

Quantifying the environmental impact of colonoscopy and colon capsule in the NHS— it's complicated!

Introduction:

The adoption of low-carbon models of care is considered a necessary step in NHS England's strategy to deliver a net zero NHS. The addition of colon capsule endoscopy (CCE) to the two-week-wait lower GI pathway constitutes an alternative to standard care and raises salient questions around decarbonisation. We examine the carbon footprint implications of including CCE in this pathway and explore the opportunities to improve the environmental sustainability of its delivery.

Methods:

A life cycle assessment (LCA) was conducted to determine the GHG emissions generated through the manufacture, packaging, and shipping of the Pillcam™ COLON 2 capsule to a UK hospital. Greenhouse gas (GHG) emissions quantified through LCA were integrated within a carbon footprint study of a typical CCE procedure, to include emissions generated via travel, consumables, waste, pharmaceuticals and the manufacture of reusable electronic equipment. A carbon footprint study with these parameters was also conducted to quantify GHG emissions generated by a typical diagnostic colonoscopy with endoscope decontamination. Interim outcome data from the NHS England colon capsule pilot were used to estimate global warming impacts at the level of the clinical pathway.

Results:

In our worked example, a diagnostic colonoscopy procedure generated 55.46kg CO₂e, with travel (30%), consumables (28%) and building energy (20%) the main contributors. Decontamination of the endoscope generated a further 11.19kg CO₂e. A CCE procedure generated 48.21kg CO₂e. Travel was the most significant (43%) contributor to the carbon footprint of a CCE procedure, the majority of which (63%) is patient travel. The manufacture and shipping of the colon capsule contributed minimally (612g CO₂e, <2%) to the overall carbon footprint. Further analysis, fitting these data to the pathway outcomes in the NHS CCE pilot, will be forthcoming.

Conclusions:

This case evaluation of colonoscopy and the NHSE CCE pilot represents a paradigm whereby LCA and carbon footprinting can be used to explore the environmental impact implications of endoscopy provision within the NHS. Travel and building energy are major determinants, and their absolute contribution will vary on a site-by-site basis. We have shown that the manufacture and shipping of the colon capsule is not a carbon-intensive process. Conversely, patient travel is the dominant contributor for CCE. Our findings can guide efforts to mitigate endoscopy-related GHG emissions and have implications for the implementation of the CCE service in England if presented as a low-carbon alternative.