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Towards Sustainable Ophthalmology:

An Analysis of Custom Packs used in Cataract Surgery to Reduce Waste and CO2 Emissions

KEYWORDS
Sustainability, Theatre, Ophthalmology

INTRODUCTION

Sustainability in healthcare is increasingly vital, particularly in operating rooms where significant waste and CO2 emissions are generated. The healthcare sector contributes to 4.4% of global greenhouse gas emissions, with operating rooms responsible for 71% of this due to disposable supplies.[1] Cataract surgery, a common procedure, heavily relies on disposable items, leading to substantial environmental impact. This study examines the custom cataract surgery pack used at Mater Dei Hospital, comparing it to the European Society of Cataract and Refractive Surgery (ESCRS) benchmark to identify potential improvements in sustainability practices.

PURPOSE

The purpose of this study is to examine the custom pack used at Mater Dei Hospital and compare it with the benchmark pack recommended by the ESCRS. The goal is to raise awareness and recommend practice changes if necessary.

METHODS

The custom pack used at Mater Dei Hospital in May 2024 was evaluated by reviewing the contents and inputting them into the Sustainability Index for Disposables in Cataract Surgery (SIDICS) calculator, which was recently published on the European Society of Cataract and Refractive Surgery (ESCRS) website. When products that were not exact matches were identified in the calculator, the closest available option was selected as an alternative.

RESULTS

In 2023 at Mater Dei Hospital, approximately 4203 custom packs for cataract packs were used. However, these are not solely used for cataract operations, but also for other types of ophthalmology surgeries such retinal surgery, glaucoma surgery and corneal surgery. 3933 of these packs were used specifically for cataract operations. The assessed custom pack uses 7.6 kg of CO2 equivalent per pack. The ESCRS benchmark pack uses 4.9 kg of CO2 equivalent per pack. Therefore, there is a potential for saving 2.7 kg of CO2 per pack, which would have amounted to 11,348 kg of CO2 in 2023.

Figure 1. Current custom pack used at Mater Dei Hospital.

Current Custom Pack	Size / Quantity	Current custom pack Carbon footprint (grams, CO2 Equivalent)
OR Gown Surgeon	XL	698.5
Or Gown Scrub Nurse	L	669.7
Body Drape with Pouch	157x254cm	2847.7
Back table cover	140x140cm	2495.8
Eye Shield	1	95.5
Eye Pad	3	17.1
Surgical Spears	10	3
Slit Knife	1	112.7
Sideport Knife	1	185.6
2ml Syringe	3	22
10ml Syringe	1	89
Cannula for Hydrodissection	2	12.1
Cystotome	1	18.3
Other Needles/Cannulas	3	12.2
Cataract pack overpack	1	230.4
Product List + Sticker	2	40.8
Total per pack		**7.6Kg**

Figure 2. ESCRS Benchmark Pack.

ESCRS Custom Pack	Size / Quantity	ESCRS custompack Carbon footprint (grams, CO2 Equivalent)
OR Gown Surgeon	L	669.7
Or Gown ScrubNurse	L	669.7
Body Drape with Pouch	100*120cm	856.9
Back table cover	110*140	1782.7
Gauze Swab	5	6.7
Stick Swab	2	22
Paper Towel/Operating room towel	1	91.3
Instrument Wipe	1	136.9
Slit Knife	1	112.7
Sideport Knife	1	185.6
Syringe 3ml	1	37.1
Syringe 5ml	1	36.4
Cannula for Hydrodissection	1	12.1
Cystotome	1	18.3
Cataract pack overpack (plastic)	1	230.4
Product List	1	77.5
Total per pack		**4.9Kg**

DISCUSSION

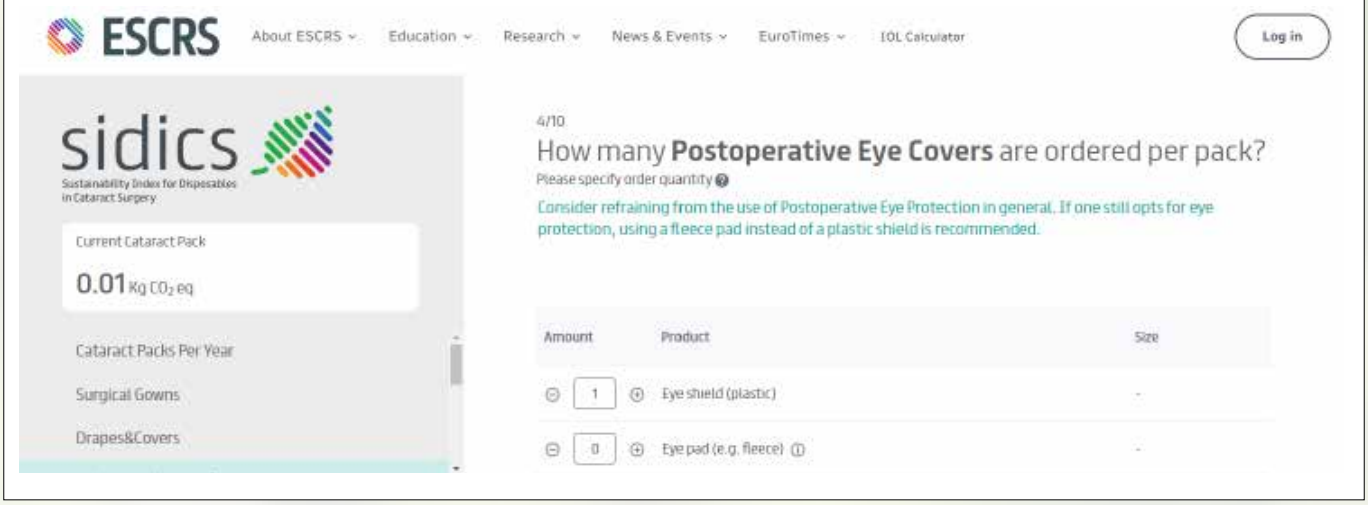
Cataract surgery is a common procedure that generates a significant amount of waste due to the use of single-use items such as drapes, gowns, and instruments. To prioritize sustainability, healthcare facilities are adopting more environmentally friendly practices such as using reusable options and reducing unnecessary waste to mitigate environmental impact.[1] One recent development at Mater Dei Hospital is the introduction of re\cycling bins for disposing of recyclable packaging waste. In keeping with this, studies have revealed that most ophthalmology practices could improve in reducing waste, travel, and carbon footprints.[2,3]

Cataract surgery has seen a shift towards disposable medical supplies in recent years.[4] This trend may be linked to concerns about prion diseases, which led to stricter (and more expensive) sterilization procedures for reusable instruments and surgical environments around 1996. However, the WHO stated in 2016 that there is no increased risk of infections during surgery when using appropriately sterilised reusable materials compared to disposables.[5]

Custom packs contain the necessary instruments and supplies for cataract surgery, tailored to the preferences and requirements of surgeons to reduce waste, and improve efficiency. However, it is important to note that not all ophthalmic surgeons use the same instruments found in the pack, and these packs may not be used exclusively for cataract surgery. By being aware of the impact that our choices have on the environment, we can make more informed decisions about the contents of our standard pack, reducing excess inventory and minimizing carbon dioxide (CO2) impact. These packs can also enhance efficiency and reduce surgical time, by ensuring that all the necessary items are readily available during surgery.

The SIDICS calculator helps assess the environmental impact of different cataract surgery packages. The calculator uses generic data to show the CO2 impact of the most common materials we use during surgery. The developers explain that the results should be interpreted as approximate estimates of environmental impact and not as absolute values. The SIDICS calculator estimates the environmental impact of different cataract surgery package configurations by analyzing data from three Austrian suppliers. This tool is meant to provide information and guidance but doesn't cover all possible product options. Consequently, the calculated results may be slightly inaccurate. It is important to consider that the contents of the ESCRS pack are only recommendations. As shown in the results section there are considerable differences in the number and type of items which have been deemed as the basic cataract set by the ESCRS. The selection of drape and gown sizes in cataract surgery remains subjective, determined by the surgeon's judgment. Key considerations during selection include surgeon comfort, ease of instrument manipulation within the draped field, and ensuring adequate patient and staff coverage.[6] Not using an eye shield has become common practice in many facilities as they have been found to offer no benefit on post-op recovery after uncomplicated cataract surgery, yet it is up to the operating surgeon to decide whether to use one or not.[7] The ESCRS acknowledges that doctors should use their own judgement when making decisions and the aim of the calculator is to provide insights for eco-conscious cataract surgery choices without dictating methods of practice.

Figure 3. Screenshot from the ESCRS website. This shows the webpage of the SIDICS calculator recommending against the use of an eye shield in the postoperative period.



After reviewing our current custom packs and comparing them to the ECSRS benchmark, we have identified a significant difference in the CO2 footprint. The benchmark indicates that there is room for improvement in our current packs. Our packs include surgical gowns, drapes, and covers, which are typically larger and have a higher environmental impact. Additionally, our current packs include a larger variety of fluid management items, eye shields and eye patches as well as variations in the number and sizes of syringes and cannulas compared to the ESCRS pack.

LIMITATIONS

We acknowledge that that the composition of custom packs utilized at Mater Dei Hospital during the calendar year 2023 may exhibit variations compared to those analyzed in May 2024. Such variations are attributable to the cyclical nature of procurement processes. However, they are usually similar with minimal alterations.

OUR RECOMMENDATIONS

- To review the current custom packs and following consultation with ophthalmologists and hospital management,
  - reduce the number of disposable items.
  - review the size of surgical drapes and surgeon gowns currently in use.
- To review and implement practices changes by increasing recycling and using more eco-friendly materials.

CONCLUSION

A survey among ESCRS member cataract surgeons reveals a strong consensus on the need to reduce operating room waste and a willingness to reuse surgical supplies and medications, reflecting a global concern for sustainability in healthcare. It also found that most surgeons preferred more reusable supplies and device options including reusable instruments.[8] By carefully reviewing the current custom pack and ensuring that the European benchmark is considered when ordering new custom packs, we could potentially save up to 2.7 kg of CO2 per pack. This could be a starting point for a more sustainable practice at Mater Dei Hospital after further consideration and analysis.

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