



Towards Earlier Discharge, Better Outcomes, Lower Cost: Stroke Rehabilitation in Ireland

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Research Summary

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Towards Earlier Discharge, Better Outcomes, Lower Cost

Stroke rehabilitation in Ireland

Summary

The introduction of Early Supported Discharge (ESD) for stroke patients in Ireland could improve outcomes and reduce overall costs.

Up to 44% of stroke patients – more than 3,000 people every year – could benefit from ESD, yielding net savings estimated at €2 million to €7 million each year. ESD could save more money in reduced length of hospital stay – €12 million– than would need to be reinvested in developing community rehabilitation (€5 – 10 million).

ESD could free up over 24,000 hospital bed days, the equivalent of 67 hospital beds, annually.

These findings provide the economic justification for the rapid development of Ireland's community rehabilitation and care services for the benefit of people who have been deprived of vital services to boost their quality of life.

Main findings

Current stroke rehabilitation

- There is poor resourcing of community and inpatient rehabilitation for stroke survivors.
- There is considerable regional variation in stroke survivors' length of stay in acute hospitals, which appears to reflect differing regional pathways of care and differing resourcing of care in alternative settings.
- Many severe stroke patients endure long waits for nursing home care and for specialist inpatient rehabilitation.
- Primary Care Services are particularly under-developed and staffing of community therapies is under-resourced.

Cost-effectiveness of Early Supported Discharge (ESD)

- ESD could be a cost-effective intervention in Ireland and almost half of stroke patients (44%) could benefit.
- ESD could improve disability outcomes, reduce the likelihood of long-term institutional care and reduce length of hospital stay.
- If almost half of stroke patients (3,000+) participated in ESD, savings of between €7 million and €2 million could be made, depending on the model of ESD provided. Reducing the length of time stroke survivors remain in hospital would save €12 million. Well-resourced ESD would cost €10 million and less well-resourced ESD would cost €5 million.
- In the first year after stroke, potential cost savings from reduced length of hospital stay could more than offset the cost of resourcing of community care and rehabilitation therapies.

PART 1: Current stroke rehabilitation in Ireland

Stroke patients receive different standards of care in different parts of the country. There is variability in the rehabilitation patients receive in hospital; differences in length of hospital stay; different approaches to where people are discharged; variation in availability of nursing home places; variability in staffing of community rehabilitation services; and variability in the intensity of therapy available in different locations.

7,000 people are hospitalised following a stroke each year. Approximately, 19% die in hospital. Most of the remaining 5,000 to 6,000 people require some level of rehabilitation.

Benefits of stroke rehabilitation for patients and the health system

- Improves outcomes, helping people to be more independent
 - Reduces the time stroke patients are in hospital
 - Saves money for the health service
 - Releases funding to develop community services
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Stroke Rehabilitation in Ireland Study

The study was undertaken by the Economic and Social Research Institute (ESRI) and the Royal College of Surgeons in Ireland (RCSI) with the guidance of some of Ireland's foremost stroke care experts.

The study:

- Describes current stroke rehabilitation services in Ireland
- Describes how rehabilitation should be provided
- Compares costs, outcomes and cost-effectiveness of current services with best international practice
- Makes recommendations about the development of rehabilitation in Ireland

Current stroke rehabilitation in Ireland

This study found poor resourcing of community and inpatient rehabilitation for stroke survivors in Ireland. There is great variability in the availability of therapy staff and the intensity with which therapy is delivered across regions, hospitals and residential and community care settings. There is considerable regional and hospital variation in stroke survivors' length of stay in acute hospitals. This appears to reflect differing regional pathways of care and differing resourcing of care in alternative settings.

There is evidence of long waits for nursing home care and specialist inpatient rehabilitation for patients with severe stroke – as long as six months wait for discharge to a nursing home for patients with severe disability in one Dublin hospital. There is insufficient capacity at the National Rehabilitation Hospital, Dún Laoghaire to treat the demand for rehabilitation for younger patients with severe stroke, with a number waiting over three months.

Great variability has been found in the availability of community therapy staff and the intensity with which therapy is delivered in differing areas and settings. For example, there is evidence of a relatively low supply of therapists and low intensity of therapy delivered in Dublin city. Yet, even where community care appears to be better resourced in Ireland – such as in HSE Region South – it falls far short of the required resourcing to implement best practice in stroke rehabilitation. The role of psychology in stroke services in Ireland is particularly under-developed. Psychology is only available to patients in four of 28 acute hospitals, according to a survey conducted by the authors of this study.

Survey of stroke hospital leads

- A clear majority believed community rehabilitation services are not adequate to meet stroke patients' needs when they leave hospital.
- Clinicians in 24 out of 28 acute hospitals agreed that inadequacies in community services lead to referrals of patients for rehabilitation in smaller hospitals, other inpatient locations or nursing homes, who could be treated at home by community services, if these were available.

Availability and intensity of therapy

Most therapy received by stroke survivors in the community is delivered through Primary Care Services. This rehabilitation is of relatively low intensity with national mean intensity for therapy delivered per patient of: physiotherapy 5.4 hours; occupational therapy 13 hours; and speech & language therapy 8 hours. National averages of therapy delivered mask considerable variability between the four HSE regions and Dublin city and county and do not take into account unmet need for therapy. There is particular evidence of a relatively low supply of therapists and intensity of therapy in Dublin city.

Acute inpatient length of stay is particularly long in the East. Rehabilitation outside the acute setting appears to be delivered more frequently in inpatient or outpatient settings rather than in the community. While community rehabilitation teams and community stroke teams deliver more intense care in home settings, these are available in few areas nationally.

Patient pathways

Depending on their location, a different pathway of care exists even for patients at the same level of disability post-stroke. Pathways of care for stroke patients therefore vary by area and appear to reflect the fragmented development of health services, which was a consequence of their highly localised and differentiated administration under the former health board structure.

Use of care appears to be related to supply of care:

- there are more referrals to community therapists in areas where more care is available
- there are more discharges to nursing homes in areas where there are more long-stay beds

There is a pattern across the country of referral from major acute hospitals to smaller, satellite acute hospitals, which, effectively operate as step-down facilities playing a rehabilitation role. Throughout the country, some patients are referred to the National Rehabilitation Hospital in Dún Laoghaire, Dublin. Such referrals are generally under-65 with moderate or severe disability.

Length of hospital stay

Length of hospital stay, which is often the most costly element of care, differs significantly across the HSE regions. There is evidence to suggest that some hospitals with long lengths of stay may be engaging in significant inpatient rehabilitation, whereas some hospitals with very short length of stay are discharging patients with severe disability to other facilities for rehabilitation.

- In 2011, mean length of stay was longest in Dublin Mid-Leinster (30 days) and Dublin North-East (28 days) and shorter in the South and West (18 days).
- Mean length of stay for discharge to nursing homes was 79 days in Dublin North-East, 76 days in Dublin Mid-Leinster, 49 days in the South and 24 days in the West.
- Median (mid-range) length of stay showed less variation across regions, with length of stay in Dublin-based regions appearing to be influenced by some patients with particularly long stays.
- At hospital level, the mean length of stay for stroke patients in 2011 ranged from under 10 to 48 days.

FIGURE 1 Mean Length of Stay in Days of Inpatients with Principal or Secondary Diagnosis of Stroke – Regional, HIPE 2011



Source HIPE 2011.

PART 2: How can stroke rehabilitation be improved?

Broadly, a consensus has emerged from international research that stroke survivors with mild or moderate disability are suited to Early Supported Discharge (ESD), while the needs of survivors with more severe disability are better met by specialised inpatient rehabilitation.

Mild, moderate and severe stroke

Patients can experience mild, moderate or severe disability after stroke. Severity of stroke may be measured by the amount of initial trauma or risk of mortality on admission, or it may be based on level of disability. Scales assessing mobility and cognition are generally used by stroke teams to assess the level of independence a person has following their stroke.

2 (a) Early Supported Discharge in Ireland - a cost-effective way of improving patient care

Stroke survivors with mild or moderate disability are suited to Early Supported Discharge (ESD) from acute hospitals. ESD can be expected to improve disability outcomes, reduce the likelihood of long-term institutional care and reduce length of stay in hospital. Evidence in this study finds ESD could be a cost-effective intervention.

Why develop Early Supported Discharge?

ESD aims to accelerate discharge from hospital by providing rehabilitation while the patient lives at home. A major goal of rehabilitation is to facilitate re-adaptation to the home environment and being at home is the best place to learn such skills.

International evidence shows that compared to standard rehabilitation, ESD:

- Reduces length of hospital stay by 7 – 13 days
- Achieves greater independence in activities of daily living
- Leads to less need for nursing home care
- Has no significant difference in mortality

Early Supported Discharge Team

Different models of ESD exist, as ESD needs to be adapted to a country's healthcare system.

A consensus document published by ESD Trialists (Fisher *et al.* 2011) recommended that an ESD team for 100 patients per year required the following members (expressed as whole-time equivalents (WTE)): physiotherapy (1.0); occupational therapy (1.0); speech and language therapy (0.4); social work (0-0.5); nursing (0-1.2); and medical staff (0.1).

Duration of ESD, frequency of visits and intensity of therapy varies based on the individual patient's need and level of disability.

An ESD pilot in the Mater Hospital

In 2011-12, a pilot ESD programme for stroke patients was undertaken at the Mater Misericordiae University Hospital, Dublin.

The estimated cost of the programme per patient was €4,130 (Table 1). The pilot team concluded that the programme achieved sufficient bed day savings to fund required therapy staffing.

TABLE 1 Estimated Total Annual Costs of Mater ESD Pilot

	Annualised costs HCP mean programme duration basis €
Staffing	180,330
Home Care Packages for 12% of participants	6,708
Equipment and expenses	15,381
Total costs	202,419
Mean costs per participant	4,131

Note: 49 patients in 2011-2012 pilot

After the programme, 88% of patients reported an improvement in their quality of life and 59% had an improvement in their level of disability. The mean duration of the programme was 5.2 weeks. The mean therapy per patient was 21 hours of physiotherapy, 11.4 hours of occupational therapy and 4 hours of speech & language therapy.

2 (b) Rehabilitation for patients with severe stroke

Patients with severe stroke benefit from specialised inpatient rehabilitation.

Rehabilitation for patients with severe stroke

Compared to conventional rehabilitation, inpatient rehabilitation in a stroke unit tends to include family participation, stroke education for providers, and improved multidisciplinary planning, discharge planning and goal setting.

The international literature suggests that specialised inpatient rehabilitation for patients with severe stroke leads to:

- reduced mortality
- reduced length of hospital stay
- increased likelihood of discharge home

Although patients with severe stroke initially may not be candidates for rehabilitation, they require follow-up as up to 50% may be able to return home following rehabilitation. The rehabilitation needs of survivors of a severe or moderate stroke should be reassessed weekly for the first month and then at regular intervals.

PART 3: Better rehabilitation can improve patient outcomes at lower cost

ESD could be implemented in Ireland at no additional cost. In the first year after stroke, potential cost savings from reduced hospital stay could more than offset the cost of resourcing community care and rehabilitation therapies for stroke patients who are discharged home earlier.

A 44% participation rate in ESD among stroke survivors could result in savings of between €7 and €2 million each year. ESD could save more money in reduced length of hospital stay - €12 million – than would need to be reinvested in developing community rehabilitation (€5 – 10 million).

Sensitivity analysis of the costs of and potential savings from ESD finds that, on most assumptions, savings from reduced length of stay by stroke patients in Irish hospitals would more than offset the additional costs of an ESD programme requiring more intense therapy in the community, greatly increased community nursing and increases in other community services.

Why has severe stroke rehabilitation been treated differently in this study?

Economic evaluation of healthcare interventions is typically based on randomised controlled trials (RCTs), which compare the costs and outcomes of proposed interventions compared to current care. RCTs for patients with severe stroke have not been conducted internationally or in Ireland. For this reason, this study has been unable to undertake an analysis of the cost-effectiveness of rehabilitation interventions for severe stroke in the same way as has been done for ESD for stroke survivors with mild to moderate disability. It is recommended that an RCT should be conducted to assess the relative costs and outcomes of providing specialised inpatient rehabilitation for severe stroke compared to usual care.

Comparison of cost-effectiveness of current and preferred rehabilitation in Ireland

This study compared the cost and cost-effectiveness of current rehabilitation with the roll out of ESD. The calculations are based on two models of ESD, two case studies describing current rehabilitation in Ireland and two methods of assessing cost-effectiveness.

Given the differences in current rehabilitation provision in Ireland discussed in Part 1 it was necessary to use two case studies to reflect the differences in current rehabilitation practices.

Two methodologies to assess cost-effectiveness have been applied – one looking at the first year after a stroke and the second at the cost of and outcomes from ESD over 10 years. Researchers at the ESRI, NUIG and King’s College London collaborated in modelling.

Two models of Early Supported Discharge

To analyse the cost of rolling out ESD in Ireland, the current study used two potential models of ESD. The Beech Model follows the approach to resourcing ESD applied in an RCT in London in the 1990s (Beech *et al.*, 1999), while the Fisher Model follows the consensus view of ESD Trialists in 2011 (Fisher *et al.*, 2011). The Fisher model is better resourced than the Beech Model (Table 2).

TABLE 2 Resources in Alternative Models of Early Supported Discharge

		Beech ESD Model	Fisher ESD Model
	Unit	Annual mean resource use	Annual mean resource use
Physiotherapist	Hour	4.8	9
Occupational therapist	Hour	6.8	9
Speech and language therapist	Hour	3.6	3.6
Hospital physician	Visit	1.9	1.9
GP	Visit	5.6	5.6
Community nurse	Visit	26.8	18 – 36*
Social worker	Hour	-	3.8 - 7.5*
Home help	Hour	54.8	54.8
Meals on wheels	Meal	30	-
Acute bed day savings	Days	-8	-8

*Trialists had differing views on community nursing and social work staffing.

Findings - cost-effectiveness of ESD versus current rehabilitation

When applied to 2011 stroke discharges, the potential savings if 44% of stroke discharges nationally were to receive ESD would be over €7 million for the Beech Model, and over €2 million for the Fisher Model, in the base case analysis.

With 17% ESD participation, the potential savings would be €2.7 million with the Beech Model and €800,000 with the Fisher Model.

Implementing ESD in Ireland could deliver a mean additional Quality-Adjusted Life Year (QALY) for a cost of €4,734 over 10 years, which compares favourably to standard UK benchmarks for cost-effective healthcare interventions.

The upper range of the patients who could benefit from ESD is assumed to be 44%, the proportion of patients with mild/moderate disability at seven days after stroke in the North Dublin Population Stroke Study of 2005/2006. 17% of stroke patients – the proportion considered feasible for inclusion in the Mater Hospital ESD pilot – is considered to be the lower range eligible for ESD.

On base case assumptions, implementing ESD in Ireland for stroke survivors with mild to moderate disability:

- Could save nationally approximately €12 million from reduced hospital length of stay
- Could free up over 24,000 hospital bed days, the equivalent of 67 hospital beds annually
- Could cost nationally between €5 million and €10 million to resource the community therapy and other community services necessary, depending on the model of ESD adopted
- Would require a substantial increase in the resourcing of community therapists and other community care from current levels in Ireland, even in areas where community rehabilitation is better-resourced
- Taking account of these costs and savings, could result in a net saving nationally of between €2 million and €7 million in first-year care after stroke, depending on the model of ESD
- Could deliver a mean additional Quality-Adjusted Life Year (QALY) for a mean additional cost of €4,734 over ten years, which compares favourably to standard UK benchmarks for cost-effective healthcare interventions

The level of cost-effectiveness is sensitive to assumptions about the improvement in disability levels consequent on ESD and the costing methodology applied.

Sensitivity analysis, undertaken to test the robustness of the analysis, shows:

- That this first-year cost saving generally holds, provided ESD delivers an expected mean eight-day reduction in hospital length of stay at Irish average stroke bed-day costs
- In one scenario, a marginal first-year cost of ESD implementation arises, when high unit costs are applied to the most generously-resourced ESD model. Even in this scenario, the marginal cost of implementing ESD is one-third of the cost of an inpatient day
- The level of cost-effectiveness (cost per QALY gained) is sensitive to assumptions about the improvement in disability levels consequent on ESD and the costing methodology applied

PART 4: Recommendations

From reflection and discussion on the findings of the analysis between the research team and the expert members of the Stroke Rehabilitation in Ireland project steering group, many of whom are clinical professionals directly involved in delivering stroke care, the report makes the following recommendations.

Current rehabilitation for stroke survivors does not meet the standards outlined in these recommendations.

Recommendations for patients with mild to moderate disability after stroke

1. Early Supported Discharge should be the preferred rehabilitation option for patients with mild to moderate disability after stroke;
2. Savings from reduced acute bed days achieved by ESD should be applied to resourcing community care staff: physiotherapists, occupational therapists, speech and language therapists, community nurses, social workers, home helps, psychologist and counsellors;
3. Further research is required to assess the feasibility of ESD in rural areas of dispersed population. If implementation of ESD is not found to be feasible, inpatient or centre-based rehabilitation programmes should be maintained or developed and resourced.

Recommendations for patients with severe disability after stroke

4. Capacity and staffing should be expanded for specialist inpatient rehabilitation for patients with severe stroke;
5. Numbers of nursing home places suitable for support and care for stroke patients with significant disability should be increased, particularly in areas where there is evidence of long delays in discharge from hospital due to difficulties in accessing nursing home care;
6. Patients with severe stroke, who could potentially be discharged home following rehabilitation, should be identified early and offered specialised inpatient rehabilitation;
7. The rehabilitation needs of survivors of a severe or moderate stroke should be reassessed weekly for the first month, and then at intervals as indicated by their health status;
8. Given the relatively limited research on best practice in rehabilitation for patients with severe stroke, a randomised controlled trial (RCT) should be conducted in Ireland to assess the relative costs and outcomes of systematically providing specialised inpatient rehabilitation for severe stroke as compared to usual care;
9. Such an RCT should measure functional outcomes and include the costs of long-term care, whether delivered at home or in an institutional setting and by formal or informal carers.

General recommendations for stroke rehabilitation in Ireland

10. Services should be provided to stroke survivors on a needs basis, without regard to age or region and with standardised delivery of care, meeting international and national best practice guidelines;
11. Any stroke survivor with declining physical activity, ability to undertake everyday tasks or mobility at six months or later after stroke should be assessed for appropriate targeted rehabilitation;
12. Evidence from this and other studies of deficits in the availability of psychological services for stroke survivors in the acute setting, in the community and in nursing homes, combined with evidence of considerable emotional distress in stroke survivors, indicates a clear need for the development of psychological and counselling services;
13. Any stroke survivor with declining cognitive function or mood at six months or later after stroke should be assessed for appropriate targeted rehabilitation;
14. A national stroke register should be resourced to sustain the systematic recording of treatment, outcomes (including measures of disability) and care in hospital, the community and long-term care settings of patients with stroke.

Background to this study

What do we know about stroke in Ireland?

One in five people will have a stroke at some time in their life; two-thirds of people who have a stroke are over 65 years of age. In Ireland, an estimated 30,000 people are living in the community with disabilities following a stroke.

The Irish Heart Foundation's (2010) **Cost of Stroke in Ireland** estimated the cost of stroke to have been €489–€805 million in 2007. The cost of nursing home care accounts for the largest proportion of total stroke costs and it is these longer-term costs which impose the greatest burden on the economy. There is scope to reduce nursing home costs if more stroke patients are able to live independently at home.

Despite the huge impact of stroke for an individual, in large parts of the country dedicated stroke rehabilitation services are inadequate, or do not exist. The gap in community rehabilitation for stroke patients was highlighted in the Irish Heart Foundation's (2008) **Irish National Audit of Stroke Care**. This was supported by the 2010 *Cost of Stroke in Ireland*, which found that less than €7 million a year was being spent on community rehabilitation for stroke survivors.

The need for stroke rehabilitation

Patients who survive a stroke are often left with some level of disability. Rehabilitation to reduce disability is therefore very important for the care of stroke patients. In-patient rehabilitation is provided when a person is in hospital. Community rehabilitation is provided by teams in the community, including Primary Care teams.

Although the importance of rehabilitation for stroke has been described in national strategies, earlier studies of stroke services in the Irish health-care system found large gaps in the provision of rehabilitation services and restrictions in access to those services. International evidence shows the importance of timely rehabilitation, with delays worsening patients' long-term outcomes.

Why undertake an economic study of stroke rehabilitation?

Health economic evaluation systematically compares different healthcare interventions. The evaluation values and compares the costs and consequences of different interventions (such as current rehabilitation versus best international practice). The aim of the evaluation is to look at how effective an intervention is for patients and how cost-effective it is for society. Cost-effectiveness considers whether it improves health for patients at an acceptable cost to society.

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The Irish Heart Foundation campaigns to eliminate avoidable death and disability from stroke. For more information see www.stroke.ie and www.irishheart.ie.

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