

Impact on workflow of ATP testing to monitor manual cleaning of gastroscopes

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Background

As flexible endoscopes contain high bioburden after use¹, they should be thoroughly cleaned and at a minimum subjected to high-level disinfection (HLD)². Adequate cleaning is essential to ensure satisfactory HLD. However, there is no consensus about the best method to monitor endoscope cleaning. Adenosine triphosphate bioluminescence (ATP) permits auditing cleanliness of endoscope channels in real time. Our objectives were to use ATP tests to assess manual cleaning of gastroscopes and determine the workload related to this testing.

Method

This prospective study was performed at a Digestive Endoscopy Center with three procedure rooms as part of a private 357 bed hospital located in São Paulo, Brazil, that performs an average of 800 gastroscopies/month. We collected samples of nine gastroscopes used in 24 gastroscopies. We compared bioburden measured by semi-quantitative culture, protein and ATP levels obtained before and after manual cleaning. Immediately after gastroscopies and manual cleaning, suction channel samples were obtained by flushing 20 mL sterile water from the umbilical end of the suction channel to the distal end and divided into three aliquots. Microbiological cultures were performed using serial 1:10 dilutions (0.1 mL) inoculated onto blood agar medium and incubated at 35° C ± 2 in an aerobic environment for 48 hours and then cfu/mL were determined. Protein determination was performed with the QuantiPro BCA Assay Kit (ranging: 0.5-30 µg/mL). A swab was immersed in the solution for 10 seconds and ATP level was measured by a luminometer. ATP cutoff for adequate cleaning was set at <200

RLUs as stated by Alfa et al^{3,4}. Endoscopes with ATP tests >200 RLU after cleaning were re-cleaned. We calculated the concordance between viable counts, ATP tests and protein levels. The time spent to perform each step of gastroscopes reprocessing was recorded by an infection control nurse.

Results

After manual cleaning 14/24 (58.3%) samples had no viable counts, 22/24 (91.7%) were below threshold for protein (0.5-30) and 17/24(70.8%) the ATP test was above the cutoff. Even after re-cleaning 11/17 (64.7%) gastroscopes failed in ATP test. The mean of viable counts reduction after manual cleaning was 2Log₁₀ (Table 1). The best cutoff for ATP was 300 RLU with 64% of specificity and 60% of sensitivity. The average time taken to perform manual cleaning, ATP tests, and for complete reprocessing of the gastroscopes was 16, 8 and 30 minutes, respectively.

Conclusion

ATP test gives objective parameter for manual cleaning monitoring. ATP cut off needs further discussion. High levels of ATP might be better understood. We hypothesized that this may be related to enzymatic detergent not completely removed by rinse after manual cleaning. ATP tests use is feasible if performed in a sample of the processed gastroscopes, however the impact of gastroscopes re-cleaning when ATP is > 200 RLUs is to be determined.

Table 1. Summary of bioburden, protein, and ATP levels in endoscopes before and after cleaning.

Variable	RLU			Protein (µg/mL)			CFU (CFU/mL)		
	Pre-clean	Post-clean	p	Pre-clean	Post-clean	p	Pre-clean	Pos-clean	p
N (24)									
Mean	23,057.1	498.8	<0.001	321,235	2,020	<0.001	4,549.9	21.3	<0.001
Minimum	2,150	53		75	0		100	0	
Maximum	227,391	1,536		911	9,103		26,400	266.7	
SD	57,868.5	447.9		228,1172	2,170		5,944.6	56.7	

References

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