Position statement on how can we can implement the Greendeal in our gastrointestinal and gastrointestinal endoscopy department in Belgium

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Abstract

The importance to reach the target to be carbon net zero by 2050, as presented by the European Commission in the European Green Deal, cannot be overestimated. In a current endoscopy world, where single use has found its place and techniques are constantly evolving, it will be a challenge to reach these goals. How can we reconcile this evolution to a carbon neutral status by 2050 without compromising patients care, clinical standards and training needs? The European Society of Gastrointestinal Endoscopy (ESGE) together with the European Society of Gastroenterology and Endoscopy Nurses and Associates (ESGENA) recently published a position statement (1) whereas in the UK there is the work from the green endoscopy group (2) in line with the strategy of the British Society of Gastroenterology (BSG) on sustainability (3). In Flanders, a project called "greendeal in duurzame zorg" had its kick off in March 2023 (4) so it is about time that we in Belgium, as gastroenterologists, start with tangible actions to a more sustainable daily practice. We wrote this position statement in cooperation with the Vlaamse Vereniging voor Gastro-Enterologie (VVGE), the Société royale belge de Gastro-entérologie (SRBGE) and the Belgian Society of Gastrointestinal Endoscopy (BSGIE). We will also work together in the coming years to continue to motivate our members to work on these initiatives and to co-opt new projects within the framework of the greendeal. (Acta gastroenterol. belg., **2024,** 87, **28-33**).

Keywords: Greendeal, Green endoscopy, sustainability.

The aim of this guideline is to provide a clear set of recommendations to ensure that we do not get lost in a jungle of possible sustainability-related actions and instead create a set of balanced measures to reach our goal. We need a strategy to get to a more sustainable GI department, and by extension, a more sustainable hospital. This guideline is largely based on the ESGE and ESGENA position statement (1) but also on the four themes described in the project "greendeal in duurzame zorg" (4). The guidelines for our GI department will mainly focus on themes 2, 3 and 4. The focus of the first theme, nature and health is mainly on integrating nature into our healthcare system and is more an objective for those responsible for greening our hospital sites. Although this is obviously also important, it is less related to the GI or GI endoscopy department.

The second theme, climate and infrastructure focuses primarily on energy and transportation. Energy is not only our direct energy consumption but also the energy needed to manufacture the products we use in our daily practice. This theme also includes attempts or suggestions to integrate renewable energy into our units. Furthermore, mobility and food also have an important impact on climate change. Obviously, the item food does not only concern the food advice for our patients but also the food offered in hospitals is part of this. The aim is to encourage sustainable food consumption and thereby integrating the already well-known protein shift. The exploration of the food triangle towards a more environmentally responsible and healthier diet is a cornerstone of the Greendeal's approach.

The third theme focuses on materials and waste. Our daily practice involves a large use of materials. A large proportion of these materials cannot be reused and thus end up as waste. In addition to basic steps within waste prevention we need to focus on fewer materials, more recycled content, longer product life and ensuring reuse and recycling. A standard sustainability principle, the 4R principle: "Reduce, Reuse, Recycle, Recover" should become the standard when selecting of our materials. According to the latest update on the 4R principle, "Reprocess" has been added and it became the 5R principle (5).

Theme 4 Pharmaceuticals in our water. Our wastewater installations are not designed to take out all possible drugs, so several drug residues end up in our waterways. This poses a risk to the environment, to potential reuse of this water or even to our drinking water. Moreover, the production of medication requires a lot of energy, which means they have a high carbon footprint. It is important to prescribe medication only when it is really needed and the correct number of pills in order not to over-prescribe medication. Return unused medication to pharmacy for proper handling instead of general waste collection. It is also important to explain to our patients to follow prescriptions when using medication and to finish antibiotic courses. Besides the regular medication, contrast agents are detected in the wastewater. Therefore, always carefully consider whether the administration of contrast is necessary.

When looking at all this it seems a lot of work needs to be done. Many practitioners are concerned about the

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high costs but we have to keep in mind that the cost of inaction further down the line is much higher. As gastroenterologists, we have to make informed choices whenever possible. Companies produce based on demand so we have the power to make the change. If we stop buying and using single use plastics, they will disappear from our practice.

All of the above in combination with local agreements, different policies and protocols in our small country make these guidelines a challenge. We believe that if we work together with our 3 associations, VVGE, SRBGE and BSGIE, that we can achieve a change in mindset regarding greening our endoscopy practices

Guideline proposal

1. Limit the number of endoscopic procedures. Endoscopy should be based on evidence based indications and surveillance algorithms. The indication for endoscopy should be checked before booking an endoscopy. If the indication is not correct, the referring physician and patient should be informed on this item. Pre-endoscopy consultation (in person or online) can overcome this issue. If patients are insufficiently prepared for their endoscopy (for example not fasting long enough, incomplete bowel preparation), the procedure should be postponed. By placing patients on the appropriate specialist list, needless repetition of examinations can be avoided.

With these measures, a higher endoscopy quality and higher patient satisfaction can be obtained, together with less material, less energy and less water consumption.

2. Look for less resource-intensive techniques without compromising patient care. The faecal immunological test (FIT) could replace a colonoscopy in a population-screening program (6). In screening programs for cirrhotic patients and portal hypertension: Baveno VII consensus states that transient elastography in combination with a platelet count is as good as endoscopy to rule out varices: in patients with compensated advanced chronic liver disease (cACLD) liver stiffness measurement (LME) by transient elastography (TE) ≤20 kPa plus platelet count ≥150x109/L rules out clinically significant portal hypertension (CSPH) with a sensitivity and negative predictive value >90% (7). Other imaging methods like CT colonography or capsule endoscopy need more studies to evaluate their cost-effectiveness and whether their environmental impact is lower than their equivalent endoscopic procedure (8).

3. We should minimize the use of histopathology. Processing biopsies is responsible for a significant carbon footprint. GI biopsy processing is estimated to emit 0.28 kg CO_2 emission when one biopsy container is used and 0.79 kg CO_2 emission when 3 jars are used (9). (To give an idea: These greenhouse gas (GHG) emissions are equivalent to driving a typical passenger vehicle 1.12 km and 3.2 km, respectively). Contributors to this high GHG emission are production of supplies, production of chemicals and reagents, electrical energy required for the laboratory equipment and waste treatment. When performing endoscopy we should avoid taking unnecessary biopsies. Depending on the demands of the pathology department, it can be considered whether multiple biopsies can be collected in one jar. For example coeliac disease: do we really need the histopathology to do proper follow-up of these patients? Actually it can be perfectly diagnosed and monitored through serological tests but in Belgium patients still need a certificate for reimbursement where BOTH serology AND biopsy are required. Therefore, something will have to change structurally at this level too to make sustainability choices work (10). In the same idea, there is no indication to take biopsy of the Z line when no suspicious area is demonstrated by good quality endoscopy, as routine duodenal biopsy when endoscopic aspect is normal. We should avoid taking biopsies of large benign-looking polyps (LST-G) if EMR/ESD is mandatory, for both technical (inducting of fibrosis) and environmental reasons. We should avoid using inappropriate resection modality as a first step and refer or use directly the appropriate resection technique (i.e: ESD, marge pEMR, FTRD...). In IBD patients, there is no indication for random biopsies for surveillance if we correctly use (virtual) chromo-endoscopy. The use of artificial intelligence with characterisation of polyps might increase our endoscopic diagnostic confidence level, making the resect and discard technique a valid option. We need to reconsider what to do with small diminutive polyps in patient > 80 years in screening for malignancy/ anaemia? Do we need to remove these polyps and if so, do we send them for pathological analysis?

4. More comparative life cycle assessment studies are needed to check if alternative tests have a smaller ecological footprint then GI endoscopy (for example H. pylori biopsies pre-bariatric surgery versus urea breath test or stool test)

If a bidirectional endoscopy is required, it should preferably be done on 1 day. This way we avoid an extra transfer to the hospital and an extra day of admission that reduces the costs (less CO_2 emission, less water and energy, less administrative tasks). We also minimize the use of personal protective equipment (PPE), and an extra sedation (11). However, it is important to avoid the pitfall of doing unnecessary examinations here and to limit it for patients where it is clinically indicated. When performing bidirectional endoscopy, the upper GI endoscopy should be performed before colonoscopy for several reasons. It provides reduced sedation levels, recovery time is shorter and the biopsy forceps can be reused (12). When a significant pathology is detected during the first examination (e.g. gastric cancer), the course of the second examination can be altered (e.g. no more polypectomy of diminutive polyps).

5. Carbon dioxide insufflation for endoscopy significantly reduces abdominal pain during and following the procedure compared with air insufflation. However, CO_2 is harmful for the environment so do we need to look for other options? Life cycle assessment to compare CO_2 insufflation colonoscopy and water exchange colonoscopy are needed.

6. Minimisation of water use. The amount of water needed to wash an endoscope must be reduced. When comparing automated versus manual reprocessing of flexible endoscopes, many pros and cons have to be taken into account. Life cycle analysis for both options should be studied to compare which option is the most sustainable. Again, it is important not to perform a low quality endoscopy. The role of smart bioactive and biodegradable materials for coating medical devices combined with sustainable processing methods will contribute towards future solutions (13).

7. Single use endoscopes should only be used in selected cases, and in GI, we are focusing on elimination of endoscope transmissible infections. Infectious outbreaks in GI endoscopy are predominantly linked to duodenoscopes. So far, contamination of an endoscope rarely translates into clinical infection in patients (14). It seems clear that single use disposable endoscopes have a higher net waste and are considered as an enormous amount of plastic pollution. However, several factors need to be taken into account since these endoscopes do not need to be cleaned which means a significant gain in water consumption and reprocessing costs (5). One study estimated the impact of changing from reusable to single-use endoscopes considering reprocessing waste: when assuming that all endoscopic procedures were performed with single-use endoscopes, waste from reprocessing would decrease, however, overall disposable waste would increase by 40%. The waste generated from reprocessing and endoscope disposal alone would quadruple when changing to a single-use endoscope practice (15). In order to make a correct comparison we should perform a Life Cycle Analysis (LCA) as the study by Nguyen et al. did (16). A life cycle assessment (LCA) is a method to look at the environmental impact of all processes throughout a product's life cycle that allows you to compare the environmental impact of a reusable with a disposable product. They evaluated three duodenoscopes: conventional reusable duodenoscopes (RDs), RDs with disposable endcaps, and single-use duodenoscopes (SDs). Performing ERCP with SDs releases between 36.3 and 71.5 kg of CO_2 equivalent, which is 24 to 47 times greater than using an RD (1.53 kg CO_2) or an RD with disposable endcaps (1.54 kg CO_2). Most of the impact of SDs comes from its manufacturing, which accounts for 91% to 96% of its greenhouse gas emission. Although SDs may provide incremental public health benefit compared with RDs, it comes at a substantially higher cost to the environment. Infection rates continue to decrease since cleaning protocols are constantly evolving and designs such as disposable endcaps facilitate cleaning, the negative impact to human health from contaminated RDs could be comparable with SDs.

8. Minimal use of material. When performing bidirectional endoscopy one biopsy forceps can serve for both ways when starting with upper GI. Follow guidelines when taking biopsies. Use artificial intelligence (AI) or high definition images to gain information instead of taking biopsies at random. The advancement of our image quality and the increase in our knowledge to interpret these images ensures that we can do optical diagnosis and do not have to take a biopsy of every lesion. Invest in (preferably online) learning programs to interpret these lesions; good examples are the BORN module for recognizing lesions in Barrett's oesophagus and the tool described by Raghavendra GIE 2010 to distinguish hyperplastic from adenomatous polyps. ESGE has published a curriculum to develop and maintain the relevant skills for the use of optical diagnosis (17). This way we gain on two levels: not using a biopsy forceps or other endoscopic equipment so less waste and lowering the carbon footprint by not using biopsies/histopathology.

9. Use of protection equipment and patient protection. We have learned from 3 years of COVID-19 that protection equipment exists in many different forms and that when we want to fully protect ourselves from any infection risk, the amount of waste in enormous. It is obviously important that infection risk is minimized but we should avoid unnecessary personal protective equipment (PPE). Reusable gowns and single use biodegradable (BDG) gloves are already available.

10. Anaesthesiology in our endoscopy unit. Different agents can be used for anaesthesia. These include vapor anaesthetics (desflurane, isoflurane, sevoflurane) and anaesthetic gases (nitrous oxide), as well as liquid agents (mostly propofol). Anaesthetic vapors and gases are known to have a very high carbon footprint. Propofol, which is administered intravenously, has a much lower footprint. Still, to compare these resources, several studies have performed a Life Cycle Analysis (LCA) for these anaesthetics. These studies show that the environmental impact of propofol is by far the lowest when compared with desflurane, isoflurane, and sevoflurane. The impact of propofol is even four times lower than desflurane or nitrous oxide (18). The impact of propofol comes mainly from the electricity required to operate the pump and not from the drug itself. In our endoscopy rooms, propofol (and midazolam) are widely used and this seems the most sustainable choice.

11. Waste management. A lot of waste is produced in an endoscopy unit (19). This waste often consists of products that have been in contact with the patient.

Think of disposable instrumentation (biopsy forceps, polypectomy loops, banding sets), gloves, or covering materials. The other part, materials that have not been in contact with a patient, are mostly packaging materials, syringes, and medication leftovers. In making waste production more sustainable, there is a classic principle that can be followed: reduce, reuse, recycle, and recover (20). Therefore, with every piece of waste produced, you can check these 4Rs. Can I reduce this waste, or even eliminate it altogether (reduce)? Can I reuse this product, instead of throwing it away (reuse)? Can I recycle this waste (recycle)? Important to remember here is that reduce yields the most sustainability gains, then reuse, and then recycle. To ensure this 4R principle remains organised and feasible, it is important to adapt our endoscopy rooms accordingly. In summary, we need: one bin for residual waste, 1 for plastics, 1 for high-risk medical waste, 1 for non-confidential paper and cardboard and 1 for confidential paper. Using ergonomic recycle bins can help with this matter. It is also important when building a new endoscopy room to take into account the space this will take up. One extra "R" was recently added: "reprocess". Would it be an option to reprocess some of our used materials? Many projects are ongoing (single-use glove recycling gloves, recycling of discarded single-use PVC medical devices…) and starting to be implemented in our daily practice.

An important side note is the role of pharmaceutical companies in lowering the amount and type of packaging material.

Replacing absorbent pads by towels will shift waste management to water and energy use in cleaning towels so again here a life cycle assessment is needed. Use tap water during colonoscopy instead of bottled water.

12. Energy Savings. Energy use is a major contributor to a hospital's carbon footprint. Energy is needed to maintain all kinds of processes in a healthcare facility. Examples include lighting, heating, cooling, medical equipment (monitors, scanners, endoscopy towers, ultrasound machine,…) and in some rooms air treatment. Many of these systems are ON night and day. In some rooms temperature and humidity needs to be above or below a certain level to ensure the safe operation of our equipment. It may be worthwhile to consider whether it is possible during the weekend or during the night, when the equipment is not being actively used, it is possible to save energy. In addition, other devices contribute to energy consumption, such as computers, lights or medical devices that are left ON when not in use (ultrasonography for example). It is worth to check whether it would be energy saving when we turn those devices off. If so, it might be interesting to label them, by using for example a sticker that says whether to turn them off after use. Ultrasonography equipment for example should be ON when performing ultrasounds on a list of patients and turned OFF after this list. It would not be beneficial to turn it ON and OFF between every patient neither for energy consumption nor for the lifespan of the machine. Same for computers and screens, when not in use they should be put into sleeping modus or OFF when not in use for a longer period. When building new endoscopy rooms make sure you install automatic lighting systems, but also installing motion detectors in existing buildings (including corridors and staircases) is feasible with low costs. When material is due for replacement make sure you buy products with a high energy label.

13. Use of renewable energy. Hospital wide, but also when building new endoscopy rooms this should be taken into account. In addition, the design of new decontamination units must include sustainability criteria. Endoscope reprocessing is a resource-heavy process. Each endoscopy washing machine produces 17 kg of CO_2 equivalent per day (21). This emission is equivalent to driving a typical passenger vehicle for 69 km. To make this process more sustainable, action must be taken on several levels. Energy consumption and the amount of water needed to wash an endoscope must be reduced and the use of plastic accessories and disposable products must be avoided. When medical or other devices need to be replaced, make sure you buy one with a high energy label.

14. Sustainability should be a topic during education. It is important to educate our teams on this matter on a regular basis. This is the only way to keep our staff motivated and to keep finding new ways to make our endoscopy practice more sustainable. It is important to explain why we implement certain guidelines. With numbers and clear results, you will keep your team motivated.

15. No non-reusable plastic cups. This does not only apply only to the GI endoscopy department but should be implemented hospital-wide. The use of non-reusable plastic cups (as well as plastic cutlery, containers, spoons, stirrer sticks in cafeteria and personnel facility at endoscopy department and hospital-wide), should be abandoned altogether. In each unit reusable plastic cups or even glasses can substitute them perfectly. Some bowel preparation products have plastic cups in the packaging. These cups are discarded after use, that is, after 24h, which creates unnecessary plastic waste. We will also have to motivate the industry to look for more sustainable solutions and pay attention to choose the most sustainable option when choosing new material. An important side note is that we must always be alert to avoid the pitfall of greenwashing (appear to be more sustainable then you actually are).

16. Digital leaflets replacing information brochures. The information provided to the patient about the scheduled examination should, of course, be available. For most patients, a QR code or a link to the information available online will be sufficient to guide them through

their examination and the preparation that sometimes needs to be done. Online, both text, figures and videos can be made available to patients. A paper version of this information should only be given to patients who are not able to access the information online (the elderly, people without access to computer systems, etc.).

17. Tele or video consultation instead of physical consultation. In many cases, a telephone or video call consultation is a full alternative to a physical consultation. In this way, we ensure that the patient does not have to travel to the hospital and this can have a major impact on the reduction of carbon emissions. It is understood that not every consultation can be replaced by a telephone consultation, but guidelines can also be established on this. In this matter we think about scheduling a colonoscopy in patients with a positive faecal immunological test (FIT), follow up of patients after an examination and discussing results. All these can be done perfectly over the phone or even by video call. If the patient needs access to information brochures, they can be delivered by mail (through a link, a QR code or an attachment). The RIZIV/INAMI should valorise this eco-friendly way of consultation in a correct way.

18. Informed consent (IC) paper forms versus online forms. There are different types of signatures: there is the handwritten signature and there is the electronic signature, which includes the ordinary electronic signature, the advanced electronic signature and the qualified electronic signature. Legally, it should be assumed that each type of signature is valid. However, only the qualified electronic signature has the same legal value as the handwritten signature. This is also, what is used in the "It's me" platform. Therefore, it could be interesting to roll out a system with your hospital's IT services where the patient can easily sign his IC electronically. This can be done in combination with a platform for tele- or video consultations.

19. Results and letters to general practitioner (GP) or other colleagues. We should strive to digital communication with colleagues and other hospitals. Letters to the GP and results of examinations should be available electronically and no longer sent in paper form.

20. Medical conferences. COVID-19 required us to seek new opportunities to exchange knowledge. Since then, conferences have been offered more often in different formats, online, hybrid or in-person. In this way, it is possible to attend only some of the congresses in-person and others online to reduce your ecological footprint. (22)

21. Policymakers and governments. Here is a responsibility for our local gastroenterology and endoscopy societies (VVGE, SRBGE and BSGIE) to make these statements heard and create awareness about the need to rethink some reimbursement criteria.

22. Endorse last statement: become net zero by 2050.

No conflict of interest

No conflict of interest

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