

Guidelines for Infection Prevention and Control in Endoscopy

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COMMUNICABLE DISEASE CONTROL

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This document was prepared by the Endoscopy Working Group of the Infection Control Subcommittee of the Manitoba Advisory Committee on Infectious Diseases.

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I. Introduction

These guidelines have been prepared to replace the “Recommendations for the Management of Endoscopes” published by Manitoba Health in July 1989, and are applicable to endoscope usage in all settings.

Non-immersible endoscopes should be replaced because they are very difficult to clean and disinfect. Endoscopes that cannot withstand the processes described in these guidelines because of age, design or damage should not be used.

There are a number of good consensus guidelines^{1, 2, 3} now available, which discuss in detail infectious agents that can be transmitted by endoscopy, appropriate procedures for cleaning, reprocessing, and discussion about disinfection issues and agents.

The American Society for Gastrointestinal Endoscopy (ASGE), the Society of Gastroenterology Nurses and Associates (SGNA), the Association for Professionals in Infection Control and Epidemiology (APIC), the Centers for Disease Control (CDC) and the Food and Drug Administration (FDA) have all endorsed a 1996 position statement “Reprocessing of Flexible Gastrointestinal Endoscopes.”⁴

In this publication, we have adapted the guidelines developed by the Canadian Society of Gastroenterology Nurses and Associates (CSGNA), “Infection Control: Recommended Guidelines in Endoscopy Settings,” 1998.⁵ We thank the Society for giving us permission to use the document.

Gastrointestinal endoscopes come into contact with mucous membranes and are considered semicritical items. High level disinfection between each patient use is the current minimum reprocessing standard of practice.^{3, 4, 5, 6, 7}

Accessories such as re-usable biopsy forceps that penetrate mucosal barriers are classified as critical items and must be sterilized between each patient use. If these accessory items are labeled “single-use, disposable” they should not be reprocessed.

Endoscopes that enter sterile body spaces (i.e., arthroscopes, laparoscopes) should be sterilized before each use. There are some references that suggest when sterilization is not feasible, endoscopes should receive at least high-level disinfection.^{20, 21}

Transmission of organisms from contaminated bronchoscopes have illustrated problems associated with automated reprocessing machines.⁸ Some bronchoscope models are not compatible with certain automated reprocessing systems. Appropriate connector systems, both device and model-specific, are essential.

Endoscopes have been implicated in the transmission of disease when appropriate cleaning, disinfection or sterilization procedures were not employed.^{8, 9, 10} Of particular significance is the need to **thoroughly manually clean equipment prior to** any manual or automated disinfection or sterilization process.

II Glossary of Terms

Air:

Airflow under pressure provided by a pump or compressor.

Automated Endoscope Reprocessor (AER):

Machines designed to assist with cleaning and disinfecting of endoscopes.

Alcohol:

70% isopropyl or ethyl alcohol.

Clean:

Visibly free from debris. Cleaning involves physical removal of blood, mucous, vomitus, fecal matter and other organic residue.

Enzymatic detergent:

Low-sudsing enzymatic detergent formulations recommended for cleaning endoscopes. These are combinations of detergent and enzymes capable of digesting organic material such as blood and mucous without damage to the instrument.

Endoscopes – Flexible:

Flexible fiberoptic or video endoscopes used in the examination of the hollow viscera (bronchoscope, colonoscope, duodenoscope, gastroscope, sigmoidoscope).

Endoscopes – Rigid:

Small straight scopes generally without lumens (arthroscope, laparoscope, cystoscope).

High-level Disinfectant:

A liquid chemical germicide capable of destroying all vegetative bacteria (including mycobacteria), viruses and fungi but not necessarily all bacterial endospores. High-level disinfectants are registered with Health Canada and/or the United States Federal Drug Administration (FDA).

Low-level Disinfectant/Cleaner:

Destroys most vegetative bacteria, fungi and some viruses, but not mycobacteria or bacterial spores. These products are registered with Health Canada and/or the United States Environment Protection Agency (EPA) similar to housekeeping products used for environmental cleaning.

Sterilization:

Killing all microorganisms, including bacterial endospores.

Patient-ready Endoscope:

An endoscope rendered clean after being subjected to a validated cleaning procedure, subjected to minimally a high-level disinfection process and rinsed so that it does not contain residual chemicals in amounts that can be harmful to humans.

Routine Practices:¹¹

Infection control precautions that apply to all patients regardless of their diagnosis or presumed infection status. All patients and all body fluids, secretions and mucous membranes are considered potentially infectious. This was previously referred to as universal precautions.

Ultrasonic Cleaner:

An instrument reprocessing unit that uses ultrasound waves to produce tiny air bubbles in a cleaning solution. The imploding of the air bubbles dislodges debris even in hard to reach areas of instruments.

Water – Potable:

Tap water that meets provincial regulations as suitable for drinking.

Water – Sterile:

Water that has either been steam autoclaved or filter sterilized by passage through a 0.2 micron filter.

III Recommendations for Safety of Personnel

Safety is of the utmost importance and should be in the forefront of each employee's thinking. Consistent practice must be maintained to prevent the spread of disease and to protect from the dangers of chemicals used in the cleaning and high-level disinfection of endoscopes. Practices that should be followed include:

- All personnel should be immunized for Hepatitis B.
- Bronchoscopy personnel should be monitored by Occupational Health for exposure to tuberculosis as required.^{19, 22}
- Health care workers who have respiratory problems (i.e., asthma, latex or chemical allergies) should be assessed by Occupational Health prior to working in the area.
- Irritation can be minimized with covered containers and by using disinfectants in a well-ventilated area. Concentration of glutaraldehyde fumes, if used, should never exceed limits set by the Workplace Safety & Health Division, Manitoba Labour, 200 – 401 York (945-3446).
- Eye protection and moisture-resistant masks or face shields should be worn to prevent contact with splashes during the cleaning procedure and disinfection/sterilization process.
- Moisture-resistant gowns should be worn to prevent contamination of personnel due to splashes of blood or other body fluids or injury due to chemical disinfectant/sterilant contact. Gowns should be changed between patient procedures or when visibly soiled.
- Protective apparel (i.e., gowns and masks) should not be worn outside the procedure room and cleaning room.
- Non-sterile gloves must be worn for handling and cleaning dirty equipment, as well as for any potential contact with blood or body fluids. Gloves are recommended when handling disinfectant solutions in order to prevent caustic effects.
- All needles and sharps are to be appropriately disposed of in puncture-resistant containers at their point of use. Do not recap needles.
- Fingernails should be kept short to prevent the puncturing of gloves. Jewellery should not be worn on the hands because it harbors microorganisms, hinders handwashing and may puncture gloves.
- Meticulous hand washing with an appropriate antimicrobial agent must be done between patient contact, after glove removal, and when entering or leaving the endoscopy area. If hands or other skin surfaces are contaminated with blood or body fluids, wash immediately.
- Health care workers who have exudative lesions or weeping dermatitis should refrain from all direct patient care and from handling patient care equipment until the condition resolves.
- Health care workers who have significant percutaneous, non-intact skin or mucous membrane exposure to the blood and/or body fluids of any patient should promptly report such contact to Occupational Health for evaluation and proper follow-up, or should follow the facility's protocol for occupational exposure.
- All personnel performing or assisting with endoscopic procedures and personnel responsible for reprocessing the equipment, must be knowledgeable about the infectious and chemical hazards associated with these procedures and equipment, including the relevant Workplace Hazardous Material Information System guidelines.

IV Guidelines for the Reprocessing of Endoscopes

Refer to the manufacturer's instructions for cleaning and disinfecting each specific model of endoscope. Only trained personnel should perform this procedure.

1. Inspection

At all stages of handling, the endoscope should be inspected for damage.

Leak testing of the endoscope, according to manufacturer's recommendations, should be performed each time **prior** to starting the cleaning process. A leak test involves applying air pressure to the inside of the endoscope insertion tube and watching for air bubbles, which identify leaks either in the covering or internally into one of the channels.

If damage is detected during the leak test (i.e., bubbling occurs), **do not** proceed with cleaning. Send to the repair service immediately. If the scope cannot be cleaned prior to transport, ensure it is clearly labeled as "contaminated" and is packaged and transported appropriately.

2. Cleaning

Reprocess immediately after use. Do not allow to dry prior to manual cleaning. If unable to initiate the manual cleaning process immediately, the endoscope may be flushed and left soaking in an enzymatic detergent solution. It is important to remove all detachable parts before reprocessing. (Figure 1)

Meticulous manual cleaning is the most important step in the cleaning process.

Wipe the outer surface of the endoscope with an enzymatic detergent-soaked gauze immediately after removal from the patient. Using the air/water channel valve, flush the air/water channel with water from the water bottle. For endoscopes with an elevator wire, manual flushing of this channel with an enzymatic detergent and rinsing is required. Transport the scope to the cleaning area in a closed container.

- After determining there are no leaks, fully immerse the scope in a solution of enzymatic detergent cleaner to prevent the drying of secretions. Brush all channels to remove organic material and decrease the number of organisms present. Ensure the air/water/CO₂ channels are also cleaned.
- Ensure the outer surface of the scope is thoroughly cleaned. Use of a soft bristle toothbrush to clean the lens end is acceptable.
- All channels must be irrigated and brushed to remove particulate matter. Channel irrigators should be used to facilitate cleaning of all channels. (However, a channel blockage can be missed by an all-channel irrigator.)
- Rinse all the channels and the endoscope thoroughly with copious amounts of tap water (i.e., minimum 500 ml) following the cleaning process to remove the residual of the enzymatic detergent.
- Remove all excess water from the channels by injecting air via the all-channel irrigator to decrease chances of diluting the disinfectant solution.
- For endoscopes with an elevator wire, this channel must be manually flushed with an enzymatic detergent and rinsed.

3. Sterilization and Disinfection

When deciding whether to sterilize or disinfect the endoscope, it is important to refer to the following classifications:²⁰

Critical items – enter sterile tissue, the vascular system or sterile body spaces. They require meticulous cleaning and sterilization between uses.

Semi-critical items – come in contact with mucous membranes or non-intact skin. They require meticulous cleaning and, at minimum, high-level disinfection between uses.

Non-critical items – come in contact with intact skin. They require meticulous cleaning and low-level disinfection between uses.

Endoscopes that enter sterile body cavities (i.e., cystoscopes, arthroscopes, laparoscopes, biopsy forceps, polysnares) are classified as critical items and therefore, require meticulous cleaning and sterilization between uses.

Endoscopes that come in contact with mucous membrane (i.e., laryngoscopes, flexible endoscopes including bronchoscopes, colonoscopes, duodenoscopes) require disinfection between use.

Non-Critical items (i.e., cameras, light source) require meticulous cleaning and low-level disinfection between use.

Sterilization or high-level disinfection of the endoscope internally and externally must be performed after scrupulous mechanical cleaning has been completed. All processes may be rendered ineffective if any organic material or moisture is retained on or in the endoscope.

4A. Recommended Methods/Agents²⁰

Chemical agents registered with Health Canada or the Federal Drug Administration (U.S. - FDA) as sterilant/disinfectants are appropriate for high-level disinfection.

The manufacturer's instructions regarding use of disinfectant must be adhered to in order to ensure efficacy.

Continuous use of a disinfectant solution for long periods eventually results in dilution and/or inactivation.

Commercial test kits are available for chlorine, hydrogen peroxide, glutaraldehyde, and peracetic acid to determine whether an effective concentration of active ingredients is present despite repeated use and dilution. However, the reliability of such test kits has not yet been established.

Ethylene Oxide (ETO)

Gas sterilization requires an extended time to complete the sterilization and aeration process so it may not always be practical.

Steam sterilization

Cannot be used for flexible endoscopes but is the preferred method for rigid scopes.

Glutaraldehyde preparations

a) *Alkaline Glutaraldehyde* – $\geq 2\%$

Several preparations of glutaraldehyde are marketed as $\geq 2.4\%$ solution to which a separately packaged "activating" preparation containing an alkaline buffer, a surface-tension depressant, an anticorrosive compound and a water-soluble dye is added. The bicarbonate (buffer) raises the pH to 7.5 to 8.5, which greatly enhances the microbicidal (including sporicidal, fungicidal and viricidal) activity. Glutaraldehyde has excellent materials compatibility. In contrast to many disinfectants, it is highly resistant to neutralization by organic soil. Chemically stabilized solutions have a shelf life (i.e., a period during which they maintain adequate glutaraldehyde concentrations) of at least 14 days and of 28 days when in-use dilution does not exceed 50 per cent.

b) *Acid Glutaraldehyde* – $\geq 2\%$

Compared with alkaline preparations, some acid solutions are more corrosive to metal. Acid solutions of glutaraldehyde (pH 3.0 to 6.3) are stable for long periods without loss of active aldehyde groups. A $\geq 2\%$ acid glutaraldehyde acts as a chemical sterilant and is acceptable for high-level disinfection.

Hydrogen Peroxide (H₂O₂)

A 7.5% hydrogen peroxide/0.85% phosphoric acid solution is classified as a high-level disinfectant. Hydrogen peroxide is a rapid oxidizer, which facilitates removal of organic debris and is relatively free of toxic fumes. Although hydrogen peroxide is a potent antimicrobial agent, it can damage rubber and plastics, and corrodes copper, zinc, and brass. As with other chemical sterilants, dilution must be monitored by regularly testing the minimum effective concentration (i.e., 6.0%).

Peracetic Acid – 1%

A 1% peracetic acid solution has broad-spectrum activity against bacteria, fungi, spores and enteroviruses. Although peracetic acid can be corrosive, an automated endoscope reprocessing system has been designed that dilutes 35% peracetic acid to a final concentration of 0.2% and adds a buffer and an anticorrosive agent. The system is designed only for reprocessing totally immersible endoscopes.

Ortho-phthalaldehyde (OPA)

OPA has several potential advantages compared to glutaraldehyde. It has excellent stability over a wide pH range of 3-9 and is non-irritating to the eyes and nasal passages. Additionally, OPA requires no activation prior to use.

4B. Agents Not Recommended for Disinfection of Endoscopes²⁰

Some agents are not recommended for use on endoscopes and endoscopic equipment because of incomplete microbiologic coverage, toxic exposure to personnel or physical damaging to the equipment.

These agents include:

- Products not cleared by Health Canada/ FDA for use on semi-critical or critical medical devices.
- Skin antiseptics (i.e., povidone - iodine, Chlorhexidine gluconate).
- Hypochlorite.
- Quaternary ammonium compounds.
- Phenolics.

5. Rinsing

To remove all traces of the disinfectant, adequate rinsing must follow the disinfection process. Any residual chemical can cause toxic effects in a patient if it is transmitted during the next endoscopic procedure.

The use of sterile water for rinsing is preferred, but tap water can be used.

6. Drying

If tap water is used for the final rinse, always follow rinse step with 70% alcohol flush and dry with compressed air.

Always use an alcohol flush and compressed air drying for scopes that will be stored before next use (i.e., not point-of-use reprocessing).

Channel valves and video caps should be kept separately from scopes during storage to facilitate drying. (Figure One)

Ensure the scope and channels are dried completely. Alcohol flush facilitates the drying.

When a scope is processed through an AER, it still requires an alcohol rinse followed by manual forced air drying prior to storage.

7. Storage

Endoscopes should be stored hanging vertically in well-ventilated areas in a way that prevents recontamination or damage. They should not be coiled and stored in their cases.

Store valves separately from endoscopes. Failure to do this may result in microbial overgrowth in the channels.

Wipe down the storage cupboard weekly with an approved low-level disinfectant/cleaner.

8. Automated Endoscope Reprocessors (AER)

Endoscopy unit cleaning/disinfection processes may be standardized by the use of an automated endoscopic reprocessor. This equipment may be useful in circulating germicides, containing vapors, and decreasing exposure of personnel to contaminated equipment and disinfectants. Operation of this equipment should be limited to those individuals trained in its proper use.

The use of any automated system must be preceded by meticulous manual cleaning and leakage check as previously described.

The following capabilities must be present in any AER:

- Enzymatic detergents and/or disinfectants should be circulated through all channels at equal pressure without trapping air.

- Washing and disinfecting cycles should be followed by thorough rinsing cycles followed by forced air to remove the used solution.
- Disinfectant should not be diluted with wash or rinse water.

Other considerations:

- If an alcohol rinse is not part of the AER cycle, perform alcohol rinse manually.
- Forced air drying cycle or air drying by hand should be completed after the final rinse.
- Routine disinfection of the AER according to the manufacturer's recommendations and institutional policy must be done.
- When used to disinfect duodenoscopes, ensure the channel for the elevator wire is cleaned and disinfected as part of the processing cycle or it may require manual processing.
- Residual water remaining in the water hoses and reservoirs may cause microbial colonization of an AER. This could lead to contamination during subsequent instrument processing.
- Protocols for both the specific scope and the specific AER (i.e., appropriate connecting systems) are necessary to ensure effective functioning of the AER.

9. Special Considerations

Sterilization or high-level disinfection should be performed as directed by institutional policy. Diagnosed or suspected infection, including Hepatitis B, VRE, MRSA, HIV or *Clostridium difficile* is not a contraindication for endoscopy. It is not recommended to have instruments dedicated for use with infected patients.

V Recommendations for Accessories

Non-disposable accessories require meticulous manual cleaning and disinfection or sterilization after each use according to manufacturer's guidelines and as directed by institutional policy. Ultrasonic cleaning is more effective for cleaning stainless steel compared to plastic devices.

Lubricate "O" rings on buttons, valves, and cleaning adaptors according to manufacturer's recommendations, as needed.

Biopsy Forceps

Meticulous manual cleaning with an enzymatic agent is required as soon as possible after the procedure.

Ultrasonic cleaning is recommended to remove debris that hand cleaning can not. Biopsy forceps break the mucosal barrier, therefore, they are classified as critical items and require sterilization.

The only method that will effectively penetrate the metal coils of the spring-like structure and any residual organic material is steam under pressure. Chemical sterilization does not completely penetrate the coils and therefore is not effective.

Water Bottle

For endoscopic irrigation, fill the bottle with sterile water.

Sterilize or high-level disinfect the water bottle and its connecting tubing at least daily.

Each endoscopic retrograde cholangiopancreatography (ERCP) procedure requires a fresh sterile bottle with sterile water.

Other Accessories

Accessories that penetrate mucosal barriers (i.e., papillatomes, cytology brushes) should either be disposable or mechanically cleaned utilizing an ultrasonic cleaner and sterilized between patient use.

VI Medical Equipment

There must be routine cleaning of non-critical equipment (i.e., teaching heads, light sources, cameras) using an approved low-level disinfectant/cleaner.

VII Recommendations for Environment

1. General Cleaning

For general cleaning of equipment such as procedure carts, stretchers, sinks, etc. after each use, use an approved low-level disinfectant/cleaner.

2. Spills

In keeping with routine practices:

- Using gloves, blot spills of blood or body fluid with disposable towels.
- Wipe the area with clean, disposable towels soaked with an approved low-level disinfectant/cleaner.

Disinfectant spills should be handled by consulting the solution MSDS (Material Safety Data Sheet) WHMIS Guidelines.

3. Waste

Minimal handling of all medical waste should be encouraged.

The storage and disposal of waste should be handled according to institutional policy and provincial and federal guidelines.

4. Facility Design

Patient care areas should be separate from cleaning/disinfection areas.

A designated area is required for handwashing.

Clean and dirty areas should be separate with proper plumbing and drains. Ensure access to sinks to facilitate immersion of scopes during cleaning and rinsing.

Adequate space should be provided for drying and storing endoscopes and endoscopic accessories.

Air-exchange equipment (i.e., ventilation system, exhaust hoods, etc.) should be utilized to minimize the exposure to potentially toxic vapors.

If glutaraldehyde is used for high-level disinfection, then periodic air quality monitoring for glutaraldehyde fumes should be performed.

VIII Continuous Quality Improvement

Provide comprehensive and intensive training for all staff assigned to reprocessing endoscopes to ensure they understand the importance of proper reprocessing. To achieve and maintain competency, each member of this staff should periodically receive:

- Hands-on training with written endoscope-specific reprocessing instruction for every endoscope model and AER used at the facility. Work should be closely supervised until competency is documented for each reprocessing task from cleaning through storage of the endoscope.
- Additional training with documented competency for new models of endoscopes or AERs as they are introduced in the facility.

- Strict warnings with frequent reminders not to deviate from the written instructions for preparing endoscopes for patient contact.

Implement a comprehensive quality control program. The reprocessing program should include:

- Visual inspections of the equipment to identify conditions that may affect the cleaning or disinfecting processes.
- Assurance that all manufacturer-recommended maintenance schedules and services are performed for endoscopes and AERs used in the facility.
- Use of appropriate process monitors as recommended by the AER and germicide manufacturers.
- Records of the use of each endoscope, showing the patient upon whom it was used, the type of procedure involved, and the system used to reprocess the endoscope.
- A surveillance system capable of detecting clusters of infections or pseudoinfections associated with endoscopic procedures.

Although routine microbiologic sampling of inanimate environmental items is not recommended, microbiologic monitoring of flexible endoscope channels is the only direct method for assuring that the reprocessing procedures being used are reliable.^{1,20} If such monitoring is implemented as part of a quality assurance program, we recommend it be performed once every 4-6 months as a process validation test. An outline of the sample collection method and interpretative criteria are presented in Appendix One.

Colonization of automatic endoscope reprocessors with opportunistic microorganisms may occur. Periodic culturing (no more frequently than quarterly) of an AER may thus be warranted.^{1, 20}

Culturing requires very precise techniques and should be done in close consultation with Infection Control and the microbiology laboratory.

IX Appendix One

Bioburden Determination for Flexible Endoscopes

Rationale: If flexible endoscope channels have been adequately cleaned, sterilized/high-level disinfected and thoroughly dried, there should be no detectable vegetative microorganisms immediately post-processing. However, since the flexible endoscopes are generally hung in closets and since there is no way to ensure a “sterile environment” there may be low levels of microorganisms in the “air” that gain access to the external and internal parts of the endoscope (similar to any other device stored in the environment). Providing the channels are dry, there should be no replication of microorganisms, as they require moisture to replicate. The occasional environmental air organism should pose no more of a problem than posed by using washed/dried cutlery that is stored in a drawer. However, if there is residual moisture in the channels, or if the cleaning hasn't been adequate prior to disinfection, there may be unacceptably high microbial levels in the endoscope channel. To ensure the endoscope “process” is adequate, sampling of the endoscope channels as part of a quality assurance program can be done.^{16, 17, 18, 20} This approach is not intended to assess each and every endoscope. It is intended to assess, at a point in time, whether there are higher than expected microorganisms, which may be the first indication that something is wrong with the endoscope reprocessing protocol.¹⁷

It is optimal to do this process validation testing on a Monday morning before the scopes are used on patients, as this usually represents the longest storage (i.e., from Friday to Monday storage) and is preferred by microbiology laboratories. The sampling method does NOT interfere with using the scope on a patient, as it uses sterile distilled water only. If the sampled scope is to be returned to storage and not used, it needs to be flushed with 70% alcohol and thoroughly dried with forced air before being stored.

Action: If there is microbial overgrowth in the biopsy/suction channel, this indicates a breakdown in adequate drying or improper cleaning/disinfection. The results should be reviewed with the reprocessing staff and the scopes that have unacceptable levels should be thoroughly recleaned and disinfected by the regular protocol. After reprocessing, these scopes should be tested again (after overnight storage) to ensure the microbial levels are within acceptable guidelines.

Method: NOTE: Two people are required for sampling of flexible endoscopes.

Materials Needed: 1 pair of wire snippers, 2 pairs of disposable gloves, labeling pen, 1 sterile specimen container (a sterile urine container is satisfactory), 1 sterile endoscope brush, 10 mLs sterile distilled water, 1 x 5 mL plastic syringe (no needle), alcohol pad.

Step 1:

Lay flexible endoscope on a table, have all materials laid out on table. Both Person 1 and Person 2 should wear gloves.

Person 1: Hold distal end of scope inside the sterile specimen container (have wire snippers and alcohol pad close by).

Person 2: Draw up 5 cc of sterile water with the syringe, and flush it through the biopsy channel (make sure it all drains out into the sterile specimen container... works best if distal end is lower than the top of the scope). Do not discard the 5 cc syringe or the sterile water container.

Step 2:

Person 1: Continue to hold the distal end inside the sterile specimen container.

Person 2: Dip the end of the endoscopy brush into the sterile water (same water used for Step 1) and pass through the biopsy channel until the brush just emerges out the distal end,

then pull brush back up the channel and then push through one more time until the brush emerges approximately 1” into the sterile specimen container.

Person 1: Carefully wipe off the snipper blades with the alcohol pad, and cut about 1” of the endoscopy brush into the sterile specimen container that contains the first 5 cc of water. Pull the remaining brush wire from the scope channel and discard in accordance with hospital policy.

Step 3:

Person 1: Continue to hold distal end of scope in sterile specimen container.

Person 2: Using the same 5 cc syringe, flush another 5 cc of sterile water through the biopsy channel and collect it in the same sterile specimen container used in step 1 and step 2.

NOTE: The same gloves and wire snippers can be used for all scope sampling on a given day. Although 10-ml samples flushed through the biopsy/suction channel can be used, the brushing improves sample recovery.

Send the sample to the microbiology laboratory using the same transportation guidelines as used for urine samples (i.e., if transit time is > 1 hr, be sure to refrigerate scope sample in transit to lab).

Microbiology workup: Culture sample by spreading 0.1 mls over a blood agar plate (incubate at 37°C for 48 hours) as well as spread 0.1 mls over a Sabouraud agar plate (incubate at 30°C for 5 days).

Interpretation of Results: (Same cutoff applies to Blood agar and Sabouraud agar)

≤ 20 colonies growing on either medium:
acceptable (i.e., ≤ 200 cfu/ml)

> 20 colonies growing on either medium:
unacceptable (i.e., > 200 cfu/ml)

These cutoffs are based on guidelines for acceptable microbial levels for potable water (i.e., ≤ 200 cfu/ml).

X Figure One

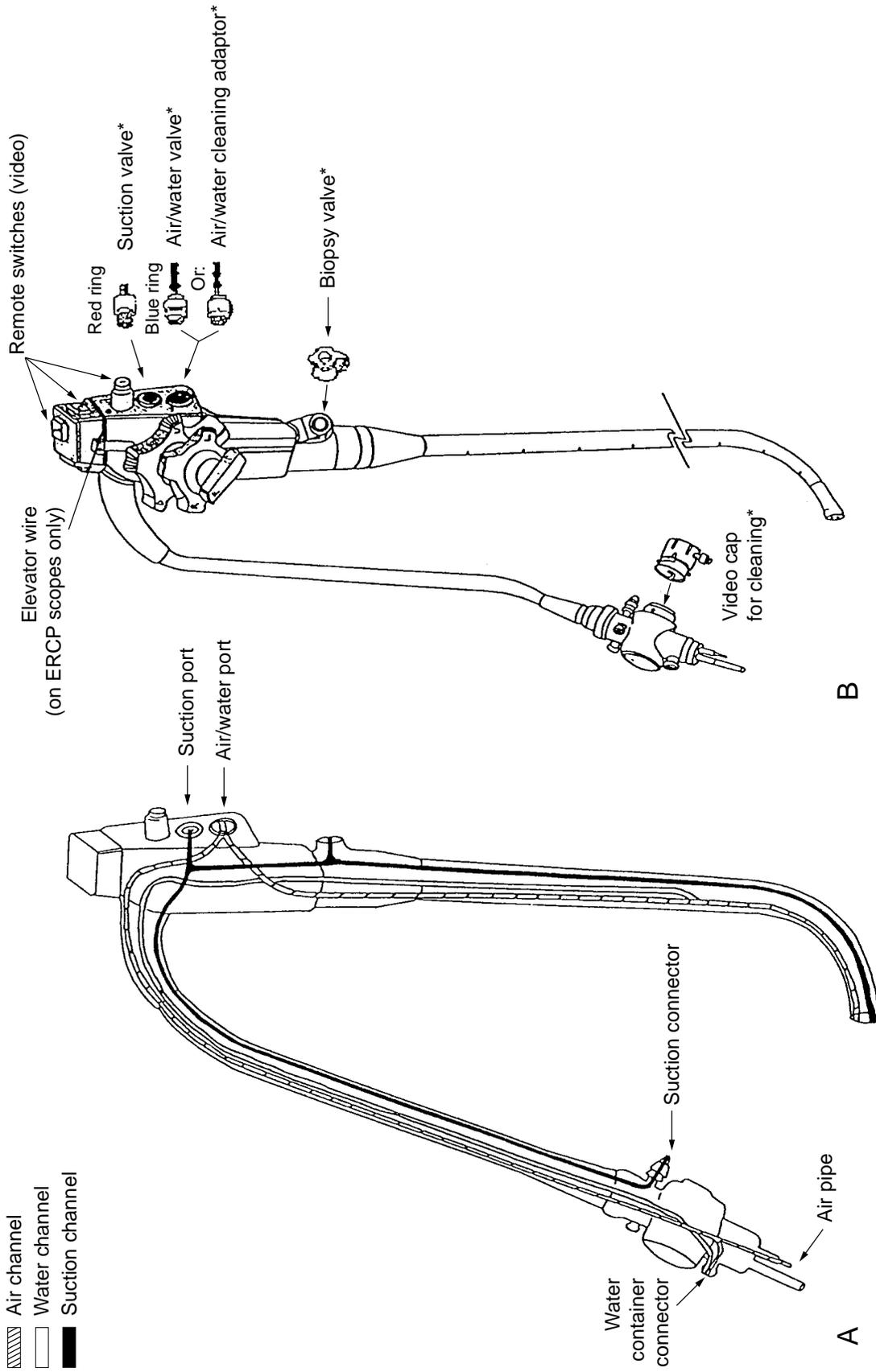


Figure 1. Parts of a Flexible Endoscope
 This is a diagram to demonstrate the channel arrangement (A) and parts/switches (B) of a flexible video colonoscope (Olympus brand). This is for illustrative purposes only and is not meant to suggest an endorsement of any particular model. The parts indicated by an "*" are stored separately from the scope during storage.

XI References

1. Martin MA, Reichelderfer M. APIC Guideline for infection prevention and control in flexible endoscopy. *Am M Infect Control*, 1994;2(1): 19-38.
2. Weller IVD, Williams CB, Jeffries DJ, et al. *Cleaning and disinfection of equipment for gastrointestinal flexible endoscopy: interim recommendations of a Working Party of the British Society of Gastroenterology*. *Gut*, 1988; 29:1134-51.
3. Society of Gastroenterology Nurses and Associates Inc. Standards for infection control and reprocessing of flexible gastrointestinal endoscopes. *SGNA Monograph Series. Gastroenterology Nursing*. 1997; 20:(2):770.
4. American Society for Gastrointestinal Endoscopy Ad Hoc Committee on Disinfection. Reprocessing of flexible gastrointestinal endoscopes. *Gastrointestinal Endosc*. 1996; 43(5):540-546.
5. CSGNA *Infection control: recommended guidelines in endoscopy settings*. 1998.
6. Cowen A, Rayner T, King B, Jones D. *Infection control in endoscopy guidelines*. Gastroenterological Society of Australia. 1999.
7. Rutala WA. APIC guideline for selection and use of disinfectants. *Am J Infect Control*. 1996; 24:313-342.
8. *Bronchoscopy – related infections and pseudoinfections*. New York, 1996 and 1998. *MMWR* 1999; 48(26):557-560.
9. Spach DH, Silverstein FE, Stamm WE. Transmission of infection by gastrointestinal endoscopy and bronchoscopy. *Ann Intern Med* 1993; 118:117-128.
10. Facero MS, Pugliese G. Infection transmitted by endoscopy: an international problem. *Am J Infec Control* 1996; 24(5): 343-345.
11. Health Canada. Infection Control Guidelines; routine practices and additional precautions for preventing transmission of infection in health care, *CCDR* Volume 25S4. July, 1999; 31-37; 52-55.
12. Bronowicki JP, Venard V, Botte C, et al. Patient to patient transmission of Hepatitis C Virus during colonoscopy. *N Engl J Med* 1997; 337:327-340.
13. Mehta AC, Minai OA. *Infection control in the bronchoscopy suite: A Review*. *Clinics in Chest Medicine* 1999; 20:1 18-32.
14. Society of Gastroenterology Nurses and Associates Inc. The safe and effective handling of glutaraldehyde solutions. *SGNA Monograph Series. Gastroenterology Nursing* 1997; 19:(5):190.
15. Society of Gastroenterology Nurses and Associates Inc. Guidelines for the use of high-level disinfectants and sterilants for reprocessing of flexible gastrointestinal endoscopes. *Gastroenterology Nursing* 1999; 22:(3):127-133.
16. Rutala WA, Weber DJ. Disinfection of endoscopes: review of new chemical sterilants used for high level disinfection. *Infect Control Hosp Epidemiol* 1999; 20:(1) 69-76.
17. Alfa MJ, Sitter DL. In hospital evaluation of contamination of duodenoscopes: a quantitative assessment of the effect of drying. *J Hosp Infect* 1991; 19:89-98.
18. Alfa MJ. Flexible endoscope reprocessing: staff training verification to ensure reproducibility. *Infection Control and Sterilization Technology*. May, 1999; 9-20.
19. Health Canada, Canadian Lung Association Standards Committee (Tuberculosis) of the Canadian Thoracic Society. *Canadian Tuberculosis Standards*. Fourth Edition, 1996; 60 - 61.
20. Alvarado CJ, Reichelderfer, M. APIC guideline for infection prevention and control in flexible endoscopy. *Am J Infection Control* 2000; 28(2); 138-155
21. Rutala, WA, Weber DJ, Infection Control: the role of disinfection and sterilization. *Journal of Hospital Infection* 1999; 43 (Supplement): 543-555.
22. Health Canada. *Guidelines for Preventing the Transmission of Tuberculosis in Canadian Health Care Facilities and other Institutional Settings*. April 1996; Volume 22S1.