

# The Q-Net™ Monthly

Volume 10, Numbers 5, 6

May-June 2004

## What's News

An article that discusses the contribution of tap water and environmental surfaces to nosocomial transmission of antibiotic-resistant *Pseudomonas aeruginosa* was published in the April (2004) issue of *Infection Control and Hospital Epidemiology*. Also, an article that discusses whether gastrointestinal endoscopy is a risk factor for Whipple's disease was published in the June (2004) issue of this same medical journal. Both articles were written by this newsletter's editor.

## Editor-in-Chief

The articles published in this newsletter are written by: **Lawrence F Muscarella, PhD, Chief, Infection Control at Custom Ultrasonics, Inc.** Ivyland, PA 18974.

## What is 'Q-Net'?

**Q-Net** is a technology-assessment network of questions and answers. Its newsletter is *The Q-Net™ Monthly*.

The mail goal of **Q-Net** is to encourage the infection control and endoscopy communities to not only ask good questions but to also demand well referenced responses.

**Q-Net** addresses the needs of both the health care provider whose goal is to provide the best care possible, and the patient who deserves affordable quality health care.

## Guidelines for reprocessing flexible laryngoscopes

*This article provides a step-by-step guideline for cleaning and high-level disinfecting flexible laryngoscopes.*

### Second in a series of articles

**Introduction:** Several professional organizations have published formal step-by-step instructions for reprocessing flexible gastrointestinal (GI) endoscopes.<sup>1</sup> Formal published guidelines for reprocessing flexible (and rigid) laryngoscopes, however, while equally as important to the prevention of disease transmission, are lacking. Procedures for reprocessing laryngoscopes therefore inevitably vary from one medical facility to another, yielding potential inconsistencies in the standard of care.

A review of the medical literature, the operator manuals of several different models of flexible laryngoscopes, and other currently available data was performed, to understand more clearly the minimum reprocessing requirements for flexible laryngoscopes. This review found that, in addition to a general lack of information about reprocessing these instruments, the reprocessing instructions provided in the operator manuals of flexible laryngoscopes marketed by different companies vary in detail, scope, and content, further raising concern about potential inconsistencies in the standard of care and the risk of nosocomial infection.

Flexible laryngoscopes can be both

simple and complex in design. Some models are "channel-less" and used only for examination and diagnosis. Other models feature an instrument channel for therapeutic applications, but do not offer suction capability. A third model features an instrument channel, suction valve, and suction nipple/adaptor used to connect the laryngoscope to an external suction source. The development of a formal set of guidelines for reprocessing flexible (and rigid) laryngoscopes is essential to the prevention of disease transmission.

**Training, education, quality assurance:** Endoscope reprocessing is a challenging task that requires extensive training and education. Few practices are more important to the prevention of disease transmission during endoscopy than proper instrument reprocessing. Many reports in the medical literature document cases of morbidity and mortality associated with improper endoscope reprocessing.

It is therefore recommended that medical facilities have on file the policies and procedures for reprocessing each

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type of flexible endoscope (e.g., GI endoscope, rhinolaryngoscope) in inventory, to minimize the risk of disease transmission and nosocomial infection. As part of an overall quality assurance program, it is also recommended that medical facilities frequently monitor their reprocessing practices, to ensure staff are in strict compliance with the reprocessing procedure appropriate for each model of flexible endoscope.<sup>1</sup>

Further, it is important to review periodically these reprocessing policies and procedures to ensure each is up-to-date, complete, and in agreement with published and manufacturers' guidelines. Revision of a reprocessing procedure may be warranted as new endoscope models are introduced and as guidelines are revised. Competency tests conducted at least annually are recommended,<sup>1</sup> to ensure reprocessing staff are aware of the distinct designs of different models of flexible endoscopes, as well as the specific reprocessing steps and cleaning adapters that some of these instruments may require.

To be sure, all flexible endoscopes are *not* alike. Some are simple in design and do not have an internal channel or valve, while others are complex and may have as many as five internal channels and two valves. It is essential that reprocessing staff be properly supervised and trained. The establishment of educational programs that emphasize to staff the potential adverse consequences associated with improper endoscope reprocessing is encouraged.

**A "perfect storm?"** The complexities of endoscope reprocessing are often unrealized. Primarily due to their complex reusable designs, high cost, limited inventory, and frequent use throughout the day on several different patients, flexible endoscopes are virtually unprecedented in the extent to which if inadequately reprocessed they can transmit disease from an index patient to a high number of other patients over a relatively short period of time. Reports of potential outbreaks spanning less than a month and involving dozens, if not hundreds, of patients due to a breach in a facility's reprocessing procedure for GI endoscopes have been published.

Despite the risk of a high number of patients becoming infected due to the failure to perform successfully all of its requisite steps, endoscope reprocessing does not always receive the attention, emphasis, and financial resources it deserves and demands. Although there are *no* reports of disease transmission associated with endoscopes reprocessed in accordance with current published guidelines, the likelihood of an inadequately reprocessed endoscope transmitting disease from one patient to another can be significant. To be clear, endoscope reprocessing is not a discipline amenable to complacency or a "lowering of the guard." All of these factors—specifically, the complex (and delicate) design, limited inventory and resources, frequent use throughout the day of flexible endoscopes, and complacency—arguably provide all of the necessary ingredients for a "perfect storm."

**Step-by-step reprocessing guidelines:** In general, a formal set of published guidelines for reprocessing flexible laryngoscopes is lacking. The following step-by-step set of instruc-

tions is therefore provided, to assist in the development of minimum standards for reprocessing flexible laryngoscopes. Some of these instructions may also be applicable to other types of flexible endoscopes, such as bronchoscopes and cystoscopes. Moreover, these instructions, which are based in part on published guidelines for reprocessing flexible GI endoscopes,<sup>1</sup> lack some details and are to be used in conjunction with—not as a replacement for—the reprocessing instructions provided by the laryngoscope's manufacturer. Because flexible laryngoscopes are *semicritical* instruments (refer to last month's double issue of this newsletter), cleaning followed by high-level disinfection is recommended.<sup>1</sup>

#### **STEP 1. Pre-cleaning** (in the procedure room):

*Purpose:* To remove patient debris and prevent its drying and hardening on the laryngoscope after the procedure.

- 1.a** Immediately after removing the laryngoscope from the patient, with the laryngoscope still connected to the light source, **wipe** the insertion tube using a gauze pad or sponge soaked in a freshly prepared solution of detergent.
- 1.b** If the laryngoscope features a suction valve, place the distal end of the insertion tube into the detergent solution and, with the biopsy port inlet covered, **suction detergent** up through the instrument channel for several seconds. Alternate between suctioning detergent and air, to create agitation and to enhance cleaning. Finish by suctioning the instrument channel with air.
- 1.c** Disconnect the laryngoscope from the light source (and suction source, if necessary). **Transport** the laryngoscope in an enclosed container to the reprocessing room.

#### **STEP 2. Leak testing** (in the reprocessing room):

*Purpose:* To determine whether the watertight design of the laryngoscope is intact. Also, to determine whether the instrument channel is damaged and may be harboring pathogens that could be transmitted to the patient during the procedure.

- 2.** Before cleaning the laryngoscope, perform both a *dry* and *wet leak test* using the proper equipment and techniques described in the laryngoscope's reprocessing instructions. If no leakage is detected, proceed with cleaning ("step 3," below). If, however, leakage is detected, dry the laryngoscope, remove it from service, and contact its manufacturer for repair instructions.

#### **STEP 3. Cleaning:**

*Purpose:* To remove patient debris and reduce the number of microorganisms on the laryngoscope. Also, to ensure that the instrument channel is not occluded or impacted with debris.

- 3.a** **Fill** a sink or basin with fresh, clean potable water mixed with a low-sudsing **detergent** (e.g., an enzymatic detergent). Ensure the dilution and temperature of the

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detergent are in accordance with its labeling. Use a sink or basin whose size and diameter are sufficiently large to prevent undue stress to the laryngoscope. Use a fresh solution of detergent for each laryngoscope.

**Note:** *Ensure all of the necessary personal protective equipment is available for reprocessing staff as required by Standard Precautions (e.g., gloves, impervious gown).*

**3.b Immerse** the laryngoscope in the **detergent** solution. Use a soft brush and sponge or wipe to **wash** manually the exterior of the laryngoscope, including its body, insertion tube, and umbilical cable. Completely immerse the laryngoscope during the cleaning process.

**3.c** If the laryngoscope features an **instrument channel**, detach the biopsy port cap (or seal) and **brush and wash** the channel by advancing a long, appropriately-sized brush down through the channel via the biopsy port inlet. When it is seen exiting the laryngoscope's distal tip, rinse the brush to remove any visible debris. Retract the brush up through the channel, remove it, rinse it, and re-insert it. Repeat this step until there is no more visible debris on the brush. Also, **brush and wash** the biopsy port inlet and the biopsy port cap. (Discard the biopsy port cap if it is disposable.) A different and unique brush will likely be required for cleaning different sections and components of the laryngoscope.

**3.d** If the laryngoscope features a **suction valve**, detach it and **brush and wash** it in the detergent solution using a small, soft brush. (Discard the suction valve if it is disposable.) Also, **brush and wash** the suction-valve housing (or cylinder) on the laryngoscope's control head, as well as the suction nipple and the sections of the laryngoscope between the suction nipple and the biopsy port inlet. Repeat this step several times.

**3.e** In addition to brushing, **wash** the **instrument channel** (if featured) by **flushing** it with the **detergent** solution using a syringe (e.g., a 20 cc syringe) that is connected to the end of the suction nipple (or biopsy port inlet if the laryngoscope does not feature a suction nipple). Repeat this step several times. When flushing this channel via the suction nipple, cover the biopsy port inlet with the biopsy port cap. Depending on the laryngoscope's manufacturer and model, it may be necessary during this step to use a cleaning/disinfecting adapter—for example, one that may attach to the suction-valve housing. Once this step is completed, detach the syringe (and the biopsy port cap).

**Note 1:** *Apply to sections 3.g, 3.h, 3.i, 4.c, 4.e, 4.f, 4.g, 5.a, and 5.b, below, the technique described in this section (3.e) for flushing/purging the instrument channel, using a cleaning/disinfecting adapter and covering the biopsy port inlet with the biopsy port cap, such as for Pentax flexible laryngoscopes. Other manufacturers of laryngoscopes may provide different types of cleaning/disinfecting adapters. Refer to the reprocessing instructions of each laryngoscope model for specific details.*

**Note 2:** *Confirm fluid flow through the laryngoscope's instrument channel (if featured) during reprocessing.*

**3.f Soak** the laryngoscope, including (if featured) the instrument channel and detached components (e.g., suction valve and biopsy port cap), in the **detergent** solution for the time indicated on the detergent's label.

**3.g Purge** the instrument channel (if featured) with **forced air** (e.g., using an empty syringe or compressed air), to remove the detergent. *Refer to section 3.e.* Remove the laryngoscope from the detergent solution. Discard the detergent solution and all disposable cleaning brushes. Clean and high-level disinfect (or sterilize) reusable cleaning brushes between cases. Do not use worn, bent, or damaged brushes.

**3.h Immerse** the laryngoscope and detached components in a large volume of fresh, clean potable **rinse water**. Also, **rinse** the instrument channel (if featured) by **flushing** it with a large volume (e.g., 200 ml) of fresh, clean potable **water**, to remove detergent. *Refer to section 3.e.*

**3.i Purge** the instrument channel (if featured) with **forced air**, to remove the rinse water. *Refer to section 3.e.* **Dry** the laryngoscope's exterior and detached components using a clean, dry, soft, lint-free cloth. Drying is important to prevent the rinse water from diluting the disinfectant (next step).

#### **STEP 4. High-level disinfection:**

*Purpose: To destroy microorganisms remaining on the laryngoscope after cleaning. Cleaning and high-level disinfection are both necessary to prevent disease transmission.*

**4.a Fill** a basin with a FDA-cleared, high-level disinfectant/sterilant ("**germicide**") listed as a compatible agent in the laryngoscope's reprocessing instructions (e.g., 2% glutaraldehyde).<sup>2</sup> If reusable, check the date when the germicide was first used, to confirm that its reuse-life has not yet expired. Some germicides may require preparation in accordance with their labeling prior to use (e.g., an elevation in temperature, or "activation"). Refer to the labeling of the germicide for specific instructions.

**4.b** Use a chemical test strip or indicator per its instructions to **monitor** the concentration of the **germicide**, to ensure it is equal to or above the germicide's *minimum effective concentration* ("MEC"). Document the results. Discard the germicide whenever its concentration is below its MEC, because high-level disinfection cannot be assured. Depending on several factors, including inadvertent dilution with rinse water, a reusable germicide may drop below its MEC and require discarding in fewer days than the maximum number of reuse days indicated on its labeling (e.g., 14 days). Per its instructions, it may be necessary to monitor the germicide before each use.

**4.c Immerse** the laryngoscope in the **germicide** and **flush**

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the instrument channel (if featured) with the germicide. Refer to section 3.e. Continue flushing until the germicide can be seen flowing out of the laryngoscope's distal tip. Once this step is completed, detach the syringe (and the biopsy port cap). Completely immerse the laryngoscope during this step.

**4.d Soak** the laryngoscope, including (if featured) the instrument channel and detached components, in the **germicide** (monitored to ensure it is above its MEC; see above) for the required time and at the required temperature to achieve **high-level disinfection**. It may be necessary to use a timer and thermometer. **Cover the basin** with a securely fitting lid, to minimize exposure of the environment to the germicide and its vapor during soaking.

**4.e Purge** the instrument channel (if featured) with **forced air**, to remove the germicide. Refer to section 3.e. Remove the laryngoscope from the germicide.

**4.f Immerse** the laryngoscope and detached components in a large volume of fresh, clean potable **rinse water**. Also, **rinse** the instrument channel by **flushing** it with a large volume (e.g., 200 ml) of fresh, clean potable **water**, to remove the germicide. Refer to section 3.e. Review the germicide's water-rinsing instructions to confirm the number of required water rinses (e.g., 3 rinses) and the volume of each rinse. Do not reuse the rinse water.

**4.g Purge** the instrument channel (if featured) with **forced air**, to remove the rinse water. Refer to section 3.e.

**Note:** Although fresh, clean potable water appears to be acceptable, sterile or bacteria-free water is recommended for rinsing. (Irrespective of the rinse water's quality, always dry the laryngoscope after reprocessing; see below).

#### **STEP 5. Drying using 70% alcohol, forced air:**

*Purpose:* To prevent the colonization and transmission of waterborne bacteria during flexible laryngoscopy.

**5.a Flush** the instrument channel (if featured) with **70% alcohol**, to facilitate drying. Refer to section 3.e. Continue flushing until alcohol can be seen flowing out of the laryngoscope's distal tip.

**5.b Purge** the instrument channel (if featured) with **forced air**, to remove the alcohol and rinse water. Refer to section 3.e. Continue this step until the channel is dry.

**5.c Dry** the laryngoscope's exterior and detached components first with a soft gauze moistened with 70% alcohol and then with a clean, dry, soft, lint-free cloth. Remove any attached cleaning/disinfecting adapter(s).

**5.d** If the laryngoscope is to be stored, proceed to "step 6," below. Otherwise, re-attach the suction valve and the biopsy port cap (if either is featured). The laryngoscope is now ready for reuse.

**Note:** Drying the laryngoscope using 70% alcohol and forced air is recommended immediately after reprocessing

both between patient procedures and before storage. Refer to The Society of Gastroenterology Nurses and Associates' (SGNA) guidelines for more details.<sup>1</sup> Also, refer to the January-February 2004 issue of this newsletter.

#### **STEP 6. Storage and handling:**

*Purpose:* To prevent bacterial colonization and damage to the laryngoscope during storage.

**6.a Store** the laryngoscope by hanging it vertically in a clean, dry, well-ventilated, dust-free area or storage cabinet. Do not re-attach the suction valve and the biopsy port cap (if either is featured) during storage. Do not coil the laryngoscope horizontally during storage or store the laryngoscope in a carrying case or a closed container.

**6.b** When needed for a procedure, carefully remove the laryngoscope from storage. **Examine** the laryngoscope and confirm it is dry and has not been damaged. Re-attach the suction valve and the biopsy port cap (if either is featured). **Handle** the laryngoscope with care during its transportation to the procedure room, to prevent damage and re-contamination. Breaches in proper storage and handling of the laryngoscope can result in nosocomial infection and/or instrument damage. ● LFM

## References

1. The Society of Gastroenterology Nurses and Associates (SGNA). Standards of Infection Control in Reprocessing of Flexible Gastrointestinal Endoscopes, 2000: <http://www.sgna.org/resources/guideline3.cfm>
2. The Food and Drug Administration (FDA): <http://www.fda.gov/cdrh/ode/germlab.html>

Thank you for your interest in this newsletter. I have addressed each issue to the best of my ability. Respectfully, the Publisher: *Lawrence F. Muscarella, Ph.D.* Please direct all correspondence to:

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