

Review

Green endoscopy: practical implementation

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ABSTRACT

There is a necessity for endoscopy services as a speciality to lead the way in creating more sustainable departments. It is important we seek to explore and implement practical measures to ensure endoscopy services are working to meet our sustainability goals. The following article explores the practical implementation of measures which can be taken to make endoscopy greener.

INTRODUCTION

Climate change affects each and every one of us on a daily basis. As climate change has far-reaching consequences for us all, it is clear that healthcare needs to make this a priority. With endoscopy being the third highest waste producing department in the National Health Service (NHS) with theatres/anaesthetics and paediatrics/critical care being the departments which produce higher volumes of waste.^{1,2} The impact on human health of climate change is obvious and healthcare needs to respond urgently to the issue. Given the size and reach of the NHS, it is not surprising that its activities are responsible for 6.3% of UK's total carbon emissions and 5% of total air pollution.³ As one of the largest global employers, with one million patient contacts every 36 hours, the NHS can influence societies behaviours and attitudes towards resource and environmental issues.⁴ Therefore, the NHS has a vested interest and a duty to act on emissions and pollution.

In healthcare, endoscopy is a major contributor to the environmental footprint—generating around 3.09 kg of waste per bed day. High throughput departments such as endoscopy create multiple non-renewable waste streams which is further compounded by a resource heavy decontamination process.⁵ It is suggested that in the UK alone 2.1 million procedures were performed in 2019.⁶ Therefore, as a speciality, we need to actively seek out new

Significance of study

This paper aims to provide practical advice on how to make endoscopy more sustainable.

What is known about the topic

⇒ This is an innovative topic and has more research is currently being conducted. The study aims to give practical advice that all endoscopy service users may be involved in creating a more sustainable endoscopy unit.

How might this impact on clinical practice

⇒ It hopes that this paper will give practical advice to make small changes to make endoscopy more sustainable in the future.

approaches to enable endoscopy services to be more sustainable.

The following article aims to explore the practical measures that can be put in place to develop more sustainable endoscopy units. The literature in this area is limited, however, and many of these suggestions come from personal experience of our sustainable journey; they are by no means exhaustive. Sharing of information and experiences will be the corner stone of making endoscopy greener.

HOW CAN WE ENACT CHANGE?

Healthcare organisations continuously update their practices to ensure the best available care is provided to patients; however, culture and behaviour change in healthcare is often considered challenging. This is due to multiple factors which are likely to occur at various levels of the organisational structure. In order to implement greener strategies in our endoscopy departments, support from all staff groups is required to ensure its success.

At a time when we are emerging from the global pandemic and teams



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are physically and mentally exhausted, it may seem daunting to embark on a sustainability journey. Staff, however, are very aware of how much waste has been produced due to the phenomenal increase in the use of PPE during this time and readily acknowledge action is needed.

The first step of focusing on any change is to identify the problem—there is little doubt that sustainability is a huge issue that affects us all. Changes in weather systems across the world causing damage and destruction with the loss of environmental habitat and a global pandemic can all act as a catalyst for change.⁷

The next step is to seek like-minded individuals who can support the change both at management and grass roots level. Kotter suggests to implement change in any organisation 'guiding coalition' which consists of a team of the right people to be organised and constantly present for those affected by the change.^{8,9} Without this it is very difficult to drive change within any organisation. With reference to collaboration with waste management and infection control teams it is suggested this may be necessary but seems likely to be a prerequisite for practical implementation.

To become sustainable, some investment from management will be needed. The NHS aiming for net zero carbon emissions by 2040, with the ambition to reach an 80% reduction between 2028 to 2036, means managers must be committed to support any sustainability journey.¹⁰

The best way for endoscopy to be more sustainable is to reduce the number of procedures performed: through more specialised triage and a more realistic/selective approach to perform procedures and the use of greener alternative surveillance approaches and streamlined surveillance guidelines.

The following section explores the practices which can be made more sustainable; however, it must be pointed out that any changes must be made in conjunction with local policies and protocols and may require involvement with waste management and infection control teams.

TAKING SMALL STEPS

The key to any successful change is taking small steps or taking advantage of the 'low hanging fruit'. These would involve making the changes that are easy to achieve by staff members but have significant impact.

Green or sustainability champions

First, appoint a sustainability lead and recruit green or sustainability champions on each endoscopy unit. These roles should be fulfilled by someone who is interested in climate change and motivated to take on the project as some reliance is required to maintain momentum.

The sustainability lead acts as a facilitator between trust waste management and sustainability teams and the champions. The champions are key to ensure

changes are communicated, implemented and maintained on units. Haddock *et al*¹¹ also support this view by suggesting that appointing a green or sustainability champion from the existing workforce provides an effective method of disseminating good practice and as a point of focus for the generation of new ideas from enthusiastic staff with practical knowledge of implementing change. The Joint Advisory Group (JAG) now has sustainability as part of the accreditation process and having green champions on each unit is also now part of the Global Rating Scale which gives an added incentive to the organisational structure.

Sustainable pledge

Communication and education are very important when enacting change. The teams need to be aware of the goal, so having a visual statement of aims can help in making sure the team is motivated. This needs to be clear and concise, reflecting the aims for the coming year. This also helps to cement the message to become part of the daily activity on the endoscopy departments.

Waste segregation

Next steps to consider would be appropriate sorting of waste, by simply making suitable use of the current waste streams a huge difference can be made. The diagram (figure 1) below gives an example of the types of waste streams available. By segregating waste correctly, the amount of waste going to land fill can be reduced, alongside potential financial savings.

Sorting waste is the beginning of culture change and the first positive step in making the department more sustainable. The following steps can continue as part of the project but are detailed in no specific order.

Contacting the organisational sustainability lead and waste management groups is essential to ensure that each department is working towards the same organisational ethos and vision. They can access resources to help support the transition to a more sustainable unit. By sharing the vision each department has commitment and motivation from the teams builds.

Hard plastics

The recycling of hard plastic varies from each local council, therefore contacting the local council recycling officer helps to establish what can and cannot be recycled. In some local councils, hard plastics, such as those in figure 2, can be recycled, however this will vary in each trust location. These hard plastics come from packaging or equipment which has not had contamination. At this point of time, disposable mouth guards are not recyclable owing to their contact with the patient and the



Figure 1 Examples of sorting waste streams (depending on local policy). PPE, personal protective equipment.

legislation involving recycling of contaminated medical waste.¹²

Single-use accessories

Most endoscopy units use single-use accessories and as yet there is no clear guidance on whether reusable devices will be available, as they are associated with a low but not zero risk of microbiological contamination following processing. Therefore, all endoscopy should continue to use single-use items accordingly, with a more selective approach to reduce the number of accessories used for each case.¹³ Effective communication and team work is vital to team performance. ‘Team briefs’ and ‘huddles’ are successfully embedded in many

units¹⁴ and can be used with good effect to discuss the sustainability agenda. It is important to incorporate a good team brief at the beginning of each list to discuss each case and what likely accessories will be required for each case, this could lead to the reduction of inappropriate opening of instruments and accessories. Some companies now offer instrument recycling bins in which biopsy forceps, snares or guidewires can be recycled, this also helps to reduce waste for incineration.

Reducing paper

Today, patients are becoming increasingly engaged in their own healthcare, a development that is supported by the growth of information technology in our society.

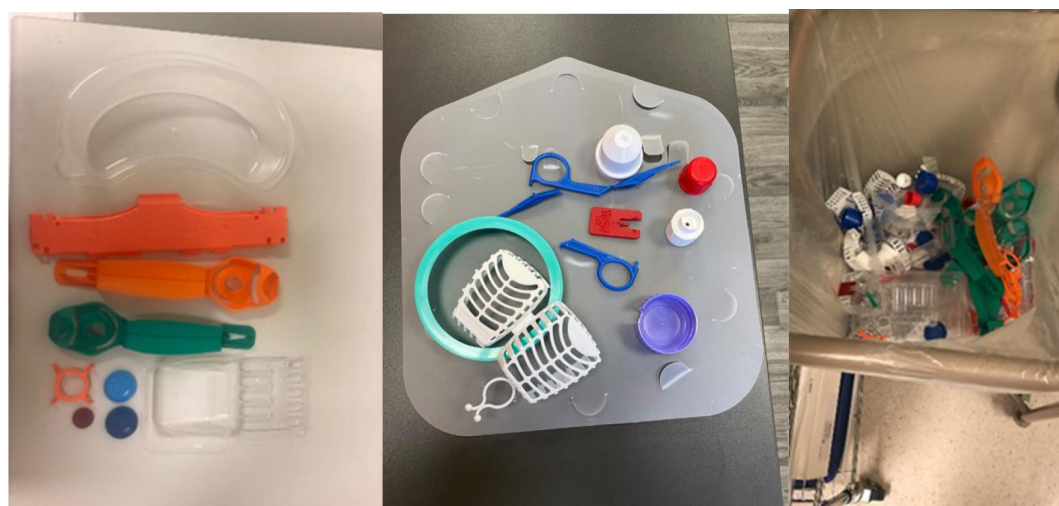


Figure 2 Recyclable hard plastics

The internet is becoming an increasingly important source of health information.¹⁵ Access to patient information in a digital format can be transformative for patients.¹⁶ It is universally accepted that structured, comprehensive written information is beneficial for patients undergoing endoscopy.¹⁷ Many patients are now familiar with using digital methods for obtaining information in most aspects of daily life. A recent study¹⁸ identified that 71% of patients have used QR codes in the past; the study also demonstrated it also has the added benefit of protecting our environment. Although the literature is limited, however, it stands to reason that the reduction in paper used will have a positive effect on the sustainability agenda.

Many of the issues relating to reducing paper and seeking alternatives to providing methods of endoscopy reporting is an organisational issue seated in informational governance and would require significant involvement from an organisation level. However, there are further opportunities to reduce paper waste in endoscopy. In the first instance on the endoscopy units, we can think about double side printing or reducing the number of copies of the report that are printed off, we need to explore to see if these can be scanned and emailed rather than traditional posting. We also need to look into procurement and source 100% recycled paper, however this would be part of a wider organisational approach.

Environmental changes

Many trusts have made changes to their hospital environments as part of their organisational commitment to sustainability but this should also be considered at the level of the endoscopy departments. Changes to lighting motion sensors where appropriate or arrangements made with IT departments to have computers shut down at a given time when the department is empty. This would require wider support from the organisation as a whole if not already part of the sustainability commitment.

FUTURE WORK

This section examines the areas of change that might need more work and might be more challenging to implement.

There are aspects of the sustainability journey which are much more difficult to implement. The reason being is that they require significant changes in behaviour and culture, clear guidance or support from industry.

Reducing the number of endoscopies

Reducing the number of endoscopies performed is by far the best way to make endoscopy more sustainable (Siau *et al*).⁶ However, this will require a huge shift in behaviour and culture.

As a specialty we need to explore a more robust system to reduce inappropriate investigations. This

would constitute adopting a clear approach to selective/realistic endoscopy. This could be achieved by:

- ▶ Following evidence and guidelines.
- ▶ Better training and education.
- ▶ Implementing stricter triaging.
- ▶ Clear conversations with patients regarding expectations.
- ▶ Review of direct to test procedures.
- ▶ Reduction of repeated procedures, for example, inadequate bowel preparation or instructions not followed.
- ▶ Reducing administration errors.

Alternative investigations also could be explored to replace endoscopic procedures in the first instance. Barrett's oesophagus surveillance is one such area which could be explored. A recent paper showed the effectiveness of using a Cytosponge biomarker panel and clinical risk factors to prioritise endoscopic Barrett's oesophagus surveillance across multiple centres in the UK during COVID-19. In this study, cellular biomarkers of atypia were combined with clinical risk factors of age, sex and length of Barrett's segment.¹⁹ Although the carbon footprint for this has not been assessed, it is likely to reduce the amount of endoscopy required. It could also be argued that earlier stage of diagnosis could lead to fewer procedures required.

In the updated guidelines regarding colonic polyp surveillance produced by the British Society of Gastroenterology,²⁰ it is suggested that the implementation of these guidelines will reduce the number of patients entering into postpolypectomy surveillance to approximately a quarter or to a third of those from the previous guideline's cohort of at-risk patient.

Reduction of histology

We need to examine the amount of inappropriate histology samples taken in endoscopy. = According to Gordon *et al*,²¹ 0.29 kg CO₂e for each biopsy pot or 0.79 kg CO₂e for three biopsy pots which translates into the equivalent of 0.7 and 2.0 miles driven. If we think about this in terms of endoscopy alone, by minimising unnecessary biopsies this could have a significant impact on the CO₂ emissions per endoscopist procedure. To ensure consistency and reduce ambiguity, each unit should have a biopsy protocol in place to make sure the appropriate biopsies are being taken for each condition in order to achieve a diagnosis.

Reducing sterile water use

The use of sterile water in endoscopy is an ongoing and contentious debate. It is estimated that an average of £4875 per year is spent in sterile water in endoscopy departments, however, it is suggested that this could be reduced if drinking quality water was used for manual flushing of organic material (GIRFT report 2021, p. 120),²² the report states:

Trusts could reduce their sterile water costs in endoscopy by using drinking water (so long as it is

of suitable quality) for manual flushes (via single-use syringes) of endoscopes during procedures. This would also reduce the number of plastic bottles that have to be physically brought into the endoscopy unit and then disposed of, by recycling or landfill.

This gives rise to the exploration of alternative options, nevertheless, independent risk assessments in conjunction with infection control teams and equipment manufacturers guidelines should be carried out prior to any change in practice. This change would not only be beneficial for individual organisations from a cost point of view but also from the benefit to the environment.

Reduction in the amount of Entonox used in endoscopy

The environmental impact of anaesthetic gases including nitrous oxide is well documented.²¹ In recent years, the use of Entonox as a method of pain control has increased in many endoscopy units. However, nitrous oxide is 316 times more harmful to the environment than carbon dioxide and once released can remain in the atmosphere for 110 years.²³ We actively need to explore alternative methods of pain relief for patients or investigate methods to reduce the environmental impact. Technology is now available to instal equipment which can effectively destroy nitrous oxide molecules, therefore, reducing the harmful impact to the atmosphere while enduring the patient has the option of Entonox as a method of pain relief.

Challenging industry and supply chains

Packaging is a major issue within the NHS and is one area that has great potential for minimising waste. According to NHS Supply Chain,²⁴ the percentage of plastic waste in NHS waste streams is significantly higher than other industries with plastic making up 22.7% total of all waste, with 13.7% being plastic film and 9% being hard plastic. The NHS disposes of around 133 000 tonnes of plastic each year with only about 5% of this plastic waste being currently recovered. Furthermore, according to Rizan *et al*,²⁵ 1 million metric ton of clean non-infectious plastic is generated by healthcare facilities each year. Much of this packaging is not necessary and also has an impact on logistics with the amount of bulk required for transportation. Seeking alternatives would be an ideal solution, however, this requires investment from industry and healthcare supply chains need to act as a catalyst to influence this change.

Further research

At present, research is limited in this field, but thankfully, research and evidence in sustainability and endoscopy are beginning to emerge; however, much more research is needed to improve our understanding of the environmental impact of

all endoscopic procedures, practices, equipment and reprocessing. Once we understand the impact endoscopy has on the environment, we can then start our sustainability journey and support the changes that can be made.

SUMMARY

It is clear that climate change is a global and health-care emergency and the NHS needs to be part of the solution. With the high volume of waste that endoscopy generates as a specialty, we need to work together to ensure the endoscopy carbon footprint is significantly reduced.

It is hoped that this article has given some practical suggestions that can be employed in many endoscopy units or provide the incentive to explore what changes could be made within individual departments so that we will collectively have a positive impact on reducing the environmental impact of endoscopy.

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