

The Environmental Impact of the First Pass Effect in Mechanical Thrombectomy in the NHS

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Introduction

- The NHS is aiming to reach net zero carbon emissions by 2040, with an 80% reduction by 2028-2032.¹
- First Pass Effect (FPE), a measure of the ability of a mechanical thrombectomy (MT) device to restore complete or near-complete reperfusion (mTICI 2c-3) in a single pass of the device through a clot, is an independent predictor of good functional outcome.²
- FPE results in improved clinical outcomes and shorter length of stay (LOS) compared to the patients who achieved mTICI 2c-3 after multiple passes (i.e. Non-FPE).³

Objective

- To appraise the environmental impact of FPE based on reductions in length of stay in hospital compared to non-FPE.

Methods

- An environmental impact model was developed.
- Clinical and resource data were obtained from the post-hoc analysis of the ARISE multi-country prospective study investigating the efficacy and safety of an MT device (EMBOTRAP).⁴
- Environmental sustainability data was obtained from the Sustainable Care Pathways Guidance, created by the Sustainable Healthcare Coalition, of which the NHS Sustainable Development Unit is a member.⁵
- Patients were limited to those in whom mTICI 2c-3 was achieved to avoid any selection bias.
- Outcomes examined were greenhouse gas emissions and waste resulting from the stay in hospital.

Results

- The estimated environmental savings based on the reduction in length of stay in hospital were 134 kg CO₂e and 13 kg waste per FPE (Table 1).

Results contd.

Table 1: Environmental impact of the reductions in LOS with FPE

Activity	Difference (FPE minus Non-FPE)	GHG emissions (kg CO ₂ e) per inpatient bed day	Total GHG emissions (kg CO ₂ e)*	Waste generation (kg) per inpatient bed day	Total waste generation (kg)*
LOS, standard bed days	-3.1	37.9	-116.7	3.3	-10.2
LOS, ICU days	-0.2	89.5	-17.0	13.0	-2.5
Environmental impact per FPE			-133.7		-12.7

*Negative values indicate a reduction in environmental metrics

- It is estimated that ~10,000 patients per year are eligible for MT in the UK.⁶ Achieving 40% FPE with mTICI 2c-3 could save 536 tonnes of CO₂e and 51 tonnes of waste each year in the UK; which is the equivalent of the carbon emissions of 2,500 round trip flights from London to Milan.⁷

Conclusion

Achieving high successful reperfusion rates and reduced length of hospital stay with FPE in MT could result in environmental benefits and thus contribute to NHS carbon emission reduction targets.

References

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