

Waste Benefits of a Reusable IoL Inserter in Cataract Surgery

Waste Case Study



Johnson & Johnson



**Sustainable
Healthcare
Coalition**

Understanding Waste Benefits of a Reusable Intraocular Lens (IoL) Inserter in Cataract Surgery

Introduction

Globally, it is recognised that health and care systems are undergoing transformative change with a goal of adapting to the ongoing needs of patients and communities while also considering and incorporating environmental sustainability activities.

Leading healthcare systems in several European countries are assessing sustainability as a component of device procurement criteria to ensure reductions and environmental responsibility. For example, hospitals in Spain and France have added environmental criteria as part of their procurement criteria for medical devices, including that packaging is made of recycled materials¹⁻⁵. The Greener NHS (National Health Service) Campaign was launched in 2020, which aims to reduce CO2 emissions 80% by 2032 and reach net zero by 2040. Reducing waste and lowering the carbon footprint of materials will help these healthcare systems achieve their sustainability goals⁶. As part of its sustainability guide, the Dutch Ophthalmology Society suggests choosing intraocular lenses that can be used with a durable reusable injector, such as the Reusable Titanium Inserter VITAN UNFOLDER™ using SmartLOAD™ Delivery technology⁷.

Cataract surgery holds the title of the most frequently conducted surgical procedure globally⁸. Optegra, who provide eye health care for the NHS across the UK, perform on average 25 cataract surgery cases per surgeon per day on each of their UK sites (~12 sites). With this many surgical procedures, this often means daily deliveries.

Based on a Canadian survey of more than 1,300 surgeons and nurses, a high proportion of ophthalmologists and operating room staff desire reductions in the carbon footprint associated with delivering ophthalmic services, and support steps to reduce waste. 93% of ophthalmologists and nurses believe operating waste is excessive and should be reduced and 10 times as many surgeons would prefer a reusable instrument over a disposable instrument assuming the same cost and functionality^{9,10}.

An opportunity to facilitate waste reduction during cataract surgery is by using reusable IoL introducers. A pilot study undertaken in collaboration with Optegra highlighted the difference in waste generated at the customer site when implementing in practice the Reusable Titanium Inserter VITAN UNFOLDER™ to the single-use alternative. The Reusable Titanium Inserter VITAN UNFOLDER™ using SmartLOAD™ Delivery technology makes use of a reusable IoL inserter with a single-use cartridge whereas the single-use inserter and cartridge are fully disposed of.

The context for reusable IoL inserters

IoLs (intraocular lenses) are clear, artificial lenses that replace your eye's natural ones. Cataracts cause the eye's natural lens to become cloudy. Cataract surgery removes this blurry lens and replaces it with a clear IoL to improve the patient's vision. The current TECNIS Simplicity™ IoL inserter used in cataract surgery is single-use plastic and is disposed of after surgery.

The Unfolder Vitan inserter is a reusable titanium device to be used with the same SmartLOAD™ Delivery Technology single-use plastic cartridge. This reusable inserter can deliver precise, controlled delivery of IoLs with a reliable technique of screw-style insertions and an ergonomic design for a comfortable grip. The reusable inserter is sterilized for reuse on the same tray as other reusable items used in the surgery.

¹ Servicio Andaluz de Salud: Central Provincial de Compras de Córdoba (2023). Anexo 1 al cuadro resumen. PAAM 1/23 [Annex 1 to the summary table. PAAM 1/23]

² Osakidetza (2023). Contrato de suministro (Expediente nº: 2023/00727): Acuerdo Marco para el suministro de material sanitario para el facoemulsificador Centurion y para el facoemulsificador vitreotomo Constellation y equipamiento para el servicio oftalmología. [Supply contract (File no.: 2023/00727): Framework Agreement for the supply of medical supplies for the Centurion phacoemulsifier and for the Constellation vitrectomy phacoemulsifier and equipment for the ophthalmology service]

³ J&J reference 1 Hospital Clínico Universitario de Valladolid (2022). Contratación del suministro de lentes y pacs de viscolástico para la realización de cirugía de cataratas, glaucoma y queratoplastia, para el Hospital Clínico Universitario de Valladolid. [Procurement of the supply of lenses and viscoelastic packs for the performance of cataract surgery, glaucoma and keratoplasty, for the University Clinical Hospital of Valladolid]

⁴ Hospital Insular Nuestra Señora De Los Reyes (2022). Pliego de cláusulas administrativas particulares para la contratación del suministro de lentes intraoculares, equipo estéril y consumibles para cirugía de cataratas. [Specific administrative clauses for the procurement of the supply of intraocular lenses, sterile equipment and consumables for cataract surgery]

⁵ Giraud JS, Hamidou F, Hassani Y, Borel C, Le Gonidec P (2022) [French national overview of the inclusion of environmental criteria in the public purchasing of health products (drugs and sterile medical devices)]. *Annales Pharmaceutiques Françaises* 80 (2): 216-226

⁶ Wong YL, Noor M, James KL, Aslam TM (2021) Ophthalmology Going Greener: A Narrative Review. *Ophthalmology and Therapy* 10 (4): 845-857

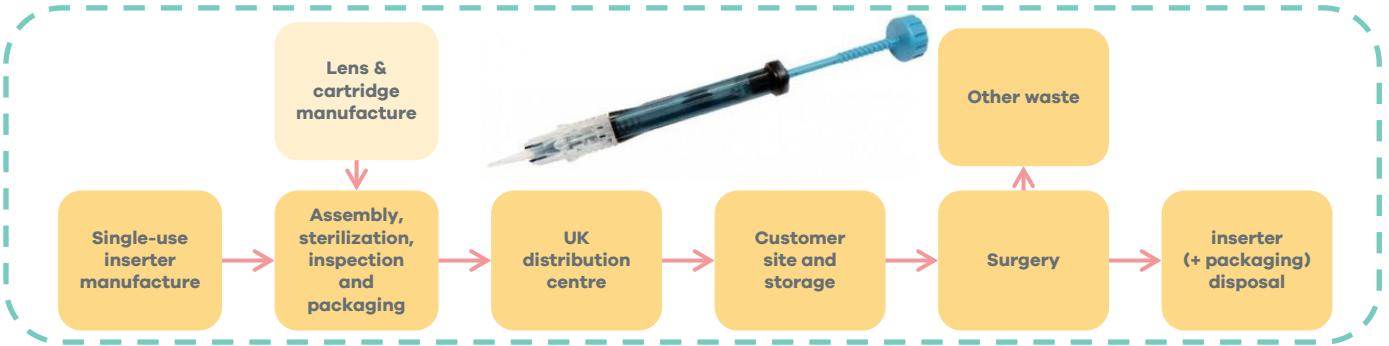
⁷ Banens RvL, R; Elferink, S; Henry, Y on behalf of the Sustainable Ophthalmology Project Group (2022). *Guide to making cataract surgery more sustainable*, Dutch Ophthalmology Society Available online at: <https://www.oogheelkunde.org/wp-content/uploads/2022/11/Best-Practise-Phaco-definitief.pdf>. Accessed: March 23, 2023

⁸ <https://www.nature.com/articles/eye2012293>

⁹ Chang DF, Thiel CL, Ophthalmic Instrument C, Sterilization Task F (2020) Survey of cataract surgeons' and nurses' attitudes toward operating room waste. *Journal of Cataract and Refractive Surgery* 46 (7): 933-940

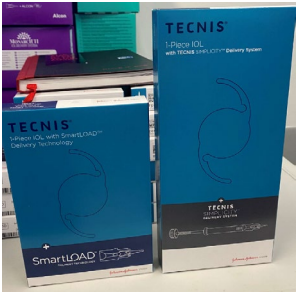
¹⁰ Chang DF (2020) Needleless Waste and the Sustainability of Cataract Surgery. *Ophthalmology* 127 (12): 1600-1602

Single-Use IoL Product System



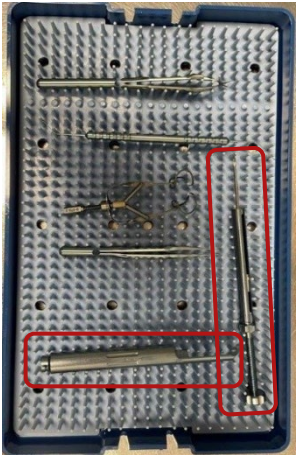
The diagrams on this page show the life cycle of the single-use and reusable system IoL inserter.

Both IoL inserters are delivered in a cardboard box to the customer site. The single-use TECNIS Simplicity™ box contains the full delivery system, including the IoL and inserter, whereas the reusable system box just contains the IoL and the single-use SmartLOAD™ cartridge. The packaging comparisons per inserter are shown in the picture on the right. This difference means the delivery package size per IoL is smaller for the reusable system, which scaled up to a daily delivery reduces the deliver size from two shipper boxes to one. This difference enables less frequent deliveries, reducing overall journeys. Due to this order consolidation, there is a 49% reduction in shipper packaging weight and a 27% reduction in overall shipment weight. These savings are equivalent to 0.845 kg per shipper, or 0.132 kg per cataract surgery, which scales up to 3.96 kg reduction in weight per shipment.

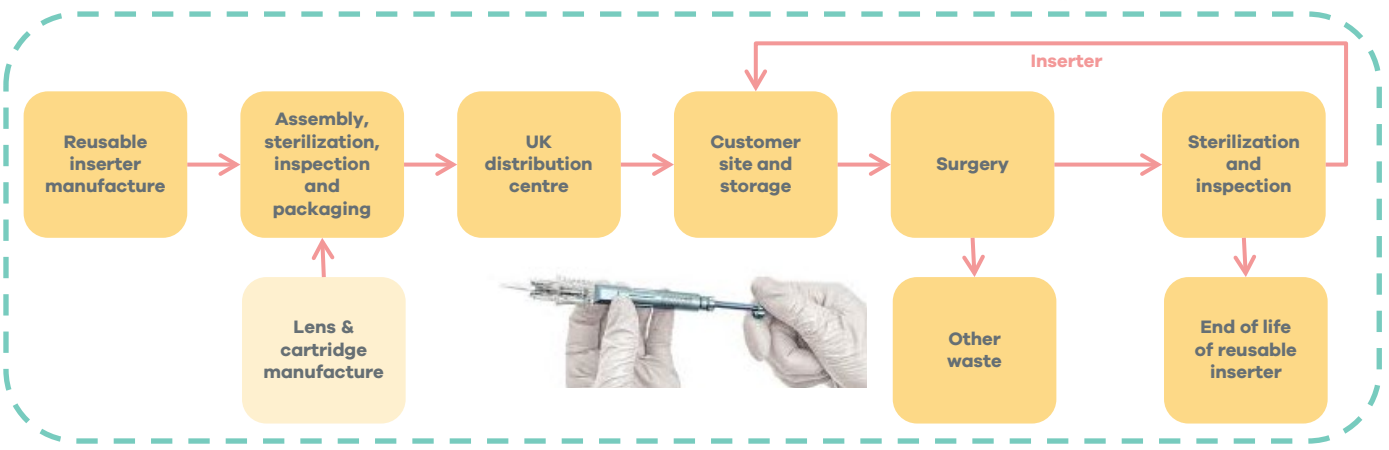


The reduced box size improves storage utilisation by 20% due to the shorter package profile. This allows more IoL products to be stored in the same storage unit where space is at a premium.

The single-use inserter is used in surgery and then the whole device is disposed of and goes to waste treatment. Once the reusable inserter is used, the single-use SmartLOAD™ cartridge is sent to disposal and the reusable portion is sent to sterilization. The reusable inserter is sterilised between each surgery alongside the other surgical equipment. As the inserter is accommodated within the existing sterilisation tray, Optegra experienced no changes to sterilization activity or energy consumption from a change to the reusable inserter. The sterilization tray, including the reusable inserter components, circled red, is shown on the right. Introducing the reusable inserter into cataract surgery caused no change to the medical staff's workflow as the screw-style and ergonomic designs of both inserter types are similar. The reusable inserters lifetime is estimated to be 500+ procedures and sterilisation cycles.



Reusable IoL Product System





49% reduction
in shipper
packaging
weight
9 boxes to 4



Weekly supply of IoLs with single-use inserters

As previously mentioned, the delivery of inserters weekly reduces the shipper packaging weight by 49% and the overall shipment weight by 27% when using the reusable inserter instead of the single-use one.

All the single-use inserter, including the cartridge, goes into the medical waste bag after use whereas only the cartridge goes to medical waste in the case of the reusable inserter. SmartLOAD™ Delivery Technology produces 4.2 times less waste than the average preloaded disposable delivery system¹¹. Scaling the saving up, exclusive use of SmartLOAD™ Delivery Technology could save over 9,300 kg of waste per year in England¹².

Substituting the single-use inserter with the reusable technology reduces the amount of material shipped, storage requirements and waste produced during cataract surgery, while not impacting the ease of use for surgical staff.

When looking at the total procedure, clinical waste is only slightly reduced with the inserter switch due to significant waste contribution relating to drapes, gowns and phaco kits. The inserter switch is a good start but the challenge to reduce overall surgical waste remains for cataract surgery, which is the most frequently conducted surgical procedure globally⁸. In a large volume context such as this, marginal gains can contribute to a large overall improvement.

Weekly supply of IoLs for use with reusable inserters

Opetgra Reusable IoL Inserter Pilot	Single-use inserter	Reusable inserter
Inserter weight (without lens, lens holder, cartridge or packaging)	9.62 g	33.4 g
Total IoL shipment weight for weekly order	14.69 kg	10.73 kg

Learnings

Using the SmartLOAD™ Delivery Technology with a reusable inserter would reduce the shipping materials, shipping journeys, storage requirements and waste produced during cataract surgery compared to the current single-use system with a similar screw-style inserter and ergonomic design. A full life cycle GHG assessment would be necessary to determine the climate change benefits of a move to reusable inserters. Such an assessment would consider manufacture, packaging, transport, sterilization and end of life impact.

Acknowledgements

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Opetgra was involved in a pilot study of the J&J Smartload injector system as a proof of concept. While the Pilot Study has demonstrated positive steps towards sustainability, Opetgra has not as yet formally adopted the system in its current clinical practice.

¹¹ Johnson & Johnson Surgical Vision, Inc. 2019, *Internal Data – REF2020OTH4140*. Calculated based on average weight of device, lens, tray and pouch of Alcon AutonoMe, Hoya Vivinex, and Alcon UltraSert delivery systems

¹² Based on estimated number of cataract surgeries in England (approximately 456,000 cases in 2019/2020)¹³ and the average weight of device, lens, tray and pouch of delivery systems.

¹³ The Royal College of Ophthalmologists (2022). National Ophthalmology Database Audit. Available online at: <https://www.nodaudit.org.uk/u/docs/20/pxawiazimp/NOD%20Audit%20Full%20Annual%20Report%202022..pdf>. Accessed: April 19, 2023.