HERU Briefing Paper

HEALTH ECONOMICS RESEARCH UNIT

Briefing paper for the NHS **March 05**

AN ECONOMIC EVALUATION OF CT SCANNING FOR STROKE

Key Messages

1 The findings of this study indicate that patients with suspected stroke should be scanned quickly, that is either 'immediately' or 'within 48 hours of admission to hospital'.

2 As the results were sensitive to the cost of inpatient days, further research in this area may be required.

Background

Stroke is a major cause of morbidity and mortality in the UK affecting 5 to 7 per 1,000 of the population[1]. The cost of stroke in the UK is high at £2300 million per year, and accounts for about 6% of total NHS and Social Services expenditure; this is nearly twice the amount spent on coronary heart disease. There are two main pathological types of stroke. About 80% of first strokes are ischaemic (cerebral infarction) and 10% to 20% haemorrhagic (primary intracerebral haemorrhage (PICH). Making an accurate diagnosis by distinguishing infarcts from haemorrhages is important as treatments for the two types of stroke differ and patients may suffer serious harm if the wrong therapy is administered[2]. Imaging techniques such as CT brain scanning are required to reliably distinguish ischaemic from haemorrhagic stroke.

This briefing paper is based on work performed in collaboration with the Department of Clinical Nueroscience, Western General Hospital (University of Edinburgh).

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Methods

This study assesses the cost effectiveness of routine CT scanning for acute stroke using decision analysis. This type of analysis involves constructing a tree to identify all probable pathways and consequences over a 5 year period of different CT scanning strategies to diagnose a first ever stroke. Thus an economic model was used to estimate the expected costs and benefits associated with different types of screening strategies.

Twelve imaging strategies (S1 to S12) were identified by using information identified from the published literature, current clinical practice and expert clinical opinion (see Table 1). The strategies varied with respect to scanning patients within different timeframes, prioritising specific patient groups for early scanning and restricting scanning to specific patient groups. In line with current UK guidelines[3,4,] 'Scan all patients within 48 hours of admission to hospital' was used as the main comparator in the study.

Information required for the evaluation was obtained from a variety of sources. The chance of events happening, such as the correct diagnosis of a cerebral infarction were obtained from a combination of systematic reviews (undertaken as part of the broader project), secondary data sources (for example, data from the Lothian Stroke Register) and expert clinical opinion.

Table 1: CT scanning strategies

Strategies	Imaging strategies
Comparator	Scan all within 48 hours of admission to hospital.
S 1	Scan all immediately
S 2	Scan patients on anticoagulants or in life a threatening condition immediately and scan all of the remaining patients within 24 hours of admission to hospital
S 3	Scan patients on anticoagulants or in life a threatening condition immediately and scan all of the remaining patients within 48 hours of admission to hospital
S 4	Scan patients on anticoagulants or in life a threatening condition immediately and scan all of the remaining patients within 7 days of admission to hospital
S 5	Scan patients on anticoagulants or in life a threatening condition immediately and scan all of the remaining patients within 14 days of admission to hospital
S 6	Scan patients on anticoagulants, in life a threatening condition or are candidates for hyperacute treatment immediately and scan all of the remaining patients within 24 hours
S 7	Scan patients on anticoagulants, in life a threatening condition or are candidates for hyperacute treatment immediately and scan all of the remaining patients within 48 hours
S 8	Scan patients on anticoagulants, in life a threatening condition or are candidates for hyperacute treatment immediately and scan all of the remaining patients within 7 days
S 9	Scan patients on anticoagulants, in life a threatening condition or are candidates for hyperacute treatment immediately and scan all of the remaining patients within 14 days
S 10	Scan only patients in atrial fibrillation, on anticoagulants or antiplatelet drugs within 7 days of admission to hospital
S 11	Scan only patients with a life-threatening stroke or anticoagulants within 7 days of admission to hospital
S 12	Do not scan anyone

Note: A life threatening stroke is defined in terms of the severity of the stroke (TACS) with an impaired level of consciousness

The model incorporated factors such as: type of stroke, severity of stroke, and sensitivity and specificity of the scan. Decisions regarding primary treatment and the implications for intermediate and final outcomes were also incorporated in the model. Final outcomes were measured using Quality Adjusted Life Years (QALYs). The advantage of using QALYs is that they enable length as well as quality of life to be combined into a single measure. Utility weights reflecting the quality of life were determined using a generic quality of life measure (EuroQol) using existing data sources.

Costs in the study were estimated from the perspective of the health service. Key areas of resource use include: CT scans, primary treatment (which consists of primary intervention and length of stay for the first episode of care) and subsequent stroke related hospital admissions within the five year time period.

The proportion of scans undertaken during 'normal working hours' and 'out of hours' was identified for each scanning strategy.

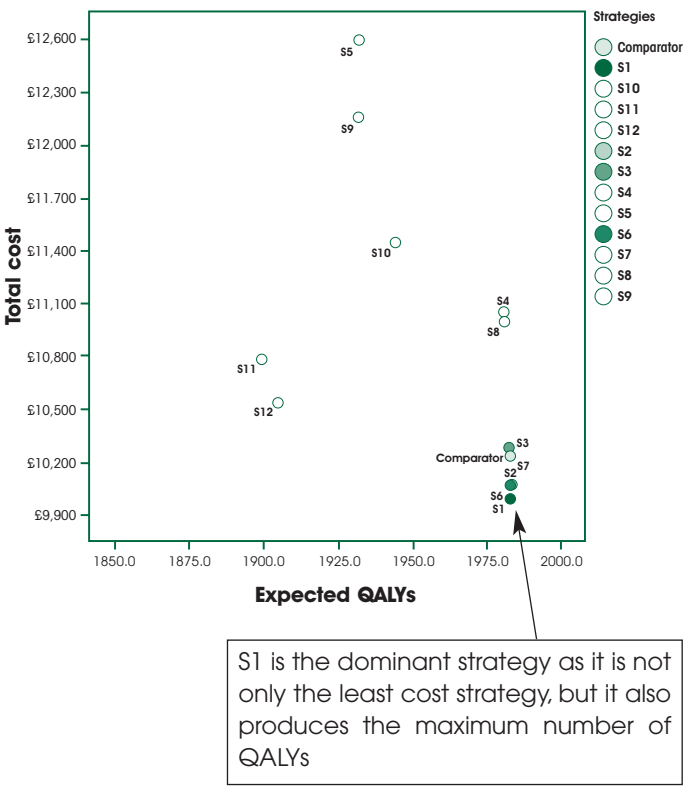
The main analysis was undertaken using a cohort of 1,000 patients aged between 70 and 74 years. Sensitivity analysis was performed to assess the impact on the results of varying the values of a number of the variables. These included the cost of CT scanning, the age of patients, sensitivity and specificity of the scans, utility weights and the cost of length of stay.

Results

The results of the study indicate that there is very little difference in the number of QALYs generated by the majority of the strategies (see Figure 1). In terms of costs, S1, 'Scan all patients immediately' is the least cost strategy, closely followed strategies which involve scanning the majority of patients within 24 hours. S1 is the dominant strategy as it is not only the least cost strategy, but it also produces the maximum number of QALYs.

Sensitivity analysis indicated that the findings of the cost-effectiveness analysis do not change when key assumptions are varied as 'Scan all patients immediately' (S1) remains the dominant strategy. However, the results are sensitive to the cost of inpatient days. When the cost of inpatient stays was reduced, 'Scan all patients within 48 hours' (comparator) became the least cost strategy. Due to very small differences in the number of QALYs, the incremental cost per QALY of 'Scanning all patients immediately' rises rapidly.

Figure 1: Total costs and expected QALYs*



*Cohort of 1,000 patients aged 70-74 years

Conclusions

This study provides some of the first economic evidence to support current UK guidelines on the provision of CT scanning for stroke patients. The findings suggest that patients suspected of having suffered a first stroke should be scanned 'quickly', that is, either immediately or within 48 hours of admission to hospital.

It is recognised that implementation of these results however depends on a number of factors. Firstly, it is important to understand current clinical practice to identify the timeframe in which suspected stroke patients currently being scanned, and how (or if) this can be changed. Secondly, the current capacity of radiological departments (especially concerning issues regarding the recruitment and retention of labour) needs to be examined. Finally, access to CT scanning, particularly for patients in remote and rural communities needs to be considered.

References

1. Wade DT. Stroke (acute cerebrovascular disease). In Stevens A, Raftery J, eds. Health care needs assessment. The epidemiologically based needs assessment reviews. Oxford, Radcliff Medical Press 1994, 111-255.

2. Keir S, Wardlaw J, Sandercock, PAG, Chen Z. Antithrombotic therapy in patients with any form of intracranial haemorrhage: a systematic review of the available controlled studies.' Cerebrovascular Disease 2002, 14, 197-206.

3. Scottish Intercollegiate Guidelines Network. (SIGN) Management of patients with stroke I: assessment, investigation, immediate management and secondary prevention 1997, Edinburgh: Scottish Intercollegiate Guidelines Network.

4. Royal College of Physicians. (RCP) National clinical guidelines for stroke. Update 2002. The Intercollegiate Working Party for Stroke 2002, Suffolk: Clinical Effectiveness and Evaluation Unit.

For further details this study see: Wardlaw J, Keir S, Seymour J, Sandercock P, Lewis S, Dennis M, Cairns J (2004) What is the best imagining strategy for acute stroke? NHS Health Technology Assessment 8,(1). The executive summary and full report can be down loaded from the NHS R&D HTA Programme website www.hta.nhsweb.nhs.uk.

This Briefing Paper describes work conducted by the Economic Evaluation Programme. Further information on this topic can be obtained by contacting Luke Vale at HERU, University of Aberdeen, Foresterhill AB252ZD (contact details - email L.Vale@abdn.ac.uk). For general information about HERU please contact Anne Bews at the above address or visit our website at www.abdn.ac.uk/heru.

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