



# The Importance of Pre-Disinfection Cleaning in Endoscope Reprocessing

## MAIN POINTS

- Cleaning is the most critical step in endoscope reprocessing.<sup>1</sup>
- Adequate cleaning removes both microbes and other soil such as blood and tissue.<sup>2</sup>
- Cleaning failures can result in microbes surviving the disinfection process because debris may inhibit the action of disinfectants.<sup>3</sup>

## PURPOSE

The purpose of this document is to describe recent scientific findings on the role and importance of pre-disinfection cleaning for endoscope reprocessing.

## INTRODUCTION

Endoscopy is a valuable tool for diagnosing and treating many gastrointestinal diseases.

- In the United States, more than 10 million gastrointestinal endoscopies are performed annually.<sup>4</sup>
- Endoscopes are reused, which makes effective cleaning and disinfection critically important to prevent infection.<sup>5</sup>

## POST-PROCEDURE ENDOSCOPE CONTAMINATION

Due to the tissues and cavities encountered by endoscopes, they become contaminated with bacteria and other microbes.<sup>4</sup>

Organic soils (such as blood and other tissues) also contaminate endoscopes.<sup>2</sup> These soils, if not removed by cleaning, can:

- Adhere to the devices after exposure to high-level disinfectants.
- Impair the ability of the disinfectant to kill microbes.<sup>3</sup>

When scientists have examined gastrointestinal endoscopes after use, they found there were between 100,000 and 10 billion viable microbes in every milliliter of rinse water.<sup>4</sup> Figure 1 illustrates the very high numbers of viable bacteria present on four types

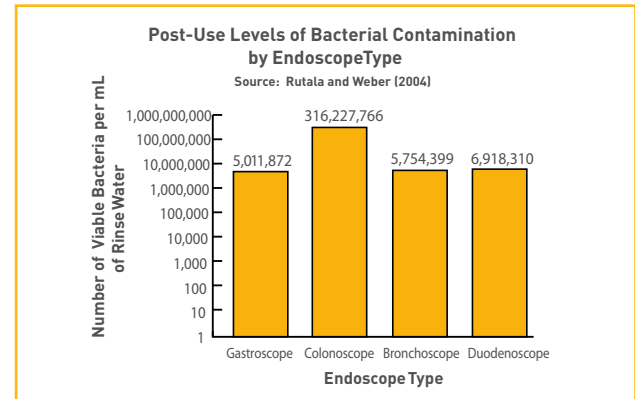


Figure 1

**Note:** Figure 1 uses a log<sup>10</sup> scale, which means every unit increase is actually an increase by a factor of ten. The actual value represented is noted above each bar.

All endoscopes, irrespective of manufacturer, have long, narrow, branching lumens which accumulate heavy loads of debris and microbial contamination during a procedure. In one study, staff reported having to remove “extensive sausages of debris” from the endoscope channels during cleaning procedures.<sup>2</sup>

## OVERVIEW OF RECOMMENDED CLEANING GUIDELINES

Multiple professional organizations have issued endoscope reprocessing guidelines and recommendations. Some of these include:

- Association of Perioperative Registered Nurses (AORN)
- Association for Professionals in Infection Control and Epidemiology (APIC)
- Society of Gastroenterology Nurses and Associates (SGNA)
- American Society for Gastrointestinal Endoscopy (ASGE)<sup>5</sup>

“Compliance with accepted guidelines for the reprocessing of gastrointestinal endoscopes between patients is critical to the safety and success of their use. When these guidelines are followed, pathogen transmission can be effectively prevented.”<sup>5</sup>



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The steps listed below have broad support from professional organizations.<sup>5</sup> Please consult the source document for a complete list of recommended steps.

- 1 Test endoscope for leaks.<sup>3,5</sup>
- 2 Take apart the endoscope, removing all possible parts.<sup>5</sup>
- 3 Meticulously clean all parts of the endoscope, including connectors, valves, channels, and any other removable parts using enzymatic detergents and appropriately sized brushes for each component.<sup>5</sup>
- 4 Continue brushing and flushing all channels with detergent until all visible soil is removed.<sup>5</sup>
- 5 Clean the outside parts with a sponge or brush.<sup>5</sup>
- 6 Rinse with water.<sup>3</sup>
- 7 Dry using forced air.<sup>3</sup>
- 8 Then disinfect, rinse, and dry using recommended procedures.<sup>5</sup>

In spite of published recommendations and guidelines on cleaning and disinfection for endoscopes by professional organizations and governmental agencies (the FDA and the CDC), compliance with these standards is not universal.<sup>5</sup>

**“In 1991, Gorse and Messner surveyed 2,030 members of the Society of Gastroenterology Nurses and Associates and found that compliance with various aspects of existing guidelines ranged from 67% to 93%.... Although two more recent studies suggest that compliance with reprocessing guidelines has improved, a minority of endoscopy centers still did not conform completely to accepted guidelines.”<sup>5</sup>**

### THE ROLE OF CLEANING BEFORE DISINFECTION

**In regard to cleaning, SGNA maintains: “This is the first and most important step in removing the microbial burden from an endoscope. Retained debris may inactivate or interfere with the capability of the active ingredient of the chemical solution to effectively kill and/or inactivate microorganisms.”<sup>3</sup>**

Cleaning is considered to be the most important step in endoscope reprocessing because debris left from the procedure can reduce the effectiveness of disinfection chemicals.<sup>3</sup> Proper cleaning and disinfection is critical to preventing the spread of disease via endoscopy.<sup>4</sup>

It has been demonstrated that thorough cleaning can:

- Significantly reduce the number of viable microbes on an endoscope.
- Completely remove all HIV viruses from a contaminated endoscope.<sup>4</sup>

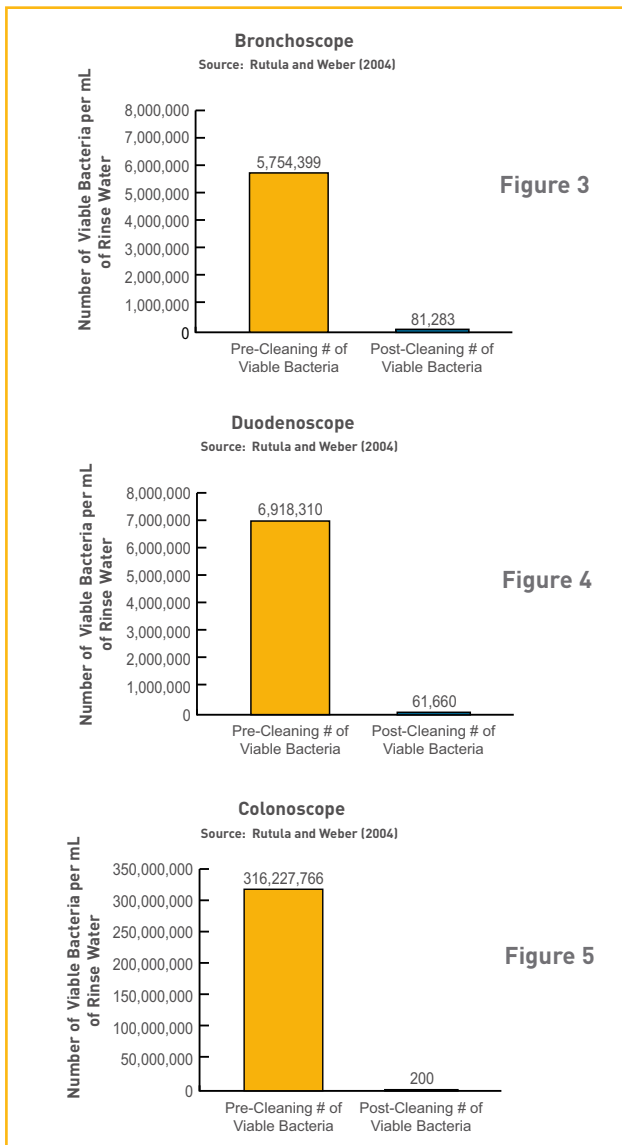
**“There are three steps in the reprocessing of flexible endoscopes including mechanical cleaning. This is defined as the physical removal of organic material and debris from objects. This is the most critical step and will result in a 104 reduction or 99.99% reduction in microbial contamination or bioburden.”**

**According to Burdick and Hambrick, step two of endoscope reprocessing is high-level disinfection using appropriate and effective germicides. Step three involves adequate rinsing and drying to remove any residual disinfectant and to prevent pathogen growth in a wet environment.<sup>6</sup>**

Figures 2 through 5 revisit the level of bacterial contamination present on endoscopes after use, and it also illustrates the significantly decreased numbers present after cleaning. Each graph represents a different type of endoscope. **See Figures 2-5.**



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**“Improper cleaning can overwhelm the high-level disinfection process and result in a contaminated device regardless of subsequent steps. This step is most susceptible to omission or error, and adequate training of staff and quality control are critical for reliable reprocessing.”<sup>6</sup> reliable reprocessing.” {Burdick, 2004 #4} p. 718**

## WHEN CLEANING FAILS

There is a relatively low risk of post-endoscopy infection with an estimated five or six infections occurring as a result on an annual basis in the US.<sup>4</sup> All known transmissions of infection via endoscopy have been linked to a failure in reprocessing or faulty equipment.<sup>5</sup>

Insufficient cleaning can result in disinfection failures. In one study, researchers contaminated endoscopes with duck Hepatitis B virus and blood. After disinfection or sterilization, 22% of endoscopes still had infective viruses present when cleaning procedures were not thorough.<sup>2</sup>

Endoscopy-related infections and outbreaks have resulted in life-threatening illnesses and death.<sup>1, 7</sup>

**“Meticulous cleaning must precede any sterilization or high-level disinfection of these instruments. Failure to perform good cleaning may result in a sterilization or disinfection failure and outbreaks of infection may occur.”<sup>4</sup>**

For more information regarding the effects of endoscopy-related infections and outbreaks, see “The Risk of Infection Related to Endoscopy.”

## REFERENCED ARTICLES

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