Flexible Endoscope Handling & Care

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When I think about endoscope care, I think...
✓ How can it be damaged?
✓ Where could it be damaged?
✓ What circumstances would render the instrument vulnerable to colonization/infection?
✓ What are the areas of the life cycle of an endoscope that require particular attention?
So, let’s walk through these concepts...
Flexible Endoscope Care
Overview

• Infection Prevention and Control
• Care & Handling of Equipment
• Common Sources of Damage

Infection Prevention and Control
FRAGILE
HANDLE WITH CARE
INFECTION CONTROL

Refers to policies and procedures used to minimize the risk of spreading infections

Addresses factors related to the spread of infections within the health-care setting

- Patient-to-patient
- Patients to staff

- Staff to patients
- Among-staff
IPCC & Microbiology

Types of Microorganisms

- **Bacteria**
  - GI relevant bacteria
  - Replicate every 20 mins
    - *Clostridium difficile* “C.diff”, MRSA, VRE
    - *Pseudomonas aeruginosa*

- **Viruses**
  - Require a host living cell to grow or replicate
  - Immunization is the most effective method to prevention

- **Fungi**
  - Systemic, opportunistic, subcutaneous, superficial

- **Prions**
  - All prions affect the structure of the brain or other neural tissues, untreatable and universally fatal
  - *Cannot be denatured, sterilized or removed*
**Biofilm**
- A layer of bacteria encased in an extra-cellular substance

**Causes & Risks in GI:**
- When non-sterile surfaces are moist or continuously wet, they can become coated with a biofilm and subsequently microorganisms can attach and grow on moist surfaces
- Biofilm and its encased bacteria can be subsequently released when disrupted (cleaning, accessory traveling down the biopsy channel) – bacteria are protected from chemical high level disinfection & sterilization!

**Mitigation:**
- For medical devices going into storage, thorough drying prevents microbial growth
- Avoid prolonged soaking of medical devices as this can cause damage or lead to biofilm formation
Reusable Devices- Risk Class

- Critical devices – enter sterile tissue, including the vascular system

- Semi-critical devices- come into contact with mucous membranes or non-intact skin, but to not ordinarily penetrate them

- Non-critical – devices that either touch only intact skin but not mucous membranes, or do not directly touch the patient
Care & Handling of Flexible Endoscopes
Reprocessing
Care & Handling of Flexible Endoscopes

1) Pre-cleaning
2) Leakage testing & inspection
3) Cleaning
4) High level disinfection
5) Drying
6) Storage
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- Flexible endoscopes undergo repeated rounds of patient-use and reprocessing

- Some evidence indicates that there is an accumulation or build-up of organic material that occurs over time in endoscope channels

- This “buildup biofilm (BBF) develops as a result of cyclical exposure to wet and dry phases during uses and reprocessing

-M. Alfa 2009
Modeling microbial survival in buildup biofilm for complex medical devices
Pre-cleaning

✓ Delay or omission of pre-cleaning will result in higher levels of residuals that will make full manual cleaning more challenging or result in biofilm.

Prepare for bedside cleaning:

- Personal Protective Equipment (PPE)
- Pre-measured container with enzymatic detergent or water
- Sponge or lint-free cloth
- Air and water channel cleaning adapters per manufacturer
- Protective video cap

1) Immediately after removal of the insertion tube from the patient and prior to disconnecting the endoscope from the power source

2) Wipe the insertion tube & distal end with the wet cloth or sponge soaked in the freshly prepared enzymatic detergent solution
Personal Protective Equipment

**Gowns** – impervious to fluid, long sleeves that fit snugly around the wrist

**Gloves** – long enough to extend up the arm to protect the forearm or clothing from splashes or seepage

**Eye and / or face protection** - face shield is recommended

**Foot covers** – especially in decontamination department
Pre-cleaning

3) Place the distal end of the endoscope into the prepared solution. Suction the solution through the biopsy / suction channel, alternate suctioning detergent solution and air several times until the solution is visibly clean – Finish by suctioning air (some endoscope manufacturers specify a volume or time to be suctioned)
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Pre-cleaning

4) Flush or blow out air and water channels in accordance with the endoscope manufacturer’s instructions
5) Flush the auxiliary water channel to ensure no blockage
6) Detach the endoscope from the light source and suction pump
7) Attach protective video cap if using a video endoscope
8) Transport the endoscope to the reprocessing area in an enclosed container

Note: Containers, sinks, and basins should be large enough that the endoscope will not be damaged by being coiled too tightly
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Pre-cleaning Transportation

- Endoscope coiling is often incorrectly executed prior to transport and can lead to damage
- Distal tip protectors are often used to protect the distal tip of the endoscope during transport
Bedside Pre-cleaning Tools

Prepared Solution
✓ Solution specified by endoscope manufacturer by volume to be flushed through lumens immediately post procedure
✓ Prepared kits available with sponge and premeasured / diluted solution

Wiping Tool
✓ Used to clean gross bioburden from the instrument → sponge, lumened sponge, lint free cloth
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**Brushes**

- May be re-usable or single use
- Follow endoscope manufacturers guidelines for reprocessing re-usable accessories

*NON-Sterile*  
*2*  
*Latex*

**Short Brush** – required for valves, small spaces & distal tip

**Long Brush** – required for endoscope channels with size specifications requirements that match the channel size
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Flush Aids

Automated Pump
✓ Eliminates syringing injury
✓ Quality assures volume of fluid flushed

Flush Gun
✓ Utilized to access lumens of accessories & valves
Dosing Pumps
Dosing Pumps used to dose chemical into the sink hands-free

Proportioner (Top)
✓ Attaches to the tap directly and dosing is set at installation

Dosing Pump (Bottom)
✓ Sits beside container on the sink and dosing is calibrated at installation
Bedside - Pre-cleaning & Handling considerations

- Suctioning of enzymatic detergent or water through the channels immediately after removal of the insertion tube from the patient – if not done bioburden dries = difficulty cleaning & biofilm potential

- Purging channels of bioburden to remove blockages – air/water & forward water jet – if this is not done blockages can result & instrument may require service to render safe for patient use

- Wipe the insertion tube with the wet cloth or sponge soaked in the freshly prepared enzymatic detergent solution – if not done residual bioburden especially on the distal end will affix to the surface

- Attach the video cap prior to transport - fluid invasion can result if left off

- Transport in correct orientation according to the manufacturer and without sharps – endoscope permanent structure can be damaged & sharps can puncture the surfaces of the instrument and present a biohazard to the staff
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Disinfectant cap left off flooded scope with disinfectant

Cracked cap due to inappropriate transportation

Clean distal end of flexible endoscope – note: shiny raised lenses

Distal end of flexible endoscope showing biofilm on distal end lenses after soaking in disinfectant
Leak Testing

✓ Detergent causes bubbles that will mask bubbles due to an endoscope leak

1. Manual Leak Testing
   - Remove suction valves, air water valves, and biopsy valves
   - Attached the leak tester and pressurize the scope before submerging it in water
   - With the insertion tube pressurized flex the distal portion of the scope in all directions, observing gauge for drop in pressure in 30 seconds
   - Submerge the entire endoscope and repeat distal end portion flex (UP/DOWN – LEFT/RIGHT)
   - Check the insertion tube and distal bending section as well as the universal cord for bubbles coming from the interior of the scope
   - Remove the umbilicus from the water, release the pressure in the leak tester & remove leak tester
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Leak Test

- Completely immerse the endoscope in water (no detergent), and ensure leak testing lasts at least 3 min
- 7/10 times a technician detects a small leak when it’s present

Why does the leak test fail?

- Complacency & Rushing
- Leak detection method not sensitive enough
- Lack of training & accountability

*If the leak test is not done properly...
Fluid invasion will occur
Undetected leak could harbor bioburden inside and cross contaminate
Care & Handling of Flexible Endoscopes – Flooding
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Manual Cleaning

Cleaning of a flexible endoscope

✓ Must be done within 1 hour of bedside pre-cleaning or BIOFILM can develop
✓ If transportation and reprocessing is delayed >3 hours, validated rapid endoscope cleaning test should be used to ensure adequacy of manual cleaning

1. Fill a sink with freshly prepared enzymatic detergent (observe temperature & dilution of the manufacturer)

2. Completely immerse the endoscope

3. Wash all the exterior of the endoscope including the distal end by brushing and wiping the instrument while submerged in the cleaning solution
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Manual Cleaning

5) The instrument must be left under water during the cleaning process to prevent splashing of contaminated fluid and aerosolization of bioburden

6) Use a small, soft brush to clean all removable parts

7) Brush all accessible endoscope channels - after each passage, visually inspect & remove any visible debris before retracting and reinserting the brush into the endoscope - Continue brushing until there is no debris visible on the brush (minimum 3 passes) or residual debris will be left in the channel

8) Attach the manufacturer’s cleaning adapters

9) Flush all channels with the cleaning solution with a syringe or flushing aid pump

10) Soak the endoscope and its internal channels for the period of time specified by the label of the cleaning solution - An incorrect contact time with enzymatic detergent will not allow the enzymes to work properly
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Rinse After Cleaning

14. Thoroughly rinse the endoscope and all accessories with potable water
15. Purge water from all channels
16. Transport to the automated endoscope reprocessor

*Automated Cleaning in Automated Endoscope Reprocessors

✓ Cleaning may be done in an automated endoscope reprocessor on a validated cleaning cycle if done within 1 hour of pre-cleaning
✓ Manual leak test should still be performed
High Level Disinfection (HLD)

High level disinfection can be achieved using one of the following methods:

1) Automated Endoscope Reprocessor (AER)
2) Manual soaking method – used rarely

After HLD - if not removed from AER within 1 h*, microbial contamination or damage might occur

High Level Disinfection is recognized as the standard of reprocessing for endoscopes by:

- CSA - Canadian Standards Association
- CSGNA - Canadian Society Gastrointestinal Nurses Association
- AAMI – Association for the Advancement of Medical Instruments
- CPSO – College of Surgeons of Ontario
- APIC - Association for Professionals in Infection Control and Epidemiology
- CDC – Centers for Disease Control and Prevention
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DRYING

✓ If the channels are not totally dry prior to storage, biofilm will form due to microbial replication

Drying is performed after high level disinfection

17. Flush all channels, including accessory channels, with alcohol until the alcohol can be seen exiting the opposite end of each channel
Endoscope Reprocessing Protocols

DRYING

Compressed air tanks

OR

House Air
Endoscope Reprocessing Protocols

**STORAGE**

- Flexible endoscopes must be dry --if not adequately dry, moisture can increase the risk of microbial overgrowth and subsequent biofilm formation
  - Flexible endoscopes are stored in cabinets to ensure the endoscope is protected from exposure to environmental contaminants
  - Scopes should not be stored unused for > 7 days.
  - Do not store accessories or valves attached to the endoscope

22. Hang the endoscope vertically, with the distal tip hanging freely in a clean, well-ventilated dust-free area
Common Sources of Damage
Impact Damage to Distal End
Cracked Distal End Cap
Bioburden on Distal Lens
Flooding in the Connector
Corrosion on setup board
Corrosion in VCA Connector
Light Guide Connector Chipped
Buckled Insertion Tube
Kinked Insertion Tube
Peeling Insertion Tube
Crushed Bending Section
Squashed Light Guide Tube
Cut Light Guide Tube
Puncture in Light Guide Tube
Broken Angulation Wires
Cracked Angulation Knobs
Cracked Housing
Flooded Scope
Flooded LG Connector
Improper transportation

Transportation is a large source of damage of endoscopes
Handle with Care!
Questions?