**Factors that influence clinicians’ decisions to offer intravenous alteplase for borderline patients with acute ischaemic stroke: results of a discrete choice experiment**

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**Abstract**

**Background**: Treatment with intravenous (IV) alteplase for eligible patients with acute ischemic stroke is underused and treatment rates vary across the UK. This study sought to elucidate factors influencing variation in clinicians’ decision-making about this thrombolytic treatment.

**Methods**: A discrete choice experiment (DCE) using hypothetical patient vignettes framed around areas of clinical uncertainty was conducted with UK-based clinicians. Mixed logit regression analyses were conducted on the data.

**Results**: 138 clinicians completed the DCE. Seven patient factors were individually predictive of increased likelihood of immediately offering IV alteplase (compared to reference levels in brackets): stroke onset time 2 hours 30 minutes [50 minutes]; pre-stroke dependency mRS 3 [mRS 4]; systolic blood pressure 185mm/Hg [140mm/Hg]; stroke severity scores of NIHSS 5 without aphasia, NIHSS 14 and NIHSS 23 [NIHSS 2 without aphasia]; age 85 [68]; Afro-Caribbean [white]. Factors predictive of withholding treatment with IV alteplase were: age 95 [68]; stroke onset time of 4 hours 15 minutes [50 minutes]; severe dementia [no memory problems]; SBP 200mm/Hg [140 mm/Hg]. Three clinician-related factors were predictive of an increased likelihood of offering IV alteplase (perceived robustness of the evidence for IV alteplase; thrombolysing more patients in the past 12 months; and high discomfort with uncertainty) and one with a decreased likelihood (high clinician comfort with treating patients outside the licencing criteria).

**Conclusions**: Both patient and clinician-related factors have a major influence on the use of alteplase to treat patients with acute ischaemic stroke. Clinicians’ views of the evidence, comfort with uncertainty and treating patients outside the licence criteria are important factors to address in programmes that seek to reduce variation in care quality about treatment with IV alteplase. Further research is needed to further understand differences in clinical decision-making about treating patients with acute ischaemic stroke with IV alteplase.

**INTRODUCTION**

Stroke remains a leading cause of death and disability.1 Thrombolysis with recombinant tissue plasminogen activator (intravenous (IV) alteplase) is a cost-effective treatment for acute ischaemic stroke that reduces stroke related disability, but unwarranted variation exists in UK thrombolysis rates2 despite a strong evidence base3, 4 reflected in the National Stroke Strategy,5 National Institute for Health and Care Excellence (NICE) guidelines,6 and treatment licensing criteria.7 Since the expansion of 24/7 hyper-acute stroke services, organisational factors seem less likely to explain this variation, which may be accounted for by variation in clinical decision-making, based on interpretation and understanding of clinical factors, and on characteristics of the individual decision-makers (such as experience, attitude towards risk). The study aimed to elucidate patient and clinician factors that influence clinicians’ decision-making about the offer of IV alteplase to patients with acute ischaemic stroke.

Clinical decision-making about IV alteplase is complex. The time limited window for treatment (maximum 4.5 hours since symptom onset) and the many clinical factors that might influence the balance between risk and benefit for individual patients factor into this high stakes decision.8 Earlier treatment is associated with better outcomes, yet there is a small but significant risk of adverse outcomes, mainly due to treatment-related symptomatic intracranial haemorrhage (sICH).9 Decision-making is further complicated by uncertainty in research evidence, typically where high quality data from randomised control trials does not exist regarding the suitability of certain patients for treatment with IV alteplase.10

In order to understand the variation in treatment rates,2 the lack of expert consensus on several treatment exclusion criteria,11 and on-going debates regarding the efficacy of IV alteplase,12, 13 a research method is required that reflects decision-making in practice.14 A discrete choice experiment (DCE) facilitates investigation of multiple factors in a decision and is therefore appropriate for exploring this complex decision. This method enables the nuances of decision-making to be understood by providing insights not easily captured using more traditional research methods, such as interviews or observation. DCEs have been increasingly adopted to examine healthcare decision-making, including stroke rehabilitation.15 Through a novel DCE approach, this study aimed to elucidate the factors influencing and contributing to variation in clinicians’ decision-making about treating patients with acute ischaemic stroke with IV alteplase, with a focus on areas of clinical uncertainty and borderline cases.

**METHODS**

**Study design**

The DCE development process consisted of five iterative stages, informed by current good practice recommendations.16-18 Through expert design and pilot testing19, hypothetical patient vignettes mimicked the clinical decision and required a binary response (offer IV alteplase or not). Supplemental tables I and II describe factors and levels included in the study and their accompanying definitions. Optional free text boxes were included after each vignette for participants to comment on their decision-making, assisting with interpretation of findings (see supplemental material). A blocked design allowed a subset of vignettes to be presented to each participant to avoid overburdening participants (see Figure 1 for sample vignette).

[Insert Figure 1 here]

An online survey also included questions and measurement scales to collect information on clinician characteristics that were hypothesised to influence decision-making, including demography and level of experience. A scale was developed to gauge the institutional culture with respect to thrombolysis (‘Institutional Culture Scale’, see supplemental Table III). The risk-taking sub-scale of the Jackson Personality Inventory (JPI) 20 and the Physician Reaction to Uncertainty Scale21 were also employed.

Clinicians were asked to state the recency of their last thrombolysis decision, and how many stroke patients they had treated with IV alteplase and how many were harmed as a result, in the past 12 months. Six-point Likert scales were used to assess the impact of clinicians’ level of comfort treating a patient outside the licencing criteria and their views on the strength of the evidence base.

Ethical approval was obtained from Newcastle University Research Ethics Committee (reference: 00720/2013).

## Recruitment

UK clinicians who were involved in decision-making regarding the offer of IV alteplase for patients with acute ischaemic stroke were recruited via newsletters and emails sent through relevant professional associations, including the British Association of Stroke Physicians, Society for Acute Medicine, College of Emergency Medicine, British Geriatrics Society, and Association of British Neurologists. An invitation to participate was also sent to UK Safe Implementation of Treatments in Stroke (SITS) coordinators and information about the study was included on the Sentinel Stroke National Audit Programme (SSNAP) website. A screening question was first provided to participants ensuring they were involved in the “final decision-making” about thrombolysis. The survey was live for six months from September 2014.

**Statistical analysis**

Data were analysed in STATA IC13.22 Mixed logit regression (mixlogit) analyses were conducted to facilitate the examination of heterogeneity amongst respondents. The intercept (alternative specific constant; ASC) and model parameters were assumed to be random and normally distributed. A positive coefficient for a level of a factor in the mixlogit models, compared with the reference level of the factor, represents a driver of a decision to offer treatment with IV alteplase, whereas a negative coefficient represents an inhibiting influence on decisions to offer this treatment (i.e. more likely not to offer treatment). Significance was set at a P-value of <0.05 and the odds ratios (95% confidence intervals) were calculated to show magnitude/precision of effects in the regression models: patient-related factors (model 1); and both patient and clinician-related factors (model 2). Implausible combinations (e.g. pre-stroke dependency of mRS 1 and severe dementia) were omitted from the regression models. In addition, to control for the effects of block design, seven dummy variables were included in the analyses (comparing each design block to block 1).

## RESULTS

## Sample Characteristics

Table 1 presents a summary of the socio-demographic profile and other characteristics of respondents (*N*=138). Respondents had a mean age of 46 years (range 30-68). The majority were male (73%) and stroke physicians (59%). The average experience treating stroke patients and administering intravenous alteplase was 11 years (range 3 months - 38 years) and 6 years 4 months (range 3 months - 22 years), respectively. Although no information is available about the non-respondents to the online survey, the profile of the respondents is broadly representative of the population of medical professionals involved in acute stroke care in the UK. Based on data from the SSNAP acute organisation audit,23 the profile of the current sample in terms of medical specialty is proportionately representative of those involved in decision-making about treatment of acute stroke patients; stroke physicians are most often on thrombolysis rotas, followed in decreasing order by geriatricians, neurologists, accident and emergency (A&E) and acute medicine physicians. Furthermore, the average age and gender distribution in the current sample is consistent with data from the Royal College of Physicians (RCP) 2012 census.24

Reliability analyses were conducted on the scales employed in the survey and showed good to high reliability across scales (see supplemental material).

There was overall general preference not to offer IV alteplase to patients described in the hypothetical vignettes, with 1,103 decisions (68.6%) not to offer treatment with IV alteplase compared to 504 decisions to offer the treatment (31.4%).

[Insert Table 1 here]

##

## DCE Regression Results

*Model 1 – Patient-related factors (Table 2)*

Compared to their reference categories (in brackets), four patient factors were statistically significant predictors of decisions not to offer treatment with IV alteplase: patient age of 95 [68]; time since stroke symptom onset 4 hours 15 minutes [50 minutes]; patients with severe dementia [no history of memory problems]; and systolic blood pressure (SBP) of 200 mm/Hg [140mm/Hg].

There were eight statistically significant predictors of decisions to offer IV alteplase (compared to reference levels in brackets): patient age of 85 years [68]; Afro-Caribbean ethnicity [white]; time since stroke symptom onset of 2 hours 30 minutes [50 minutes]; pre-stroke dependency score of mRS 3 [mRS4]; and SBP of 185 mm/Hg [140mm/Hg]. Compared with the stroke severity reference category of the National Institutes of Health Stroke Scale25 (NIHSS) score of 2 without aphasia, respondents were significantly more likely to offer thrombolysis to patients with scores of NIHSS 5 without aphasia, NIHSS 14 and NIHSS 23.

[Insert Table 2 here]

The standard deviation for the ASC was statistically significant suggesting considerable heterogeneity among respondents in IV alteplase decision-making. There was also substantial heterogeneity on several of the random effects coefficients, with nine standard deviations significant, indicating variation between participants in their IV alteplase decisions as a function of differing levels of patient-related factors.

*Model 2 – Patient-related and clinician factors (Table 3)*

Model 2 added seven clinician characteristics to the patient-related factors: respondents’ perception of the effectiveness and safety of treating acute ischaemic stroke patients with IV alteplase; Physician Reaction to Uncertainty Scale; clinicians’ attitude towards risk; estimated number of patients harmed by IV alteplase in the past 12 months and days since a patient was harmed; estimated number of patients treated with IV alteplase in the past 12 months; and comfort treating patients outside licensing criteria.

The standard deviation for the ASC for Model 2 is also statistically significant, which indicates the presence of considerable heterogeneity amongst respondents regarding their decisions about treating patients with IV alteplase. There was also considerable heterogeneity for the random effects coefficients (i.e., the levels of patient factors), with the standard deviations of 17 factor levels emerging as statistically significant. All the statistically significant patient factor predictors from Model 1 remained significant in Model 2, but two additional patient factors became statistically significant predictors of decisions to offer treatment with IV alteplase: moderate dementia; and NIHSS 5 with aphasia.

Respondents’ were significantly more likely to offer treatment of IV alteplase when they perceived the evidence base for this treatment to be robust; had treated a high number of patients in the past 12 months; and reported a higher level of discomfort with uncertainty. Clinicians who reported being comfortable treating patients outside the licencing criteria were significantly less likely to offer thrombolysis.

Comparison of the Akaike and Bayesian information criteria established that Model 2 was a better fit for these data than Model 1.

The predicted probabilities of offering IV alteplase for patients with acute ischaemic stroke based on Model 1 are presented in Table 4.

[Insert Tables 3 & 4]

**DISCUSSION**

This is the first DCE to explore patient and clinician factors that influence the decision to offer IV alteplase (thrombolysis) to treat patients with acute ischaemic stroke, with a particular focus on areas of uncertainty and borderline cases. For the vignettes included in this study, analysis revealed an aggregate level preference not to offer this treatment, which was expected given that the vignettes were designed to explore decisions related to the ‘grey’ areas of the licensing and evidence base for treatment.

Levels of seven different patient-related factors (patient age, patient ethnicity, stroke symptom onset time, pre-stroke dependency, systolic blood pressure, stroke severity [NIHSS]25; and pre-stroke cognitive status) and four different clinician-related ‘psychosocial’ factors (perception of the evidence for the effectiveness and safety of IV alteplase, number of patients treated in the past 12 months, comfort with uncertainty, and comfort with treating patients outside the licensing criteria) were significant predictors of the treatment decision.

Patients aged 95 were significantly less likely to be offered treatment compared with patients aged 68. However, respondents were significantly more likely to treat 85 year olds compared with patients aged 68. The benefits of thrombolysis for older patients in terms of reduction in disability are at least as great as younger patients, despite an increased risk of symptomatic intracranial haemorrhage. This may also reflect acceptance of a high profile clinical trial and case control study data that reports benefit for patients aged >80, in particular for those with onset to treatment time of <3 hours.3, 4 It is feasible that a social desirability effect explains this latter finding; respondents may be over-compensating (pro-actively recommending a positive decision) to avoid denying treatment based on age. It appears that clinicians are not disinclined to treat older patients, but less likely to treat the very old (~95). This may reflect the upper limit of data from IST-3 or clinical experience (there are few patients who have been treated in this age range in routine practice). SITS data indicate that only approximately 10% of treated patients were older than 8026 and national audit data suggests that only 2.5% of the total number of patients who received IV alteplase between April 2010 and November 2011 were older than 90 years.27

Consistent with evidence of increased benefit with earlier treatment,4 we identified a statistically significant decreased likelihood of offering treatment to patients who could be treated at 4 hours 15 minutes compared to 50 minutes from symptom onset. However, clinicians were significantly more likely to treat patients at 2 hours 30 minutes relative to 50 minutes. This unexpected finding suggests that some clinicians rarely see patients this soon after onset or that clinicians might observe cases presenting early for a short while, particularly if there are factors which create high uncertainty; for instance in mild stroke, when a patient’s symptoms are rapidly improving, to see if symptoms may resolve (per licencing guidelines7), or to give blood pressure time to stabilise or to take more readings before making a final decision.28,29 This is in contrast to research which confirms that earlier treatment is associated with substantially more favourable outcomes9 particularly when treatment occurs within the ‘golden hour’ (<60 minutes from symptom onset).29

Respondents were significantly more likely to offer IV alteplase to patients with moderate or severe stroke and not offer IV alteplase to patients with mild stroke. These findings are likely to reflect the lack of data and/or uncertainty around the risk/benefit ratio of treatment of minor stroke and the otherwise poor outcomes for untreated patients with severe strokes. There was significant heterogeneity amongst respondents on the influence of NIHSS 2 with aphasia and NIHSS 5 without aphasia, implying that clinicians differ in their thresholds for treatment of minor stroke and may consider the gains in quality of life for individual patients with isolated language deficits differently.

Compared to white patients, Afro-Caribbean patients were significantly more likely to be offered treatment, though there was no effect for Asian ethnicity. The explanation for this finding is unclear.

Patients with pre-stroke dependency of mRS 3 were more likely to be offered treatment than those with mRS 4. We would have expected that respondents would be more willing to treat patients with mRS 1 compared to mRS 4, but this did not emerge. However, the failure of this to reach significance may be due to an imbalance between the levels of pre-stroke dependency across vignettes in the study, where mRS 1 vignettes were significantly underrepresented.

Patients presenting with severe dementia were significantly less likely to be offered IV alteplase in Models 1 and 2, although in Model 2, clinicians were more likely to offer treatment to those with moderate dementia (compared to patients with no memory problems). This is difficult to explain but may be due to an attempt to preserve a patients’ independence when there is already a low probability that this might be retained. Inspection of the standard deviations reveals significant variation between respondents on the influence of both moderate and severe dementia on decision-making. This may show that clinicians are weighing up the pros and cons of treatment with reference to individual patient characteristics that are not part of the licensing criteria, although it may also reflect perceptions that dementia reduces likelihood of clinical benefit or is associated with an increased risk of adverse effects. However, current evidence suggests there is no increased risk of adverse effects from IV alteplase in patients with dementia.30

Four of the seven clinician factors emerged as significant. There was a significant association found between the respondents’ perception of the evidence base and the offer of treatment with IV alteplase. Greater discomfort with uncertainty was associated with increased likelihood of offering IV alteplase. This may indicate a preference for action over inaction in instances of high uncertainty, or what may be termed commission bias when observed consistently.31 Commission bias is defined as the tendency towards action/intervention rather than inaction.31 Given the high scores observed on the Institutional Culture Scale in the study (indicating a strong culture of administering IV alteplase to patients with acute ischaemic stroke in respondents’ institutions), clinicians may worry more about decisions not to treat and, therefore, those with higher levels of discomfort with uncertainty may be more willing to provide this treatment, if it is perceived as the dominant or favoured position among colleagues. The results also indicated that clinicians who reported being more comfortable treating patients outside the licensing criteria were less likely to offer treatment in the current study; we do not have an explanation for this finding.

Finally, there was a significant positive association between clinicians’ experience of administering IV alteplase and the likelihood of offering the treatment in the current study. This may indicate that familiarity with administration of the treatment (and positive outcomes) increases the likelihood of future use, and has important practical implications for how clinicians are supported when they begin involvement in decision-making.32 Alternatively it may simply represent that those more likely to offer treatment in the DCE are more likely to offer treatment in practice, and therefore have higher reported treatment rates.

A key strength of this study was our ability to account for both observed heterogeneity amongst respondents (via inclusion of clinician factors in the model) as well as unobserved variation (via the estimation of random parameters for the alternative specific constant and factor levels) using the mixed logit regression. Our research offers an important contribution towards a deeper understanding of the factors influencing the decision to offer IV alteplase to patients, in particular factors that influence decisions for patients that fall within the licensing criteria grey zone. However, a limitation of the study was the potential for response bias, given we cannot be certain about the absolute number of eligible clinicians that received the invitation to participate. Furthermore, whilst there was no significant difference in decision-making observed between medical specialities.

There were a number of results in this study that were unexpected, for example, respondents were more likely to offer IV alteplase to patients presenting with a stroke onset time of 2 hours 30 minutes compared to 50 minutes. We do not have clear explanations for these findings without undertaking additional data collection. There are at least three issues to consider:
(i) Technical: As a reflection of the degree of clinical uncertainty being examined by the vignettes, the responses did not contain enough positive responses for some factor levels to fully explore interactions between different factors/levels. A larger cohort or number of vignettes would have enabled greater certainty about the dependency between different factor levels and factors. A replication of the current study using a broader range of factor levels (e.g., for pre-stroke dependency) and including vignettes where there is likely to be clear consensus about whether or not to offer IV alteplase would help to clarify the results observed in this study.

(ii) Overcorrection: Respondents may have used their responses to emphasise a particular point which had been recently highlighted by clinical or research developments (e.g. evidence to support treatment of patients > 80 years old), or to avoid a perception of bias against certain demographic groups.

(iii) Diagnostic uncertainty: The decision to treat patients with IV alteplase involves a high degree of confidence that ischaemic stroke is the cause of the acute symptoms. Despite assurance that only patients with acute ischaemic stroke were being described in the vignettes, respondents may have been influenced by their clinical experience with stroke mimics. For instance, this may explain the apparent greater enthusiasm to treat at 2 hours 30 minutes rather than 50 minutes, as respondents may have been concerned that the former could resolve and be a transient ischaemic attack (TIA) rather than stroke. This may be a training issue which should be addressed.

Training for the assessment and treatment of patients with acute ischaemic stroke should address the impact of the influence of clinician factors on decision-making, impart cognitive de-biasing strategies to optimise and support decision-making, and should ensure clinicians develop practical learning and self-efficacy in the administration of IV alteplase to eligible patients early in training to maximise appropriate treatment utilisation. The use of patient vignettes as choice scenarios which focus on the ‘grey’ areas in decision-making are useful in generating discussion and revealing differences in individual-level clinical decision-making. Future DCEs could feed back information to participants about their decision-making relative to other experienced colleagues, and inform reflective practice and professional development. High quality clinical studies are also required to inform ‘grey areas’ of decision-making and address current gaps in the evidence base; in particular, those patient factors (e.g. moderate and severe dementia) which resulted in significant heterogeneity in decision-making among participants in the current study. Future research could apply this method to make between-country comparisons of IV alteplase decision-making and should investigate additional factors beyond those included in this study. National stroke audit programmes should consider including additional patient variables, such as pre-stroke cognitive status, in data collection strategies, as this could further illuminate variances in decision-making about the offer of IV alteplase.

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**Contributors**

ADB, RGT, GAF, DF, LT, EL, HR, MR and CP were involved in study design, interpretation of results and drafting of this manuscript. SS and JT were involved in critique of the project, interpretation of results, and drafting of this manuscript.

**Conflicts of interest**

DF, GAF, HR, and RGT have been involved in the development of 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. HR is President of the British Association of Stroke Physicians and a member of the Intercollegiate Stroke Working Party. GAF's previous institution has received research grants from Boehringer Ingelheim (manufacturer of alteplase), and honoraria from Lundbeck for stroke-related activities. GAF has also received personal remuneration for educational and advisory work from Boehringer Ingelheim and Lundbeck. GAF is supported by an NIHR Senior Investigator award. ADB, LT, MR, SS, JT and EL, have no conflicts of interest.

**Disclaimer**

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**Figures and Tables**

Figure 1**.** Sample patient vignette

Table 1. Characteristics of sample (*N*=138)

Table 2. Model 1: Summary of mixed effects logit regression analysis for influence of patient factors/levels on the clinical decision to offer IV alteplase

Table 3. Model 2: Summary of mixed effects logit regression analysis for influence of patient factors/levels and clinician factors on the decision to offer IV alteplase

Table 4.Predicted probabilities of offering IV alteplase

Figure 1**.** Sample patient vignette



Table 1. Characteristics of sample (*N*=138)

|  |  |  |
| --- | --- | --- |
| **Variables** | **Mean (SD)** | **N (%)** |
| Age | 46 (8·7) |  |
| Male |  | 101 (73%) |
| Medical speciality |  |  |
| Stroke medicine  |  | 81 (59%) |
| Accident & Emergency  |  | 20 (15%) |
| Geriatric medicine  |  | 17 (12%) |
| Neurology |  | 17 (12%) |
| Acute care  |  | 3 (2%) |
| Grade/Seniority |  |  |
| Consultant |  | 123 (89%) |
| Staff doctor |  | 6 (4%) |
| Speciality trainee |  | 7 (5%) |
| Other |  | 2 (2%) |
| Experience with treating acute ischaemic stroke (months) | 132 (99) |  |
| Experience with administering IV alteplase (months) | 76 (43) |  |
| Willing to control blood pressure (where applicable) before treatment with IV alteplase |  | 132 (96%) |
| Formal protocol is available for assessing patient eligibility for treatment with IV alteplase |  | 136 (99%) |
| Number of clinicians who report that there are occasions when they do not strictly adhere to the protocol for assessing patient eligibility for treatment with IV alteplase |  | 93 (67%) |
| Service configuration |  |  |
| Consultant-led |  | 61 (44%) |
| Combined telemedicine & consultant-led |  | 77 (56%) |
| Risk-taking scale score | -2·19 (5.33) |  |
| Physicians’ Reaction to Uncertainty scale score | 12·86 (9.39) |  |
| Institutional Culture scale score | 24·73 (5.24) |  |
| Perception of the evidence base for treatment with IV alteplase | 4·67 (1.36) |  |
| Confidence communicating benefits/risks of treatment with IV alteplase | 5·12 (1.02) |  |
| Number of days since last IV alteplase decision made | 18 (38) |  |
| Number of patients treated with IV alteplase by respondents in last 12 months | 19 (15) |  |
| Number of patients harmed as a result of treatment with IV alteplase in last 12 months | 0·8 (1·05) |  |
| Days since patient was harmed as a result of treatment with IV alteplase | 408 (744) |  |

Table 2. Model 1: Summary of mixed effects logit regression analysis for influence of patient factors/levels on the clinical decision to offer treatment with IV alteplase

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factor** | **Level** |  | **Coefficient** | ***SE*** | ***p* value** | **Odds ratio (95% CIs)** |
| **Patient age** | 68 | Reference |
| 85 | MeanSD | 0·710·26 | 0·260·33 | 0·0050·44 | 2·03(1·23, 3·35) |
| 95 | MeanSD | -2·020·71 | 0·660·27 | 0·0020·01 | 0·13(0·04, 0·49) |
| **Patient ethnicity** | White | Reference |
| Asian | MeanSD | -0·460·23 | 0·270·28 | 0·090·41 | 0·63(0·37, 1·08) |
| Afro-Caribbean | MeanSD | 0·870·09 | 0·330·42 | 0·0090·82 | 2.39(1·24, 4.58) |
| **Patient gender** | Male | Reference |
| Female | MeanSD | -0·320·01 | 0·440·28 | 0·4630·97 | 0·73(0·31, 1·71) |
| **Time since** **symptom onset** | 50 minutes  | Reference |
| 2 hrs 30 mins  | MeanSD | 0·540·61 | 0·250·72 | 0·030·40 | 1·72(1·05, 2·81) |
| 4 hrs 15mins | MeanSD | -1·540·66 | 0·310·32 | <0·0010·04 | 0·21(0·12, 0·39) |
| **Patient frailty** | Not frail | Reference |
| Frail  | MeanSD | -0·260·34 | 0·190·26 | 0·0180·20 | 0·77(0·53, 1·12) |
| **Pre-stroke dependency****(mRS)** | mRS 1 | MeanSD | 0·80-3·01 | 1·050·49 | 0.447<0·001 | 2·23(0·28, 17·51) |
| mRS 3 | MeanSD | 1·330·39 | 0·420·34 | 0·0010·24 | 3.78(1.67, 8.6) |
| mRS 4 | Reference |
| **Pre-stroke cognitive status** | No history of memory problems | Reference |
| Moderate dementia | MeanSD | 0·291·30 | 0·310·30 | 0·349<0·001 | 1·34(0·73, 2·44) |
| Severe dementia | MeanSD | -2·820·11 | 0·600·30 | <0·0010·73 | 0·06(0·02, 0·19) |
| **Systolic blood** **pressure** | 140 mm/Hg | Reference |
| 185 mm/Hg | MeanSD | 1·171·17 | 0·360·33 | <0·001<0·001 | 3·22(1·7, 6·11) |
| 200 mm/Hg | MeanSD | -5·192·05 | 0·770·42 | <0·001<0·001 | 0·01(0·00, 0·02) |
| **NIHSS score** **(stroke severity)** | 2 (without aphasia) | Reference |
| 2 (with aphasia) | MeanSD | 0·151·20 | 0·510·53 | 0·7610·02 | 1·16(0·43, 3·14) |
| 5 (without aphasia) | MeanSD | 1·480·33 | 0·490·59 | 0·0020·57 | 4·39(1·69, 11·38) |
| 5 (with aphasia) | MeanSD | 0·652·56 | 0·410·60 | 0·111<0·001 | 1·92(0·86, 4·28) |
| 14 | MeanSD | 2·040·39 | 0·600·51 | 0·0010·45 | 7·69(2·35, 25·13) |
| 23 | MeanSD | 1·381·15 | 0·5970·52 | 0·0210·03 | 3·98(1·23, 12·84) |
| **Alternative specific constant (ASC)** | Decision to offer treatment  | MeanSD | -5·462·07 | 1·030·30 | <0·001<0·001 | 0·01(0, 0·03) |
| **Block effects** | Block 6 | Mean | 1·82 | 0·9 | 0·042 |  |

*Note*: Log likelihood = -610·642; LR χ2(20) = 225·22; number of observations = 1583; 24 observations removed by STATA for not contributing significantly to the model estimates. These observations related to individual respondents with little or no variation in their treatment with IV alteplase decision-making, i.e., decided to treat/not treat for all cases or all but one case.

Note: AIC: 1275·29; BIC: 1420·2

Note: mRS = modified Rankin scale score; NIHSS = National Institutes of Health Stroke Scale

Table 3. Model 2: Summary of mixed effects logit regression analysis for influence of patient factors/levels and clinician factors on the decision to offer treatment with IV alteplase

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factor** | **Level** |  | **Coefficient** | ***SE*** | ***p value*** | **Odds ratio** **(95% CIs)** |
| **Patient age** | 68 | Reference |
| 85 | MeanSD | 2·994·46 | 1·041·17 | 0·004<0·001 | 19·89(2·58, 152·7) |
| 95 | MeanSD | -2·882·95 | 1·240·83 | 0·02<0·001 | 0·06(0, 0·64) |
| **Patient ethnicity** | White | Reference |
| Asian | MeanSD | -0·322·06 | 0·570·58 | 0·57<0·001 | 0·73(0·24, 2·22) |
| Afro-Caribbean | MeanSD | 3·792·78 | 1·150·84 | 0·0010·001 | 44.42(4·69, 422·06) |
| **Patient gender** | Male | Reference |
| Female | MeanSD | 1·622·21 | 1·070·72 | 0·130·002 | 5·05(0·62, 40·82) |
| **Time since** **symptom onset** | 50 minutes  | Reference |
| 2 hrs 30 mins  | MeanSD | 3·050·91 | 0·850·43 | <0·0010·03 | 21·12(4, 111·1) |
| 4 hrs 15mins | MeanSD | -6·213·72 | 1·650·98 | <0·001<0·001 | 0(0·01, 0·05) |
| **Patient frailty** | Not frail | Reference |
| Frail  | MeanSD | 0·010·03 | 0·380·35 | 0·980·94 | 1·01(0·48, 2·14) |
| **Pre-stroke dependency****(mRS)** | mRS 1 | MeanSD | 3·0812·81 | 1·763·28 | 0·08<0·001 | 21·76(0·69, 685·31) |
| mRS 3 | MeanSD | 3·513·04 | 1·060·88 | 0·0010·001 | 33·45(4·11, 271·11) |
| mRS 4 | Reference |
| **Pre-stroke cognitive status** | No history of memory problems | Reference |
| Moderate dementia | MeanSD | 2.87-1·81 | 0·990·59 | 0·0040·002 | 17·64(2·5, 125·76) |
| Severe dementia | MeanSD | -8·075·42 | 1·971·4 |  <0·001 <0·001 | 0·01(0·01, 0·02) |
| **Systolic blood** **pressure** | 140 mm/Hg | Reference |
| 185 mm/Hg | MeanSD | 4·646·98 | 1·231·79 | <0·001<0·001 | 103·54(9·33, 1158·2) |
| 200 mm/Hg | MeanSD | -17·519·11 | 4·12·24 | <0·001<0·001 | 0(0, 0) |
| **NIHSS score** **(stroke severity)** | 2 (without aphasia) | Reference |
| 2 (with aphasia) | MeanSD | -1·383·82 | 1·051·43 | 0·190·01 | 0·25(0·03, 1·97) |
| 5 (without aphasia) | MeanSD | 7·742·41 | 2·221·24 | <0·0010·05 | 2298·5(29·4, 178688) |
| 5 (with aphasia) | MeanSD | 3·1311·84 | 1·172·89 | 0·008<0·001 | 22·87(2·29, 227·3) |
| 14 | MeanSD | 6·983·39 | 1·861·11 | <0·0010·002 | 1074·92(28, 41386·5) |
| 23 | MeanSD | 9·150·37 | 2·70·89 | 0·0010·68 | 9414·44(43·6, 2047889) |
| **Perception of evidence base** |  |  | 0·55 | 0·29 | 0·053 | 1·73(0·99, 3·05) |
| **No. treated with IV alteplase in past 12 months** |  |  | 0·21 | 0·05 | <0·001 | 1·23(1·11, 1·37) |
| **Physician reaction to uncertainty**  |  |  | 2·46 | 0·89 | 0·006 | 11·7(2·01, 67·71) |
| **Attitude towards risk** |  |  | 0·06 | 0·07 | 0·35 | 1·06(0·93, 1·22) |
| **No. harmed by IV alteplase in past 12 months** |  |  | -0·48 | 0·52 | 0·36 | 0·62(0·22, 1·72) |
| **Days since patient was harmed by IV alteplase** |  |  | 0·01 | 0·001 | 0·48 | 1.01(1, 1·01) |
| **Comfort treating outside criteria** |  |  | -0·78 | 0·34 | 0·02 | 0·46(0·24, 0·89) |
| **Alternative specific constant (ASC)** | Decision to offer treatment | MeanSD | -26·997·17 | 6·791·82 | <0·001<0·001 | 0(0 , 0) |
| **Block effects** | Block 2  | Mean | 5·2 | 1·76 | 0·01 |  |
| Block 3 | Mean | 3·93 | 1·76 | 0·03 |  |
| Block 5  | Mean | 6·81 | 2·16 | 0·01 |  |
| Block 7 | Mean | 6·48 | 2·07 | 0·01 |  |
| Block 8 | Mean | 4·91 | 1·89 | 0·01 |  |

*Note*: Log likelihood = -583·65; LR χ2(20) = 227·81; number of observations = 1583; 24 observations removed by STATA for not contributing significantly to the model estimates. These observations related to individuals with little or no variation in their decision-making, i.e., answered in one way (i.e., to treat/not treat) in all or all but one case.

Note: AIC: 1235·29 BIC: 1417·77

Note: All clinician factors were interacted with the treatment ASC and entered in the model.

Note: mRS = modified Rankin scale score; NIHSS = National Institutes of Health Stroke Scale

Table 4.Predicted probabilities of offering treatment with IV alteplase

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Patient vignette details** |  |  |  |
| **Vignette no.** | **Block** | **Age** | **Gender** | **Ethnicity** | **Symptom onset time** | **Cognitive status**  | **Dependency (mRS)** | **NIHSS score** | **Systolic BP** | **Frailty** | **Utility** | **Probability of treatment** | **% of respondents who offered treatment** |
|  | 7 | 95 | female | white | 4hr15mins | no memory problems | mRS3 | 5 (with aphasia) | 140 mm/Hg | not frail | 3.08 | 95.62 | 44.40% |
|  | 4 | 95 | female | Afro-Caribbean | 2hr30mins | no memory problems | mRS3 | 2 (without aphasia) | 185 mm/Hg | frail | -3.28 | 3.62 | 6% |
|  | 7 | 95 | male | white | 50mins | severe dementia | mRS3 | 14 | 140 mm/Hg | frail | 1.79 | 85.75 | 55.60% |
|  | 4 | 85 | female | white | 50mins | moderate dementia | mRS1 | 14 | 185 mm/Hg | not frail | 0.08 | 51.94 | 68.80% |
|  | 7 | 68 | female | white | 2hr30mins | moderate dementia | mRS4 | 5 (with aphasia) | 140 mm/Hg | frail | -5.79 | 0.30 | 44.40% |
|  | 1 | 85 | male | white | 4hr15mins | moderate dementia | mRS4 | 23 | 140 mm/Hg | frail | -3.07 | 4.43 | 20% |
|  | 7 | 85 | female | white | 4hr15mins | severe dementia | mRS3 | 2 (without aphasia) | 185 mm/Hg | frail | -13.30 | 0.00 | 0% |
|  | 5 | 68 | female | Afro-Caribbean | 4hr15mins | severe dementia | mRS4 | 2 (without aphasia) | 140 mm/Hg | frail | -16.07 | 0.00 | 0% |
|  | 8 | 95 | male | white | 50mins | severe dementia | mRS3 | 5 (with aphasia) | 140 mm/Hg | frail | 0.41 | 60.01 | 30.80% |
|  | 2 | 85 | female | white | 4hr15mins | no memory problems | mRS3 | 2 (with aphasia) | 200 mm/Hg | frail | -8.46 | 0.02 | 9.10% |
|  | 1 | 85 | female | Asian | 2hr30mins | severe dementia | mRS3 | 2 (without aphasia) | 140 mm/Hg | not frail | -7.90 | 0.04 | 15% |
|  | 8 | 95 | male | white | 4hr15mins | moderate dementia | mRS3 | 2 (without aphasia) | 200 mm/Hg | not frail | -14.11 | 0.00 | 0% |
|  | 6 | 85 | female | Asian | 50mins | no memory problems | mRS3 | 23 | 140 mm/Hg | not frail | 5.00 | 99.33 | 100% |
|  | 4 | 95 | male | Asian | 50mins | no memory problems | mRS4 | 2 (without aphasia) | 200 mm/Hg | frail | -13.34 | 0.00 | 0% |
|  | 3 | 95 | male | Asian | 2hr30mins | moderate dementia | mRS3 | 14 | 140 mm/Hg | not frail | 4.90 | 99.26 | 73.90% |
|  | 7 | 95 | female | white | 50mins | moderate dementia | mRS1 | 2 (without aphasia) | 200 mm/Hg | not frail | -12.73 | 0.00 | 0% |
|  | 4 | 68 | male | Afro-Caribbean | 2hr30mins | no memory problems | mRS4  | 2 (with aphasia) | 200 mm/Hg | frail | -11.35 | 0.00 | 6.30% |
|  | 1 | 85 | male | Afro-Caribbean | 50mins | no memory problems | mRS3 | 23 | 200 mm/Hg | frail | -2.77 | 5.91 | 25% |
|  | 5 | 68 | female | white | 2hr30mins | moderate dementia | mRS3 | 23 | 185 mm/Hg | frail | -4.45 | 1.15 | 69.20% |
|  | 7 | 85 | male | Asian | 2hr30mins | no memory problems | mRS4 | 14 | 185 mm/Hg | frail | -0.99 | 27.04 | 50% |
|  | 2 | 95 | female | Afro-Caribbean | 50mins | moderate dementia | mRS3 | 2 (with aphasia) | 140 mm/Hg | frail | 3.65 | 97.46 | 54.50% |
|  | 5 | 68 | male | white | 2hr30mins | moderate dementia | mRS4 | 23 | 185 mm/Hg | frail | -7.28 | 0.07 | 30.80% |
|  | 1 | 68 | male | Afro-Caribbean | 4hr15mins | moderate dementia | mRS4 | 23 | 140 mm/Hg | frail | -5.23 | 0.53 | 45% |
|  | 6 | 68 | male | white | 2hr30mins | severe dementia | mRS4 | 5 (without aphasia) | 185 mm/Hg | frail | -10.29 | 0.00 | 16.70% |
|  | 4 | 85 | male | Afro-Caribbean | 2hr30mins | severe dementia | mRS3 | 2 (without aphasia) | 185 mm/Hg | frail | -9.30 | 0.01 | 6.30% |
|  | 6 | 85 | female | Afro-Caribbean | 50mins | no memory problems | mRS3 | 5 (with aphasia) | 185 mm/Hg | not frail | 2.74 | 93.93 | 54.20% |
|  | 1 | 95 | female | Afro-Caribbean | 50mins | no memory problems | mRS3 | 2 (with aphasia) | 140 mm/Hg | not frail | 6.40 | 99.83 | 70% |
|  | 2 | 68 | female | white | 50mins | moderate dementia | mRS4 | 14 | 140 mm/Hg | frail | -3.94 | 1.90 | 54.50% |
|  | 8 | 85 | male | Afro-Caribbean | 2hr30mins | no memory problems | mRS3 | 23 | 200 mm/Hg | not frail | -2.72 | 6.19 | 23.10% |
|  | 8 | 68 | female | Asian | 50mins | moderate dementia | mRS3 | 2 (without aphasia) | 200 mm/Hg | not frail | -17.00 | 0.00 | 7.70% |
|  | 5 | 85 | female | Asian | 4hr15mins | no memory problems | mRS3 | 23 | 140 mm/Hg | frail | 1.94 | 87.47 | 84.60% |
|  | 7 | 85 | male | Afro-Caribbean | 4hr15mins | moderate dementia | mRS3 | 2 (with aphasia) | 200 mm/Hg | not frail | -8.28 | 0.03 | 11.10% |
|  | 2 | 85 | male | Asian | 2hr30mins | no memory problems | mRS4 | 5 (without aphasia) | 200 mm/Hg | frail | -7.92 | 0.04 | 18.20% |
|  | 3 | 85 | male | white | 4hr15mins | moderate dementia | mRS4 | 2 (without aphasia) | 200 mm/Hg | frail | -19.39 | 0.00 | 0% |
|  | 4 | 95 | male | white | 4hr15mins | no memory problems | mRS3 | 14 | 200 mm/Hg | frail | -4.62 | 0.97 | 0% |
|  | 7 | 95 | male | white | 2hr30mins | severe dementia | mRS3 | 5 (without aphasia) | 140 mm/Hg | frail | 0.77 | 68.42 | 44.40% |
|  | 8 | 68 | female | white | 2hr30mins | no memory problems | mRS4 | 2 (with aphasia) | 200 mm/Hg | frail | -13.27 | 0.00 | 23.10% |
|  | 4 | 68 | male | white | 2hr30mins | severe dementia | mRS3 | 23 | 185 mm/Hg | not frail | -6.41 | 0.16 | 37.50% |
|  | 5 | 68 | female | Asian | 2hr30mins | severe dementia | mRS3 | 5 (with aphasia) | 140 mm/Hg | frail | -5.49 | 0.41 | 46.20% |
|  | 6 | 95 | male | Asian | 4hr15mins | severe dementia | mRS3 | 5 (with aphasia) | 140 mm/Hg | not frail | -1.69 | 15.63 | 8.30% |
|  | 2 | 95 | female | white | 4hr15mins | moderate dementia | mRS1 | 2 (without aphasia) | 200 mm/Hg | not frail | -15.28 | 0.00 | 0% |
|  | 2 | 85 | female | white | 4hr15mins | severe dementia | mRS3 | 5 (without aphasia) | 140 mm/Hg | not frail | -2.75 | 6.00 | 18.20% |
|  | 2 | 95 | female | white | 4hr15mins | moderate dementia | mRS3 | 2 (with aphasia) | 140 mm/Hg | not frail | 0.34 | 58.41 | 27.30% |
|  | 5 | 85 | female | Asian | 4hr15mins | no memory problems | mRS3 | 14 | 185 mm/Hg | frail | -0.26 | 43.63 | 61.50% |
|  | 7 | 85 | female | white | 2hr30mins | moderate dementia | mRS3 | 2 (without aphasia) | 185 mm/Hg | frail | -8.11 | 0.03 | 11.10% |
|  | 3 | 68 | male | white | 50mins | moderate dementia | mRS3 | 23 | 200 mm/Hg | frail | -9.72 | 0.01 | 17.40% |
|  | 5 | 95 | male | Asian | 4hr15mins | no memory problems | mRS3 | 23 | 185 mm/Hg | not frail | 1.54 | 82.38 | 53.80% |
|  | 2 | 85 | male | white | 50mins | severe dementia | mRS3 | 5 (without aphasia) | 185 mm/Hg | frail | -2.93 | 5.07 | 18.20% |
|  | 6 | 68 | female | Asian | 4hr15mins | severe dementia | mRS3 | 23 | 140 mm/Hg | frail | -6.85 | 0.11 | 45.80% |
|  | 6 | 85 | female | Asian | 4hr15mins | no memory problems | mRS3 | 2 (with aphasia) | 200 mm/Hg | frail | -8.51 | 0.02 | 4.20% |
|  | 5 | 68 | female | Asian | 2hr30mins | moderate dementia | mRS3 | 2 (with aphasia) | 200 mm/Hg | frail | -12.11 | 0.00 | 15.40% |
|  | 3 | 68 | male | Afro-Caribbean | 2hr30mins | moderate dementia | mRS4 | 5 (with aphasia) | 185 mm/Hg | frail | -6.73 | 0.12 | 39.10% |
|  | 1 | 68 | female | Afro-Caribbean | 2hr30mins | severe dementia | mRS3 | 2 (without aphasia) | 185 mm/Hg | not frail | -12.87 | 0.00 | 0% |
|  | 6 | 68 | female | Afro-Caribbean | 4hr15mins | moderate dementia | mRS3 | 23 | 140 mm/Hg | not frail | -1.90 | 13.02 | 95.80% |
|  | 4 | 68 | female | white | 2hr30mins | moderate dementia | mRS1 | 23 | 200 mm/Hg | not frail | -10.84 | 0.00 | 0% |
|  | 5 | 68 | female | Asian | 4hr15mins | no memory problems | mRS4 | 5 (without aphasia) | 185 mm/Hg | frail | -7.72 | 0.04 | 23.10% |
|  | 4 | 68 | male | white | 4hr15mins | severe dementia | mRS3 | 5 (without aphasia) | 200 mm/Hg | not frail | -14.77 | 0.00 | 0% |
|  | 5 | 68 | female | Afro-Caribbean | 4hr15mins | no memory problems | mRS4 | 23 | 140 mm/Hg | frail | -3.63 | 2.59 | 61.50% |
|  | 8 | 85 | male | white | 50mins | moderate dementia | mRS3 | 14 | 185 mm/Hg | not frail | 1.25 | 77.74 | 69.20% |
|  | 6 | 95 | male | white | 2hr30mins | no memory problems | mRS4 | 2 (without aphasia) | 200 mm/Hg | frail | -13.75 | 0.00 | 0% |
|  | 3 | 95 | female | white | 2hr30mins | no memory problems | mRS3 | 5 (with aphasia) | 185 mm/Hg | frail | 1.80 | 85.85 | 52.20% |
|  | 2 | 95 | female | white | 2hr30mins | no memory problems | mRS3 | 14 | 140 mm/Hg | not frail | 6.56 | 99.86 | 100% |
|  | 3 | 68 | male | Asian | 50mins | severe dementia | mRS3 | 5 (without aphasia) | 200 mm/Hg | not frail | -12.28 | 0.00 | 8.70% |
|  | 5 | 95 | male | Afro-Caribbean | 50mins | moderate dementia | mRS3 | 5 (with aphasia) | 140 mm/Hg | frail | 4.79 | 99.17 | 76.90% |
|  | 2 | 95 | female | white | 50mins | no memory problems | mRS3 | 2 (with aphasia) | 185 mm/Hg | not frail | 2.27 | 90.67 | 54.50% |
|  | 2 | 85 | male | Asian | 50mins | no memory problems | mRS4 | 2 (with aphasia) | 200 mm/Hg | frail | -8.79 | 0.02 | 9.10% |
|  | 7 | 95 | male | white | 50mins | moderate dementia | mRS1 | 14 | 200 mm/Hg | not frail | -4.34 | 1.28 | 16.70% |
|  | 3 | 95 | female | white | 2hr30mins | no memory problems | mRS1 | 5 (with aphasia) | 200 mm/Hg | not frail | -4.59 | 1.01 | 17.40% |
|  | 7 | 68 | male | Asian | 50mins | severe dementia | mRS3 | 14 | 185 mm/Hg | not frail | -5.35 | 0.47 | 55.60% |
|  | 5 | 85 | male | Asian | 50mins | no memory problems | mRS4 | 14 | 185 mm/Hg | frail | -0.53 | 36.99 | 46.20% |
|  | 1 | 85 | male | white | 4hr15mins | moderate dementia | mRS4 | 5 (with aphasia) | 185 mm/Hg | frail | -6.66 | 0.13 | 20% |
|  | 6 | 85 | male | Asian | 4hr15mins | severe dementia | mRS3 | 5 (without aphasia) | 185 mm/Hg | frail | -5.53 | 58.71 | 12.50% |
|  | 7 | 68 | female | Asian | 50mins | moderate dementia | mRS4 | 2 (with aphasia) | 140 mm/Hg | frail | -5.88 | 0.28 | 27.80% |
|  | 8 | 68 | male | Afro-Caribbean | 50mins | moderate dementia | mRS3 | 23 | 200 mm/Hg | frail | -8.45 | 0.02 | 15.40% |
|  | 8 | 95 | female | Asian | 50mins | no memory problems | mRS3 | 5 (without aphasia) | 140 mm/Hg | not frail | 6.40 | 99.83 | 69.20% |
|  | 5 | 68 | female | white | 50mins | no memory problems | mRS4 | 14 | 185 mm/Hg | frail | -4.55 | 1.04 | 30.80% |
|  | 6 | 95 | male | Asian | 4hr15mins | no memory problems | mRS4 | 5 (with aphasia) | 140 mm/Hg | frail | -0.30 | 42.44 | 37.50% |
|  | 3 | 68 | female | white | 2hr30mins | moderate dementia | mRS3 | 5 (with aphasia) | 200 mm/Hg | not frail | -11.04 | 0.00 | 8.70% |
|  | 3 | 95 | male | Asian | 2hr30mins | severe dementia | mRS3 | 5 (with aphasia) | 140 mm/Hg | not frail | 0.40 | 59.89 | 34.80% |
|  | 1 | 95 | male | Afro-Caribbean | 50mins | no memory problems | mRS3 | 5 (with aphasia) | 185 mm/Hg | frail | 4.18 | 98.49 | 50% |
|  | 8 | 85 | male | Afro-Caribbean | 50mins | severe dementia | mRS3 | 2 (without aphasia) | 200 mm/Hg | not frail | -14.70 | 0.00 | 0% |
|  | 8 | 68 | female | Asian | 4hr15mins | severe dementia | mRS3 | 5 (without aphasia) | 140 mm/Hg | frail | -6.75 | 0.12 | 30.80% |
|  | 3 | 68 | male | Asian | 50mins | severe dementia | mRS4 | 23 | 140 mm/Hg | frail | -7.12 | 0.08 | 39.10% |
|  | 8 | 68 | female | Afro-Caribbean | 4hr15mins | no memory problems | mRS4 | 5 (with aphasia) | 185 mm/Hg | frail | -7.22 | 0.07 | 61.50% |
|  | 2 | 85 | female | Asian | 50mins | moderate dementia | mRS4 | 2 (without aphasia) | 140 mm/Hg | frail | -8.31 | 0.02 | 9.10% |
|  | 1 | 85 | male | Afro-Caribbean | 4hr15mins | moderate dementia | mRS4 | 2 (without aphasia) | 185 mm/Hg | frail | -11.74 | 0.00 | 0% |
|  | 8 | 85 | female | white | 2hr30mins | moderate dementia | mRS3 | 2 (without aphasia) | 200 mm/Hg | not frail | -13.97 | 0.00 | 7.70% |
|  | 6 | 95 | male | Asian | 2hr30mins | no memory problems | mRS3 | 14 | 185 mm/Hg | frail | 3.78 | 97.76 | 58.30% |
|  | 3 | 95 | female | white | 2hr30mins | moderate dementia | mRS3 | 2 (with aphasia) | 140 mm/Hg | frail | 1.92 | 87.17 | 43.50% |
|  | 1 | 68 | female | white | 50mins | no memory problems | mRS3 | 23 | 200 mm/Hg | not frail | -7.61 | 0.05 | 15% |
|  | 2 | 95 | male | Afro-Caribbean | 2hr30mins | moderate dementia | mRS3 | 5 (with aphasia) | 140 mm/Hg | not frail | 4.84 | 99.21 | 72.70% |
|  | 1 | 85 | male | white | 50mins | moderate dementia | mRS4 | 5 (without aphasia) | 185 mm/Hg | frail | -3.28 | 3.61 | 35% |
|  | 7 | 95 | female | Asian | 50mins | severe dementia | mRS3 | 2 (without aphasia) | 140 mm/Hg | frail | -6.65 | 0.13 | 5.60% |
|  | 6 | 85 | male | Asian | 4hr15mins | no memory problems | mRS4 | 5 (with aphasia) | 185 mm/Hg | frail | -4.47 | 1.13 | 29.20% |

Note: Note: mRS = modified Rankin scale score; NIHSS = National Institutes of Health Stroke Scale