Environmental and healthcare trade-offs between single-use and reusable gastroscopes

We would like to offer some critical observations regarding the recent article published on the environmental impact of single-use (SU) versus reusable (RU) gastroscopes.[1] The study provides essential insights into the growing concerns about the environmental effects of medical procedures, but we believe there are certain areas that require further clarification and contextual analysis. Specifically, the interpretation of the results in the discussion section, particularly concerning the carbon footprint comparison between SU and RU gastroscopes, leaves some important aspects unaddressed. While the findings about the carbon emissions of SU gastroscopes are significant, it is essential to consider their advantages in specific healthcare settings. Moreover, a more nuanced discussion of the broader ecological impacts, beyond the focus on carbon footprint, would enhance the understanding of the environmental consequences of these devices.

The authors conclude that SU gastroscopes have a carbon footprint 2.5 times greater than RU gastroscopes, which is an important finding. However, the study seems to oversimplify this conclusion by suggesting that this should largely restrict the use of SU gastroscopes to exceptional cases. The authors did not sufficiently explore the role that SU gastroscopes can play in reducing healthcare-associated infections (HAIs), particularly in high-risk environments such as intensive care units or during outbreaks of highly contagious diseases. Reducing the risk of cross-contamination is a significant concern in these settings, and while the study highlights the environmental burden of SU scopes, it does not account for the potential reduction in infection-related costs and outcomes. Evidence has demonstrated that SU devices can lower infection rates in specific cases, and in some scenarios, the environmental and economic benefits of reduced HAIs may outweigh the costs of higher carbon emissions.[2] Therefore, it would be beneficial for future analyses to include an evaluation of the healthcare advantages of SU scopes in relation to their environmental footprint.

Moreover, the authors mention that RU gastroscopes require significantly more water for decontamination (9.5 m^3 compared with 6.2 m^3 for SU scopes), but it stops short of fully exploring the downstream environmental impacts of using harsh chemicals during the reprocessing phase. While the carbon footprint of RU scopes may be lower, the reprocessing chemicals pose a substantial risk of freshwater contamination and toxic waste generation, which are critical environmental issues often associated with hospital operations. Evidence has identified the environmental hazards of medical waste, particularly the disposal of toxic sterilisation chemicals, which can lead to freshwater ecotoxicity and acidification.[3] Therefore, it would be prudent to take a more holistic view of environmental sustainability, considering not only carbon emissions but also the broader ecological footprint of both SU and RU gastroscopes.

Furthermore, the authors briefly mention logistical and geographical factors that could make SU gastroscopes more viable in remote or low-volume healthcare centres. However, they do not integrate this point into the environmental analysis in a meaningful way. In certain rural or remote healthcare settings, where access to advanced sterilisation facilities is limited, SU gastroscopes may be the more practical option. In such cases, the use of RU scopes could lead to inefficiencies and higher environmental costs due to the need for transportation and infrastructure to support reprocessing. The article implies that SU gastroscopes are only appropriate in exceptional cases, but this oversimplification overlooks the diverse contexts in which medical devices are used. Research in other medical fields, such as urology and anaesthesiology, has shown that SU devices can be both cost-effective and environmentally sustainable in low-volume settings.[4] These findings suggest that SU gastroscopes could be more environmentally friendly in certain scenarios than the authors acknowledge. A more in-depth exploration of how these devices perform in different healthcare environments would have provided a more balanced perspective.

Additionally, while the study focuses on carbon footprint as the primary metric for environmental impact, it is essential to acknowledge that this is only one aspect of a device's environmental footprint. For example, RU gastroscopes, while having a lower carbon footprint, require frequent repairs, extensive use of detergents and disinfectants and generate additional waste from their packaging and transport. This raises questions about whether the emphasis on carbon footprint is the most appropriate measure for gauging environmental sustainability. A multi-criteria approach that includes water usage, chemical pollution and waste generation would provide a more comprehensive picture of the environmental trade-offs between SU and RU gastroscopes. Research has shown that a focus on a single environmental metric, such as carbon footprint, can sometimes obscure the broader ecological implications of medical practices.[3] Therefore, incorporating a broader range of environmental factors into the analysis could improve the understanding of the true ecological costs of these medical devices.

Jiashu Han,[1] Dan Shan [2]

[1]Department of General Surgery, Peking Union Medical College Hospital, Beijing, China
[2]Department of Biobehavioral Sciences, Columbia University, New York, New York, USA

Correspondence to Dan Shan; ds3806@columbia.edu

Contributors JH: Study design and manuscript writing. DS: Study design and manuscript revision. DS is the guarantor.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; internally peer reviewed.

To cite Han J, Shan D. *Gut* Epub ahead of print: [*please include* Day Month Year]. doi:10.1136/gutjnl-2024-333827

Received 5 September 2024
Accepted 27 September 2024

Gut 2024;**0**:1. doi:10.1136/gutjnl-2024-333827

ORCID iD
Dan Shan http://orcid.org/0000-0002-2762-6770

REFERENCES

1 Pioche M, Pohl H, Cunha Neves JA, *et al*. Environmental impact of single-use versus reusable gastroscopes. *Gut* 2024;23:gutjnl-2024-332293.
2 Vaccari M, Tudor T, Perteghella A. Costs associated with the management of waste from healthcare facilities: An analysis at national and site level. *Waste Manag Res* 2018;36:39–47.
3 Huijbregts MAJ, Steinmann ZJN, Elshout PMF, *et al*. ReCiPe2016: a harmonised life cycle impact assessment method at midpoint and endpoint level. *Int J Life Cycle Assess* 2017;22:138–47.
4 Sherman JD, Raibley LA, Eckelman MJ. Life Cycle Assessment and Costing Methods for Device Procurement: Comparing Reusable and Single-Use Disposable Laryngoscopes. *Anesth Analg* 2018;127:434–43.