A group memory rehabilitation programme for people with traumatic brain injuries: the ReMemBrIn RCT

Roshan das Nair,[1,2,3]* Lucy E Bradshaw,[4] Hannah Carpenter,[5] Sara Clarke,[5] Florence Day,[4] Avril Drummond,[6] Deborah Fitzsimmons,[7] Shaun Harris,[7] Alan A Montgomery,[4] Gavin Newby,[8] Catherine Sackley[9] and Nadina B Lincoln[5] on behalf of the ReMemBrIn Trial Collaborative Group

[1]Division of Psychiatry and Applied Psychology, University of Nottingham, Nottingham, UK
[2]Institute of Mental Health, Nottingham, UK
[3]Department of Clinical Psychology and Neuropsychology, Nottingham University Hospitals NHS Trust, Nottingham, UK
[4]Nottingham Clinical Trials Unit, University of Nottingham, Nottingham, UK
[5]Division of Rehabilitation and Ageing, University of Nottingham, Nottingham, UK
[6]School of Health Sciences, University of Nottingham, Nottingham, UK
[7]Swansea Centre for Health Economics, Swansea University, Swansea, UK
[8]Newby Psychological Services Ltd, Northwich, UK
[9]Division of Health and Social Care, King's College London, London, UK

*Corresponding author roshan.dasnair@nottingham.ac.uk

Declared competing interests of authors: Alan A Montgomery reports membership of the National Institute for Health Research (NIHR) Health Technology Assessment Clinical Evaluation and Trials Board. Catherine Sackley and Roshan das Nair report membership of the NIHR Health Services and Delivery Research Board.

Published April 2019
DOI: 10.3310/hta23160

Scientific summary

Group memory rehabilitation for traumatic brain injury: ReMemBrIn RCT

Health Technology Assessment 2019; Vol. 23: No. 16
DOI: 10.3310/hta23160

NIHR Journals Library www.journalslibrary.nihr.ac.uk

Scientific summary

Background

Traumatic brain injury (TBI) is a major cause of mortality and morbidity. The most common cause of TBI is road traffic accidents, which tend to produce diffuse injuries. Impairments of memory are commonly reported by people with TBIs. They are persistent, debilitating and reduce quality of life. Many people with memory impairment do not routinely receive memory rehabilitation after discharge from hospital, yet they continue to have problems in daily life. Cognitive rehabilitation is a structured set of therapeutic activities designed to retrain an individual's memory and other cognitive functions. A narrative review found cognitive rehabilitation to be beneficial for treating cognitive deficits following brain damage. Some randomised controlled trials (RCTs) have demonstrated the effectiveness of cognitive rehabilitation following TBI, focusing mainly on attention, executive functions and visual neglect; however, memory rehabilitation has not been sufficiently researched. Most evidence for the effectiveness of memory rehabilitation comes from single case experimental design studies and controlled clinical trials. The few RCTs and quasi-RCTs in this area have offered some support for the effectiveness of memory rehabilitation, but many trials have had methodological limitations.

We conducted a small-scale RCT (REMIND; $n = 72$) to evaluate a group memory rehabilitation programme. Patients with memory problems were randomly allocated to one of three group treatment programmes: compensation strategy training, restitution or a self-help attention placebo control. The results showed that there were no statistically significant differences in outcome between the groups. However, the qualitatively analysed participant feedback interviews indicated that the interventions seemed worthy of further evaluation.

Objectives

The primary objective of the ReMemBrIn trial was to determine whether attending a group memory rehabilitation programme was associated with subjective reports of reduced frequency of forgetting in daily life when compared with a usual-care control. The secondary objectives were to assess whether the intervention was associated with improvements in objectively assessed memory abilities, participants' ability to achieve individually set goals, mood, health-related quality of life and cognitive, emotional and social well-being. The cost-effectiveness of the intervention was also investigated. A qualitative evaluation sought to explore participants' experiences of the trial and the intervention.

Methods

We conducted a multicentre, pragmatic, cluster RCT with follow-up at 6 and 12 months after randomisation. A subset of participants took part in a qualitative study that explored the perceived benefits of the intervention and experiences of being involved in the trial. A health economic evaluation was also conducted.

Participants were recruited from community settings in nine sites in England. We included participants who had sustained a TBI > 3 months prior to recruitment, who had participant-reported or objectively assessed memory problems, who were aged 18–69 years, who were able to travel to one of our sites and attend group sessions and who spoke English and gave informed consent. We excluded those who were considered unable or unsuitable to engage in group treatment if allocated, who were involved in other psychological intervention studies or who had a language impairment.

Once four to six participants had been recruited at a site, all of whom could notionally attend the intervention sessions at the same time, they were randomly allocated as a cluster to memory rehabilitation or usual care on a 1 : 1 ratio. The randomisation was based on a computer-generated pseudo-random code using random permuted blocks of randomly varying size and stratified by study site.

Those allocated to the intervention received 10 weekly sessions of a manualised group memory rehabilitation programme in addition to their usual care. Participants were taught restitution strategies to retrain impaired memory functions and compensation strategies to enable them to cope with their memory problems. Some sessions were video recorded to check the fidelity of the intervention.

Outcomes were assessed 6 and 12 months after randomisation. The primary outcome was the Everyday Memory Questionnaire – patient version (EMQ-p) at the 6-month follow-up. Secondary outcomes included the Rivermead Behavioural Memory Test – third edition (RBMT-3) to objectively assess memory ability, the General Health Questionnaire 30-item version (GHQ-30) to assess mood, the European Brain Injury Questionnaire (EBIQ) to assess cognitive, emotional and social well-being, the Everyday Memory Questionnaire – relative version (EMQ-r) and individual goal attainment, with the Euro-Qol-5 Dimensions, five-level version (EQ-5D-5L) and a service use questionnaire used to inform the economic evaluation.

A sample size of 312 was required to detect a minimum clinically relevant difference in mean scores of 12 points on the EMQ-p with a type 1 error of 0.05 and 90% power assuming a standard deviation (SD) of 21.9 and accounting for 20% loss to follow-up and the potential for clustering as a result of the group intervention.

The main approach to analysis was a modified intention-to-treat approach, that is, analysis according to randomised arm regardless of adherence to allocation and including only participants who provided outcome data at follow-up. We estimated the difference in mean outcome scores between the two arms using a multilevel linear model, with site and baseline score (if measured) as covariates and a random effect for cluster in the memory rehabilitation arm and by allowing the participant-level variance to differ between arms. A planned exploratory subgroup analysis on the primary outcome was performed on the basis of memory impairment at baseline.

We undertook a within-trial analysis consisting of a cost–utility [incremental cost per quality-adjusted life-year (QALY) gain] analysis at 12 months and secondary analysis at 6 months. Incremental cost-effectiveness analyses were also conducted based on the EMQ-p and GHQ-30 at these time horizons. A UK NHS and personal social services perspective was adopted. An exploratory model-based analysis considered longer-term cost-effectiveness at 5 years, with 3.5% discounting applied.

A subset of participants was interviewed from each arm and different participating sites. The purposive selection strategy was designed to include participants with varying levels of memory impairment and with varying social situations. The interviews were conducted by a researcher who was not involved in the participants' assessment or treatment.

Results

In total, 4023 people with TBI were invited to participate between February 2013 and December 2015. Of these, 1710 (43%) did not respond to the invitation, 1129 (28%) were not eligible, 718 (18%) were not enrolled for other reasons and 466 (12%) gave consent. Of those who gave consent, 328 (70%) were randomised. The main reasons participants were not randomised after consent were non-eligibility and recruitment being closed at the site. In total, 171 participants were randomised to the memory rehabilitation arm and 157 to the usual-care arm.

The mean age of participants was 45 years (SD 12 years), 239 (73%) were men and 314 (96%) were white. The median time since TBI was just over 4 years. The mean EMQ-p score at baseline was 48.7 (SD 22.8). Characteristics assessed at baseline were well balanced between the arms.

Attendance at the memory rehabilitation groups was good. Participants attended a mean of 6.3 sessions (SD 3.5 sessions) and 131 (77%) participants attended four or more sessions. At the 6-month follow-up, 260 (79%) participants returned the questionnaire booklet and 276 (84%) completed the assessment visit. Questionnaire booklet return and visit completion were similar in the two arms. At the 12-month follow-up, 238 participants (73%) returned the questionnaire booklet and 256 (78%) completed the assessment visit; completion was again similar in the two arms. In total, 122 (78%) participants in the usual-care arm and 129 (75%) in the memory rehabilitation arm were included in the primary analysis.

There was no clinically important difference on the EMQ-p between the two arms at the 6-month follow-up [adjusted difference in mean scores –2.1, 95% confidence interval (CI) –6.7 to 2.5; $p = 0.37$]. There was no evidence of a difference in the effect of the group memory rehabilitation sessions across subgroups based on baseline RBMT-3 score; the *p*-value for the interaction effect was 0.12. Although the difference in mean EMQ-p score in the subgroup of those with borderline/moderate memory impairment favoured the memory rehabilitation arm (adjusted difference in mean scores –7.1, 95% CI –13.9 to –0.3; $n = 102$), there was no statistical evidence of any overall subgroup effect.

Memory ability on the RBMT-3 favoured the memory rehabilitation arm at 6 months; however, there was no evidence of a difference at the 12-month follow-up (adjusted difference in mean scores: 6 months 2.5, 95% CI 0.1 to 4.8; 12 months 0.5, 95% CI –2.6 to 3.6). There was no evidence of a difference in mood between the arms based on the GHQ-30 at 6 months (adjusted difference in mean scores: –1.6, 95% CI –5.3 to 2.1) or 12 months (adjusted difference in mean scores: –0.2, 95% CI –4.5 to 4.1). Scores from all subscales of the EBIQ for both the participant and the relative/friend versions were similar in the two arms at both 6 and 12 months' follow-up. Goal attainment scores favoured the memory rehabilitation arm at both the 6-month follow-up (adjusted difference in mean scores: short-term goal 0.6, 95% CI 0.3 to 0.9; long-term goal 0.5, 95% CI 0.2 to 0.7) and the 12-month follow-up (adjusted difference in mean scores: short-term goal 0.3, 95% CI 0.0 to 0.5; long-term goal 0.4, 95% CI 0.1 to 0.6). No safety concerns were raised and no deaths were reported.

The cost of the memory rehabilitation programme was estimated at £167 per participant. The base-case analysis (incremental cost per QALY gained at 12 months) showed the intervention to be slightly less effective but less costly than usual care, with a reported incremental cost-effectiveness ratio of £2445. At 6 months, the intervention was slightly less costly and slightly more effective, with numerically small, statistically non-significant differences in costs and QALY gains. The health economic analyses showed uncertainty, with results changing depending on the outcomes, time horizon and imputation method used. Overall, it was unlikely that memory rehabilitation, as provided by the trial, could be considered cost-effective compared with usual care. Exploration of the longer-term cost-effectiveness at 5 and 10 years did not change the conclusions.

Thirty-two participants from both arms of the trial were interviewed. Four main themes were identified: feedback on the trial, experience of the rehabilitation group, strategy use and usual care. Participants were positive about their experiences of taking part in the trial. Those who received the intervention found it helpful, and the format and content of the intervention were appropriate, with specific benefits identified from being part of a group. Participants reported little systematic training in strategy use before the intervention and had developed memory coping strategies themselves. Participants reported that there was a lack of support or specific training for those with memory problems provided as part of their usual care.

Conclusions

Implications for practice

- People who have had a TBI continue to report memory problems following discharge from hospital or rehabilitation services.
- This trial did not show any benefit of this group memory rehabilitation intervention for people with a TBI, late after their injury.
- However, participant feedback based on interviews was positive, with some participants reporting benefits of attending memory rehabilitation.
- Clinicians need to identify what interventions may be useful at this late stage after TBI.

Recommendations for research

- There needs to be more small-scale efficacy studies to establish appropriate selection criteria for group memory rehabilitation programmes so that interventions are tailored to those who may benefit most.
- Further research may also need to consider the required 'dose' of the intervention to effect changes.
- There needs to be more information on the usual care that people with memory problems following TBI receive so that group memory rehabilitation can be evaluated in those who have not already been taught the strategies covered in the group programme.

Trial registration

This trial is registered as ISRCTN65792154.

Funding

Funding for this study was provided by the Health Technology Assessment programme of the National Institute for Health Research.

Health Technology Assessment

HTA/HTA TAR

ISSN 1366-5278 (Print)

ISSN 2046-4924 (Online)

Impact factor: 4.513

Health Technology Assessment is indexed in MEDLINE, CINAHL, EMBASE, The Cochrane Library and the Clarivate Analytics Science Citation Index.

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics (COPE) (www.publicationethics.org/).

Editorial contact: journals.library@nihr.ac.uk

The full HTA archive is freely available to view online at www.journalslibrary.nihr.ac.uk/hta. Print-on-demand copies can be purchased from the report pages of the NIHR Journals Library website: www.journalslibrary.nihr.ac.uk

Criteria for inclusion in the *Health Technology Assessment* journal

Reports are published in *Health Technology Assessment* (HTA) if (1) they have resulted from work for the HTA programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

HTA programme

The HTA programme, part of the National Institute for Health Research (NIHR), was set up in 1993. It produces high-quality research information on the effectiveness, costs and broader impact of health technologies for those who use, manage and provide care in the NHS. 'Health technologies' are broadly defined as all interventions used to promote health, prevent and treat disease, and improve rehabilitation and long-term care.

The journal is indexed in NHS Evidence via its abstracts included in MEDLINE and its Technology Assessment Reports inform National Institute for Health and Care Excellence (NICE) guidance. HTA research is also an important source of evidence for National Screening Committee (NSC) policy decisions.

For more information about the HTA programme please visit the website: http://www.nets.nihr.ac.uk/programmes/hta

This report

The research reported in this issue of the journal was funded by the HTA programme as project number 10/57/24. The contractual start date was in September 2012. The draft report began editorial review in June 2017 and was accepted for publication in December 2017. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HTA editors and publisher have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this report.

Published by the NIHR Journals Library (www.journalslibrary.nihr.ac.uk), produced by Prepress Projects Ltd, Perth, Scotland (www.prepress-projects.co.uk).