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Major Article

Evaluation of adenosine triphosphate test for cleaning assessment of gastroscopes and the effect on workload in a busy endoscopy center

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Key Words:

Gastroscope
 Reprocessing medical devices
 Rapid cleaning test
 Workload

Objective: Using adenosine triphosphate (ATP) tests to assess manual cleaning of gastroscopes and to determine the associated workload in a busy endoscopy unit.

Methods: Patient-used gastroscopes were sampled before and after cleaning to assess ATP levels, bioburden, and protein. Samples were collected by flushing 20 mL of sterile water through the biopsy port to the distal end. Time spent for reprocessing and performing the ATP test was recorded.

Results: Twenty-four samples were collected from 10 gastroscopes. After manual cleaning, 14/24 (58.3%) samples had no microbial growth (mean, 21 colony-forming units/cm²), and in 22/24 (91.7%) samples the protein was undetectable (mean, 0.04 µg/cm²). ATP test was above the cutoff (200 relative light units [RLU]) in 17/24 (70.8%) samples (mean, 498 RLU). After the second cleaning, 11/17 (64.7%) gastroscopes still failed the ATP test (mean, 321.2 RLU). The mean time spent to perform manual cleaning and ATP tests was 16 and 8 minutes, respectively. Hence, each test increased the length of time for cleaning plus testing cleanliness by 50%.

Conclusion: Further studies regarding the optimal cutoff for ATP tests are needed. ATP tests for cleaning monitoring are easy to perform and provide immediate feedback to the team. However, the increased workload needs to be considered.

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Flexible endoscopes contain high bioburden after use, and infections associated with endoscopic procedures have been reported.¹ To prevent healthcare-acquired infections related to endoscopic procedures, prompt cleaning is recommended along with a minimum of high-level disinfection of endoscopes.² Cleaning is essential to ensure satisfactory high-level disinfection. Guidelines

recommend cleaning verification with indicators.² Potential tests for cleaning assessment include adenosine triphosphate (ATP), microbial culture, and chemical reagent tests (eg, detection of protein, carbohydrate, and hemoglobin).² ATP testing has been broadly studied as a potential indicator for cleaning quality, even though the methodology and threshold values are not yet standardized. The advantages of using this test are rapid and real-time results, which contribute for educational programs, and objective measurements with defined cutoffs for action.³

A few endoscopy centers in Brazil have established cleaning monitoring protocols.^{4,5} This is most likely related to the associated costs of such monitoring, including the costs of the monitoring test and the added workload leading to increased staffing costs.⁴

The main objective of this study was to use ATP tests to assess manual cleaning of patient-used gastroscopes and to determine the associated workload in a busy endoscopy unit.

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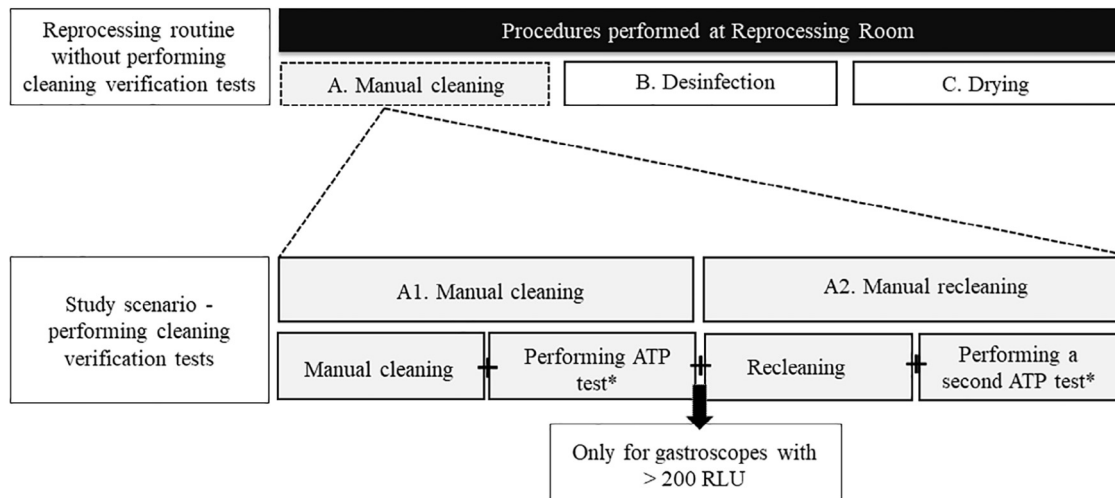


Fig 1. Study scenario scheme for performing gastroscop cleaning verification tests. Footnote: * Steps included for calculating the time spent for sampling: handwashing, donning gloves, preparing sterile water in the syringe, flushing sterile water and air into the channels, collecting sample, splitting it in 3 aliquots, immersing swab into the sample, and reading the test on the equipment.

METHODS

Setting

This prospective study was performed at the Digestive Endoscopy Center of Hospital Alemão Oswaldo Cruz, a private tertiary care hospital in São Paulo, Brazil. This center performs on average 800 gastroscopies per month.

Eligibility criteria and sampling

We included Olympus gastroscopes (Olympus America Inc, Center Valley, Pennsylvania) after clinical use in the Digestive Endoscopy Center; we excluded those used outside the center (eg, when a gastroscop was used in the surgical center). Samples were collected from 9 gastroscopes (models included: GIF-H180, GIF-Q150, GIF-H180, and GIF-Q145) that were used in 24 patients.

Gastroscop reprocessing procedure

Manual cleaning procedure

Immediately after use, the gastroscopes were pre-cleaned at the bedside by wiping the external surface and suctioning tap water through the biopsy channel. In the disinfection room, the cleaning was performed using Endozime (Ruhof Corporation, Mineola, New York), according to the dilution recommended by the manufacturer. Gastroscopes were immersed in the enzymatic cleaner for 10 minutes as recommended by the manufacturer. The external surface of the gastroscop was cleaned with a wipe. All valve cylinders, openings, and channels were cleaned with Olympus reusable brushes (Olympus America Inc). The channels were brushed until no debris was visible on the brush. All gastroscop channels were flushed with tap water by using a cleaning adapter to remove the detergent solution and subsequently dried with compressed air.

Automated reprocessing

After initial manual cleaning, gastroscopes were disinfected inside automated endoscopy reprocessing machines (Endolav, Lifemed Inc, São Paulo, Brazil) using peracetic acid and filtered water (0.5 μ). After the automated reprocessing, the gastroscop was dried with compressed air and flushed with ethyl alcohol.

A team of 16 nursing professionals reprocessed the gastroscopes. Once a year, a refresher training on endoscopy reprocessing is provided by senior nurses.

Sample collection

Two infection preventionists (IPs) performed the collection of 27 paired samples before and immediately after manual cleaning. Samples were taken from the same patient-used gastroscopes. All samples were collected in the reprocessing room from the biopsy port to the distal end, which is the portion of the suction channel known to have the highest bioburden,⁶ by flushing 20 mL of sterile water (Isofarma, Isofarma Industrial Farmacêutica Inc., Ceará, Brazil) with a syringe. The water used was a commercial non-bacteriostatic sterile water. After flushing, 20 mL of air was infused into the channel to evacuate the remaining liquid. Samples were collected in a sterile urine cup. Gastroscop samples were split into 3 5-mL aliquots for performing the tests (ATP, protein, and microbial culture). The remaining portion of the sample was wasted. The IPs wore caps, masks, gowns, and sterile gloves, and maintained aseptic techniques during sampling. An IP recorded the time spent for sample collection and for the reprocessing procedure.

Time spent for sampling

For calculating the time spent for sampling, we considered all the following steps: handwashing, donning gloves, preparing sterile water in the syringe, flushing sterile water and air into the channels, collecting sample, splitting it in 3 aliquots, immersing swab into the sample, and reading the test on the equipment. Time was measured for the following procedures: cleaning, ATP test, and re-cleaning with a second ATP test for failed gastroscopes (Fig 1).

Assay methods for ATP, protein, and viable organisms

ATP test

The Clean-Trace ATP water test (3M Inc, St. Paul, Minnesota) was used for channel (liquid) samples. The ATP swab was immersed in the solution for 10 seconds and measured with a 3M Clean-Trace NG Luminometer.

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