Health Economics Analysis Plan (HEAP)

Final v2.0

Study Title: A study to assess the clinical and cost-effectiveness of aphasia computer treatment versus usual stimulation or attention control long term post stroke (Big CACTUS)

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1. Aim and Objectives

The aim is to provide definitive evidence of the cost-effectiveness of targeted, high dose speech and language impairment based therapy intervention for word finding for persisting post stroke aphasia delivered through self-managed computer exercises, using data from the Big CACTUS study. The objective is to establish whether self-managed computerised speech and language therapy is cost-effective for persistent aphasia post stroke

2. Cost effectiveness measurement

An economic evaluation (cost-utility analysis[1]) will be undertaken where results will be expressed in terms of incremental cost per quality-adjusted life years (QALY[2]) gained. Intervention and speech and language therapist (SLT) time costs will be estimated for individuals. Costs of software and hardware used as part of the intervention will be considered for each individual participant. The EQ-5D-5L questionnaire was administered at every data collection time point and will be combined with standard valuation sources [1] to measure the QALYs gained in each treatment arm. The EQ-5D-5L and CarerQoL scores will also be elicited from carers. An economic model developed alongside the pilot study [2] will be updated. Differences between costs and QALYs in the 3 groups will be described and the incremental cost effectiveness ratio (ICER)[3] will be calculated.

3. Economic Analysis

A cost-utility analysis will be undertaken from the NHS and personal social service (PSS) perspective as recommended by the National Institute for Health and Care Excellence (NICE) [3]. Due to the use of volunteers to help participants with their use of the computer program we will undertake a supplementary analysis taking a societal perspective. The analysis will follow recommended methods and good practice guides [4-8]. Costs will be estimated for individual patients including intervention costs and SLT support and co-ordination time combined with standard costing sources [9]. In the pilot study [2] we collected other resource use data (on, for example, GP

[1] Cost-utility analysis is one of the methods used to carry out an economic evaluation. The benefits are assessed in terms of both quality and duration of life, and expressed as quality-adjusted life years (QALYs). Utility is a measure of morbidity or health-related quality of life. It is measured on a scale anchored on 1 (perfect health) and zero (death). Negative values are possible for health states considered to be worse than death. The values given are based on patient or societal preferences. Utilities are essential for the calculation of QALYs.

[2] QALY is a measure of the health of a person in which length of life is adjusted to reflect the quality of life. Length of life is measured in years, whilst quality of life is measured on a 'utility' scale anchored on 1 (perfect health) and zero (death). One year of life in perfect health is equal to 1 QALY (i.e. one multiplied by one). Two years of life in a health state valued at 0.5 is also equal to 1 QALY (i.e. two multiplied by 0.5). QALYs are liked by many economists and policy analysts as they are thought to be a generic measure of health gain (i.e. they are relevant to all health interventions).

[3] ICER is the difference (or increment) in mean costs in the population of interest divided by the difference (or increment) in mean outcomes. For a cost-utility analysis, the ICER is measured in terms of the incremental cost per quality adjusted life year gained.

and hospital visits and prescribed medications) via patient and carer diaries but these did not show important differences between treatment groups and therefore we will not collect such data in the full trial.

An accessible version of the EQ-5D-3L designed for people with aphasia were trialled in the pilot study. This has not been validated but represents a way in which EQ5D scores can be elicited directly from patients. The EQ-5D-5L (made accessible for Big CACTUS, and by proxy versions) combined with standard valuation sources and recommended mapping functions will be used to calculate QALYs gained in each group. We will administer the accessible version of the EQ5D alongside the standard version which will be completed by carers (where the participant has a carer) by proxy. EQ5D and CarerQoL scores will also be elicited from carers, and a life satisfaction question will be included in the analysis. The 5L version of the EQ-5D was used in Big CACTUS as it was recommended to improve the instrument's sensitivity to pick small changes in quality of life and reduce the ceiling effects, as compared to the 3L used in the pilot study. However, NICE has recently recommended that studies used the 5L version to convert the estimated utilities to the equivalent 3L values using the recommended mapping functions, while a quality assurance process for the 5L tariffs is completed. Therefore, the primary analysis will be based on EQ-5D-3L mapped from EQ-5D-5L data using van Hout et al. 2012 [10] mapping function as recommended by NICE [11]. A secondary analyses using EQ-5D-3L mapped from 3L based on Hernandez et al. 2017 [12] mapping function, and the EQ-5D-5L scores will also be undertaken. Within-trial analyses (secondary analysis) will be reported from the NHS Personal Social perspective and societal perspective using tables and figures.

We developed a Markov model to estimate the cost-effectiveness of the computer intervention alongside our previous pilot study published elsewhere [2]. Model parameters were informed by clinical data from the pilot trial. We estimated that the intervention was likely to be cost effective, with an incremental cost effectiveness ratio (ICER) of £3,058 per QALY gained, however results were uncertain and the value of obtaining further (perfect) information was very high – Expected Value of Perfect Information (EVPI) was approximately £37 million. The model will be updated with data from the full trial. The third "attention control" group will be added to the model. Differences between costs and QALYs in the three groups will be described and a fully incremental cost-utility analysis will be performed comparing usual care (UC), usual care with an attention/activity control (AC), and the computerised speech language therapy (CSLT). ICERs will be calculated. Probabilistic sensitivity analysis will be undertaken to allow the production of cost-effectiveness acceptability curves (CEACs) and expected value of perfect information analyses (EVPI) will be undertaken [13].

The economic analysis will compare the following interventions:

Intervention arm

- Computerised speech language therapy – CSLT (n=97)

Comparator arm(s)

- Usual care - UC (n=101)

- Attention control - AC (n=80)

4. Within-trial analysis (secondary analysis)

The trial-based economic analysis will be undertaken using Stata® software version 14.2 and will involve the following analyses:

4.1. Health-related quality of life

Based on NICE's recent position statement on the EQ-5D-5L valuation tariffs for England, and the discussions with senior Health Economists within ScHARR (University of Sheffield), three approaches for calculating QALYs will be undertaken. One approach will be based on the 5L tariffs for England and the other two approaches will be based on mapping from EQ-5D-5L to EQ-5D-3L using recommended mapping functions.

QALYs will be calculated at individual patient-level using EQ-5D-3L (aphasia-friendly) mapped from 5L data using van Hout et al. 2012 mapping algorithm [10] in the base case analysis and EQ-5D-3L (proxy), also mapped from 5L as a secondary analysis. Another secondary analysis using EQ-5D-3L (carer) will also be undertaken in addition to patient's EQ-5D-3L both mapped from 5L using the recommended method [10]. A separate analysis using EQ-5D-5L (aphasia-friendly) will be performed. Utilities for later analysis will be based on the English tariffs [1] applied to the EQ-5D-5L scores (at baseline, 6, 9 and 12 months) and QALYs will then be calculated using the trapezium rule. The data were collected using EQ-5D-5L, and therefore, all descriptive analysis will be based on 5L utility scores at various follow up time points (see figures and tables). Participants who died within the trial follow up will be included in the primary analysis, and a sensitivity analysis excluding them will be performed,

4.2. Costs

Costing will be based on the standard approach used in economic evaluations following the three-stage process: identification of resource use, measurement and valuation [8]. The intervention cost will include the following:

- Cost of computers (for those participants that did not have their own computer)
- Cost of the Step-by-Step software
- Cost of microphones required for the program
- Cost of SLT support and training
- Cost of SLT assistant support
- Any other costs
- Societal costs (adding volunteers costs)

Time spent by SLTs setting up the intervention and assisting patients (and also time spent training or advising SLTAs or volunteers) will be converted into costs using the PSSRU national unit costs [9]. During the intervention period, SLTs and SLTAs involved with the participants in all groups were asked to complete a diary of direct and indirect time spent with the participant, and this data will be used in the economic analysis. Other health care

resource use will not be included in the analysis. Further details of the costs which will be used for the analysis are provided in the appendix of this document.

4.3. Cost-effectiveness analysis (within trial)

The trial-based analysis will be based on imputed data. The multiple imputation chained equation (MICE) with predictive mean matching will be utilised for imputing missing values of baseline utilities, QALYs and costs. The imputation model will be adjusted for appropriate covariates based on good practice guide by Faria et al. 2014 [4]. A seemingly unrelated regression (SUR) model will be fitted for estimating differential mean total costs and QALYs between CSLT versus AC versus UC (fully incremental analysis). The SUR model will be controlled for imbalance in baseline utility at the QALY equation. Uncertainty around the primary CUA estimates will be addressed using a number of approaches based on parametric methods. This will include CEACs, cost-effectiveness confidence ellipses, and net benefit lines with 95% confidence intervals. Sensitivity analyses and subgroup analysis will be undertaken by varying values on uncertain parameters (e.g. unit cost of StepByStep software) and assess their impact on the ICER estimates.

5. Long-term modelling (primary analysis)

A model-based approach will be taken for the long-term analysis (the primary analysis). Costs and utility data collected within the Big CACTUS trial will be used to extrapolate the analysis beyond the trial follow up. A lifetime horizon will be adopted for the long-term analysis. QALY decrements will be applied overtime using multipliers estimated by Ara and Brazier [14]. QALYs will be estimated for each cycle of the model by combining utility scores with life years allowing the total QALYs associated with each treatment strategy to be calculated.

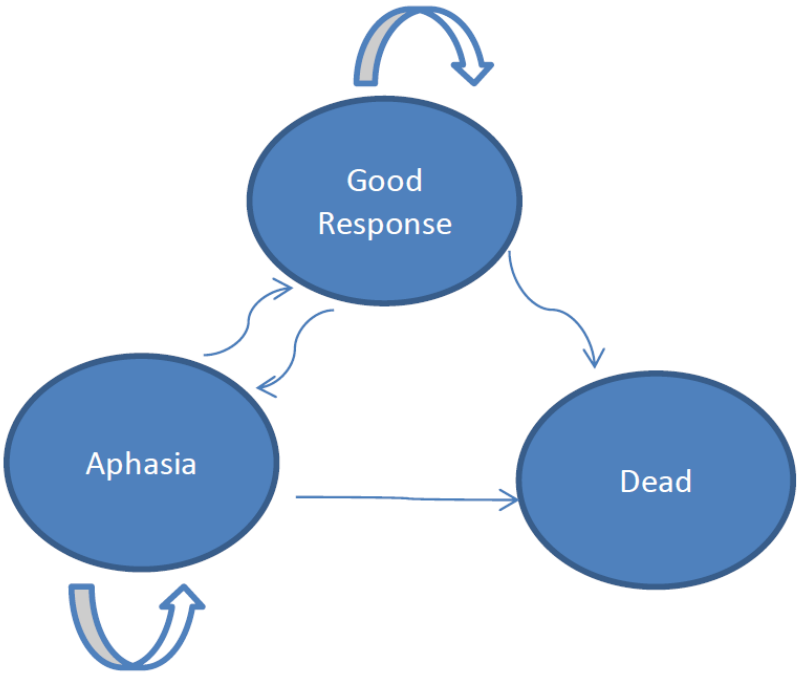
The co-primary outcome measures assessed at 6 months from baseline are: 1) change in word finding ability - in the study, there were 100 words and each word is scored 0, 1 or 2 depending on the participant response, this gives a maximum score of 200. Word finding ability is then expressed as a percentage (x/200)*100%; and 2) change in functional communication measured by blinded rating of video recorded conversations between SLT and participants using the activity scale of the Therapy Outcome Measure (TOMS). Follow up measures at 9 months and 12 months were also undertaken. The transition probabilities, which will govern movement between modelled health states, will primarily be based on data from the trial using the co-primary endpoints - see model parameters (Table 14).

5.1. Model Design

A three-health state Markov model will be adapted from a model which was developed for the pilot study (Figure 1), and data from the within trial analysis will be used to populate the model. The model will be built in Microsoft Excel® 2010, and a lifetime period will be modelled using monthly cycles. In this model, participant could transition from their initial 'aphasia' health state to a 'good response' health state or to 'death'. Participants in the 'good response' state could relapse to 'aphasia' state or die.

Transitions from the 'aphasia' and 'good response' states to death will be based upon evidence from the literature on long-term survival following stroke [15]. We will use mortality rates for patients who had experienced a stroke one or more years previously and applied these rates to both the good response state and the aphasia state for the first five years of the model to reflect the duration for which evidence was available from the literature [15]. After five years, additional mortality will be applied based upon Office for National Statistics lifetables [16].

Figure 1: Markov model structure



5.2. Model parameters

- The probability of 'good response' in the intervention group (an increase of 10% or more of words named correctly at 6 months or an increase of 0.5 points or more in the activity dimension of the TOMS rating scale will be considered as a good response). We will assume the mean increase as a cut-off point for good response, and also assume it occurred at month 1.

- Relapse rate (calculated at 9 and 12 months)
- Utility in Aphasia health state
- Utility improvement in Good Response state
- % who require computer
- Mean SLT face-to-face time
- Mean SLT non face-to-face time
- The mortality rate for the first five years based will be based on evidence on long-term survival following stroke [15]. After five years, additional mortality based on ONS life table data [16].

5.3. Addressing uncertainty

A probabilistic sensitivity analysis (PSA) will be undertaken and the distributions for the model parameters will be chosen based on within trial analysis. Assumptions could be made in assigning different distributions. A discount rate[4] of 3.5% will be used based on NICE Recommendations. The PSA will be run for 10,000 iterations to address uncertainty associated with the parameters estimates used to populate the model. Analyses on EVPI and expected value of perfect partial information (EVPPI) will be undertaken. Deterministic sensitivity analysis will also be undertaken (e.g. varying relapse rates and utilities) and results will be presented using the Tables and a Tornado diagram.

5.4. Subgroup analysis

The following subgroup analysis will be performed to explore cost-effectiveness among pre-specified subgroups of patients.

a) The severity of word finding difficulty based on CAT naming scores: mild (31 to 43), moderate (18 to 30), and severe (5 to 17).
b) Baseline comprehension ability based on the CAT sentence comprehension scores: within normal limits (27 to 32) mild (18 to 26), moderate (9 to 17), and severe (0 to 8).
c) Categorisation based on distribution of outcomes data according to time post stroke in terms of quartiles: <Q1, Q1 - <Q2, Q2 - <Q3, >=Q3; where Q1=25th percentile, Q2=50th percentile (median), Q3=75th percentile

[4] Costs and benefits incurred today have a higher value than costs and benefits occurring in the future. Discounting health benefits reflects individual preference for benefits to be experienced in the present rather than the future. Discounting costs reflects individual preference for costs to be experienced in the future rather than the present.

6. Presentation of results (Dummy Tables and Figures)

For the health economics sections in the HTA monograph, the detailed methodological approach used will be described, and data inputs and results will be presented using both tabular formats and graphs as outlined in this document.

6.1. Within trial analysis

6.1.1. NHS Personal Social Perspective (within trial)

Table 1 shows the proportions of missing data for the key parameters used in the analysis. Data completeness for QALY parameters means that the patient should have completed valid EQ-5D-5L questionnaires for baseline and all follow up time points over the 12 months' time horizon. For baseline utilities, data completeness means the patient has a completed valid EQ-5D-5L questionnaire at baseline. The utility score for a patient who died within the trial will take a zero value from the follow up time point when the death was recorded. These will be included in the primary analysis and a sensitivity analysis excluding deaths will be performed. All unit costs and their sources are presented in Table 2. Table 3 reports descriptive statistics for baseline utilities, QALYs and the differences between the compared treatment arms. The trend of EQ-5D-5L at baseline and subsequent follow up in terms of mean utility scores and 95% confidence intervals (CIs) are shown in Figures 2-5. This is a descriptive analysis and will be based on completed cases only. In this case and for EQ-5D data not to be recorded as 'missing', all five responses of the questionnaire would need to be completed. The denominator for calculating percentages in Table 1 will be all participants randomised in each arm of the trial including those who died within the study follow up. Since participants who died prior to six month follow up will excluded from the clinical effectiveness analysis, the denominator in Table 1 will be slightly different to those in the SAP (Statistical Analysis Plan).

Table 1 : Data completeness for key parameters used in the economic analysis (missing data)

	UC	AC	CSLT	CSLT vs UC	CSLT vs AC	AC vs UC
Parameter	**n (%)**	**n (%)**	**n (%)**	**Diff. in % missing**	**Diff. in % missing**	**Diff. in % missing**
Baseline utility (EQ-5D Accessible)	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx.xx	xx.xx	xx.xx
Baseline utility (EQ-5D Proxy)	xx (xx.x)	xx (xx.x)	xx x(x.x)	xx.xx	xx.xx	xx.xx
Baseline utility (EQ-5D Carer)	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx.xx	xx.xx	xx.xx
QALYs based on EQ-5D Accessible	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx.xx	xx.xx	xx.xx
QALYs based on EQ-5D Proxy	xx (xx.x)	xx (xx.x)	xx x(x.x)	xx.xx	xx.xx	xx.xx
QALYs based on EQ-5D Accessible plus Carers	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx.xx	xx.xx	xx.xx
Total cost	xx (xx.x)	xx (xx.x)	xx (xx.x)	xxx.xx	xxx.xx	xxx.xx

Table 2: Units costs applied for valuation of resource use

Item Description	Unit cost (£)	Source of unit cost	Note
Laptop/tablet (for participants who did not have their own computers)	xxx.xx	Big CACTUS Study	xx % of patients on CSLT arm (xx/xx)
Step-by-step software	xxx.xx	xx	xxxxx
Microphone	xxx.xx	xx	xxxxx
SLT cost per minute (set up StepByStep©, support, monitoring)	xxx.xx	PSSRU	xxxxx
SLTA cost per minute	xxx.xx	xx	xxxxx
Volunteer cost per minute	xxx.xx	xx	xxxxx
Travel cost per minute (car/taxi/public transport/community transport/others)	xxx.xx	xx	xxxxx
Volunteer cost per minute	xxx.xx	xx	xxxxx
Others	xxx.xx	xx	xxxxx
Others	xxx.xx	xx	xxxxx
Others	xxx.xx	xx	xxxxx
Others	xxx.xx	xx	xxxxx
Others	xxx.xx	xx	xxxxx

PSSRU=Personal Social Services Research Unit. SLT=Speech and language Therapist. SLTA=Speech and Language Therapist Assistant

Table 3: Descriptive statistics for baseline utilities and QALYs

	UC		AC		CSLT		CSLT vs UC	CSLT vs AC	AC vs UC
Paramter	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	Diff. in mean	Diff. in mean	Diff. in mean
Baseline utility (EQ-5D Accessible)	xx	xx (xx.x)	xx	xx (xx.x)	xx	xx (xx.x)	xx.x	xx.x	xx.x
Baseline utility (EQ-5D Proxy)	xx	xx (xx.x)	xx	xx (xx.x)	xx	xx x(x.x)	xx.x	xx.x	xx.x
Baseline utility (EQ-5D Carer)	xx	xx (xx.x)	xx	xx (xx.x)	xx	xx (xx.x)	xx.x	xx.x	xx.x
QALYs based on EQ-5D Accessible	xx	xx (xx.x)	xx	xx (xx.x)	xx	xx (xx.x)	xx.x	xx.x	xx.x
QALYs based on EQ-5D Proxy	xx	xx (xx.x)	xx	xx (xx.x)	xx	xx x(x.x)	xx.x	xx.x	xx.x
QALYs based on EQ-5D Accessible plus Caers	xx	xx (xx.x)	xx	xx (xx.x)	xx	xx (xx.x)	xx.x	xx.x	xx.x

Figure 2: Mean EQ-5D scores with 95% CIs over 12 months follow-up (patients-accessible) based on complete cases

Figure 3: Mean EQ-5D scores with 95% CIs over 12 months follow-up (patients-proxy) based on complete cases

Figure 4: Mean EQ-5D scores with 95% CIs over 12 months follow-up (carers) based on complete cases

Table 4 shows the descriptive statistics for costs by treatment arm based on completed cases and the distribution of costs are presented using histograms (Figure 5). The within-trial cost-effectives results based on imputed data are presented in Table 5.

Table 4: Descriptive statistics for mean total costs based on complete cases by treatment group

Treatment group	n	Mean cost (£)	SE	95% CI
UC	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx
AC	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx
CSLT	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx

Figure 5: Histograms for costs distributions (perctages of participants) over 12 months follow up (UC, AC &CSLT)

Table 5: Differential costs and QALYs and ICERs estimates based on imputed data (within trial analysis)

Analysis	Outcome	Difference in Mean	SE	95% CI	P-value
CSLT vs UC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			
CSLT vs AC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			
AC vs UC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			

Figures 6 -8 shows the uncertainty around the within-trial cost-effectiveness results. These include the CEACs, net monetary benefit line with 95% CIs, and cost-effectiveness confidence ellipses.

Figure 6: Cost-effectiveness Acceptability Curves (CEAC) trial analysis for CSLT, AC and UC

Figure 7: Net benefit line with 95% CIs (within trial analysis)

Figure 8: Cost-effectiveness confidence ellipses (within trial analysis)

Results from within-trial base-case, secondary and all sensitivity analysis are presented in Tables 6-6 according to the interventions compared. Results from subgroup analyses are shown in Tables 9-11.

Table 6: Cost-effectiveness results from base-case, secondary and sensitivity analyses - CSLT vs UC within trial

Analysis	Incremental cost [£]: CSLT vs UC (95% CI); P-value	Incremental QALYs: CSLT vs UC (95% CI); P-value	ICER £ per QALY gained	Probability that CSLT is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Base case based on EQ-5D-3L mapped from 5L using van Hout et al. 2012	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-3L mapped from 5L using Hernandez Alava et al. 2017	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-5L	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Complete cases	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

Table 7:Cost-effectiveness results from base-case, secondary and sensitivity analyses - CSLT vs AC within trial

Analysis	Incremental cost [£]: CSLT vs AC (95% CI); P-value	Incremental QALYs: CSLT vs AC (95% CI); P-value	ICER £ per QALY gained	Probability that CSLT is cost effective at the threshold[5] 20,000/QALY (£30,000/ QALY)
Base case based on EQ-5D-3L mapped from 5L using van Hout et al. 2012	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-3L mapped from 5L using Hernandez Alava et al. 2017	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-5L	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Complete cases	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

[5] In order to claim an intervention to be cost-effective (or 'efficient' or 'good value for money') a benchmark or a threshold is required. For cost-utility analysis, the benchmark needs to be in terms of an incremental cost effectiveness ratio (ICER). The National Institute for Health and Care Excellence has set a threshold for cost-effectiveness as £20,000 per quality adjusted life year gained.

Table 8: Cost-effectiveness results from base-case, secondary and sensitivity analyses - AC vs UC within trial

Analysis	Incremental cost [£]: AC vs UC (95% CI); P-value	Incremental QALYs: AC vs UC (95% CI); P-value	ICER £ per QALY gained	Probability that AC is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Base case based on EQ-5D-3L mapped from 5L using van Hout et al. 2012	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-3L mapped from 5L using Hernandez Alava et al. 2017	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-5L	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Complete cases	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

Table 9: Cost-effectiveness results from subgroup analyses (CSLT vs AC) - within trial analysis

Analysis	Subgroup	Incremental cost [£]: CSLT vs UC (95% CI); P-value	Incremental QALYs: CSLT vs UC (95% CI); P-value	ICER £ per QALY gained	Probability that CSLT is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Severity of word finding difficulty	Mild	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Severe	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Baseline comprehension ability based on CAT	Within normal limit	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Mild	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Severe	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Length of time post-stroke	<Q1	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Q1-<Q2	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Q2-<Q3	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	>=Q3	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

Q=25th percentile, Q2=50th percentile (median), Q3=75th percentile

Table 10: Results from subgroup analyses (CSLT vs UC) - within trial analysis

Analysis	Subgroup	Incremental cost [£]: CSLT vs UC (95% CI); P-value	Incremental QALYs: CSLT vs UC (95% CI); P-value	ICER £ per QALY gained	Probability that CSLT is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Severity of word finding difficulty	Mild	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Severe	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Baseline comprehension ability based on CAT	Within normal limit	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Mild	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Severe	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Length of time post-stroke	<Q1	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Q1-<Q2	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Q2-<Q3	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	>=Q3	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

Q=25th percentile, Q2=50th percentile (median), Q3=75th percentile

Table 11: Results from subgroup analyses (AC vs UC) - within trial analysis

Analysis	Subgroup	Incremental cost [£]: AC vs UC (95% CI); P-value	Incremental QALYs: AC vs UC (95% CI); P-value	ICER £ per QALY gained	Probability that AC is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Severity of word finding difficulty	Mild	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Severe	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Baseline comprehension ability based on CAT	Within normal limit	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Mild	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Severe	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Length of time post-stroke	<Q1	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Q1-<Q2	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	Q2-<Q3	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
	>=Q3	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

Q=25th percentile, Q2=50th percentile (median), Q3=75th percentile

6.1.2. Societal Perspective (within trial)

Results from within-trial analyses from societal perspective are reported in Tables 12 and 13. These include costs by treatment arm in terms of means, standard errors and 95% CIs as well as differential means, ICERs and p-values.

Table 12: Mean total costs of resource use based on complete cases by treatment group from societal perspective (within trial analysis)

Treatment group	n	Mean cost (£)	SE	95% CI
UC	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx
AC	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx
CSLT	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx

SE= Standard Error

Table 13: Differential costs and QALYs and ICERs estimates from societal perspective (within trial analysis)

Analysis	Outcome	Difference in Mean	SE	95% CI	P-value
CSLT vs UC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			
CSLT vs AC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			
AC vs UC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			

6.2. Long-term analysis

6.2.1. NHS Personal Social Perspective (long-term)

The key model parameters are parented in Table 14 including general parameters, transition probabilities, quality of life and cost parameters alongside their assigned distributions used in the model and sources of parameter values. The long-term cost-effectiveness results (primary analysis) are presented in Tables 15-21 and Figures 9-12 for the NHS PSS perspective. For the societal perspective (which includes all costs from the NHS and personal social perspectives plus volunteers costs), results are shown in Tables 22 and 23 and Figure 13.

Table 14: Model parameters and assigned distributions used in the long-term analysis

		UC		AC		CSLT		
Parameter	**Distribution**	**Mean**	**95% CI**	**Mean**	**95% CI**	**Mean**	**95% CI**	**Source**
General parameters								
Time horizon (years)	NA	xx.x	NA	xx.x	NA	xx.x	NA	xxxxx
Start age (years)	NA	xx.x	NA	xx.x	NA	xx.x	NA	xxxxx
Cycle length (months))	NA	xx.x	NA	xx.x	NA	xx.x	NA	xxxxx
Discount rate (costs)[6]	NA	xx.x	NA	xx.x	NA	xx.x	NA	xxxxx
Discount rate (QALYs)[7]	NA	xx.x	NA	xx.x	NA	xx.x	NA	xxxxx
Transition probabilities								
Probability of good response (1 month)	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Annual mortality rate (first 5 years)	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Mortality rate (after 5 years - ONS)	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Health-related Quality of Life								
Aphasia state utility	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Good response utility	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Dead utility	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Costs								
Cost of intervention	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Other costs (first 5 months)	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
other costs (after 5 months)	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Others	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx
Others	xxxxx	xx.x	xx to xx	xx.x	xx to xx	xx.x	xx to xx	xxxxx

ONS= Office for National Statistics

[6] Costs and benefits incurred today have a higher value than costs and benefits occurring in the future. Discounting costs reflects individual preference for costs to be experienced in the future rather than the present.

[7] Costs and benefits incurred today have a higher value than costs and benefits occurring in the future. Discounting health benefits reflects individual preference for benefits to be experienced in the present rather than the future.

Table 15: Differential costs and QALYs and ICERs estimates based on imputed data used within the decision analytic model (Long-term analysis)

Analysis	Outcome	Difference in Mean	SE	95% CI	P-value
CSLT vs UC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			
CSLT vs AC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			
AC vs UC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			

Figure 9: Cost-effectiveness Acceptability Curves (CEAC) - model-based analysis for CSLT, AC and UC

Figure 10: Cost-effectiveness plane CSLT vs AC vs UC (model-based analysis)

Figure 11: Deterministic sensitivity analyses – Tornado diagram

Figure 12: Overall Expected Value of Perfect Information (EVPI) per patient from NHS personal social perspective at different cost-effectiveness threshold values

Table 16: Cost-effectiveness results from base-case, secondary and sensitivity analyses - CSLT vs UC (long-term)

Analysis	Incremental cost [£]: CSLT vs UC (95% CI); P-value	Incremental QALYs: CSLT vs UC (95% CI); P-value	ICER £ per QALY gained	Probability that CSLT is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Base case based on EQ-5D-3L mapped from 5L using van Hout et al. 2012	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-3L mapped from 5L using Hernandez Alava et al. 2017	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-5L	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Complete cases	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

Table 17:Cost-effectiveness results from base-case, secondary and sensitivity analyses - CSLT vs AC (long-term)

Analysis	Incremental cost [£]: CSLT vs AC (95% CI); P-value	Incremental QALYs: CSLT vs AC (95% CI); P-value	ICER £ per QALY gained	Probability that CSLT is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Base case based on EQ-5D-3L mapped from 5L using van Hout et al. 2012	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-3L mapped from 5L using Hernandez Alava et al. 2017	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-5L	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Complete cases	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

Table 18: Cost-effectiveness results from base-case, secondary and sensitivity analyses - AC vs UC (long-term)

Analysis	Incremental cost [£]: AC vs UC (95% CI); P-value	Incremental QALYs: AC vs UC (95% CI); P-value	ICER £ per QALY gained	Probability that AC is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Base case based on EQ-5D-3L mapped from 5L using van Hout et al. 2012	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-3L mapped from 5L using Hernandez Alava et al. 2017	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Using EQ-5D-5L	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Complete cases	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)
Sensitivity analysis: xxx	xxxx (xxx - xxx); x.xx	x.xx (x.xx - x.xx); x.xx	xxxx	x.xx (x.xx)

Table 19: Subgroup analyses (CSLT vs UC) – long-term probabilistic analysis

Analysis	Subgroup	Incremental cost [£]: CSLT vs UC	Incremental QALYs: CSLT vs UC	ICER £ per QALY gained	Probability that CSLT is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Severity of word finding difficulty	Mild	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Severe	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
Baeline comprehesnion ability based on CAT	Within normal limit	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Mild	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Severe	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
Length of time post-stroke	<Q1	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Q1-<Q2	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Q2-<Q3				
	>=Q3	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)

Q=25th percentile, Q2=50th percentile (median), Q3=75th percentile

Table 20: Subgroup analyses (CSLT vs AC) – long-term probabilistic analysis

Analysis	Subgroup	Incremental cost [£]: CSLT vs AC	Incremental QALYs: CSLT vs AC	ICER £ per QALY gained	Probability that CSLT is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Severity of word finding difficulty	Mild	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Severe	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
Baeline comprehension ability based on CAT	Within normal limit	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Mild	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Severe	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
Length of time post-stroke	<Q1	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Q1-<Q2	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Q2-<Q3	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	>=Q3	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)

Q=25th percentile, Q2=50th percentile (median), Q3=75th percentile

Table 21: Subgroup analyses (AC vs UC) – long-term probabilistic analysis

Analysis	Subgroup	Incremental cost [£]: AC vs UC	Incremental QALYs: AC vs UC	ICER £ per QALY gained	Probability that AC is cost effective at the threshold 20,000/QALY (£30,000/ QALY)
Severity of word finding difficulty	Mild	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Severe	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
Baseline comprehesnion ability based on CAT	Within normal limit	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Mild	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Moderate	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Severe	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
Length of time post-stroke	<Q1	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Q1-<Q2	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	Q2-<Q3	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)
	>=Q3	xxxx.xx	xxxx.xx	xxxx	x.xx (x.xx)

Q=25th percentile, Q2=50th percentile (median), Q3=75th percentile

6.2.2. Societal Perspective (long-term)

Table 22: Mean total costs of resource use based on complete cases by treatment group from societal perspective (long-term analysis)

Treatment group	n	Mean cost (£)	SE	95% CI
UC	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx
AC	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx
CSLT	xxx	xxx.xx	xxx.xx	xxx.xx to xxx.xx

Table 23: Differential costs and QALYs and ICERs estimates from societal perspective (long-term analysis)

Analysis	Outcome	Difference in Mean	SE	95% CI	P-value
CSLT vs UC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			
CSLT vs AC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			
AC vs UC	Costs (£)	xxxx	xxxx	xxx.xx to xxx.xx	x.xxx
	QALYs	xx.xx	xx.xx	xx.xx to xx.xx	x.xxx
	ICER	xxxxx.xx			

Figure 13: Overall Expected Value of Perfect Information (EVPI) per patient from societal perspective at different cost-effectiveness threshold values

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Appendix 1: Costing of trial

All of the costs which will be estimated for the analysis are presented in Table A1. There is no missing data for all the costs used for the analysis, including therapist/volunteer time costs. It may be the case that therapists occasionally neglected to fill in the time diaries, but as we are not able to ascertain whether or how many times this was done, it will be assumed that the time diaries were recorded fully for participants.

Table A1: Unit costs applied for valuation of resource use

Item description	Unit cost (£)	Source of unit cost	Note
Unit costs for computer therapy (CSLT) arm			
Laptop/tablet loan for 6 months (for participants who did not have their own computer)	69	Big CACTUS study	68% of participants on CSLT arm (66/97) provided with computer/tablet loan. Unit cost calculated from the average cost of a laptop/tablet purchased through the NHS and divided by 10 users over its shelf life. The shelf life of an NHS laptop or tablet will be estimated at 5 years.
Step-by-step software individual licence	250	Step by step website	
Step-by-step software clinician licence	550	Step by step website	
Step-by-step software clinician 5 license bundle	2200	Step by step website	
Headsets	14.50	Big CACTUS study	Headset provided to 32 (33% of) CSLT arm participants
SLT band 7 cost per minute	0.90	PSSRU 2017	Delivery of training on Stepbystep software
SLT band 6 cost per minute (set up Stepbystep, support, monitoring)	0.75	PSSRU 2017	Costed according to the NHS Band 6 salary (the average grade of an SLT that could deliver the computer intervention according to usual care data from the trial)
SLTA band 3 cost per minute	0.41	PSSRU 2017	Costed according to the NHS Band 3 salary (average band of SLTA that could support computer therapy according to usual care data from the trial)
Travel cost per mile	0.45	GOV.UK	
Volunteer cost per minute	0.41	PSSRU 2017	Only included in societal perspective, volunteers costed the same as an SLTA for providing an equivalent service
Unit costs for attention control (AC) arm			
Puzzle books	2.50	Big CACTUS study	Average cost of puzzle book purchased in Big CACTUS study.
SLT band 5 cost per minute	0.57	PSSRU 2017	Costed according to the NHS Band 5 salary as it could be SLTs, assistants or administrators who make the phone calls to the patients.

Note: PSSRU - Personal Social Services Research Unit; SLT - Speech and Language Therapist; SLTA - Speech and Language Therapy Assistant.

Note: For the training activities, both the cost of the time of the SLT for providing the training, as well as the time of the SLTA for receiving the training (and volunteer time in the societal perspective) will be estimated.