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Individual Cognitive Stimulation Therapy for people with Intellectual Disability and Dementia: Protocol of a feasibility randomised controlled trial

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ABSTRACT

Introduction

Cognitive Stimulation Therapy (CST) is a psychosocial intervention for dementia. Group CST is effective in reducing cognitive decline and improving quality of life in patients with dementia. There is some evidence that individual CST (iCST) may be beneficial in reducing cognitive decline. People with intellectual disability (ID) have an increased risk of dementia. However, there are no published studies of CST in people with ID and dementia. This protocol describes the feasibility and acceptability of a randomised controlled trial of iCST delivered by carers to people with ID and dementia, compared to Treatment as Usual (TAU). The results of this study will inform the design of a future definitive Randomised Controlled Trial.

Methods and analysis

The iCST intervention has been adapted for this trial. Forty dyads (individuals with ID and their carer) will be randomised to either iCST or TAU. The manualised intervention comprises 40 iCST sessions delivered by a carer for 30 minutes, twice a week, over 20 weeks. The primary outcome will be process measures assessing the feasibility and acceptability of the intervention and trial procedures. The secondary outcome will be changes in the scores of outcome measures (cognition, functional ability, and quality of life in individuals with ID, and caregiver burden, competence in managing dementia and anxiety and depression in carers). Data will be collected at baseline, 11 weeks and at 21 weeks. A process evaluation will examine adherence to iCST and will include qualitative interviews with participants to identify aspects of the intervention that were or were not successful

Ethics and dissemination

The study has received ethical approval. The results of the study will be presented at conferences and submitted to a peer reviewed Journal.

Trial registration: registered with International Standard Randomised Controlled Trial Number (identifier: ISRCTN18312288) on the 12th of September 2017.

Key words: intellectual disability, dementia, Cognitive Stimulation Therapy, cognition, functioning

Article Summary

Strengths and limitations of this study

- This is the first feasibility randomised controlled trial on Cognitive Stimulation Therapy, which has been adapted for use in people with dementia and ID
- The study is being led by researchers with expertise in carrying out trials in people with ID and trials of Cognitive Stimulation Therapy
- The findings of the study will need to be interpreted with caution due to this being a feasibility study

INTRODUCTION

The incidence of dementia in older people with intellectual disabilities (ID) is almost five times higher compared to the general population (1). In people with Down syndrome, the risk of dementia is greatly increased. One study found that 90% of participants with Down Syndrome developed Alzheimer's dementia over a 14 year period (2). Dementia is a significant cause of morbidity and mortality in people with ID (3). In the UK, the NICE guidelines (4) recommend that people with mild/moderate dementia should be given the opportunity to participate in a structured group Cognitive Stimulation Therapy (CST) programme. CST has been shown to improve quality of life and cognition in people with dementia in the general population (5, 6), and particularly benefits language skills such as naming, word finding and comprehension (7). It is cost effective and has comparable efficacy to anti-dementia drugs (8). Most of the evidence is based on group CST, typically two sessions a week lasting 45 minutes, over a seven week period (5). The intervention involves activities that include word association, categorisation, reminiscence, creative activities, number and word games and discussion of current affairs. A range of methods are used which are believed to stimulate learning and memory, including making new semantic connections, Reality Orientation (RO) and multi-sensory stimulation (9 , 10). RO involves presenting information about time, place and person to an individual in order to orient an individual to his/her environment. It has been criticised for being too rigid and confrontational. CST employs the positive aspects of RO, using a sensitive, respectful and person centred approach (6). The benefits of CST may arise from activation of neuronal networks associated with cognition such as memory and language (11). Currently, people with ID and dementia are not routinely offered CST, and there have been no studies that have examined its effectiveness in this group.

To our knowledge, there has been only one pilot randomised controlled study of 25 participants with Down syndrome without dementia investigating the impact of group CST in improving cognition, adaptive functioning and quality of life, compared to treatment as usual (12). The study found that the intervention significantly improved cognitive functioning in the group receiving CST pre and post treatment, and there was an improvement on quality of life scores at three months follow up. However, when the treatment and control groups were compared, there were no differences in any of the outcomes post intervention and at three months. This finding is perhaps not surprising given that the participants did not have dementia and the sample size was also relatively small. However, the study did demonstrate that CST could be adapted for use in people with ID.

In order for group CST to be successful, the groups should comprise individuals with a similar degree of cognitive impairment in order to ensure that participants are effectively engaged. Differences in baseline cognition in individuals with ID, coupled with possible sensory impairment, poses a challenge for recruitment and effective group work. Individual CST (iCST) may therefore be a more practical and acceptable option for people with ID and dementia. Individual CST involves participating in one to one activities with a carer. The iCST programme is based on similar principals to group CST and involves mental stimulation, reminiscence and RO. There are ten principles: mental stimulation; developing new ideas, thoughts and associations; focusing on opinions rather than facts; using reminiscence, using triggers to support memory; using a "person-centred" approach; offering a choice of activities; enjoyment and fun; maximizing potential; and strengthening the relationship by spending quality time together (13).Individual CST therefore promotes positive interactions between the carer and individual, which could benefit their relationship, as well as potentially enhance cognition.

There is some evidence for the effectiveness of iCST delivered by carers, for people with dementia in the general population. Typically, 75 sessions are administered by carers over a 25 week period (3 sessions, each 30 minutes). A randomised controlled trial of individual reality orientation therapy in people with dementia receiving anticholinesterase inhibitors versus anticholinesterase inhibitors alone, found significant improvements in cognition but not for behavioural or functional outcomes (14). A recent multicentre randomised controlled trial of manualised iCST delivered by family carers, compared to "treatment as usual", in 356 carers and individuals with dementia (15) found that iCST did not improve cognition or quality of life for people with dementia and it did not improve carers' physical or mental health. However, there was some improvement in the caregiving relationship and in carers' health related quality of life. Possible reasons for the lack of differences in the treatment and control groups in relation to cognition and quality of life could be attributed to the poor therapy adherence rate. Only 51% of the dyads completed more than 30 sessions out of 75 and 22% did not complete any sessions. Adherence analyses found that people with dementia who completed more sessions showed improved quality in the caregiving relationship and carers reported lower depressive symptoms at 26 weeks. Qualitative data suggested that people with dementia and their carers experienced better communication as a result of iCST.

No studies have examined the impact of iCST in people with ID and dementia. Given the lack of previous data, and potential issues with adherence rates to the iCST intervention, a

feasibility study will help to address whether a full scale randomised controlled trial should be carried out in this population.

Adapting the intervention for use in people with ID

We have modified and adapted the iCST manual in order to make it more suitable for use with people with ID and dementia. Where possible, we have retained the themes in the original manual but simplified the activities. However, some of the more complex activities were completely removed and substituted with alternative activities. An initial draft was developed with the input of a Speech and Language Therapist. We then made further revisions to the manual following feedback from three group consultations with twelve health and social care professionals working with people with ID, five carers of people with ID and five individuals with ID. Selected activities from the manual were field tested with five dyads (carer and individual with ID and dementia) who were asked to provide feedback on five activities each. Further changes to the manual were made based on the feedback.

AIMS AND OBJECTIVES

The aim of the study is to assess the feasibility of carrying out a future randomised controlled trial of iCST compared to Treatment as Usual (TAU) in people with ID and dementia. The primary objective of the study is to determine the feasibility of the intervention and study procedures, by assessing the recruitment rate and drop-out rate of dyads (carer and individual with ID and dementia), the appropriateness of the outcome measures, adherence to the iCST intervention and the acceptability of the intervention.

The secondary objective of the study is to examine the effects of iCST on the outcome measures, which include measures of cognitive and adaptive functioning and quality of life in individuals with dementia and measures of carer burden, competence and anxiety and depression in carers. In addition, we aim to estimate the sample size of a full scale randomised controlled trial.

METHODS AND ANALYSIS

Design

This will be a single blind, feasibility randomised controlled trial of iCST delivered by carers (formal or informal) versus TAU for people with ID and dementia. TAU has been selected as the comparator arm as it reflects current practice. Forty dyads (one carer and one individual

with ID and dementia) will be randomised to either the intervention group or control group (TAU). Each arm will have 20 dyads. The primary and secondary outcomes will be measured at baseline prior to randomisation, at midpoint (11 weeks) and at the end of the intervention (21 weeks).

Sample size

A sample size of 40 has been selected for pragmatic reasons. Assuming a recruitment rate of 80% from participants who are eligible, a sample size of 40 provides a 95% Confidence interval for the recruitment rate of 67.6 to 92.4%. Assuming that 20% of participants drop out of the study, a sample size of 40 provides a 95% confidence interval for the drop-out rate of 7.60% to 32.40%.

Participants

Inclusion criteria

Participants will be over the age of 40. This age has been selected as people with Down Syndrome are likely to present with dementia from the age of 40 onwards (cases in younger people are less common). They will have premorbid mild or moderate ID and have a confirmed diagnosis of mild or moderate dementia. The participants will be screened for the presence of dementia using ICD-10 criteria (taken from the CAMDEX-DS, 16). They will need to be able to communicate verbally and in English, and be able to participate in simple games. Participants taking dementia medication can continue to take these during the study.

Each individual will also need to have a carer such as a member of staff, family member or friend who knows the individual well and is willing to take part in the study. Carers will need to be over the age of 18, be able to speak English and provide consent to taking part.

Exclusion criteria

Significant physical illness or disability,visual or hearing impairment, or behavioural problems that could affect participation in the iCST sessions or during assessments.

Recruitment

Participants will be recruited from community learning (intellectual) disability teams based in England. Clinicians will be asked to screen their case load for potential participants (individuals with dementia and their carers) and will approach them to discuss the study. If they are interested in taking part, their details will be passed on to the trial research team

who will contact the participant and their carer to arrange a face to face meeting in order to assess eligibility. If they are eligible, and the individual and their carer agree to take part, then informed consent will be obtained from both the carer and the participant with dementia. Participants' capacity to consent to take part in the research will be assessed by the research assistant who will follow the guidelines stipulated in the Mental Capacity Act (2005). If the participant with dementia lacks the capacity to consent, a personal consultee (a relative or friend) will be consulted to consider the participant's beliefs and wishes about taking part in the study and they will need to sign the declaration form before the participant is included in the study. If a personal consultee is not available, then we will consider approaching a nominated consultee (a member of the clinical team not directly involved in the research) who will need to sign a declaration form agreeing to the individual's participation in the study.

We estimate that we will need to recruit four eligible dyads each month, over ten months. If recruitment is anticipated to be slow, we will recruit from other centres if necessary.

Randomisation

Randomisation will occur after eligibility, consent and baseline assessments have been carried out. Randomisation will be undertaken centrally by the coordinating trial team using a web based system called Sealed Envelope. An administrator, who is not involved in the study, will enter the patient's trial ID into the web based randomization system ("sealed Envelope"). This system will randomly allocate the participant to either the intervention or control arm and he/she will inform the participants of their allocation. Randomisation will be based on varying block sizes. Although participants cannot be blinded to their allocated group, the research assistant administering the questionnaires will be blind to the allocation group. Due to the risk of carers revealing the allocation group, carers will be reminded before the follow up assessments not to divulge this information. At the end of the study we will assess researcher blindness by asking them to guess the allocated group.

Intervention Group

The intervention will comprise 40 sessions of iCST, which will be delivered by carers using the modified manual. The number of sessions has been reduced to 40 from the original 75 sessions in an attempt to improve adherence and acceptability of the intervention. Each carer will administer the activities within the manual two times a week for 30 minutes, over a period of 20 weeks. Each session will begin with discussion of the day, date, weather and location (5 mins) followed by discussion of events in the news or current issues (5 mins) and

then the main activity (20 mins). The activities are based around a different theme for each session and have been designed to be fun and engaging for the individual as well as mentally stimulating. Activities include word and number games, discussion of current affairs and famous people, creative and physical activities and quizzes. Carers will be encouraged to make the activities person-centred and multi-sensory and to tailor the activities to the ability and interests of the individual with ID. The themes and activities within the manual are summarised in table 1.

Carer training and support

Carers will attend a half day training session on how to use the manual in either a group setting or will receive individual training at home, depending on their preference, and this will be provided by the research team. They will receive a copy of the adapted manual which includes paper based activities, as well as additional materials for specific activities (e.g. dominoes, activity CD, dice).

Carers will be asked to keep a record of their sessions (e.g. the duration, activities completed, level of engagement and enjoyment of activities by the individual and reasons for not competing the session) in a diary. In order to assess adherence to the manual, for each individual dyad, two sessions will be audio-taped (40 in total). A brief adherence measure will be developed for the study. If a carer is unable to continue the intervention (e.g. due to poor health) then another carer can be substituted. In order to support the carers and to ensure continued momentum, the research team will contact carers at least once a month by phone and there will be regular contact by email. Home visits can also be carried out if needed. The intervention group will also have access to "usual care" and therefore the intervention arm will be examining the additional effects of individual CST.

Control group

The control group will continue to have access to their usual care, which will include anticholinesterase inhibitors, input from health professionals as well any day activities. If they are interested, participants and carers in the control group will also be offered a copy of the manual and training in how to use it after the 20 week study period.

Outcome Measures

The primary outcome: feasibility measures

1. Recruitment rate

We will assess the proportion people who are referred to the study and are eligible to take part, and the proportion of people who are eligible and are willing to take part in the study. Reasons for refusing to take part in the study will be noted.

2. Retention and drop-out rate

We will record the number of participants who completed assessments at each of the follow up points and reasons for withdrawal/ non completion

3. Appropriateness of outcome measures

Missing data for each outcome measure will be analysed, as well as sensitivity of the outcome measure to change as a result of the intervention.

4. Adherence to the intervention and acceptability of the intervention

This will be assessed through the process evaluation (described below).

Secondary outcome measures

Outcome measures will be recorded in both individuals with dementia and their carer. at baseline, midway (11 weeks) and post intervention (21 weeks). See table 2 for the Schedule of Assessments.

Outcomes in individuals with dementia

i. Measures of cognition

Change in cognitive functioning will be measured by the Cambridge Cognitive Examination for older Adults with Down Syndrome (CAMCOG-DS) which will be administered with the individual with dementia (16). It includes an assessment of orientation, language, attention, praxis, and abstract thinking. It provides individual subscale scores as well as total scores. Higher scores indicate better ability.

The Modified Memory for Objects test from the Neuropsychological Assessment of Dementia in Intellectual Disabilities Battery (17) will also be administered with individuals with dementia. This assessment involves presenting 7 every-day items to the individual and testing his/her ability to recall an item that has been covered up. The maximum score is 7. Higher scores indicate better ability.

The Cognitive Scale for Down Syndrome (CS-DS) (18) will be administered with carers. This measure has 61 items that have been validated in adults with Down syndrome but the items are relevant to people with intellectual disability in general. The scale includes items testing executive functioning, memory and language. Higher scores indicate better cognitive functioning.

ii. Other outcome measures

Functional ability will be measured using the Alzheimer's Dementia Cooperative study - Activities of Daily Living Inventory (ADCS-ADL) (19). This will be administered with the carer. This is a measure of the ability of the individual with dementia to carry out a range of daily activities. There are 23 items covering a range of areas such as feeding, bathing, grooming, preparing meals, use of household appliances and hobbies. The maximum score is 78. Higher scores indicate better ability.

Quality of life will be assessed using the Quality of life - Alzheimer's Disease Scale (QOL-AD) (20). This will be administered with both the individual and the carer. This is a 13 item scale with items covering physical health, mood, family life and functioning. The maximum score is 52, with higher scores indicating a better quality of life.

Carer Outcomes

Care giving burden in both paid and informal carers will be assessed using the Care Giving Burden Scale (21). Carers will be asked if the individual requires assistance in a range of areas, whether they have provided assistance in the last month and whether providing assistance has been stressful. There are three domains and each has a maximum score of 15.

The competence to look after someone with dementia will be assessed using the Sense of Competence in Dementia Care Staff (SCIDS) Scale (22). This is a 17 item scale with four subscales (professionalism, Building relationships, Care challenges and sustaining Personhood. The maximum score is 68, with higher scores indicating more competence. Although this questionnaire was developed for care staff, the questions may also be relevant for family members. Minor modifications to the questions will need be made to ensure that it is appropriate for use in both groups.

The presence of an anxiety or depressive disorder in the carer will be assessed using the Hospital Anxiety and Depression Scale (HADS) (23).

Process Evaluation

A process evaluation will be carried out, based on MRC guidance (24). The aim of the process evaluation will be to examine whether the different components of the intervention (e.g. training of carers, monitoring visits) were consistently followed; the extent to which iCST is delivered as intended; the extent to which the intervention would need to be modified prior to a full trial in order to make it more acceptable to participants and understanding the perceived value, benefits and harm or unintended consequences of the intervention so that these are fully measured in the full trial. In order to carry out the process evaluation, a mixed methods approach employing qualitative and quantitative approaches will be used.

Qualitative approach

At the end of intervention all the participants will be given a short questionnaire to complete about their experience and satisfaction in participating in the study and to provide feedback. Participants will be asked whether they thought the intervention was practical and acceptable, such as whether the length and number of sessions were appropriate. In addition, five dyads from the intervention group and five dyads from the control group will also be invited to participate in a semi-structured interview where more detailed feedback will be obtained in relation to the acceptability of the intervention. We will enquire about what aspects of the intervention worked well or could be further improved and whether there were any positive or negative effects of the intervention on the individual with dementia. Participants will also be asked about their experience of the study processes (e.g. randomisation) and assessments. The interviews will be audio-taped and transcribed verbatim. Transcripts will be analysed using thematic analysis supported by computer software (NVivo 9). The analytic strategy will identify themes relating to the barriers and facilitators that will enable the successful implementation of the intervention.

Quantitative approach

Carer diaries will be examined to identify the number of sessions that were completed by each dyad and reasons for non-completion. We will calculate the proportion of dyads who were able to complete all the sessions, those who were able to complete 50% and those who did not complete any. We will examine the feedback for each activity to identify which themes and activities were likely to be completed or missed. The extent of participation of the individuals in the sessions will also be examined (e.g. was there full or partial participation?). The quality of the delivery of the iCST intervention will also be assessed by rating the 40 audiotaped sessions on the extent to which the manual was followed.

One of the major challenges will be changes in paid carers or periods where no carer may be available due to illness or annual leave during the course of the intervention. We will examine the frequency of changes in carers and the number of sessions missed due to unavailability of carers. We will examine whether there are differences in adherence rates between paid and family carers.

Incentives

In both arms of the study the carers and participants with dementia will receive a £10 gift voucher for completing each follow up assessment (at 11 weeks and 21 weeks; £20 in total). Carers in the intervention arm will receive an additional £10 gift voucher for competing each audio-taped session (£20 total). The participants who take part in the post intervention interviews will also receive a £10 gift voucher each.

Statistical analysis

The study sample will be analysed using descriptive statistics. Data on recruitment will be recorded and examined. This will include information on how many participants were approached and agreed to be screened; how many met the eligibility criteria and agreed to take part and how many completed the study, or dropped out. This information will be presented in a Consort diagram describing the flow of participants through the study (see figure 1)

The baseline clinical and demographic characteristics of participants in both arms of the study will be compared descriptively. Descriptive statistics (mean and standard deviation), and the proportion of participants who competed the measures, will be reported for each outcome at baseline, 11 weeks and 21 weeks, which will provide data on determining the most appropriate outcome for a future trial.

A linear regression model adjusting for baseline scores will be used to estimate the effect of iCST on each of the outcome variables. The results will be presented as estimates with 95% Confidence intervals. The analysis will be based on Intention to Treat and will be exploratory due to the small sample size. Based on this analysis, an appropriate primary outcome will be identified and will be used to estimate the sample size for a future RCT.

Criteria for progression to a full trial

We will consider a full trial if the following criteria are met:

1. If we are able to achieve at least 70% of our recruitment target of 40 (28 dyads or more).

2. If 75% of the dyads in the intervention arm complete at least half the number of sessions (20 sessions out of 40). If less than 50% of the dyads complete half the sessions, the intervention is likely to be ineffective (16)

3. The drop- out rate of dyads in the entire study is less than 30%

4. The intervention and trial procedures are considered to be acceptable by study participants.

If the study fails to recruit our minimum target, or the drop-out rate is higher than expected, or the adherence rate is lower than expected, we will consider whether measures can be implemented in order to improve these outcomes and this will inform our decision to progress to a full trial.

ETHICS AND DISSEMINATION

Ethical Approval, research governance and trial sponsorship

Ethics approval was obtained from the Harrow Research Ethics Committee on 20/03/2017 (reference: 17/LO/0030), for the modification phase of the intervention as well as the trial. Health Research Authority approval was also obtained on 11/05/2017. The trial has been registered and its International Standard Randomised Controlled Trial Number (ISRCTN) is ISRCTN18312288. The study is being sponsored by University College London. Any amendments to the trial protocol, participant information sheets, consent forms, GP letter and any submitted supporting documents will not be implemented prior to receipt of the required approvals. Paper-based data that is collected will be stored securely in locked filing cabinets in locked offices at UCL. Participants will be given participant identification numbers and participant identifiable data will be anonymised and password protected.The results of the study will be published in peer reviewed journals and presented at conferences.

Study time line

The trial is anticipated to start recruitment in February 2018. There will be nine months of recruitment, ending in October 2018. All the follow up assessments will be completed by the end of March 2019. There will be three further months to complete the process evaluation and to analyse the results and write up the study findings.

DISCUSSION

Dementia is more common in people with ID but the evidence base for interventions in dementia in people with ID is very limited. Individual CST may be particularly useful in people with ID due to the person-centred nature of the intervention, making it easier to tailor activities based on the individual's preference, and the availability of paid carers who may be able to deliver the intervention as part of their caring role. To our knowledge, this is the first feasibility study of individual CST in people with ID and dementia. The study will provide information about whether this treatment is feasible and acceptable for people with ID.

A key challenge that may arise from the study is adherence to the intervention (15). By reducing the number of sessions to be delivered by the carer from the 70 to 40, we hope to minimise the burden on carers delivering the intervention. Previous studies on iCST have been carried out using only family carers, whereas we intend to include paid carers. This may have an advantage in that paid carers are more likely to have dedicated time that they can use to carry out the iCST sessions (e.g. as part of a key work session) and they may value the structured nature of the intervention and appreciate the therapeutic value of the intervention in enhancing communication and interaction with the individual. However, not all individuals will have access to one to one support from a paid carer, even if they live in a care home, and paid carers may also experience stress as a consequence of caring for someone with dementia (25). Other challenges include the frequent changes and turn-over of staff, which could affect the delivery of the intervention and the value of having carer outcome measures.

If the study meets the pre-specified progression criteria, we will apply for funding to conduct a full scale RCT in order to examine the effectiveness of iCST compared to treatment as usual. This study could lead to changes in health policy including improved access to CST for people with ID and dementia.

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Declaration of interests

The authors have no competing interests

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Author Contributions

AA is the Chief Investigator of the study and is responsible for ensuring that the study follows the agreed protocol. AA, AH, EA and AS were involved in the conceptualization of the study and are part of the trial management group. EB is a Research Assistant who has been involved in the development of the manual, and will be carrying out the baseline and outcome assessments. All the authors were involved in writing and reviewing the contents of the paper.

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Tables

Table 1: Themes/ activities within the manual

Session Number	Themes/activities	Session Number	Themes/ activities
1	My Life	**21**	Associated words
2	Food 1	**22**	Orientation 1
3	Current Affairs	**23**	Thinking Cards
4	Number Games 1	**24**	Household Objects 1
5	Art Discussion 1	**25**	Categorising objects 1
6	Cross words	**26**	Number Games 3
7	Physical Games	**27**	Sounds 2
8	Childhood Toys	**28**	Jobs
9	Word Games 1	**29**	Scenes 2
10	Sound Games 1	**30**	Food 2
11	Using Money	**31**	Art Discussion 3
12	Travel	**32**	Household Objects 2
13	Being Creative	**33**	Physical Games 2
14	Quiz Games 1	**34**	Orientation 2
15	Clothes	**35**	Signs and Symbols
16	Word Games 2	**36**	Word Games 3
17	Scenes 1	**37**	Memories of the past
18	Number Games 2	**38**	Animals
19	Brands and products	**39**	Categorising objects 2
20	Art Discussion 2	**40**	Quiz Games 2

Table 2: Schedule of Assessments

	Screening (pre-treatment assessment)	Intervention phase				Final visit	Optional
Visit No:	1	2	3	4	5	6	7
Week number:		Week 1	Week 5	Week 11	Week 15	Week 20	
Window of flexibility for timing of visits:			e.g.+/- 7 days	E.g..+/- 7 days		e.g.+/- 7 days	
Informed Consent	X						
Medical History	X						
Eligibility confirmation (ICD-10 criteria)	X						
CAMCOG-DS	X			X		X	
Memory for Objects Test	X			X		X	
CSDS	X			X		X	
ADCS-ADL	X			X		X	
QOL-AD	X			X		X	
Care Giver Durden Scale	X			X		X	
HADS	X			X		X	
SCIDS Scale	X						
Training for carers		X					
Treatment adherence/monitoring visit			X		X		
Trial evaluation questionnaire						X	
Semi-structured interview							X
Randomisation	X						
Adverse Events review	X	X		X		X	
Concomitant Medication review	X	X		X		X	

CAMCOG-DS: The Cambridge Cognitive Examination for older Adults with Down Syndrome; CSDS: Cognitive Scale for Down Syndrome; ADCS-ADL: Alzheimer's Dementia Cooperative study - Activities of Daily Living Inventory; QOL-AD: Quality of life - Alzheimer's Disease Scale; HADS: Hospital Anxiety and Depression Scale; SCIDS: Sense of Competence in Dementia Care Staff Scale

Figure 1: Trial Flow Chart

Legend: This figure illustrates the flow of participants through the study from referral through to analysis of data. The number of participants who are referred and are eligible will be recorded as will the number of people who are eligible and agree to be randomised. Reasons for participant withdrawal/ drop out will be recorded.

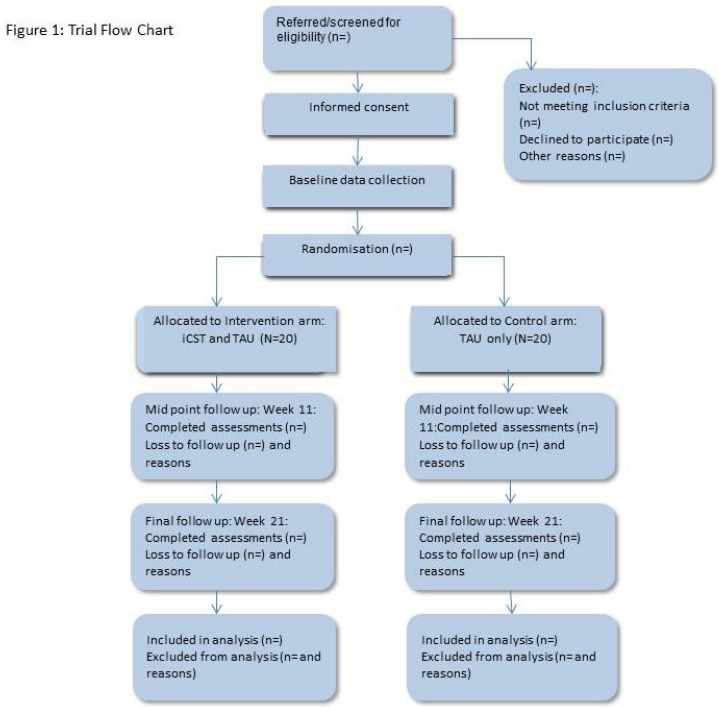

Figure 1: Trial flow Chart.This figure illustrates the flow of participants through the study from referral through to analysis of data. The number of participants who are referred and are eligible will be recorded as will the number of people who are eligible and agree to be randomised. Reasons for participant withdrawal/ drop out will be recorded.

254x190mm (96 x 96 DPI)

SPIRIT 2013 Checklist: Recommended items to address in a clinical trial protocol and related documents*

Section/item	Item No	Description	Addressed on page number
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	1
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	2
	2b	All items from the World Health Organization Trial Registration Data Set	
Protocol version	3	Date and version identifier	N/A
Funding	4	Sources and types of financial, material, and other support	16
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	1, 16
	5b	Name and contact information for the trial sponsor	14
	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities	_____
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee)	N/A

Introduction			
Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention	4, 5, 6
	6b	Explanation for choice of comparators	7
Objectives	7	Specific objectives or hypotheses	6
Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory)	6, 7
Methods: Participants, interventions, and outcomes			
Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained	7
Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists)	7
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	8
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease)	8, 9
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	9
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	7
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended	9, 10, 11
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure)	Table 2

Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations	7
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	8
Methods: Assignment of interventions (for controlled trials)			
Allocation:			
Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions	8
Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned	8
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	8
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	8
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	8
Methods: Data collection, management, and analysis			
Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol	_____
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols	10

Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol	_____
Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol	13
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	N/A
	20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation)	N/A
Methods: Monitoring			
Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed	N/A
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial	N/A
Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct	12
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	N/A
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	14
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators)	14

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	8
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	N/A
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial	14
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	15
Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators	
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation	
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions	14
	31b	Authorship eligibility guidelines and any intended use of professional writers	N/A
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	N/A
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	
Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable	N/A

*It is strongly recommended that this checklist be read in conjunction with the SPIRIT 2013 Explanation & Elaboration for important clarification on the items. Amendments to the protocol should be tracked and dated. The SPIRIT checklist is copyrighted by the SPIRIT Group under the Creative Commons "Attribution-NonCommercial-NoDerivs 3.0 Unported" license.

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Individual Cognitive Stimulation Therapy for people with Intellectual Disability and Dementia: Protocol of a feasibility randomised controlled trial.

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Individual Cognitive Stimulation Therapy for people with Intellectual Disability and Dementia: Protocol of a feasibility randomised controlled trial

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ABSTRACT

Introduction

Cognitive Stimulation Therapy (CST) is a psychosocial intervention for dementia. Group CST is effective in reducing cognitive decline and improving quality of life in patients with dementia. There is some evidence that individual CST (iCST) may be beneficial in reducing cognitive decline. People with intellectual disability (ID) have an increased risk of dementia. However, there are no published studies of CST in people with ID and dementia. This protocol describes the feasibility and acceptability of a randomised controlled trial of iCST delivered by carers to people with ID and dementia, compared to Treatment as Usual (TAU). The results of this study will inform the design of a future definitive Randomised Controlled Trial.

Methods and analysis

The iCST intervention has been adapted for this trial. Forty dyads (individuals with ID and their carer) will be randomised to either iCST or TAU. The manualised intervention comprises 40 iCST sessions delivered by a carer for 30 minutes, twice a week, over 20 weeks. The primary outcome will be process measures assessing the feasibility and acceptability of the intervention and trial procedures. The secondary outcome will be changes in the scores of outcome measures (cognition, functional ability, and quality of life in individuals with ID, and caregiver burden, competence in managing dementia and anxiety and depression in carers). Data will be collected at baseline, 11 weeks and at 21 weeks. A process evaluation will examine adherence to iCST and will include qualitative interviews with participants to identify aspects of the intervention that were or were not successful

Ethics and dissemination

The study has received ethical approval. The results of the study will be presented at conferences and submitted to a peer reviewed Journal.

Trial registration: registered with International Standard Randomised Controlled Trial Number (identifier: ISRCTN18312288) on the 12th of September 2017.

Key words: intellectual disability, dementia, Cognitive Stimulation Therapy, cognition, functioning

Article Summary

Strengths and limitations of this study

- This is the first feasibility randomised controlled trial on Cognitive Stimulation Therapy, which has been adapted for use in people with dementia and ID
- The study is being led by researchers with expertise in carrying out trials in people with ID and trials of Cognitive Stimulation Therapy
- The findings of the study will need to be interpreted with caution due to this being a feasibility study

INTRODUCTION

The incidence of dementia in older people with intellectual disabilities (ID) is almost five times higher compared to the general population (1). In people with Down syndrome, the risk of dementia is greatly increased. One study found that over 97% of participants with Down Syndrome developed Alzheimer's dementia over a 20 year period (2). Dementia is a significant cause of morbidity and mortality in people with ID (3).

There are several non-pharmacological interventions that aim to enhance cognition or reduce the impact of cognitive deficits in individuals suffering from dementia, including cognitive training, cognitive rehabilitation, reminiscence therapy and cognitive stimulation therapy. Cognitive training involves guided practice on standardised tests that reflect specific cognitive functions such as attention, memory and problem solving. Currently there is no evidence for the effectiveness of cognitive training on patients on dementia (4). Cognitive rehabilitation is an approach to managing the impact of dementia related symptoms, such as memory loss, on activities of daily living. It involves setting specific goals and using strategies to learn new information and compensatory techniques. There is evidence from a small RCT that Cognitive rehabilitation therapy may improve goal performance and subjective memory ratings in participants with dementia (5). Reminiscence therapy involves the discussion of past activities and experiences using prompts and props such as photographs or objects. There is evidence that reminiscence therapy may improve communication but its effects on cognition are small (6).

Cognitive stimulation therapy (CST) uses a range of methods to stimulate learning and memory, including errorless learning, reality orientation and multi-sensory stimulation (7, 8). Reality Orientation involves presenting information about time, place and person to an individual in order to orient the individual to his/her environment. It has been criticised for being too rigid and confrontational. CST employs the positive aspects of reality orientation, using a sensitive, respectful and person centred approach. There is consistent evidence that CST improves cognitive functioning, quality of life, wellbeing, communication and social interaction in people with dementia in the general population (9). Its effects are most marked on language skills such as naming, word finding and comprehension (10). The benefits of CST may arise from activation of neuronal networks associated with cognition such as memory and language (11). Most of the evidence is based on group CST, typically two sessions a week lasting 45 minutes, over a seven week period (12). The intervention involves activities that include word association, categorisation, reminiscence, creative activities, number and word games and discussion of current affairs.

In the UK, the NICE guidelines (13) recommend that people with mild/moderate dementia should be given the opportunity to participate in a structured group CST programme. CST is cost effective and has comparable efficacy to anti-dementia drugs (14).

There have been no randomised controlled trials of CST or any of the aforementioned cognitive interventions in people with dementia and ID. Given that CST has the most evidence for improving cognition in the general population, it may have similar effects in other populations such as people with ID. However, people with ID may respond differently to the intervention due to the presence of premorbid cognitive difficulties and differences in their cognitive profile, and therefore it is imperative that the impact of CST is examined within a randomised controlled trial.

To our knowledge, there has been only one pilot randomised controlled study of 25 participants with Down syndrome without dementia investigating the impact of group CST in improving cognition, adaptive functioning and quality of life, compared to treatment as usual (15). The study found that the intervention significantly improved cognitive functioning in the group receiving CST pre and post treatment, and there was an improvement on quality of life scores at three months follow up. However, when the treatment and control groups were compared, there were no differences in any of the outcomes post intervention and at three months. This finding is perhaps not surprising given that the participants did not have dementia and the sample size was also relatively small. However, the study did demonstrate that CST could be adapted for use in people with ID.

In order for group CST to be successful, the groups should comprise individuals with a similar degree of cognitive impairment in order to ensure that participants are effectively engaged. Differences in baseline cognition in individuals with ID, coupled with possible sensory impairment, poses a challenge for recruitment and effective group work. Individual CST (iCST) may therefore be a more practical and acceptable option for people with ID and dementia. Individual CST involves participating in one to one activities with a carer. The iCST programme is based on similar principals to group CST and involves mental stimulation, reminiscence and RO. There are ten principles: mental stimulation; developing new ideas, thoughts and associations; focusing on opinions rather than facts; using reminiscence, using triggers to support memory; using a “person-centred” approach; offering a choice of activities; enjoyment and fun; maximizing potential; and strengthening the relationship by spending quality time together (16).Individual CST therefore promotes

positive interactions between the carer and individual, which could benefit their relationship, as well as potentially enhance cognition.

There is some evidence for the effectiveness of iCST delivered by carers, for people with dementia in the general population. Typically, 75 sessions are administered by carers over a 25 week period (3 sessions, each 30 minutes). A randomised controlled trial of individual reality orientation therapy in people with dementia receiving anticholinesterase inhibitors versus anticholinesterase inhibitors alone, found significant improvements in cognition but not for behavioural or functional outcomes (17). A recent multicentre randomised controlled trial of manualised iCST delivered by family carers, compared to "treatment as usual", in 356 carers and individuals with dementia (18) found that iCST did not improve cognition or quality of life for people with dementia and it did not improve carers' physical or mental health. However, there was some improvement in the caregiving relationship and in carers' health related quality of life. Possible reasons for the lack of differences in the treatment and control groups in relation to cognition and quality of life could be attributed to the poor therapy adherence rate. Only 51% of the dyads completed more than 30 sessions out of 75 and 22% did not complete any sessions. Adherence analyses found that people with dementia who completed more sessions showed improved quality in the caregiving relationship and carers reported lower depressive symptoms at 26 weeks. Qualitative data suggested that people with dementia and their carers experienced better communication as a result of iCST.

No studies have examined the impact of iCST in people with ID and dementia. Given the lack of previous data, and potential issues with adherence rates to the iCST intervention, a feasibility study will help to address whether a full scale randomised controlled trial should be carried out in this population.

Adapting the intervention for use in people with ID

We have modified and adapted the iCST manual in order to make it more suitable for use with people with ID and dementia. Where possible, we have retained the themes in the original manual but simplified the activities. However, some of the more complex activities were completely removed and substituted with alternative activities. An initial draft was developed with the input of a Speech and Language Therapist. We then made further revisions to the manual following feedback from three group consultations with twelve health and social care professionals working with people with ID, five carers of people with ID and

five individuals with ID. Selected activities from the manual were field tested with five dyads (carer and individual with ID and dementia) who were asked to provide feedback on five activities each. Further changes to the manual were made based on the feedback.

AIMS AND OBJECTIVES

The aim of the study is to assess the feasibility of carrying out a future randomised controlled trial of iCST compared to Treatment as Usual (TAU) in people with ID and dementia. The primary objective of the study is to determine the feasibility of the intervention and study procedures, by assessing the recruitment rate and drop-out rate of dyads (carer and individual with ID and dementia), the appropriateness of the outcome measures, adherence to the iCST intervention and the acceptability of the intervention.

The secondary objective of the study is to examine the effects of iCST on the outcome measures, which include measures of cognitive and adaptive functioning and quality of life in individuals with dementia and measures of carer burden, competence and anxiety and depression in carers. In addition, we aim to estimate the sample size of a full scale randomised controlled trial.

METHODS AND ANALYSIS

Design

This will be a single blind, feasibility randomised controlled trial of iCST delivered by carers (formal or informal) versus TAU for people with ID and dementia. TAU has been selected as the comparator arm as it reflects current practice. Forty dyads (one carer and one individual with ID and dementia) will be randomised to either the intervention group or control group (TAU). Each arm will have 20 dyads. The primary and secondary outcomes will be measured at baseline prior to randomisation, at midpoint (11 weeks) and at the end of the intervention (21 weeks).

Sample size

A sample size of 40 has been selected for pragmatic reasons. Assuming a recruitment rate of 80% from participants who are eligible, a sample size of 40 provides a 95% Confidence interval for the recruitment rate of 67.6 to 92.4%. Assuming that 20% of participants drop out of the study, a sample size of 40 provides a 95% confidence interval for the drop-out rate of 7.60% to 32.40%.

Participants

Inclusion criteria

Participants will be over the age of 40. This age has been selected as people with Down Syndrome are likely to present with dementia from the age of 40 onwards (cases in younger people are less common). They will have premorbid mild or moderate ID and have a confirmed diagnosis of mild or moderate dementia. The participants will be screened for the presence of dementia using ICD-10 criteria (taken from the Cambridge Examination of Mental Disorders of Older People with Down's Syndrome and Others with Intellectual Disabilities (CAMDEX-DS), 19). The CAMDEX-DS does not screen for the severity of dementia, which will be assessed using ICD- 10 criteria, clinical judgement. Mild dementia is defined as memory loss affecting the learning of new material and the cognitive difficulties do not significantly impact on the person's ability to live independently. As most people with ID require some support with daily living, in someone with mild dementia and ID, the level of decline in functioning would not be expected to be severe enough to require a significant increase in the support they are receiving. In a person with ID and moderate dementia, the memory loss is more marked and there is a significant decline in the ability of the individual to carry out activities of daily living that they were able to do previously, resulting in greater dependence on others.

The participants will need to be able to communicate verbally and in English, and be able to participate in simple games. Participants taking dementia medication can continue to take these during the study.

Each individual will also need to have a carer such as a member of staff, family member or friend who knows the individual well and is willing to take part in the study. Carers will need to be over the age of 18, be able to speak English and provide consent to taking part.

Exclusion criteria

Participants will be excluded if they have severe dementia (indicated by a significant deterioration in cognitive functioning resulting in complete reliance on others and inability to recognise familiar people), significant physical illness or disability, visual or hearing impairment, or behavioural problems that could affect participation in the iCST sessions or during assessments.

Recruitment

Participants will be recruited from community learning (intellectual) disability teams based in England. Clinicians will be asked to screen their case load for potential participants (individuals with dementia and their carers) and will approach them to discuss the study. If they are interested in taking part, their details will be passed on to the trial research team who will contact the participant and their carer to arrange a face to face meeting in order to assess eligibility. If they are eligible, and the individual and their carer agree to take part, then informed consent will be obtained from both the carer and the participant with dementia. Participants' capacity to consent to take part in the research will be assessed by the research assistant who will follow the guidelines stipulated in the Mental Capacity Act (2005). If the participant with dementia lacks the capacity to consent, a personal consultee (a relative or friend) will be consulted to consider the participant's beliefs and wishes about taking part in the study and they will need to sign the declaration form before the participant is included in the study. If a personal consultee is not available, then we will consider approaching a nominated consultee (a member of the clinical team not directly involved in the research) who will need to sign a declaration form agreeing to the individual's participation in the study.

We estimate that we will need to recruit four eligible dyads each month, over ten months. If recruitment is anticipated to be slow, we will recruit from other centres if necessary.

Randomisation

Randomisation will occur after eligibility, consent and baseline assessments have been carried out. Randomisation will be undertaken centrally by the coordinating trial team using a web based system called Sealed Envelope. An administrator, who is not involved in the study, will enter the patient's trial ID into the web based randomization system ("sealed Envelope"). This system will randomly allocate the participant to either the intervention or control arm and he/she will inform the participants of their allocation. Randomisation will be based on varying block sizes. Although participants cannot be blinded to their allocated group, the research assistant administering the questionnaires will be blind to the allocation group. Due to the risk of carers revealing the allocation group, carers will be reminded before the follow up assessments not to divulge this information. At the end of the study we will assess researcher blindness by asking them to guess the allocated group.

Intervention Group

The intervention will comprise 40 sessions of iCST, which will be delivered by carers using the modified manual. The number of sessions has been reduced to 40 from the original 75 sessions in an attempt to improve adherence and acceptability of the intervention. Each carer will administer the activities within the manual two times a week for 30 minutes, over a period of 20 weeks. Each session will begin with discussion of the day, date, weather and location (5 mins) followed by discussion of events in the news or current issues (5 mins) and then the main activity (20 mins). The activities are based around a different theme for each session and have been designed to be fun and engaging for the individual as well as mentally stimulating. Activities include word and number games, discussion of current affairs and famous people, creative and physical activities and quizzes. Carers will be encouraged to make the activities person-centred and multi-sensory and to tailor the activities to the ability and interests of the individual with ID. For example, pictures in the manual that the individual with ID is not familiar with could be replaced by pictures that are of interest or of relevance to them. Examples of how activities could be made easier or more challenging will be discussed.

The themes and activities within the manual are summarised in table 1.

Carer training and support

Carers will attend a half day training session on how to use the manual in either a group setting or will receive individual training at home, depending on their preference, and this will be provided by the research team. They will receive a copy of the adapted manual which includes paper based activities, as well as additional materials for specific activities (e.g. dominoes, activity CD, dice).

Carers will be asked to keep a record of their sessions (e.g. the duration, activities completed, level of engagement and enjoyment of activities by the individual and reasons for not competing the session) in a diary. In order to assess adherence to the manual, for each individual dyad, two sessions will be audio-taped (40 in total). A brief adherence measure will be developed for the study. If a carer is unable to continue the intervention (e.g. due to poor health) then another carer can be substituted. In order to support the carers and to ensure continued momentum, the research team will contact carers at least once a month by phone and there will be regular contact by email. Home visits can also be carried out if

needed. The intervention group will also have access to "usual care" and therefore the intervention arm will be examining the additional effects of individual CST.

Control group

The control group will continue to have access to their usual care, which will include anticholinesterase inhibitors, input from health professionals as well any day activities. If they are interested, participants and carers in the control group will also be offered a copy of the manual and training in how to use it after the 20 week study period.

Outcome Measures

The primary outcome: feasibility measures

1. Recruitment rate

We will assess the proportion people who are referred to the study and are eligible to take part, and the proportion of people who are eligible and are willing to take part in the study. Reasons for refusing to take part in the study will be noted.

2. Retention and drop-out rate

We will record the number of participants who completed assessments at each of the follow up points and reasons for withdrawal/ non completion

3. Appropriateness of outcome measures

Missing data for each outcome measure will be analysed, as well as sensitivity of the outcome measure to change as a result of the intervention.

4. Adherence to the intervention and acceptability of the intervention

This will be assessed through the process evaluation (described below).

Secondary outcome measures

Outcome measures will be recorded in both individuals with dementia and their carer. at baseline, midway (11 weeks) and post intervention (21 weeks). See table 2 for the Schedule of Assessments.

Outcomes in individuals with dementia

i. Measures of cognition

Change in cognitive functioning will be measured by the Cambridge Cognitive Examination for older Adults with Down Syndrome (CAMCOG-DS) which will be administered with the individual with dementia (19). It includes an assessment of orientation, language, attention, praxis, and abstract thinking. It provides individual subscale scores as well as total scores. Higher scores indicate better ability.

The Modified Memory for Objects test from the Neuropsychological Assessment of Dementia in Intellectual Disabilities Battery (20) will also be administered with individuals with dementia. This assessment involves presenting 7 every-day items to the individual and testing his/her ability to recall an item that has been covered up. The maximum score is 7. Higher scores indicate better ability.

The Cognitive Scale for Down Syndrome (CS-DS) (21) will be administered with carers. This measure has 61 items that have been validated in adults with Down syndrome but the items are relevant to people with intellectual disability in general. The scale includes items testing executive functioning, memory and language. Higher scores indicate better cognitive functioning.

ii. Other outcome measures

Functional ability will be measured using the Alzheimer's Dementia Cooperative study - Activities of Daily Living Inventory (ADCS-ADL) (22). This will be administered with the carer. This is a measure of the ability of the individual with dementia to carry out a range of daily activities. There are 23 items covering a range of areas such as feeding, bathing, grooming, preparing meals, use of household appliances and hobbies. The maximum score is 78. Higher scores indicate better ability. This measure has not been validated in people with ID but has been found to be sensitive to change after CST (23). Most of the items appear to be relevant to the ID population.

Quality of life will be assessed using the Quality of life - Alzheimer's Disease Scale (QOL-AD) (24). This will be administered with the carer. This is a 13 item scale with items covering physical health, mood, family life and functioning. The maximum score is 52, with higher scores indicating a better quality of life. There are currently no suitable measures for quality of life in people with ID and dementia. This measure has been used in studies of CST as a primary outcome measure and has been found to detect an improvement in quality of life (12, 23).

Carer Outcomes

Care giving burden in both paid and informal carers will be assessed using the Care Giving Burden Scale (25). Carers will be asked if the individual requires assistance in a range of areas, whether they have provided assistance in the last month and whether providing assistance has been stressful. There are three domains and each has a maximum score of 15.

The competence to look after someone with dementia will be assessed using the Sense of Competence in Dementia Care Staff (SCIDS) Scale (26). This is a 17 item scale with four subscales (professionalism, Building relationships, Care challenges and sustaining Personhood. The maximum score is 68, with higher scores indicating more competence. Although this questionnaire was developed for care staff, the questions may also be relevant for family members. Minor modifications to the questions will need be made to ensure that it is appropriate for use in both groups. This measure has been found to be sensitive to change following CST (27)

The presence of an anxiety or depressive disorder in the carer will be assessed using the Hospital Anxiety and Depression Scale (HADS) (28).

Process Evaluation

A process evaluation will be carried out, based on MRC guidance (29). The aim of the process evaluation will be to examine whether the different components of the intervention (e.g. training of carers, monitoring visits) were consistently followed; the extent to which iCST is delivered as intended; the extent to which the intervention would need to be modified prior to a full trial in order to make it more acceptable to participants and understanding the perceived value, benefits and harm or unintended consequences of the intervention so that these are fully measured in the full trial. In order to carry out the process evaluation, a mixed methods approach employing qualitative and quantitative approaches will be used.

Qualitative approach

At the end of intervention all the participants will be given a short questionnaire to complete about their experience and satisfaction in participating in the study and to provide feedback. Participants will be asked whether they thought the intervention was practical and acceptable, such as whether the length and number of sessions were appropriate. In addition, five dyads from the intervention group and five dyads from the control group will also be invited to participate in a semi-structured interview where more detailed feedback will be obtained in relation to the acceptability of the intervention. We will enquire about what

aspects of the intervention worked well or could be further improved and whether there were any positive or negative effects of the intervention on the individual with dementia. Participants will also be asked about their experience of the study processes (e.g. randomisation) and assessments. The interviews will be audio-taped and transcribed verbatim. Transcripts will be analysed using thematic analysis supported by computer software (NVivo 9). The analytic strategy will identify themes relating to the barriers and facilitators that will enable the successful implementation of the intervention.

Quantitative approach

Carer diaries will be examined to identify the number of sessions that were completed by each dyad and reasons for non-completion. We will calculate the proportion of dyads who were able to complete all the sessions, those who were able to complete 50% and those who did not complete any. We will examine the feedback for each activity to identify which themes and activities were likely to be completed or missed. The extent of participation of the individuals in the sessions will also be examined (e.g. was there full or partial participation?). The quality of the delivery of the iCST intervention will also be assessed by rating the 40 audiotaped sessions on the extent to which the manual was followed.

One of the major challenges will be changes in paid carers or periods where no carer may be available due to illness or annual leave during the course of the intervention. We will examine the frequency of changes in carers and the number of sessions missed due to unavailability of carers. We will examine whether there are differences in adherence rates between paid and family carers.

Incentives

In both arms of the study the carers and participants with dementia will receive a £10 gift voucher for completing each follow up assessment (at 11 weeks and 21 weeks; £20 in total). Carers in the intervention arm will receive an additional £10 gift voucher for competing each audio-taped session (£20 total). The participants who take part in the post intervention interviews will also receive a £10 gift voucher each.

Patient and Public Involvement

Patients and the public were not involved in the design of the study and will not be involved in the conduct of the study. The findings of the study will be disseminated to the study participants in the form or an accessible newsletter.

Statistical analysis

The study sample will be analysed using descriptive statistics. Data on recruitment will be recorded and examined. This will include information on how many participants were approached and agreed to be screened; how many met the eligibility criteria and agreed to take part and how many completed the study, or dropped out. This information will be presented in a Consort diagram describing the flow of participants through the study (see figure 1)

The baseline clinical and demographic characteristics of participants in both arms of the study will be compared descriptively. Descriptive statistics (mean and standard deviation), and the proportion of participants who competed the measures, will be reported for each outcome at baseline, 11 weeks and 21 weeks, which will provide data on determining the most appropriate outcome for a future trial.

A linear regression model adjusting for baseline scores will be used to estimate the effect of iCST on each of the outcome variables. The results will be presented as estimates with 95% Confidence intervals. The analysis will be based on Intention to Treat and will be exploratory due to the small sample size. Based on this analysis, an appropriate primary outcome will be identified and will be used to estimate the sample size for a future RCT.

Criteria for progression to a full trial

We will consider a full trial if the following criteria are met:

1. If we are able to achieve at least 70% of our recruitment target of 40 (28 dyads or more).

2. If 75% of the dyads in the intervention arm complete at least half the number of sessions (20 sessions out of 40). If less than 50% of the dyads complete half the sessions, the intervention is likely to be ineffective (16)

3. The drop- out rate of dyads in the entire study is less than 30%

4. The intervention and trial procedures are considered to be acceptable by study participants.

If the study fails to recruit our minimum target, or the drop-out rate is higher than expected, or the adherence rate is lower than expected, we will consider whether measures can be implemented in order to improve these outcomes and this will inform our decision to progress to a full trial.

ETHICS AND DISSEMINATION

Ethical Approval, research governance and trial sponsorship

Ethics approval was obtained from the Harrow Research Ethics Committee on 20/03/2017 (reference: 17/LO/0030), for the modification phase of the intervention as well as the trial. Health Research Authority approval was also obtained on 11/05/2017. The trial has been registered and its International Standard Randomised Controlled Trial Number (ISRCTN) is ISRCTN18312288. The study is being sponsored by University College London. Any amendments to the trial protocol, participant information sheets, consent forms, GP letter and any submitted supporting documents will not be implemented prior to receipt of the required approvals. Paper-based data that is collected will be stored securely in locked filing cabinets in locked offices at UCL. Participants will be given participant identification numbers and participant identifiable data will be anonymised and password protected.The results of the study will be published in peer reviewed journals and presented at conferences.

Study time line

The trial is anticipated to start recruitment in February 2018. There will be nine months of recruitment, ending in October 2018. All the follow up assessments will be completed by the end of March 2019. There will be three further months to complete the process evaluation and to analyse the results and write up the study findings.

DISCUSSION

Dementia is more common in people with ID but the evidence base for interventions in dementia in people with ID is very limited. Individual CST may be particularly useful in people with ID due to the person-centred nature of the intervention, making it easier to tailor activities based on the individual's preference, and the availability of paid carers who may be able to deliver the intervention as part of their caring role. To our knowledge, this is the first feasibility study of individual CST in people with ID and dementia. The study will provide information about whether this treatment is feasible and acceptable for people with ID.

A key challenge that may arise from the study is adherence to the intervention (18). By reducing the number of sessions to be delivered by the carer from the 70 to 40, we hope to minimise the burden on carers delivering the intervention. Previous studies on iCST have been carried out using only family carers, whereas we intend to include paid carers. This

may have an advantage in that paid carers are more likely to have dedicated time that they can use to carry out the iCST sessions (e.g. as part of a key work session) and they may value the structured nature of the intervention and appreciate the therapeutic value of the intervention in enhancing communication and interaction with the individual. However, not all individuals will have access to one to one support from a paid carer, even if they live in a care home, and paid carers may also experience stress as a consequence of caring for someone with dementia(30). Other challenges include the frequent changes and turn-over of staff, which could affect the delivery of the intervention and the value of having carer outcome measures.

If the study meets the pre-specified progression criteria, we will apply for funding to conduct a full scale RCT in order to examine the effectiveness of iCST compared to treatment as usual. This study could lead to changes in health policy including improved access to CST for people with ID and dementia.

Acknowledgements

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Declaration of interests

The authors have no competing interests

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Author Contributions

AA is the Chief Investigator of the study and is responsible for ensuring that the study follows the agreed protocol. AA, AH, EA and AS were involved in the conceptualization of the study and are part of the trial management group. EB is a Research Assistant who has been involved in the development of the manual, and will be carrying out the baseline and outcome assessments. All the authors were involved in writing and reviewing the contents of the paper. AA will have access to the final data set.

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Tables

Table 1: Themes/ activities within the manual

Session Number	Themes/activities	Session Number	Themes/ activities
1	My Life	**21**	Associated words
2	Food 1	**22**	Orientation 1
3	Current Affairs	**23**	Thinking Cards
4	Number Games 1	**24**	Household Objects 1
5	Art Discussion 1	**25**	Categorising objects 1
6	Cross words	**26**	Number Games 3
7	Physical Games	**27**	Sounds 2
8	Childhood Toys	**28**	Jobs
9	Word Games 1	**29**	Scenes 2
10	Sound Games 1	**30**	Food 2
11	Using Money	**31**	Art Discussion 3
12	Travel	**32**	Household Objects 2
13	Being Creative	**33**	Physical Games 2
14	Quiz Games 1	**34**	Orientation 2
15	Clothes	**35**	Signs and Symbols
16	Word Games 2	**36**	Word Games 3
17	Scenes 1	**37**	Memories of the past
18	Number Games 2	**38**	Animals
19	Brands and products	**39**	Categorising objects 2
20	Art Discussion 2	**40**	Quiz Games 2

Table 2: Schedule of Assessments

	Screening (pre-treatment assessment)	Intervention phase				Final visit	Optional
Visit No:	1	2	3	4	5	6	7
Week number:		Week 1	Week 5	Week 11	Week 15	Week 20	
Window of flexibility for timing of visits:			e.g.+/- 7 days	E.g..+/- 7 days		e.g.+/- 7 days	
Informed Consent	X						
Medical History	X						
Eligibility confirmation (ICD-10 criteria)	X						
CAMCOG-DS	X			X		X	
Memory for Objects Test	X			X		X	
CSDS	X			X		X	
ADCS-ADL	X			X		X	
QOL-AD	X			X		X	
Care Giver Durden Scale	X			X		X	
HADS	X			X		X	
SCIDS Scale	X						
Training for carers		X					
Treatment adherence/monitoring visit			X		X		
Trial evaluation questionnaire						X	
Semi-structured interview							X
Randomisation	X						
Adverse Events review	X	X		X		X	
Concomitant Medication review	X	X		X		X	

CAMCOG-DS: The Cambridge Cognitive Examination for older Adults with Down Syndrome; CSDS: Cognitive Scale for Down Syndrome; ADCS-ADL: Alzheimer's Dementia Cooperative study - Activities of Daily Living Inventory; QOL-AD: Quality of life - Alzheimer's Disease Scale; HADS: Hospital Anxiety and Depression Scale; SCIDS: Sense of Competence in Dementia Care Staff Scale

Figure 1: Trial Flow Chart

Legend: This figure illustrates the flow of participants through the study from referral through to analysis of data. The number of participants who are referred and are eligible will be recorded as will the number of people who are eligible and agree to be randomised. Reasons for participant withdrawal/ drop out will be recorded.

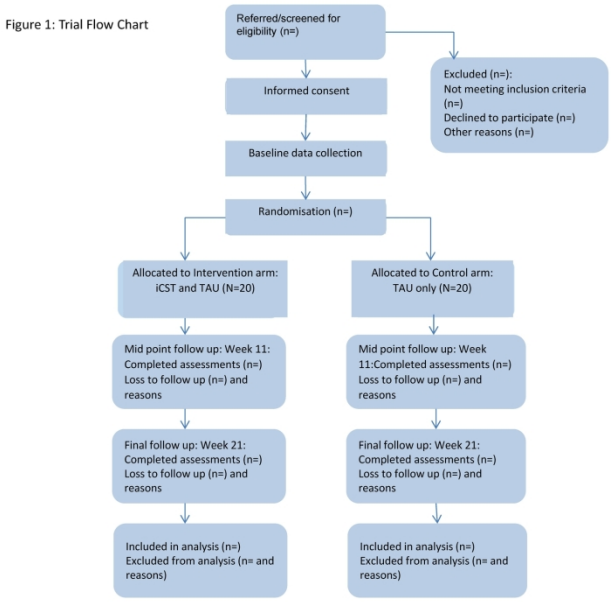

Figure 1: Trial flow Chart.This figure illustrates the flow of participants through the study from referral through to analysis of data. The number of participants who are referred and are eligible will be recorded as will the number of people who are eligible and agree to be randomised. Reasons for participant withdrawal/ drop out will be recorded.

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SPIRIT 2013 Checklist: Recommended items to address in a clinical trial protocol and related documents*

Section/item	Item No	Description	Addressed on page number
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	1
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	2
	2b	All items from the World Health Organization Trial Registration Data Set	
Protocol version	3	Date and version identifier	N/A
Funding	4	Sources and types of financial, material, and other support	16
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	1, 16
	5b	Name and contact information for the trial sponsor	14
	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities	_____
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee)	N/A

Introduction			
Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention	4, 5, 6
	6b	Explanation for choice of comparators	7
Objectives	7	Specific objectives or hypotheses	7
Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory)	7
Methods: Participants, interventions, and outcomes			
Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained	9
Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists)	8
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	10
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease)	10
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	10
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	11
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended	11-13
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure)	Table 2

Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations	7
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	9
Methods: Assignment of interventions (for controlled trials)			
Allocation:			
Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions	9
Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned	9
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	9
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	9
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	N/A
Methods: Data collection, management, and analysis			
Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol	_____
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols	10

Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol	_____
Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol	15
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	N/A
	20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation)	N/A
Methods: Monitoring			
Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed	N/A
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial	N/A
Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct	13
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	N/A
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	16
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators)	16

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	9
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	N/A
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial	16
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	17
Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators	17
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation	N/A
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions	16
	31b	Authorship eligibility guidelines and any intended use of professional writers	N/A
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	N/A
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	included
Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable	N/A

*It is strongly recommended that this checklist be read in conjunction with the SPIRIT 2013 Explanation & Elaboration for important clarification on the items. Amendments to the protocol should be tracked and dated. The SPIRIT checklist is copyrighted by the SPIRIT Group under the Creative Commons "Attribution-NonCommercial-NoDerivs 3.0 Unported" license.