam sterilizers and dry heat ovens. All biological indicators must be used according to the manufacturer's instructions and records should be kept of these results. If biological testing indicates that sterilization has not been achieved, sterility of the instruments cannot be assured. The test must be repeated, and the machine serviced, if necessary. Regular maintenance checks are essential.

Canadian Standards Association (CSA) Guidelines can be consulted for further details.

PACKAGING AND STORAGE OF STERILANTS

PACKAGING MATERIALS FOR STERILIZATION: There are many types of packaging materials available, each with advantages and disadvantages. The following criteria must be kept in mind.

The packaging material:

- must allow the sterilant to enter the pack;
- must maintain the sterility of the contents and be impervious to the environment; and
- should minimize the contamination risk when the package is opened.

The most useful wrapping materials in the physician's office are plastic/peel pouches. They are easy to use, often with features such as self-sealing closures and chemical indicator strips, and come in a variety of sizes that can accept single or small groups of instruments.

HOW DO YOU STORE INSTRUMENTS AFTER STERILIZATION?

It is critical that steam-sterilized packs be subject to a drying cycle prior to handling for storage. Wrapped packs should be carefully stored in clean, dry, dust-free areas (closed shelves), not at floor level, and should be away from debris, drains, moisture and vermin to minimize recontamination and maintain sterility until the time of use. All stored equipment and instruments should be left undisturbed as much as possible since handling may draw contaminants in through a bellows effect.

Sterile instruments that are not for immediate use should not be stored in trays of disinfectants or solutions.

Check the following to determine if the integrity of the package has been compromised:

- Is the seal still intact?
- Is the package free from tears, dust, soil and dampness?
- Have the chemical indicators on the pack changed to the appropriate colour?

HOW LONG CAN YOU KEEP A STERILE ITEM BEFORE IT IS OUTDATED?

If the integrity of the package has been maintained, it can be kept for various lengths of time. A muslin or crepe-wrapped pack should be stored for only a few months, but the use of a plastic dust jacket may greatly extend the shelf life of the pack. The maximum storage time should not exceed one year.

Time does not contaminate - events do

REFERENCES

1. *Effective Sterilization in Hospitals by the Steam Process.* Canadian Standards Association, Toronto, Ontario, 1991.

2. Block S. *Disinfection, Sterilization and Preservation,* 1991.4th Edition. Lee and Feibiger, Philadelphia, PA.

3. *APIC Infection Control and Applied Epidemiology. Principles and Practice.* Mosby - Year Book Inc., 1996, St. Louis, Mo.

4. Rutala WA. Manual of Clinical Microbiology, 1995. *Antiseptics, disinfection and sterilization in hospitals and related institutions.* 6th Ed. Eds Murray, PR; Baron, ES; Pfaller, MA; Tenover, FG; Yolken, RH; pp 227-246.

5. Drummond DC. *The Prevention of Cross Infection in the Physician's Office.* College of Physicians and Surgeons of British Columbia, 1992.

iv) Disinfection

Disinfection is a relative term. The microbial burden of an instrument is reduced, but not entirely eliminated, by a disinfection process with either heat or chemical agents. The extent of this reduction depends on the intrinsic power of the disinfectant process, and the innate resistance of the microbial forms present.

Don't disinfect if you can sterilize

The following list ranks the spectrum of microbial life in terms of resistance to destruction by heat or chemicals:

MICROBES RANKED IN ORDER OF INCREASING RESISTANCE TO DESTRUCTION

1) vegetative bacteria (e.g., staphylococcus, pseudomonas)
2) lipid or medium sized virus (e.g., herpes, HIV, hepatitis B, hepatitis C)
3) fungi (e.g., candida, aspergillus)
4) non-lipid or small viruses (polio virus, coxsackie virus)
5) mycobacteria (e.g., *M. tuberculosis*)
6) bacterial spores

DISINFECTION PROCEDURES

Disinfection Procedures can be divided into three levels: high level, intermediate-level and low-level disinfection.

1. HIGH-LEVEL DISINFECTION

Those instruments which are considered to be semicritical items require high-level disinfection as a minimum requirement. This procedure is effective for all microbial forms but may not be able to kill large numbers of bacterial spores. Two types of procedures may be used:

a) Boiling: Boiling offers a cheap and readily accessible form of high-level disinfection. It can be accomplished by using a 'hot water disinfector' which lowers a trivet of instruments into boiling water. Plain tap water can be used; if scale develops, a descaling agent can be added. It is essential that the contact time be at least 20 minutes after boiling has started.

Important points include:

- change water at least daily
- keep water level full during the day
- ensure all parts of the instruments are in contact with boiling water (i.e., open scissors, forceps)
- wash and dry the boiling vessel at the end of each day

b) Chemicals: High-level disinfection with chemicals has been referred to as "cold sterilization".

High-level chemical disinfectants have a demonstrated level of activity against bacterial spores and all other forms of micro-organisms. The capability of killing a bacterial spore is an assurance of the relative power and activity spectrum of the germicide. Thus, if the contact time is long enough, as long as 24 hours, it can be used as a sterilant.

Some examples of high-level disinfectants are:

- glutaraldehyde preparations
- hydrogen peroxide
- sodium hypochlorite

i) Glutaraldehyde Preparation (2%): Glutaraldehydes are the only chemical agents that can confidently be called high-level disinfectants/sterilants. They are widely used in institutional settings, but may also be used in appropriately ventilated office settings for a wide variety of medical instruments that cannot be subjected to heat. They must be prepared and used according to manufacturer's instructions. Activated 2% glutaraldehyde, which is made alkaline with sodium bicarbonate, is the most commonly used preparation and has a shelf life of 14 days. After disinfection, thorough rinsing of instruments with sterile water is imperative due to the potential toxicity of glutaraldehyde residue on human tissue.

Advantages

- It is a high-level disinfectant with contact time of ≥20 minutes at room temperature.
- It is a sterilant with contact time of 6-10 hours at room temperature.
- It is not corrosive to metals, does not damage lensed instruments, rubber or plastic.
- It is highly resistant to neutralization by organic soil.

Disadvantages

- Expensive.

- Toxic - irritating to skin, eyes and nasal passages, and can cause breathing problems. Health care workers may be exposed to elevated glutaraldehyde vapour levels if equipment is processed in rooms with inadequate ventilation, when spills occur, or where there is an open immersion bath. A well ventilated area is required. Staff must wear protective clothing, gloves and face protection. The current maximum airborne concentration or ceiling exposure value to which a worker can be exposed is 0.2 ppm.
- Activated glutaraldehyde is unstable and germicidal potency tends to decrease after storage and use. The shelf life is 14 days, the solution must be kept in a covered container, and concentrations should be monitored.
- Concentrations of < 1% are no longer capable of high level disinfection.
- Residues are toxic to tissues; disinfected instruments must be rinsed well with sterile water.

ii) 6% Hydrogen Peroxide: Hydrogen peroxide is a safe and effective product to use on almost all medical instruments. However, it will damage the external surfaces of rubbers and plastics, and corrode copper, zinc, and brass instruments after prolonged use. Although it is widely used in health care facilities and offices, no 6% preparation has been approved for use as a high-level disinfectant in Canada.

iii) Sodium Hypochlorite (1:50 dilution): Chlorine compounds such as sodium hypochlorite (household bleach) require a contact time of 20 or more minutes. The compounds are very corrosive to stainless steel. A 1:50 dilution of household bleach, 1 teaspoon in 1 cup of water, provides 1000 ppm of available chlorine, and is a high level disinfectant. After disinfection, instruments must be thoroughly rinsed with sterile water and then air dried or dried using a sterile cloth. Sodium hypochlorite solutions should be prepared weekly, and stored at room temperature in an opaque container to ensure the concentration is maintained.

2. INTERMEDIATE-LEVEL DISINFECTION

Intermediate-level disinfectants do not necessarily kill large numbers of bacterial spores in 6 to 12 hours, but can kill all other organisms in the preceding list. Small, non-lipid viruses (e.g., enteroviruses) may be resistant.

Some examples of intermediate-level disinfectants are:

- 70 to 90% ethanol and isopropanol
- iodine and iodophors
- phenols and phenolics
- sodium hypochlorite (1:100 dilution, 1 teaspoon bleach in 2 cups water)

3. LOW-LEVEL DISINFECTION

Equipment that does not touch mucous membranes and only touches intact skin, e.g., stethoscopes, blood pressure cuffs and baby scales, require cleaning with low-level disinfectants. Such chemicals cannot be relied upon to destroy, within a practical period of time, bacterial spores and tubercle bacilli, and often fail to kill many fungi and viruses. Germicidal activity is flexible, depending on the concentration of the active ingredient.

Some examples of low-level disinfectants are:

- phenols and phenolics
- quaternary ammonium compounds ("quats")
- sodium hypochlorite - 1:500 dilution of household bleach prepared weekly, and stored at room temperature in an opaque container to ensure the concentration is maintained. (1 teaspoon in 10 cups water)
- iodine and iodophors

v) Disposable Devices

Many items used in the health care industry are designated by the manufacturer to be single-use only, e.g., syringes, plastic vaginal specula, mouthpieces for pulmonary function testing. Such items should ***not*** be reused unless a comprehensive quality assurance program is in place to ensure that items are cleaned, disinfected or sterilized appropriately, and that they do not lose their functional integrity after use and subsequent reprocessing. The health care worker or institution that chooses to reuse disposable equipment assumes liability for doing so.

REFERENCES
1. Rutala WA. APIC *Guideline for Selection and Use of Disinfectants.* AmJ Infect Control 1996; 24: 313-342.

ANTISEPTICS

An antiseptic is a chemical agent intended for use on skin or tissue. It reduces the less resistant, non-spore forming micro-organisms on the skin and mucous membranes.

WHAT ARE ANTISEPTICS FOR?

- patient skin preparation
- skin wound cleanser
- hand washing agent and surgical scrub (See Section 1)

Remember that for the antiseptic to be effective, it must be applied for at least 30 seconds and allowed to dry. Some preparations are used as both antiseptics and disinfectants, e.g., alcohols, but they are produced in different formulations, and are therefore not interchangeable for these two tasks.

The following agents are commercially available as antiseptic agents:

- isopropyl alcohol (70-90%)
- chlorhexidine gluconate (4%, 2% detergent base, 0.5% tincture)
- iodine/iodophor (10%, 7.5%, 2%, 0.5%)

Do not use antiseptics as cleaning agents for surfaces or instruments - they are not disinfectants

GENERAL HOUSEKEEPING OF THE OFFICE

Medical offices should be cleaned at the end of every day, unless a situation arises that warrants immediate attention. General housekeeping routines involve cleaning and disinfecting surfaces, toys and objects with a low-level disinfectant. Cleaning of body fluid spills requires special consideration.

i) Cleaning Materials and Practices

The following detergent disinfectants are suggested for use in the daily cleaning and disinfection of all surfaces in the office:

- phenolic
- iodophor
- quaternary ammonium compounds
- sodium hypochlorite (1:100 dilution prepared weekly) is a disinfectant which can be used for some environmental cleaning as outlined below.

Always have a bottle of appropriately diluted disinfectant available. Sodium hypochlorite solutions should be prepared weekly, and stored at room temperature in an opaque container to ensure the concentration is maintained.

CAN THE DETERGENT BE USED ON EVERYTHING?

Yes, it can be used on:

- baby scales
- table tops
- floors
- sinks
- toilets

Examination tables: Uncovered examination tables should be cleaned between patients. Table covers, linen, paper, plastic, etc., should be changed between patients. If there is a body fluid spill, clean and disinfect the table after removing the cover, (see *Spot Cleaning of Body Fluid Spills*) otherwise clean the table daily.

Toys: Frequently touched toys should be cleaned daily with a freshly prepared 1:100 bleach solution. Let them air dry. If the toys are visibly soiled, wash them first with soap and water, and then disinfect. Avoid mouth, cloth and plush toys.

ii) Spot cleaning of body fluid spills

1. Wear household gloves while cleaning.
2. Wipe up as much of the visible material as possible with disposable towelling and dispose in a lined, covered garbage container. For disposal of this garbage, see waste disposal section in Section 5.
3. Clean the spill area with the prepared disinfectant detergent. Rinse and dry with a disposable towel.
4. After the spills are wiped up and cleaned, disinfect the surface with the 1:100 dilution of bleach by putting a small amount of the solution on the area and wiping it with a paper towel.

Carpets are not recommended for patient care areas. If spills occur on carpets, remember that bleach may damage the carpet and so another agent should be used. In certain cases, cleaning carpets may not be sufficient, and replacement and disposal of carpeting may be required.

Sharps, including broken glassware, should be picked up with a dustpan and scraper. Discard such waste in a manner as to avoid injuries. Wash dustpan and scraper if soiled.

iii) Equipment and material maintenance practices

A. MEDICATION REFRIGERATOR

- Store only medications in the medication refrigerator. Do not store medications in the door; it is the warmest area.
- Store food or personal items in a designated refrigerator, not the medication refrigerator.
- Check temperature twice daily in refrigerators that store vaccines. Temperatures should not be below 2°C or above 8°C.
- Record temperature daily.
- Obtain information about vaccine handling and basic cold chain equipment, including maximum minimum thermometers, from the Ontario Government Pharmaceutical and Medical Supply Service for Metro Toronto physicians and from the local health departments outside Metro Toronto. Review refrigerator inventory monthly. Discard or return expired products.
- Defrost refrigerator as often as necessary to avoid malfunction. Vaccines should be maintained in a working refrigerator during defrosting.
- Disinfectant used for environmental cleaning can be used to clean the refrigerator.

B. MULTIDOSE VIALS

- See the product leaflet for recommended duration of use after entry of vial.
- Use strict aseptic technique when administering parenteral medications.
- Refrigerate medications only if directed by manufacturer.
- Discard vials if contamination is suspected.

C. STERILE IRRIGATION SOLUTIONS

- Discard open bottles at the end of each day.
- Use small bottles if possible and store at room temperature.

D. OPHTHALMOLOGY OINTMENTS AND DRUGS

- Check expiration date of medications before each use.
- Discard multi-use eye drops and ointments when manufacturer's expiration date is reached.
- Discard ophthalmic medications immediately if there is any possibility that they have been contaminated.
- Replace tops of ointments and drops immediately after use. If left uncovered for a prolonged period, the medication must be considered contaminated.

REFERENCES

1. *Well Beings.* Canadian Pediatric Society. Creative Premises Ltd. Toronto, Ontario, 1992.

2. Heroux D, et al. *Ambulatory Care, Infection Control Manual.* Group Health Cooperative Publishing, Puget Sound, Washington, 1993.

WASTE DISPOSAL

Waste from any health care facility is divided into two categories: biomedical and general. Legislation dictates that biomedical waste be handled and disposed of in a manner that avoids transmission of potential infections. It is necessary to understand the differences between these types of waste so that private offices and small clinics can separate the waste and make arrangements for appropriate disposal of biomedical waste.

BIOMEDICAL WASTE

The Ontario Ministry of the Environment's draft regulation "General-Waste Management", as of June 1998, includes waste generated from "professional offices and includes:

Anatomical waste consisting of tissues, organs and body parts, not including teeth, hair and nails;

Non-anatomical waste consisting of

i) human liquid blood or semi-liquid blood and blood products, items contaminated with blood that would release liquid or semi-liquid blood if compressed, dried items that would, before drying, have released liquid of semi-liquid blood if compressed, and body fluids contaminated with blood, excluding urine and faeces;

ii) sharps including needles, needles attached to syringes, and blades; or

iii) broken glass or other materials capable of causing punctures or cuts which have come into contact with human blood or body fluids.

It is necessary to transport this waste to an appropriate facility for disposal by incineration, autoclaving, chemical or other means, as approved by the ministry. At present, by law, only a licensed biomedical waste company can transport biomedical waste for disposal. According to the 1998 draft proposal, small amounts of waste may be transported by non-licensed personnel to a hospital or laboratory for disposal. Consult your local Medical Officer of Health for transport regulations in your jurisdiction.

Each office should have written policies defining their biomedical waste according to the Ontario Ministry of Environment and Energy's definitions, as well as the handling and disposal of same.

The Ministry's recommendation for colour-coding non-anatomical waste as per the above cited definition is YELLOW. Anatomical waste should go in a RED bag. Ensure that the waste basket, which is designated to contain the biomedical waste in the office, is lined with the appropriate coloured bag.

GENERAL WASTE

General office waste includes all other garbage which does not fit into the above cited category, and requires no special disposal methods other than careful containment of waste during disposal and removal.

GENERAL RECOMMENDATIONS *FOR ALL* TYPES OF WASTE

- Ensure all garbage containers are waterproof and have tight-fitting lids, preferably operated by a foot pedal. Open waste baskets might be dangerous if children are around them.
- Use plastic bags to line the garbage containers. The use of double bagging is not necessary unless the integrity of the bag is jeopardized or the outside is visibly soiled.
- Do not overfill garbage containers.
- Do not place sharp, hard or heavy objects into plastic bags which could cause bags to burst.

Sharps injuries should be avoided at all cost

EMPLOYEE PROTOCOL FOLLOWING SIGNIFICANT EXPOSURE TO BLOOD

Blood-borne infections include hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV). Prompt and organized action is required when staff are accidentally exposed to blood or body fluids through percutaneous (needlestick) or mucous membrane (splash) accidents.

1. PROVIDE FIRST AID

After sharps injuries, encourage bleeding, then wash the area well with soap and warm water. If blood or body fluid is splashed in the eyes, flush out the eyes well for at least 10 minutes with cold water.

2. PROVIDE HIV PROPHYLAXIS AS INDICATED

CHEMOPROPHYLAXIS AFTER OCCUPATIONAL EXPOSURE TO HIV

The approach to post-exposure chemoprophylaxis after occupational exposure to HIV has changed significantly over the past two years. The risk of acquiring HIV after percutaneous exposure to infected blood remains at 0.5%. However, a recent study examining cases of health care workers exposed to infected blood, has identified three risk factors associated with their seroconversion to HIV:

1. Volume of blood injected (e.g., deep injury, procedure involving a needle placed directly into source patient's vein or artery, and visible contamination of the sharp with patient blood);
2. Terminal HIV illness in source patient; and
3. Non-use of zidovudine post-exposure prophylaxis. Zidovudine use was associated with about an 80% reduction in the risk of HIV seroconversion, and is now recommended for high-risk exposures.

The superiority of combination antiretroviral therapy, as treatment for HIV-infected patients, has been extrapolated to prophylaxis regimens for high-risk situations. A three-drug therapy with zidovudine, lamivudine and indinavir is recommended for percutaneous exposures involving both a large volume of blood, and a source patient with acute or terminal HIV disease.

Table 2 describes the provisional recommendations for chemoprophylaxis after occupational exposure to HIV, classified by nature of exposure and type of source material. Table 3 details the drugs usually used. The number of drugs used depends on the type of exposure and the viral load in the source case.

Post-exposure prophylaxis for occupational HIV exposure should be started **as soon as possible** and continued for four weeks. If the HIV status of the source is unknown, decisions to initiate prophylaxis must be individualized. The source case, if known, should be informed of the incident and asked to be tested for

HIV. Informed consent is vital, and should be documented.

An expert experienced in the use of anti-HIV medication should be consulted when initiating post-exposure prophylaxis, and/or if management is uncertain. Counselling and follow-up serological testing, at 3 and 6 months, are best done by an expert.

During the period of follow-up, blood, semen and organ donations should be avoided and safe sexual practices adopted.

TABLE 2

Provisional recommendations for chemoprophylaxis after occupational exposure to HIV by exposure type and source material

Type of Exposure	Source Material	Antiretroviral Prophylaxis
Any percutaneous, mucous membrane, non-intact skin[a]	Concentrated virus	Recommend
Percutaneous	Blood and other infectious body fluids[b]	
	- higher risk[c]	Recommend
	- lower risk[d]	Offer
	Other body fluids[e]	Not offer
Mucous membrane or non-intact skin[a]	Blood and other infectious body fluids[b]	Offer
	Other body fluids[e]	Not offer

a. The larger the area of skin exposed, and the longer the contact time, the more important it is to verify that all the relevant skin area is intact.

b. Serum, plasma, any fluid containing blood, organ and tissue transplants, vaginal/uterine fluids, semen, pleural, amniotic, pericardial, peritoneal, synovial, and cerebrospinal fluid.

c. Higher risk percutaneous exposures include exposures involving deep injury, injection of source person's blood or body fluid, a needle placed directly in a source person's blood vessel, or a source person with high viral titre (as in acute retroviral illness or terminal HIV disease).

d. Lower risk percutaneous exposures do not involve any of the features noted in (c).

e. Body fluids not mentioned in (b) (such as non-bloody urine or faeces).

Reprinted with permission of Health Canada. An integrated protocol to manage health care workers exposed to blood borne pathogens. Canada Communicable Disease Report 1997; 23S2:1-14.

TABLE 3

Drugs for Chemoprophylaxis after Occupational Exposure to HIV

DRUG	USUAL DOSE	MAJOR SIDE EFFECTS
1. Zidovudine	200 mg. tid	anemia, thrombocytopenia, headache, nausea, malaise
2. Lamivudine	150 mg. bid	headache, malaise, nasal symptoms
3. Indinavir	800 mg. tid	renal calculi, unconjugated hyperbilirubinemia, anemia, neutropenia

REFERENCES

1. Canadian Immunization Guide, Fourth Edition, 1995.

2. Centers For Disease Control and Prevention. Public Health Service guidelines for the management of health care worker exposures to HIV and recommendations for postexposure prophylaxis. MMWR 1998; 47 (No.RR-7): 1-33.

3. Health Canada. An integrated protocol to manage health care workers exposed to blood-borne pathogens. CCDR 1997; 23S2.

3. PROVIDE HEPATITIS B PROPHYLAXIS AS INDICATED

The risk of acquiring hepatitis B infection after percutaneous exposure can be as high as 25%, depending on the infectious status of the source case. Hepatitis B prophylaxis should be initiated as soon as possible after the incident, and depends on the following variables: vaccination status of the staff, anti-HBs level, and HBsAg status of the source. Current recommendations of the National Advisory Committee on Immunization are outlined in Table 4.

4. DOCUMENT THE INCIDENT

The Workers' Compensation Board Incident Report form should be completed immediately. Record the date and time of the incident, what the worker was doing, what protective measures were being employed at the time, and what action was taken after exposure.

5. HEPATITIS C

The risk of transmission following percutaneous exposure is about 3%. Exposed health care workers should be monitored by the most sensitive test available for Hepatitis C, and treatment started if infection is diagnosed. An expert should be consulted. Immunoglobulin is of no proven efficacy.

REFERENCES

1. Canadian Immunization Guide, Fifth Edition, 1998.

2. Centers For Disease Control and Prevention. Public Health Service guidelines for the management of health care worker exposures to HIV and recommendations for postexposure prophylaxis. MMWR 1998; 47 (No.RR-7): 1-33.

3. Health Canada. An integrated protocol to manage health care workers exposed to blood-borne pathogens. CCDR 1997; 23S2.

4. Sherman M, CASL Hepatitis Consensus Group. Management of viral hepatitis: clinical and public health perspectives – a consensus statement. Can J Gastroenterol 1997; 11:407-416.

TABLE 4

Post-Exposure Immunoprophylaxis for Hepatitis B

This table recommends action for possible exposure to hepatitis B according to the vaccination and antibody status of the exposed person. The source may be known to be infected or in a risk group for infection, or infectious status may not be known, either because the source has not been identified or has not been tested. The recommendations assume the real possibility of exposure in ways in which HBV is known to be transmitted.

Vaccination and antibody status of the exposed person:

a. **immunized with documented protective anti-HBs at any time or documented as immune because of previous natural infection**
   - no action required

b. **no anti-HBs response to two previous courses of vaccine**
   - administer HBIG
   - assess for HBV infection at least 2 months after the exposure

c. **two or more doses of vaccine; anti-HBs status not known**
   i) health care workers or others known or highly likely to have been exposed to HBV
   - test for anti-HBs and simultaneously administer one dose of vaccine*
   - if the first test is negative, retest 4 weeks after this dose, and if still negative assess for HBV infection at least 2 months after the exposure
   - give the final dose of a three-dose series at the time it is normally due if infection has not occurred and anti-HBs is still lacking

   ii) all others
   - test for anti-HBs as soon as possible
   - if negative, administer one dose of vaccine*
   - retest 4 weeks after this dose, and if still negative assess for HBV infection at least 2 months after the exposure
   - give the final dose at the time it is normally due if infection has not occurred

d. **0 or 1 dose of vaccine or non-responder to one course of vaccine**
   - administer HBIG and an accelerated course of vaccine at 0, 1, 2 and 6 to 12 months
   - assess for HBV infection at least 2 months after the exposure

*HBIG will be of value only in the unlikely situation that the source is infected and the worker has no protection despite immunization. It should be given if there is compelling reason to do so.

Notes:

1. If test results are available on the source patient within 48 hours and show that the source is not infected, the use of HBIG may be precluded in b and d above.
2. If the source is known not to be infected or known to be at negligible risk for HBV, the only required action is to ensure that the workers receive the usual pre-exposure course of vaccine and antibody testing if these actions have not already been completed.
3. LCDC recommends baseline testing of the health care worker for HBsAG and anti-HBs; testing for anti-HBs is recommended if the injured HCW is susceptible, a non-responder, or has an unknown anti-HBs status at the time of injury; if tests are negative, retesting after 6 months is recommended.
4. This advice differs from the 1997 statement published in the CCDR supplement in the following ways: This table is based primarily on the status of the injured health care worker and not the source. In the CCDR supplement HBIG is recommended for health care workers who have unknown anti-HBs status; a second dose 1 month after the first is recommended if the health care worker is a known non-responder.

Reprinted with permission,

The Canadian Immunization Guide, 5th Edition, 1998.

For further details consult the Canadian Blood Services, an expert in Infectious Diseases or your local Medical Officer of Health.