

# Factors that influence variation in clinical decision-making about thrombolysis in the treatment of acute ischaemic stroke: results of a discrete choice experiment

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**Declared competing interests of authors:** Darren Flynn, Gary A Ford, Helen Rodgers and Richard G Thomson have been involved in marketing activity for COMPASS, a decision aid to support thrombolysis decision-making and risk communication, which may be made commercially available, including covering the costs of technical maintenance and updating of the information content. Helen Rodgers is president-elect of the British Association of Stroke Physicians and a member of the Intercollegiate Stroke Working Party. Gary A Ford's previous institution has received research grants from Boehringer Ingelheim (manufacturer of Alteplase), and honoraria from Lundbeck for stroke-related activities. Gary A Ford has also received personal remuneration for educational and advisory work from Boehringer Ingelheim and Lundbeck; in addition, he is supported by a National Institute for Health Research Senior Investigator award.

Published January 2017

DOI: 10.3310/hsdr05040

## Scientific summary

### Clinical decision-making about thrombolysis

Health Services and Delivery Research 2017; Vol. 5: No. 4

DOI: 10.3310/hsdr05040

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# Scientific summary

## Background

Intravenous thrombolysis using recombinant tissue plasminogen activator is an effective medical treatment for patients with acute ischaemic stroke. Despite clear evidence of its efficacy and benefit in certain patient groups and presence in national guidelines, it is underused, as only approximately 80% of patients eligible for thrombolysis receive it in the UK. As thrombolysis treatment can reduce disability from stroke and consequent care costs, maximising its appropriate use is a health and economic priority. Previously, the suboptimal use of thrombolysis might have been largely attributable to structural factors; however, with the widespread implementation of '24/7' hyperacute stroke services (services available 24 hours per day, 7 days per week), continuing variation is likely to reflect differences in clinical decision-making, in particular the influence of ambiguous areas in the guidelines, licensing criteria and research evidence. This variation in decision-making could lead to the underuse, or result in inappropriate use, of thrombolysis.

## Objectives

This research sought to elucidate factors influencing thrombolysis decision-making by using (1) patient vignettes (designed to explore difficult cases both within and outside the licensing criteria) to identify patient-related and clinician-related factors that may help to explain variation in treatment; and (2) associated trade-offs in decision-making based on the interplay of factors influencing decision-making. The study aimed to influence clinicians' behaviour by translating learning into continuing professional development (CPD) activity, national clinical guidelines, supporting implementation of an existing thrombolysis decision support tool and informing clinical audit and evaluation programmes (Sentinel Stroke National Audit Programme; SSNAP).

## Methods

A discrete choice experiment (DCE) framed around areas of clinical uncertainty was conducted to better understand how clinicians make decisions about whether or not to offer thrombolysis to patients with acute ischaemic stroke. To inform the design of the DCE, a five-stage process was undertaken to ensure that all potentially influential factors were considered for inclusion; to gain insights into the 'grey areas' of the licensing criteria with reference to levels of patient factors; to maximise clinical face validity; and to ensure that the content was meaningful and sufficient for clinicians to reach a decision about the offer of thrombolysis. A fractional factorial design was employed to combine levels of patient factors in vignettes, which were presented to clinicians to allow estimation of the variable effects on decisions to offer thrombolysis. Participants were recruited via e-mails and newsletters circulated via the professional bodies representing the various medical specialties involved in acute stroke care, as well as via the Stroke Association Stroke Improvement Bulletin and a notice about the study on the SSNAP website. Mixed-logit regression analyses were conducted on the data.

## Results

A total of 138 clinicians responded and, overall, opted to offer thrombolysis in 31.4% of cases. Seven patient factors were individually predictive of increased likelihood of offering thrombolysis (compared with reference levels in brackets): stroke onset time of 2 hours 30 minutes (50 minutes); pre-stroke dependency modified Rankin Scale (mRS) score of 3 (mRS4); systolic blood pressure (SBP) of 185 mmHg (140 mmHg); stroke severity [using National Institutes of Health Stroke Scale (NIHSS)] scores of NIHSS 5 without aphasia, NIHSS 14 and NIHSS 23 (NIHSS 2 without aphasia); age 85 years (65 years); and Afro-Caribbean (white). Factors predictive of not offering thrombolysis were age 95 years; stroke onset time of 4 hours 15 minutes; severe dementia (no memory problems); and SBP of 200 mmHg. Three clinician-related factors were predictive of an increased likelihood of offering thrombolysis (perceived robustness of the evidence for thrombolysis; thrombolysing more patients in the past 12 months; and high discomfort with uncertainty) and one factor was predictive of a decreased likelihood of offering treatment (clinicians' being comfortable with treating patients outside the licensing criteria).

## Limitations

Although we sought a sample size of 150–200 participants, our final sample of 138 is good, as the total population of eligible clinicians in the UK is relatively small. Furthermore, census data from the Royal College of Physicians suggest that our sample is representative of UK-based clinicians involved in final decisions about thrombolysis. A limitation of the study was that trade-offs between factors could not be explored, as no linear variables were included in the analysis.

## Conclusions

There was considerable heterogeneity among respondents in thrombolysis decision-making (in the context of cases which were specifically generated to address grey areas/areas of uncertainty), indicating that clinicians differ in their thresholds for treatment across a number of patient-related factors. Respondents were significantly more likely to treat 85-year-olds than patients aged 68 years and this likely reflects acceptance of data from the Third International Stroke Trial that report benefit for patients aged > 80 years, in particular for those with onset-to-treatment time of < 3 hours, and recognition that chronological age does not necessarily equate to physiological age. The findings suggest that clinicians may be willing to delay treatment for patients who present early. This may reflect clinicians' inexperience, given the infrequent nature of early presentation. Alternatively, some clinicians may wait a short while to see if the symptoms spontaneously improve or to give blood pressure time to stabilise. The former explanation is counter to the evidence for better outcomes with earlier treatment.

The finding that participants were significantly more likely to offer thrombolysis to patients with severe stroke and to not offer thrombolysis to patients with mild stroke may indicate uncertainty or concern about the risk/benefit balance around the benefit of treatment of minor stroke or concerns that symptomatic intracranial haemorrhage is not an acceptable risk for those with less severe symptoms. There was significant heterogeneity among respondents on the influence of NIHSS 2 with aphasia and NIHSS 5 without aphasia. This implies that clinicians differ in their thresholds for treatment of minor stroke and that they may consider the gains in quality of life for individual patients with isolated language difficulties to be of less value.

## Future work

Evidence-based strategies such as cognitive debiasing approaches and the use of decision support tools could be incorporated within clinical training, CPD and masterclasses. Problem-based learning using a representative cross-section of patients with different clinical and non-clinical characteristics, which reflects up-to-date observational and trial evidence, has the potential to maximise the appropriate delivery of thrombolysis in the treatment of acute ischaemic stroke.

The nature of DCEs demands that only a subset of potentially influential factors on clinical decision-making could be explored, although these were carefully selected via a rigorous design process. Factors not explored in this study warrant future research to understand their impact on the clinical decision to offer intravenous thrombolysis. These include the influence of decision support tools and/or graphical depictions of the likely balance of absolute risks and benefits for individual patients treated with and without thrombolysis.

## Funding

Funding for this study was provided by the Health Services and Delivery Research programme of the National Institute for Health Research.

# Health Services and Delivery Research

ISSN 2050-4349 (Print)

ISSN 2050-4357 (Online)

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The research reported in this issue of the journal was funded by the HS&DR programme or one of its preceding programmes as project number 12/5001/45. The contractual start date was in June 2013. The final report began editorial review in June 2015 and was accepted for publication in November 2015. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HS&DR editors and production house have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the final report document. However, they do not accept liability for damages or losses arising from material published in this report.

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