Sustainability in gastrointestinal endoscopy

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In July, 2020, in *The Lancet Gastroenterology & Hepatology*, James Maurice and colleagues[1] called for the reinvention of endoscopy. The environmental costs of this practice had been exposed: the tools and the systems that have been built around them generate huge volumes of waste and contribute substantially to the environmental impact of a carbon-intensive health-care system.[2] The status quo is unsustainable.

The National Health Service (NHS) in the UK has made great strides in the year since the Net Zero plan was unveiled, showing that large-scale institutional change is possible.[3] The gastroenterology community was challenged to urgently transform endoscopy practice to one that is environmentally, economically, and socially sustainable. This transformation first requires a change in mindset because the desire to investigate and treat patients with gastrointestinal disease can no longer be considered a concern contained within the traditional bounds of the specialty. The clinical practice of endoscopy is supported by a vast infrastructure, and decisions made in the clinic or endoscopy suite have implications across a web of interdependencies that render these actions inseparable from the resources on which the practice depends. Seen this way, the responsibilities of clinicians are inevitably more complex, extending beyond the individual patient to include planetary health.

However, attempts to address an issue of planetary scale within the concerns of a niche medical community carry risks; clinicians are perhaps liable to underappreciate the networked nature of the problem, and the enthusiasm to intervene risks seeding unintended consequences that emerge, unnoticed, outside the sphere of gastroenterology. But operating within a small, invested team also has its advantages: it can be easier to activate a community already familiar with the process of tackling shared problems because the domain knowledge, channels of communication, professional relationships, and trust necessary to embark on a common project are all already in place.

The Green Endoscopy group—a grassroots group of enthusiastic individuals—has grown exponentially through social networks. Its output and influence have been examples of how constructive interaction between a grassroots group and policy making organisations can be an effective and nimble model for innovation and adaptation in this field.[4,5]

And so, from small beginnings, steps of progress have been made. Gastroenterology clinicians, professional organisations, and industry have been increasingly eager to make public commitments towards sustainable practice. The British Society of Gastroenterology has established a Working Group on Climate Change and Sustainability and has divested from fossil fuels. The European Society of Gastrointestinal Endoscopy will shortly publish its position statement and guidance on reducing the carbon footprint of endoscopy practice. The World Gastroenterology Organisation Climate Change Working Group has members from 18 countries, and their consensus commentary on climate change and gastrointestinal disease has just been published.[6] The UK Joint Advisory Group on Gastrointestinal Endoscopy now asks units to demonstrate sustainability efforts when undergoing their accreditation process. Individual endoscopy units have also instituted innovative and pragmatic solutions to reduce consumables and use of resources: filters attached to taps to reduce the unnecessary use of sterile water with the associated plastic waste are already in use in London, and recycling programmes have been instituted across the UK.

The advent of non-invasive testing for gastrointestinal disease—while primarily driven by clinical imperatives—has helped limit the number of procedures done, or at least justified those procedures that are undertaken. Intuitively, it is these non-invasive measures that are most likely to lead to swift, clinically appropriate, and substantial reductions in endoscopy's carbon footprint. However, the environmental impact of these efforts should not be entirely assumed until there are more comparative data about the carbon footprint of the non-invasive tests and devices in question. Here, policy makers should also be aware of the Jevons paradox: that an increase in efficiency in a system can potentially result in rebound increased consumption of a resource.

Faecal immunohistochemical testing (FIT) is already in widespread use to identify those in greater need of colonoscopy, in both the bowel cancer screening programme and the triage of patients with symptoms considered at low risk of harbouring colorectal cancer. Recent data suggest that a FIT value less than the lower limit of detection, particularly if combined with clinical features, has an acceptable negative predictive value for colorectal cancer in all symptomatic patients, potentially further extending the role of FIT in determining the appropriateness of endoscopy. Faecal calprotectin could be added to the investigation of these patients to help exclude inflammatory pathology. FIT could also be considered for use in other groups—eg, the investigation of patients with anaemia. Additionally, there might be a role for stool-based testing to identify the need for colonoscopy in the follow-up of patients after polypectomy.

Colon capsule endoscopy has been piloted by NHS England in patients referred on the 2-week wait cancer pathway due to FIT values of 10–100 μg/g, and has been rolled out in multiple NHS boards in Scotland for low-risk colorectal symptomatic referrals. Emerging data will provide valuable information about the role of colon capsule endoscopy as a first-line diagnostic test and its use in other indications, such as assessment of inflammatory bowel disease.

Cytosponge, coupled with biomarker analysis, has a potential role in the identification of Barrett's oesophagus in patients considered to be at risk, and is now being rolled out in Scotland for use in Barrett's surveillance and for the investigation of patients with low-risk upper gastrointestinal symptoms.

The increase in the number of endoscopic procedures has been accompanied by an increase in the need for histological analysis and the accompanying carbon footprint. The processing of three biopsy pots generates the carbon emissions equivalent of driving 2 miles in a car.[7] Millions of such pots are processed from gastrointestinal endoscopy in the UK alone. The resect-and-discard and diagnose-and-leave strategies for diminutive polyps, as well as the advent of artificial intelligence in endoscopic diagnosis, could substantially reduce costs alongside carbon emissions—a win-win for the triple bottom line.[8]

Meanwhile, new challenges are emerging. Most notable is the growing interest in a single-use endoscope model, driven largely by concern surrounding infection transmission with reusable endoscopes, particularly duodenoscopes. But the environmental implications of such a move are a major concern.[9] Preliminary data suggest that the environmental impact of single-use endoscopes is substantially higher than for reusable ones.[10] But this area urgently needs further research, focused on clinically relevant outcomes, to make informed judgements about the indications for, and implications of, a shift to single-use. Until then, the widespread use of single-use endoscopes does not seem justified.

High-quality research is still needed, probably involving step-by-step process mapping and robust life cycle assessment of pathways to provide granular data. Closer and more honest relationships between health-care professionals and industry must be fostered as early as possible, to reduce the footprint of the supply chain, equipment, and logistics that lie beyond the immediate control of clinicians. The green endoscopy movement has shown that change is possible and that while enthusiasm is high, it needs to be channelled to ensure that efforts are targeted, effective, and implemented promptly where evidence exists.

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