

Improving the quality of stroke care



Fonseca AC¹, Webb A², Randall G³, Thijs V⁴, Berge E⁵, Frazekas F⁶, Norrving B⁷, Vanhooren G⁸

¹Universidade de Lisboa; ²University of Oxford; ³Stroke Alliance for Europe (SAFE); ⁴Florey Institute of Neuroscience and Mental Health, University of Melbourne; ⁵University of Tromsø; ⁶European Academy of Neurology (EAN); ⁷Lund University; ⁸European Stroke Organization (ESO)

Background

Stroke is a leading cause of disability and death among adults. It is the second cause of death worldwide and the first cause of acquired disability. Despite improvements in care, around one third of the 1.3 million people who have a stroke in Europe each year will not survive. One third will make a good recovery, but one third will live with long-term disability. Furthermore, stroke results in post stroke dementia, depression, epilepsy and falls that cause substantial morbidity and economical costs. Strokes are more likely to occur with ageing, with 75% of strokes happening to people older than 65 years. However, 25% of strokes still occur in younger people of working age, resulting in more prolonged impairment, greater dependency and a significant loss of productivity.

Methods

In this study we describe the key issues and unmet needs along the patient pathway, based on research methodology defined by the Rotterdam Institute of Health Policy and Management for the "patient journey" analysis. We gathered data from a literature review, stroke experts, patients' associations and neurological scientific societies. We propose recommendations on how to improve stroke care in the future through the delivery of evidence-based interventions within the stroke unit.

Treatment Gaps

INADEQUATE TREATMENT OF ATRIAL FIBRILLATION (AF). Patients with AF have an increased risk of ischemic stroke that is five times higher than the risk of patients without this arrhythmia. AF is estimated to be responsible for 15% of all strokes. Most of these strokes could be avoided through improved detection and use of anticoagulants. Although anticoagulation in AF patients is recommended by the European Stroke Organization (ESO), low rates of prescription can still be found in several European countries, including UK (53%), Sweden (53%), Poland (41%), and Greece (41%).

LOW IMPLEMENTATION OF STROKE UNITS are multi-disciplinary units devoted to care of stroke patients. They provide a wide range of interventions, from acute reperfusion therapies (thrombolysis, thrombectomy), to early rehabilitation and secondary prevention. Treatment in stroke units has been shown to reduce the risk of death and disability. ESO strongly recommends the establishment of stroke units. Still, the implementation of stroke units is inadequate across Europe due to cost barriers, lack of trained staff and limited provision of specialised facilities.

LOW ACCESS TO REHABILITATION. Many stroke survivors experience functional deficits that make them dependent for their daily tasks. Rehabilitation aims to enable people with disabilities to regain physical, intellectual, psychological and/or social function. The rehabilitation process from a stroke starts in a stroke unit and frequently needs to be continued after the patient is discharged from the hospital. It has been shown that continued rehabilitation after discharge during the first year after stroke reduces the risk of disability.

Recommendations

Improve primary and secondary prevention of Stroke. Population based initiatives are required to improve primary prevention of stroke, through control of hypertension and identification of individuals with asymptomatic AF including screening programs for people at risk. After a stroke, patients should be carefully monitored to detect asymptomatic AF, for example with long-term heart rate monitoring. Once AF is detected, patients should receive oral anticoagulant therapy, unless there are clear contraindications.

Foster implementation of Stroke Units and Comprehensive Stroke Centres. Stroke units should be established in all centres caring for stroke patients through national policy initiatives, supported by a requirement for stroke unit certification through the ESO program. Strategic plans are also required to improve access to Comprehensive Stroke Centres that provide sophisticated facilities for reperfusion therapies, through development of facilities, clinical services and targeted training programs.

Improve the access to timely and effective rehabilitation. Access to timely and individualized rehabilitation should be available to all stroke patients, through development of acute stroke units linked into stepped rehabilitation services matched to patient need, from community-based early supported discharge up to comprehensive inpatient rehabilitation units. Very few clinical trials have been conducted in this field. Therefore, many of the recommendations for treatment in this field are weak, and investment in funding of research in this area is essential.

Conclusions

Stroke is a leading cause of morbidity and mortality in Europe. To reduce the burden of stroke, major treatment gaps need to be addressed such as inadequate treatment of atrial fibrillation, low implementation of stroke units and low access to rehabilitation. Resources should be directed to improve primary prevention and secondary prevention and to optimize the current existing treatments for acute stroke.

Patient testimonies

Before "I never had thought before about that disease; I had no way of knowing, nobody in the family had ever had a stroke. I thought everything was fine and I was relatively young. I was 47." (Female stroke survivor, Austria)

During "While I was having a shower I suddenly felt like something had exploded in my head. I was not able to speak any more and I felt like the right side of my body had disappeared." (Female stroke survivor, Netherlands)

"I was lucky enough to be in a Clinic which is across the street from the Emergency Centre. The full diagnostic was done in the first hour of the onset of symptoms. I received thrombolytic therapy and recovered completely, as if I never had a stroke" (Male stroke survivor, Serbia)

Afterwards "The worst thing about it was that I had no understanding about stroke at all. No one had told me "you may feel like this, you may feel like that". No one explained to my partner what it was going to be like moving forward, what the consequences might be, or not be" (Male stroke survivor, UK).

Across Europe, it is estimated that only 30% of patients receive stroke unit care.



References:

Feigin VL, et al. 2010. Global and regional burden of stroke during 1990-2010: findings from the Global Burden of Disease Study 2010. Lancet; Truelsen T, et al. 2006. Stroke incidence and prevalence in Europe: a review of available data. European Journal of Neurology; Krishnamurthi RV, et al. 2013. Global and regional burden of first-ever ischaemic and haemorrhagic stroke during 1990 - 2010: findings from the Global Burden of Disease Study 2010. The Lancet Global Health. Mikulik, R., V. Caso, and N. Wahlgren, Past and Future of Stroke Care in Europe. 2017: ORUEN - The CNS Journal.

Acknowledgements:

This work was supported by Pfizer Inc. We would like to thank Charles Faid (Pfizer Inc.) and Stephanie Roso (Pfizer Inc.) for their contribution to this work. A digital version of the poster and other supporting documents are available here:

<http://www.braincouncil.eu/activities/projects/the-value-of-treatment/stroke>



Cost effectiveness analysis of full implementation of acute stroke treatments in the UK setting



Webb A¹, Thijs V², Fonseca AC³, Randall G⁴, Berge E⁵, Frazekas F⁶, Norrving B⁷, Vanhooren G⁸

¹University of Oxford; ²Florey Institute of Neuroscience and Mental Health, University of Melbourne; ³Universidade de Lisboa;

⁴Stroke Alliance for Europe (SAFE); ⁵University of Tromsø; ⁶European Academy of Neurology (EAN); ⁷Lund University; ⁸European Stroke Organization (ESO)

Background

Stroke is the second leading cause of death and dependency in Europe and costs the EU >€30 billion in direct healthcare costs, and considerably more in indirect costs, yet there is a large gap in translating evidence of significant reductions in death and dependency in randomised controlled trials of acute stroke treatments to the real world. Across Europe, only approximately 30% of patients have access to acute stroke unit care, and there is wide variation in access to intravenous thrombolysis (clot-busting drugs) and mechanical thrombectomy [1]. Optimal acute stroke treatment, initiation of secondary prevention and transition to appropriate rehabilitation depends on access to Comprehensive Stroke Services. Therefore, we assessed the cost-efficacy of full implementation of such acute stroke treatments to the maximum extent possible in the population, using the UK as a model, compared to available evidence in other European settings.

Methods

The primary intervention assessed was the provision of Comprehensive Stroke Services through an acute stroke unit, providing optimal acute stroke care, secondary prevention and transition to rehabilitation in accordance with current guidelines and best practice. The expected summative effect and cost of interventions were estimated, and compared to the expected outcomes and costs from non-provision of these interventions. Clinical efficacy data was taken from available meta-analyses of randomised controlled trials for each intervention [2,3], with expected ideal rates of uptake estimated from published registry data and expert opinion. Costs of interventions, hospital costs and cost of resulting death and dependency were taken from extensive reports available for the UK [4]. A Markov model was used to calculate cost-effectiveness of full implementation of acute stroke treatment, expressed in Quality Adjusted Life-Years (QALYs), with a life-time horizon. The model outcomes were total costs, total QALYs, incremental costs, incremental QALYs and the incremental cost-effectiveness ratio (ICER). Sensitivity analyses for variation in cost-effectiveness for variation in estimated costs and benefits were performed. Results were compared to published cost-effectiveness analyses in a systematic review.

Results

EFFECT OF INTERVENTION

Full implementation of acute ischemic stroke treatments to the maximum extent possible led to absolute reductions in death of dependency at six months after stroke of 97.5 patients per 1000 acute ischemic stroke patients treated (NNT=10.3). The rate of dependency in the intervention group was 25.9% versus 29.8% in the group in which none of the interventions was performed. Mortality rates were 11.8% versus 14.4%. The comparable estimated QALYs were 3.38 vs 3.14.

MEDICAL RESOURCE CONSUMPTION

The average cost of intervention was £9,566 versus £6,640 in the standard of care group. The average length of stay was updated to UK average length of stays in 2015. The medical resource consumption per year after the first six months period was £1938 in the independent state and £5782 in the dependent state. Overall, taking the base case example, the total costs of care in the intervention group were £41,071.32, compared to £36,820.38 in the non-intervention group.

COST-EFFECTIVENESS

The intervention was cost effective with an ICER of £17,437.82, (incremental change: QALY=0.2438; cost=£4,251) below the standard cost-effectiveness threshold of £30,000 or a conservative threshold of £20,000. This was highly robust in sensitivity analyses, being affected by increasing patient age, increasing cost of intervention and degree of disability at 6 months. However, the intervention was estimated to be cost-beneficial in 4.9% of sensitivity analyses, and only dominated by non-intervention in 24.8% of probabilistic sensitivity analyses, and was likely to be cost-effective despite using the most pessimistic input parameters.

COMPARISON TO OTHER PUBLISHED REPORTS

In cost-effectiveness analyses of large UK stroke service reorganisations in the UK, systematic implementation of stroke unit care services was cost-effective with an ICER of £5500 per QALY [5], with subsequent initiation of hub-and-spoke acute stroke services in London resulting in an estimated cost-saving of £811 per patient, consistent with multiple European settings

Conclusions

This analysis suggests that full implementation of stroke services would be a cost-effective treatment for acute ischemic stroke in the United Kingdom healthcare setting. This is consistent with reports from multiple European healthcare settings. The model compared ideal implementation of services compared to no service provision and is therefore readily translatable across Europe, dependent upon local costs of intervention.

Although provision of Comprehensive Stroke Services represents a significant logistical and financial challenge, the ultimate benefits are likely to be extensive, both in terms of cost and in terms of the total burden of death and disability due to stroke in the European population.

Intervention	Population applicable	NNT (mRS 3-6)	Number prevented
Acute stroke unit care	1000	18	56
Thrombolysis	250	40	10
Endovascular clot retrieval	100	5	20
Early aspirin	650	71	9
AF detection and treatment	1000	34	1.5
Carotid endarterectomy	100	142	0.7
Total	1000		97.5

Table1: Estimated benefits of acute stroke interventions and initiation of secondary prevention Strategies from published randomised controlled trials.

Acute Treatment Costs	Intervention Group	No intervention group
Hospitalization cost	4916.98	5354.05
Thrombolysis	537.91	0.00
Carotid endarterectomy	473.50	0.00
Clot retrieval	886.19	0.00
Stroke specialist	274.00	0.00
Occupational therapist	102.00	0.00
Physiotherapist	170.00	0.00
Speech and language therapist	68.00	0.00
Social worker	40.00	0.00
Early aspirin	2.03	0.00
Early anticoagulation	106.40	0.00
Late aspirin if no anticoagulation	37.63	0.00
Nursing home	525.64	525.64
Inpatient rehabilitation	1285.58	1285.58
Monitoring for AF	140.08	0.00
Total Acute costs per patient	9565.94	6639.62
Incremental costs per patient	2926.31	

Table 2: UK costs (2015) for provision of interventions associated with Comprehensive Stroke Services

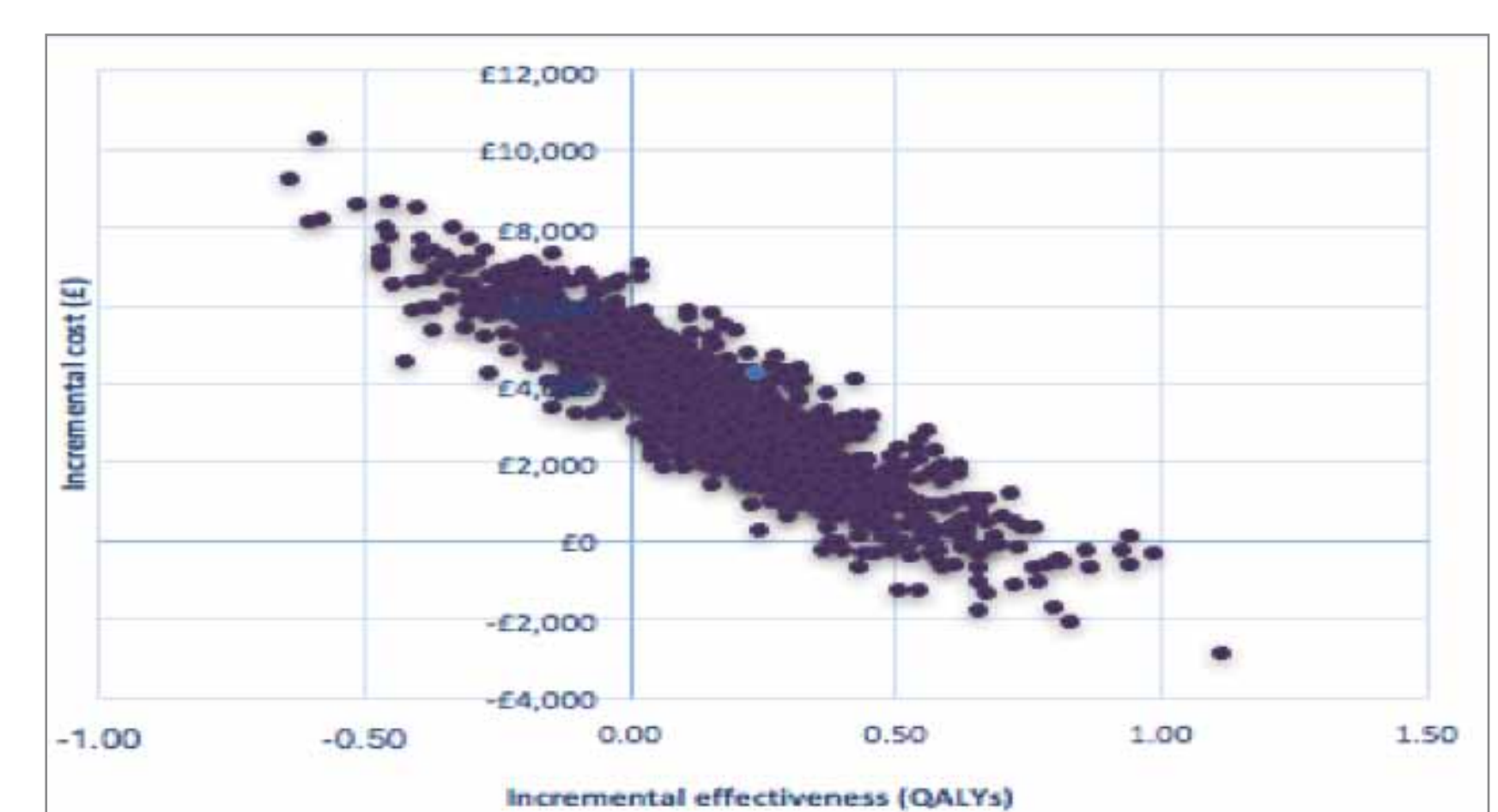


Table1: Estimated benefits of acute stroke interventions and initiation of secondary prevention Strategies from published randomised controlled trials.

References:

- King's College London, on behalf of the Stroke Alliance for Europe. 2017. The Burden of Stroke in Europe Report;
- Stroke Unit Trialists Collaboration. 2007. Organised inpatient (stroke unit) care for stroke. Cochrane Database Syst Rev.;
- Langhorne P, et al. 2005. Early supported discharge services for stroke patients: a meta-analysis of individual patients' data. Lancet;
- Luengo-Fernandez R, et al. 2013. Hospitalization resource use and costs before and after TIA and stroke: results from a population-based cohort study (OXVASC). Value Health;
- Hunter RM, et al. 2013. Impact on clinical and cost outcomes of a centralized approach to acute stroke care in London PLoS One.

Acknowledgements:

This work was supported by Pfizer Inc. We would like to thank Charles Faid (Pfizer Inc.) and Stephanie Roso (Pfizer Inc.) for their contribution to this work. A digital version of the poster and other supporting documents are available here:

<http://www.braincouncil.eu/activities/projects/the-value-of-treatment/stroke>

