

Reducing the carbon footprint of cataract surgery: co-creating solutions with a departmental Delphi process

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Introduction

- The 2009 Lancet Commission on Global Health reported that, "climate change is the biggest global health threat of the 21st century" (1).
- Health care is one of the leading contributors to climate change, accounting for around 5% of global greenhouse gas emissions (GHG) (2,3).
- High-volume surgical services, such as cataract surgery, have been identified as one of the most carbon-intensive components of health care (4,5).
- Cataract surgery is the most performed operation in the NHS and the demand for cataract surgery is forecast to increase around 50% in the years leading up to 2035 (6).
- It is likely that as cataract services expand to accommodate the increasing demand, so will GHG emissions.
- Recent literature reviews found a lack of evidence in support of strategies for developing more environmentally sustainable cataract services (7).
- The Delphi process is a method of identifying solutions to problems by gaining a consensus of expert opinion that has been used to prioritize responses to global eye health concerns (8).

Objective

To assess the effectiveness of a departmental Delphi process for improving cataract services' environmental sustainability.

Methods

- All members of an ophthalmology theatre team in a UK teaching hospital were invited to participate in a Delphi process.
- Team members were surveyed for suggestions for reducing the department's environmental impact.
- Suggested interventions were refined during a plenary face-to-face discussion and ranked.
- The highest ranked interventions were combined into a mutually agreed action plan.

Results

- Twenty-three discrete interventions were suggested by 24 team members (5 consultants,7 trainees, 10 nursing staff and 2 health care assistants).
- The list of interventions were then refined during a plenary face-to-face discussion and ranked by team members as shown in table 1.

Rank	Intervention
1st	Start a project to encourage trust to do recycling of theatre paper and plastic waste that currently goes into black landfill bins.
2nd	Explore with the suppliers about reducing packaging, using recycled materials and getting rid of plastic in their packs. Start conversation with Bausch + Lomb about this.
3rd	Clinical Governance application to be exempted from counting swabs for each cataract surgery – thereby saving the plastic swab counting trays.
4th	Remove the large blue kidney dish from the cataract packs as it is incinerated and offers little benefit (a gallipot is used for the povidone iodine preparation).
5th	Remove the spears swabs from the standard cataract packs as these are seldom used and easily available if needed in individual cases.
6th	Ward staff administer first drop of post-operative steroid on the ward (hence no dexamethasone minimum needed at end of operation and this also gets patient's bottle open for them).
7th	Buy more reusable surgical instrument trays as the shortage means we've been using disposable ones.
8th	Use Keratome for both main incision and paracentesis so only one blade is needed per cataract operation (change packs, but other knives still easily available for individual cases).
9th	Start a Commissioning Support Unit paperless workstream – if there were wider availability of mobile computers on the ward, we could avoid printing out all pre-assessment and theatre documents (other than paper letters for non-Leeds post-codes).
10th	Motion sensor-controlled taps to reduce water use when scrubbing.
11th	Start a project to identify what is 'standard' in each cataract pack and encourage everyone to adopt a unified and lighter cataract instrumentation practice.
12th	Clinical Governance to apply for exemption from counting instruments at the end of cataract surgery. It is not possible to leave an instrument in the eye or orbit and there has been no benefit of counting in preventing loss or damage of instruments by sterile services.
13th	Cataract pathway folders (currently plastic with red for 2nd eyes) – try to source coloured cardboard versions to reduce plastic use.
14th	Encourage surgeons to arrive on time to theatre. Even if ward round not finished try to start team brief on time. Monitor arrival times of surgeons.
15th	Task shift pre-operative preparation with povidone iodine. Single minimum drop on ward 25. Full prep in anaesthetic room by Operating Department Practitioner prior to coming into theatre.

Table 1. Ranked list of suggested interventions

Results (continued)

- The 2nd, 4th, 5th, 8th and 11th ranked interventions were combined into an "Eco-packs" project in collaboration with suppliers (Bausch + Lomb).
- As shown in figure 1, environmentally friendly phaecoemulsification packs containing only the essential equipment for cataract surgery were designed to reduce waste sent to landfill.
- The phaecoemulsification packs routinely used weigh 1.05kg, whereas the new "Eco-packs" weigh 0.915kg.
- Since approximately 5,000 cataract operations are performed annually in the host institution's ophthalmology department, if all surgeons used "Eco-packs", around 675kg of disposable waste would be saved each year.

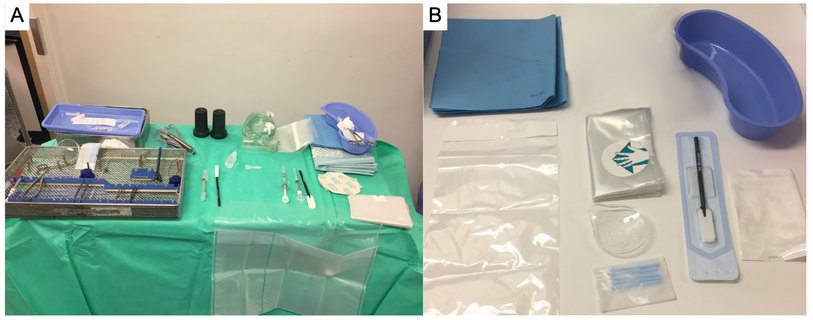


Figure 1. A) Phacoemulsification trolley set-up prior to the Delphi process. B) Items removed following the results of the Delphi process

Conclusions

- Our study demonstrates that the Delphi process is an effective tool for innovating strategies for improving the environmental sustainability of cataract services.
- We would recommend the use of a Delphi process to all UK cataract departments looking to reduce their carbon footprint.

References
1. Costello A, Abbas M, Allen A, Ball S, Bell S, Bellamy R, et al. Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission. Lancet. 2009;373(9676):1693–733.
2. Watts N, Amann M, Arnell N, Ayeb-Karlsson S, Belesova K, Boykoff M, et al. The 2019 report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate. Lancet. 2019;394(10211):1836–78.
3. Pichler P-P, Jaccard IS, Weisz U, Weisz H. International comparison of health care carbon footprints. Environ Res Lett. 2019;14:064004.
4. Morris DS, Wright T, Somner JEA, Connor A. The carbon footprint of cataract surgery. Eye. 2013;27(4):495–501.
5. MacNeill AJ, Lillywhite R, Brown CJ. The impact of surgery on global climate: a carbon footprinting study of operating theatres in three health systems. Lancet Planet Heal. 2017;1(9):e360–7.
6. Buchan JC, Norman P, Shickle D, Cassels-Brown A, MacEwen C. Failing to plan and planning to fail. Can we predict the future growth of demand on UK Eye Care Services? Eye. 2019;33(7):1029–31.
7. Buchan JC, Thiel CL, Steyn A, Somner J, Venkatesh R, Burton MJ, et al. Addressing the environmental sustainability of eye health-care delivery: a scoping review. Lancet Planet Heal. 2022;6(6):e524–34.
8. Buchan JC, Dean WH, Foster A, Burton MJ. What are the priorities for improving cataract surgical outcomes in Africa? Results of a Delphi exercise. Int Ophthalmol. 2018;38(4):1409–14.