Designing greener intravitreal injection services using the Delphi process

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Introduction:

- The NHS has set a goal to become net zero by 2045 (1).
- Over 677 000 intravitreal injections (IVIs) were performed in the UK in the 2021/22 NHS year (2).
- It is likely that as IVI services expand to meet the growing demands of the ageing UK population, the carbon footprint of IVI services will also increase (3, 4).
- Strategies are needed to ensure that IVI service expansion is environmentally sustainable.
- The Delphi process is a method for designing solutions to problems by generating a consensus of expert opinion that has been successfully implemented to better the environmental sustainability in cataract services within our own NHS trust (5).

Objective:

To assess the effectiveness in a departmental Delphi process in improving environmental sustainability within intravitreal injection services

Methods:

- Staff of all cadres involved with IVIs at a UK teaching hospital were asked by group email for suggestions on how to reduce the carbon footprint and waste production of IVI services, yielding 25 responses
- Participating staff were invited via email to meet in-person during a medical retinal clinical audit meeting, where we discussed ideas and discarded unrealistic proposals, leaving us with 23 interventions
- These were then de-duplicated, anonymised and coalesced into 17 discreet interventions.
- These were put into an online poll and were circulated via email to be ranked 1-17 by staff.
- The highest-ranking interventions were formulated into an action plan.
- Financial and waste saving achieved by the action plan were calculated.

Results

Sourced suggestions

- Our received suggestions were refined to 17 in total.
- The list of interventions were ranked in order of preference with the results of seen in Table 1 (right)
- The most popular ideas focused on reducing packaging, sorting waste, and increasing proportion of waste recycled

Implemented changes and their impact

- Waste reduction involved removing under-utilised items from the IVI pack and reducing the use of under-utilised PPE, saving 39.4g of waste and 42 pence per IVI.
- Recycling bins were purchased, and IVI staff were trained about waste segregation (Figure 1 and Table 2).
- As ~12,000 IVIs are performed locally per annum, initial interventions from our Delphi process are projected to increase waste recycled by 1 300kg per year, save £5 000 and reduce waste by 470kg.

Table 1: Proposed actions ordered into overall preference among staff

Rank	Intervention
1st	Ask manufacturers to reduce packaging
2nd	Separate clinic (yellow bags) and domestic waste (black bags) and explore recycling
3rd	Increase intervals between Faricimab injections by 4 weeks, not 2 weeks, when the eye has a good initial response to treatment and is "dry"
4th	Explore the use of paper aprons instead of plastic aprons for injection
5th	Make more moves to being paperless (e-prescription and e-consent and use Green/Yellow/Red cards to help move through clinic
6th	Explore re-usable instruments (speculum, calliper) and autoclaving
7th	Agree and remove or reduce the number of plastic spears and wooden cotton buds
8th	Don't wipe down the injection room chairs with alcohol/chlorine wipes between every patient
9th	Don't use single bottles of sterile water or saline to clean skin after injection but use tap water or explore large bottle of saline
10th	Produce and circulate clear guidance on the management, follow-up and imaging of patients with diabetic maculopathy and retinopathy
11th	Print out QR codes for common patient information leaflets
12th	Stop printing out the clinic lists/appointments
13th	Consider virtual clinic in Wharfedale with Eidon camera and consider patient-initiated follow-up (PIFU)
14th	Instigate MDT meeting to discuss care pathway for specific patients and share management plans
15th	Make use of imaging hubs in community for patient assessment
16th	Produce and circulate clear guidance on the use of Ozurdex and the follow-up of treated patients
17th	Explore setting up a new injection clinic in South Leeds to reduce travel for patients from South Leeds





Figure A: The different waste receptacles implemented: Clockwise from top left: Dry mixed recycling, domestic waste, offensive waste, cytotoxic sharps, recycling sharps
Figure B: Segregated waste generated from an IVI clinic in a community hospital

Waste Stream	Waste disposal prior to Delphi process	Improved waste disposal practices
Offensive waste (kg)	228.97	56.64
Domestic waste (kg)	0	72.38
Dry mixed recycling (kg)	0	99.95
Recycling sharps bins (kg)	0	8.91
Cytotoxic sharps bin (kg)	14.79	5.88

Table 2: Waste disposed per 1,000 IVIs prior and after Delphi process implementation

Conclusion:

- Our study demonstrates how the Delphi process can be used to reduce the waste production of IVIs within an NHS trust, as well as reducing financial expenditure
- The Delphi process encourages staff involvement in managing sustainability.
- We would recommend the use of a Delphi process to all medical retina teams across the United Kingdom looking to reduce waste production or carbon footprint.

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