

SBRI NROL Health Economics Summary

Project Title: Scaling and Evaluating the NeuroRehabilitation OnLine (NROL) Model: Enhancing Access to Intensive Digital Stroke Rehabilitation Across NHS Regions for Better Outcomes

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Background

We provide an economic interpretation of the evidence generated by the NROL evaluation (Ackerley et al. 2026; SBRI MM Evaluation Report 2026), structured around the concepts of technical efficiency and productivity as applied to NHS community neurorehabilitation. It is intended to inform a business case for sustained NROL delivery by providing commissioners and funders with a transparent account of what the data show and any assumptions made to produce findings or make inferences.

We draw on the input-output framework for measuring productivity in health care, as set out in the Atkinson (2005) review and applied to the NHS context by the Arden & GEM CSU (2025) productivity report. Throughout, we distinguish between claims that are directly supported by evaluation data, those that require stated assumptions, and those that remain directions for future work.

Note: The primary analysis draws on L&SC data as the more complete, long-term dataset. Where data are available for L&SC (Apr24/Mar25) and L&SC+ (Apr25/Mar26), these are reported alongside the original L&SC (Apr22/Mar24) findings.

The Economics of NROL

We consider whether NROL represents a more efficient way of producing neurorehabilitation than the existing model of predominantly in-person, one-to-one home visits. This requires us to compare inputs and outputs across the two models of delivery.

Inputs

Standard (in-person) model

- Therapist labour (including travel time)
- Vehicle mileage
- Overhead costs associated with individual community visits

The key variable cost driver is therapist time per patient contact, estimated at approximately 2.0 hours including travel (at an average of 18.8 miles per visit).

NROL model

- Therapist labour (no travel)
- A digital platform (Microsoft Teams)
- A dedicated NROL operational team (operational manager, technology support, administrator)

The therapist time per patient contact is approximately 0.47 hours, reflecting the group-based delivery model (median staff:patient ratio of 0.2-0.4).

The two models use the same hourly therapist wage rate (£23.83/hr) but a different input mix. NROL substitutes individual travel-intensive contacts for shared, technology-mediated sessions. However, NROL also requires dedicated infrastructure costs (the operational team) that do not exist in the standard model.

Outputs

The primary measurable output is therapy provision, quantified as therapy minutes delivered to patients. We have comparative data on this. Secondary outputs include patient-reported outcomes (EQ-5D-5L, PSFS) and qualitative indicators of care quality (patient experience, peer support). For most of the secondary outcomes, we have data from the intervention group only.

The table below summarises the data sources used and their limitations.

Output measure	L&SC (Apr22/Mar24)	L&SC (Apr24/Mar25)	L&SC+ (Apr25/Mar26)	Limitations
Therapy minutes delivered	NROL median 1,535 min vs non-NROL 335 min (stroke patients, $p<0.001$)			Selection bias: NROL patients may differ systematically from non-NROL (younger, possibly with higher need for rehab)
Duration in service	NROL 146 days vs non-NROL 59 days (stroke patients, $p<0.001$)			Longer duration may partly reflect NROL programme structure rather than additional need
Health-related quality of life (EQ-5D-5L)	Significant within-subject improvement ($p<0.01$). 30-39% exceeded MCID	Significant within-subject improvement ($p<0.05$) for health state and overall health. 61-68% of individuals improved or remained stable, 35-38% exceeded MCID	Significant within-subject improvement ($p<0.05$) for overall health. Health state NS. 60-75% of individuals improved or remained stable, 29-40% exceeded MCID	Group-level change did not meet MCID. No control group comparison
Activity performance (PSFS)	Significant within-subject improvement ($p<0.001$)	Significant within-subject improvement ($p<0.001$). 82% improved or remained stable, 17% exceeded MCID	Significant within-subject improvement ($p<0.001$). 86% improved or remained stable, 24% exceeded MCID	Short programme duration (6 weeks) may limit detectable change
Patient experience	93% valued NROL; 94% found it convenient; 85% valued peer support (source:		89% felt NROL sessions were an important part of their rehab; 94% rated NROL good or very good; 89%	Survey of participants only; non-participants not captured

	Ackerley et al. 2026)		felt joining online was easy; 77% felt they always had the support they needed; 91% liked it was a group activity (source: HINWC survey report, n=62)	
Downstream health service use	No data	No data	No data	Would require linked data on readmissions, GP contacts, social care etc.
Patient productivity (return to work)	No data	No data	No data	Median age 60; may be limited relevance for much of cohort

Note: L&SC+ (Apr25/Mar26) outcome and experience data are provisional and will be updated following completion of Block 24.

Technical Efficiency of NROL

Improved technical efficiency requires that for a given level of expenditure, NROL is producing more output than the alternative. (Or, equivalently, could NROL produce more output at the same cost.)

The evaluation data support the following claim, subject to the assumptions stated below:

NROL delivers substantially more therapy per pound of (variable) therapist cost than in-person delivery. At a variable cost of £11.20 per patient contact (vs £58.75 for in-person), the cost per therapy contact is approximately 81% lower under the NROL model.

Assumptions underpinning this comparison

Assumption 1: The variable cost comparison uses the same hourly therapist rate (£23.83) for both models. This is appropriate where NROL uses existing workforce within their contracted hours.

Assumption 2: The in-person comparator assumes 2.0 hours per contact including travel (18.8 miles average). This is a service average; actual travel varies by geography.

Assumption 3: The £11.20 figure reflects variable therapist cost only. It excludes the NROL operational infrastructure (dedicated team salaries, platform costs). A fully loaded cost per NROL contact would be higher.

Assumption 4 (critical): The comparison implicitly assumes that each NROL contact substitutes for an in-person contact. In practice, much of the NROL therapy is likely

additional: therapy that would not have been delivered at all under the standard model (given the 4.6x difference in therapy minutes).

This final assumption is central: what we show is that NROL enables a level of therapy provision that the existing service model cannot deliver within current resources. The 2022/24 therapy provision data show that stroke patients receiving NROL obtained a median of 1,535 therapy minutes compared with 335 minutes for non-NROL patients, a factor of approximately 4.6x. This strongly suggests that the majority of NROL-delivered therapy is additional rather than substitutive. The economic framing should therefore be:

For a marginal cost of £11.20 per patient contact in variable therapist costs (plus a share of infrastructure overhead to be quantified), NROL enables delivery of rehabilitation that the system cannot currently provide through existing in-person models. This additional therapy moves services closer to nationally recommended rehabilitation targets.

NROL is therefore best characterised as enabling additional rehabilitation provision at lower marginal cost per contact, rather than as a cost-saving intervention. A cost-saving characterisation would require NROL contacts to substitute for in-person contacts, which the data do not support and which the service design (NROL as adjunct to standard care) does not intend.

What Is Needed for a Complete Cost Comparison

To move from a variable cost comparison to a full economic assessment of technical efficiency, the following additional data are required:

Data item	L&SC (Apr22/Mar24)	L&SC (Apr24/Mar25)	L&SC+ (Apr25/Mar26)	Purpose
NROL operational team costs (annual)	Ops lead (1.0 FTE, B8) Tech Support (1.0 FTE, B5) Assistant (1.0 FTE, B4) Admin (1.0 FTE, B3)	Ops lead (1.0 FTE, B8) Tech Support (1.0 FTE, B5) Assistant (1.0 FTE, B4) Admin (1.0 FTE, B3)	Ops lead (1.0 FTE, B8) Tech Lead (0.2 FTE, B) Assistant/ Tech Support (1.0 FTE, B4) Admin (1.0 FTE, B3) Clinical leads (1.4 FTE, B7)	Fully loaded cost per NROL contact
Technology / platform costs	Equipment/resource	Platform	As above	As above
Training costs	To be confirmed	To be confirmed	To be confirmed	
Total service budget (standard model)	To be confirmed	To be confirmed	To be confirmed	Establishing the cost envelope

Allocation of freed therapist time		Not available		Quantifying opportunity cost / redeployment value
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Quantified Resource Savings

Alongside the efficiency argument, the evaluation provides concrete data on resource savings from avoided travel. These are modest in absolute terms but verifiable:

Resource saving (annual)	L&SC (Apr22/Mar24)	L&SC (Apr24/Mar25)	L&SC+ (Apr25/Mar26)
Avoided driving distance	37,777 miles / year	39,803 miles / year	47,311 miles / year
Avoided driving time	1,253 hours / year	1,320 hours / year	1,658 hours / year
Avoided mileage cost	£22,289 / year	£23,484 / year	£27,913 / year
Avoided carbon emissions	11,523 kgCO ₂ e / year	12,799 kgCO ₂ e / year	15,213 kgCO ₂ e / year

Note: The avoided driving time represents potential productive capacity that could be redeployed to direct patient care. However, we do not have data on how this time was actually used. The mileage cost saving is a real cash-releasing saving. The carbon figure supports alignment with NHS net zero targets.

Broader Economic Considerations

Several wider economic arguments can be made in support of NROL, but they rely on inference from the literature rather than direct evaluation data. We set these out transparently for completeness.

Downstream cost avoidance

The rehabilitation dose-response literature suggests that higher therapy intensity improves functional outcomes, which may in turn reduce future health and social care utilisation (readmissions, long-term care needs, GP contacts). This is a plausible mechanism but we have no data on downstream costs for NROL participants. This would require linkage to secondary care, primary care and social care datasets over a longer follow-up period. Model-based research could combine estimates from NROL evaluation data with inputs from the literature to examine a partial picture of possible prevention benefits at population level.

Equity and access

NROL at L&SC has served a geographically dispersed population (~4,250 km²) with about 20-25% of participants living in rural areas. By removing travel as a barrier, the model may improve access for patients in underserved areas. This has distributional implications relevant to allocative efficiency in the broader sense, though we cannot quantify the welfare impact. The evaluation also found that NROL participants were younger than non-

participants, which warrants further investigation to ensure the model does not inadvertently exclude older or less digitally confident patients.

Workforce productivity

The staff:patient ratio (0.2-0.4) demonstrates that the group-based model uses therapist time more intensively per unit of patient contact. Avoided travel time has grown across the evaluation periods (1,253 hours in L&SC Apr22/Mar24; 1,320 hours in L&SC Apr24/Mar25; 1,658 hours in L&SC+ Apr25/Mar26), representing capacity that is, in principle, available for other clinical activity. Together these suggest a productivity gain in how workforce is deployed, though we lack data on how the released time was actually utilised.

Summary: What We Can and Cannot Claim

Supported by evaluation data	Not supported / requires further evidence
Variable cost per patient contact is substantially lower under NROL (£11.20 vs £58.75)	Total cost comparison (infrastructure costs not yet quantified)
NROL patients receive significantly more therapy (4.6x median minutes)	That more therapy minutes cause better long-term outcomes for these patients
Concrete travel/mileage savings (£22-28k/yr, 1,253-1,658 hrs, 11.5-15.2t CO ₂ e)	How freed therapist time is actually redeployed
Group-based model achieves efficient staff:patient ratios (0.2-0.4)	Downstream cost savings (readmissions, social care, GP contacts)
Positive within-subject health outcome shifts (though below group-level MCID)	Comparative effectiveness vs in-person care (no control group)
High patient satisfaction and perceived value	Patient productivity / return to work impacts

Potential Take-Home for Decision Makers

NROL is not primarily a cost-saving intervention. It is a more efficient model of therapy delivery that enables substantially greater rehabilitation provision at a lower cost per unit of output. The case for investment rests on the value of the additional therapy enabled, set against the incremental cost of the NROL infrastructure. A complete business case requires quantification of the NROL overhead costs to calculate the fully loaded cost per contact.