

The estimated contamination rate of reprocessed gastroscopes: a systematic review and meta-analysis

Emma Martine Nørgaard Thomsen¹, Sara Larsen², Anne Sig Sørensen³

¹School of Medicine and Health, Aalborg University, Aalborg, Denmark

²Ambu A/S, Ballerup, Denmark

³Department of Business and Management, Danish Center for Healthcare Improvements, Aalborg University, Aalborg, Denmark

Keywords: gastroscopes, contamination, patient-safety

Background

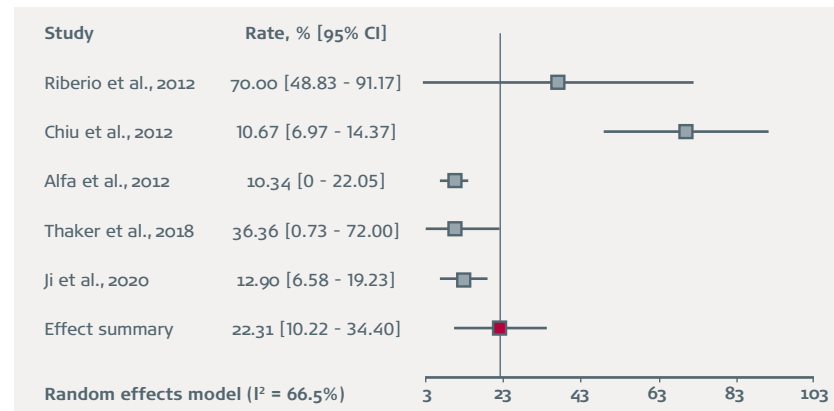
Reusable flexible gastroscopes are challenging to reprocess properly and appropriate reprocessing is essential to assure quality and patient safety¹. Multiple studies have found that there is a risk that reprocessed patient-ready gastroscopes remain contaminated even when following reprocessing guidelines, which increases the risk of patients acquiring an endoscope-associated infection^{2,3}. This study aimed to estimate the contamination rate of reusable patient-ready gastroscopes.

Methods

A systematic literature review was conducted in PubMed and Embase to identify studies, in which gastroscopes have been cultured for microbiological growth after reprocessing. The publication date for the studies was from January 2010 to February 22, 2020. Only full-text papers on randomized controlled trials and observational studies were included. Publication languages included English and the Scandinavian languages. Both thesaurus and free-text searches were performed. Only studies with a sample size of 10 samples or more were included to estimate the contamination rate. The outcome of the random effects model was a pooled contamination rate of patient-ready reusable gastroscopes based on each included study. Inconsistency index (I²) statistics were used to analyze inter-study heterogeneity and publication bias was assessed using Egger's regression test and funnel plots.

Results

In the systematic literature review, 1,025 studies were found via PubMed and 1,058 studies via Embase. After applying the inclusion and exclusion criteria, the search was narrowed down to 45 studies which were reviewed in full detail. Five studies met the inclusion criteria and the total sample size included 524 samples from gastroscopes, of which 97 were contaminated. Studies were excluded if they did not state the total number of samples from the gastroscopes and the number of which that were contaminated. Included studies were conducted in the United States, Canada, Brazil, Taiwan, and China. The pooled contamination rate was 22.31% +/- 0.061 (95% CI: 0.1021 - 0.3340). I² was 66.54% which was considered moderate heterogeneity. Egger's regression test was significant for publication bias (p<0.01).



Study	Positive samples, n	Total sample size, n	Contamination rate
Ribeiro et al., 2012	4	11	36%
Chiu et al., 2012	42	60	70%
Alfa et al., 2012	32	300	11%
Thaker et al., 2018	3	29	10%
Ji et al., 2020	16	124	13%
Average contamination rate (using a random effects model)			22.31%

Conclusion

The contamination rate of patient-ready reusable gastroscopes was estimated to be 22.31% based on currently available literature. Significant publication bias and a small sample size should be considered. More high-quality studies should be performed to investigate the true contamination rate of reprocessed gastroscopes more thoroughly and to assess the infection risk associated with contaminated gastroscopes.

References

- Ulrike Beilenhoff A, Biering H, Blum R, Brijak J, Gimbro M, Dumonceau J-M, et al. Reprocessing of flexible endoscopes and endoscopic accessories used in gastrointestinal endoscopy: Position Statement of the European Society of Gastrointestinal Endoscopy (ESGE) and European Society of Gastroenterology Nurses and Associates (ESGENA)-Update 2018. *Endoscopy* [Internet]. 2018 [cited 2020 Mar 13];50:1205-34. Available from: <https://doi.org/10.1055/a-0759-1629>
- Thornhill G, David M. Endoscope-associated infections: A microbiologist's perspective on current technologies. *Tech Gastrointest Endosc* [Internet]. 2019;21(4):150625. Available from: <https://doi.org/10.1016/j.tgie.2019.150625>
- Kovaleva J. Infectious complications in gastrointestinal endoscopy and their prevention [Internet]. Vol. 30, Best Practice and Research: Clinical Gastroenterology. 2016 [cited 2020 Jan 31]. p. 689-704. Available from: <http://dx.doi.org/10.1016/j.bpg.2016.09.008>