

Appraisal of Environmental Impact of a Surgical Procedure

ULS Matosinhos
Portugal



AstraZeneca 



**Sustainable
Healthcare
Coalition**

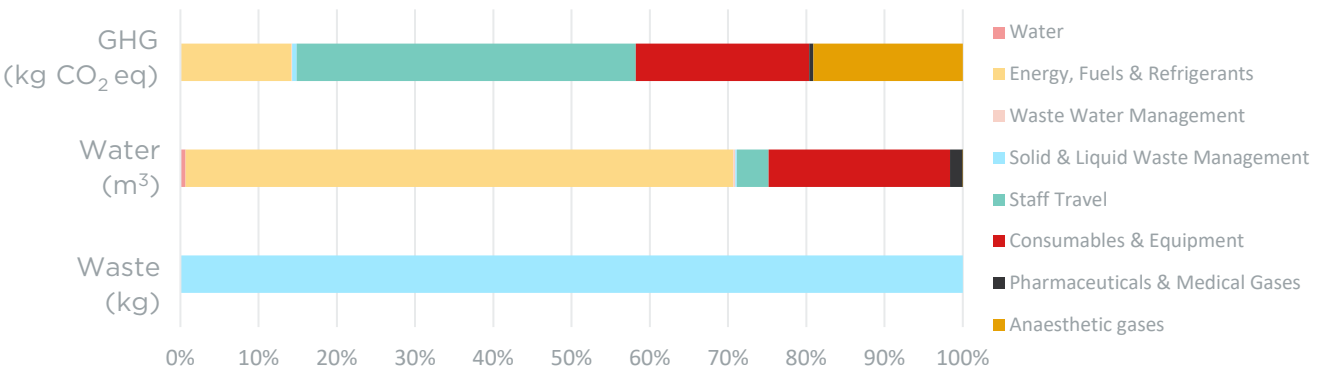
Title	Surgical procedure at ULS Matosinhos – Hospital Pedro Hispano, Portugal
Organisation and role	AstraZeneca UK Limited initiated and funded this work, but it was not involved in collecting and analysing the hospital data. AstraZeneca saw only the final output.
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Completion date	September 2023
Assurance	Internal assurance
Supporting information	Operational data from Unidade Local de Saúde (ULS) Matosinhos – Hospital Pedro Hispano, Portugal
Data gathering and analysis contact	Michael Collins, Partner, ERM (michael.collins@erm.com)
Hospital contact	Pedro Machado (pedro.machado@ulsm.min-saude.pt)
Conformance with Care Pathways: Guidance on Appraising Sustainability ¹	Adheres to the principles of the Guidance
Care pathway description	Surgical procedure visit at ULS Matosinhos
Environmental issues appraised	Global warming potential (IPCC, CO ₂ eq, 100-year), water use, waste

This resource is supplementary material for the care pathway study of ULS Matosinhos and activities within the hospital, ‘Appraisal of Environmental Impact of ULS Matosinhos.’² Refer to that document for a description of the assessment procedures.

Findings

This study appraised the environmental impact of a surgical procedure visit at ULS Matosinhos in Portugal. The study found a greenhouse gas (GHG) emission impact of 93.2 kg CO₂ eq, water use of 183 m³ and waste of 1.7 kg per hour of surgery.

Staff travel was the most significant contributor to the total GHG emissions, accounting for 43% of the impact and driven by the number of staff in the department. It should be noted that the emission factor for staff travel was based on average commuting emissions in the UK, as local data were unavailable. A dedicated staff travel survey would provide data to enable a more accurate appraisal of staff commuting impacts. Energy, fuels and refrigerants, consumables and equipment and anaesthetic gases were also identified as GHG emissions hotspots.



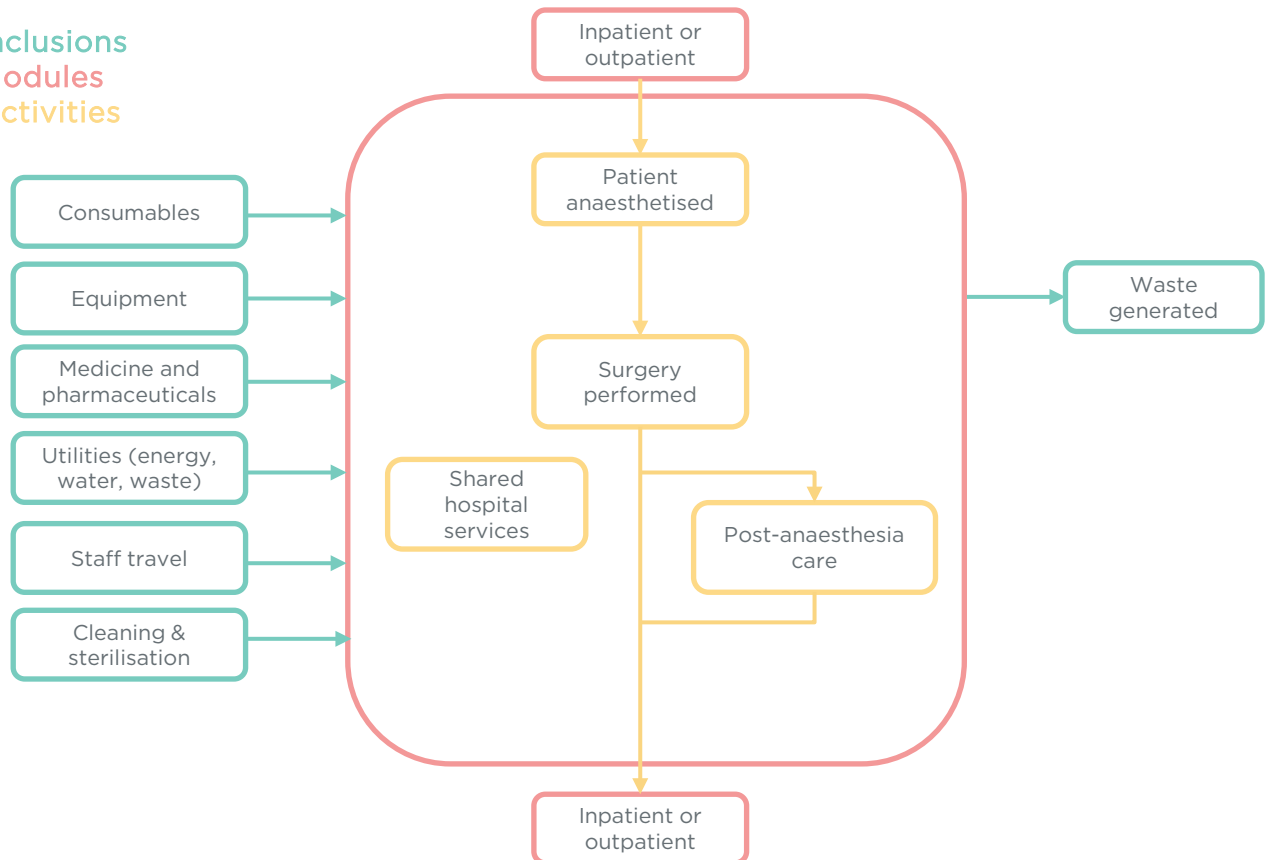
¹ Care Pathways: Guidance on Appraising Sustainability. (SHC, 2023). <https://shcoalition.org/sustainable-care-pathways-guidance/>

² Appraisal of Environmental Impact of ULS Matosinhos, (SHC, 2025), https://shcoalition.org/wp-content/uploads/2025/07/AppraisalOfHospitalActivities_Portugal.pdf

Scope

- This assessment appraises the environmental impact of a surgical procedure visit at ULS Matosinhos.
- The functional unit of the system studied is an hour of a surgical procedure in 2021.
- The scope includes the patient being anaesthetised, surgery performed on the patient and post-anaesthesia care. The scope does not include referral to other services.

Inclusions Modules Activities



Data

The following data were collected for all relevant activities for 2021, and are described in the diagram:

- Utilities data (fuels, electricity renewable or not, water use, and waste generated)
- Department consumables, such as bone cement, trochanteric pins and multi-axial screws
- Medical gases, including oxygen and nitrogen
- Anaesthetic gases, including desflurane and sevoflurane
- Pharmaceutical products, including muscle relaxants and antibiotics
- Equipment, such as disposable electrode ECG cards, perfusion syringes, clinical pipe and perfusion pump systems
- Staff travel
- Linen use and cleaning and facilities cleaning

The environmental impact of all surgical procedures for 2021 were modelled and then divided by the total number of surgery hours. The hospital's utilities data were provided and allocated to the surgical department based on floor space.

Results

- Results are the environmental impact of an hour of surgery at ULS Matosinhos

Module	GHG kg CO ₂ eq	Water m ³		Waste kg
		Direct	Indirect	
Water	0.07	0.20	1.03	-
Energy & fuels	11.29	-	125	-
Refrigerant	1.86	-	2.76	-
Waste water management	0.10	-	0.48	-
Solid/ liquid waste management	0.50	-	0.36	1.74
Staff travel	40.40	-	7.38	-
Consumables	18.22	-	42.37	-
Equipment	2.45	-	0.09	-
Pharmaceuticals and medical gases	0.50	-	2.95	-
Anaesthetic gases	17.77	-	0.02	-
Total	93.2	0.20	182.8	1.74

Acknowledgements

This document has been developed collaboratively with ULS Matosinhos and the Sustainable Healthcare Coalition. The coalition comprises a range of organisations within the healthcare sector, including pharmaceutical and medical device companies, trade bodies, procurement, government organisations and other stakeholders. The Sustainable Healthcare Coalition operates with the aim of facilitating the journey towards good health and wellbeing on a finite planet, through open-minded collaboration across public and private healthcare.