

Supplementary table 1: Best practice statements published by the British Society for Gastroenterology (BSG), Joint Advisory Group on GI Endoscopy (JAG) and Centre for Sustainable Health (CSH) in collaboration together.

<p>Working group 1: functional organisation of a green endoscopy unit</p> <p>Practice position statement 1.1 We recommend adherence to relevant professional guidelines to ensure clinical appropriateness for all endoscopic procedures.</p> <p>Practice position statement 1.2 We recommend that sustainable alternatives to conventional diagnostic endoscopy should be considered in all patients where clinically indicated. These might include Cytosponge for barrett's oesophagus surveillance, CT colonography and colon capsule endoscopy for bowel cancer screening.</p> <p>Practice position statement 1.3 We recommend that evidence-based methods including simulation and online image libraries should play a role in sustainable endoscopy training.</p> <p>Practice position statement 1.4 We recommend providing digital patient information and communications to support a sustainable endoscopy unit; however, provision will be needed for patients/service users who require paper copies.</p>	<p>Working group 2: sustainable endoscopic procedure-related practices</p> <p>Practice position statement 2.1 We recommend that, where clinically appropriate, combined procedures ('bidirectional' upper and lower GI endoscopy) should be booked on the same day.</p> <p>Practice position statement 2.2 The environmental impact of a pathway employing single-use endoscopes is not yet clear. We recommend that their use should be restricted to select indications and environmental impact taken into account.</p> <p>Practice position statement 2.3 design of new decontamination units must include sustainability as an explicit criterion for procurement of hardware and consumables.</p> <p>Practice position statement 2.4 Water is used in endoscope decontamination, peri-procedural flushes and for immersion colonoscopy. We recommend that an agreed standard operating procedure should exist to ensure rationalisation and minimisation of water use.</p> <p>Practice position statement 2.5 We recommend that tap water may be used for manual flushes through the biopsy valve during endoscopy, but not through automated flushing systems. The use of filtered water could be an alternative, subject to local agreement and protocols, in all scenarios.</p> <p>Practice position statement 2.6 We recommend further research into sustainable alternatives to mitigate the</p>
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	<p>environmental impact of sterile water use in the endoscopy unit, while meeting infection control standards.</p> <p>Practice position statement 2.7 We recommend that endoscopy departments should consider local protocols to minimise the use of histopathology in appropriate clinical pathways.</p> <p>Practice position statement 2.8 We recommend that use of endoscopy accessories should be carefully considered and planned preprocedure. This is an important endoscopic non- technical skill and could be part of training alongside endoscopic technique.</p> <p>Practice position statement 2.9 We recommend that the significant adverse environmental effects of nitrous oxide must be considered against its clinical efficacy in GI endoscopy. staff and patients should be provided information on the environmental impact of nitrous oxide.</p>
<p>Working group 3: sustainability in endoscopy environment</p> <p>Practice position statement 3.1 We recommend endoscopy units adopt sustainable reporting practices such as electronic documentation and reporting and report dissemination.</p> <p>Practice position statement 3.2 We recommend reduction in personal protective equipment (PPE) use where possible and maximising availability of reusable PPE in endoscopy.</p> <p>Practice position statement 3.3 We recommend flexible working patterns for appropriate team members should be actively encouraged, to enable remote working where possible.</p> <p>Practice position statement 3.4</p>	<p>Working group 4: sustainability considerations postendoscopic procedures</p> <p>Practice position statement 4.1 Patients should be encouraged to bring their own reusable drinks bottle or cup for the purpose of refreshments.</p> <p>Practice position statement 4.2 Patient information leaflets and discharge instructions should be offered to patients in a digital format. For those patients requesting information in paper form, this should be printed on recycled paper with double-sided printing.</p> <p>Practice position statement 4.3 Remote consultation should be seen as the default means of providing postendoscopy follow-up. Patient selection and engagement are critical to ensure success and avoid widening health inequalities.</p>

<p>We recommend low flow devices on water taps. If hands are not visibly soiled, then use of other appropriate hand disinfectants should be considered.</p> <p>Practice position statement 3.5 We recommend that energy to power endoscopy units should come from renewable sources, wherever possible.</p> <p>Practice position statement 3.6 We recommend energy-efficient lighting and motion sensors for endoscopy units, where appropriate. In addition, aside from critical equipment such as drying cabinets, we recommend all equipment, including computers and machines, should be turned off when not in use.</p> <p>Practice position statement 3.7 We recommend the waste hierarchy must be followed and triage of contaminated, non-contaminated and recyclable waste should be a priority for all endoscopy units.</p> <p>Practice position statement 3.8 We recommend education of all endoscopy staff in waste management.</p> <p>Practice position statement 3.9 We recommend heating, ventilation and air conditioning setbacks to minimise air exchanges when endoscopy rooms are not in use.</p>	<p>Practice position statement 4.4 Adoption of less-invasive tools may represent an opportunity to reduce the environmental impact associated with endoscopic surveillance, but their use in this context is currently limited to trials and pilot settings.</p>
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Supplementary Table 2: European Society for Gastrointestinal Endoscopy (ESGE) statement pledging recommendations for how to achieve greener practice in the areas of gastroenterology and endoscopy.

<p>Main statements</p> <p>1 GI endoscopy is a resource-intensive activity with a significant yet poorly assessed environmental impact.</p> <p>2 ESGE-ESGENA recommend adopting immediate actions to reduce the environmental impact of GI endoscopy.</p> <p>3 ESGE-ESGENA recommend adherence to guidelines and implementation of audit strategies on the appropriateness of GI endoscopy to avoid the environmental impact of unnecessary procedures.</p>
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- 4** ESGE-ESGENA recommend the embedding of reduce, reuse, and recycle programs in the GI endoscopy unit.

5 ESGE-ESGENA suggest that there is an urgent need to reassess and reduce the environmental and economic impact of single-use GI endoscopic devices.

6 ESGE-ESGENA suggest against routine use of single-use GI endoscopes. However, their use could be considered in highly selected patients on a case-by-case basis.

7 ESGE-ESGENA recommend inclusion of sustainability in the training curricula of GI endoscopy and as a quality domain.

8 ESGE-ESGENA recommend conducting high quality research to quantify and minimize the environmental impact of GI endoscopy.

9 ESGE-ESGENA recommend that GI endoscopy companies assess, disclose, and audit the environmental impact of their value chain.

10 ESGE-ESGENA recommend that GI endoscopy should become a net-zero greenhouse gas emissions practice by 2050.

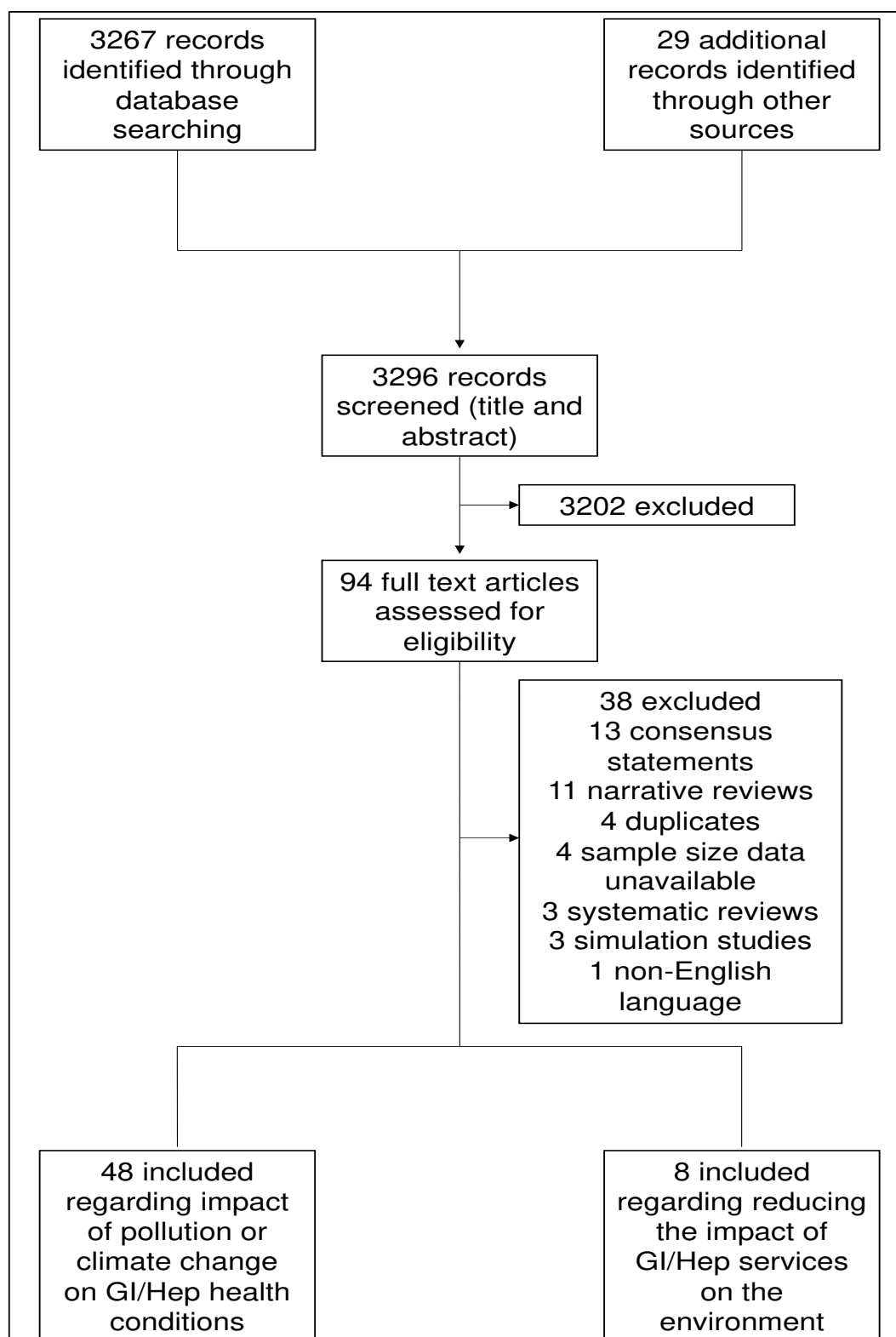
Supplementary Methods

We searched PubMed and Ovid MEDLINE between January 1st 1990 and August 21st 2023. We also manually searched clinical guidelines, relevant professional websites and reference lists of included papers. Search terms were:

- ‘sustainable’ or ‘climate’ or ‘emissions’
- combined with
- ‘hepatology’ or ‘cirrhosis’ or ‘liver disease’ or ‘endoscopy’ or ‘colitis’ or ‘inflammatory bowel disease’ or ‘Crohn’s’ or ‘gastroenterology’ or ‘neuroendocrine tumour’ or ‘Barrett’s oesophagus’ or ‘peptic ulcer’ or ‘irritable bowel syndrome’ or ‘colorectal neoplasm’ or ‘liver neoplasm’ or ‘pancreatic neoplasm’ or ‘stomach neoplasm’ or ‘oesophageal neoplasm’

Supplementary Table 3 outlines the inclusion and exclusion criteria for the search.

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none">• >18 years old• An association between climate change/pollution and the development of gastrointestinal/liver disease was investigated or• An assessment of the environmental impact of gastrointestinal/liver services was undertaken• Individual patient data meta-analyses	<ul style="list-style-type: none">• Papers without original data• Simulated data• Studies not in English• Other (not individual patient data) meta-analyses and systematic reviews



Supplementary Figure 1: Inclusion of studies in the systematic review.