Work in Progress:

Single Case Experimental Design – a bridge between Science and Practice?

Abstract Topic: research methodologies for rehabilitation
Abstract Type: 1b Research Work in Progress
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BACKGROUND

Single-Case Experimental Designs (SCEDs) are ideal for reporting behavioural interventions due to their flexibility, but the scientific calibre of such studies is variable (Tate et al. 2008). Standards for conducting and reporting SCED studies have recently improved significantly (Evans et al. 2014). These may be helpful to build quality studies in everyday clinical practice.

AIM

Test the feasibility of delivering publishable neuropsychological rehabilitation in normal clinical practice.

METHOD

This is a Single Case Experimental Design (SCED) embedded within a service development context.
Outer context: A system within Recolo UK Ltd (the clinical organization) to produce publishable clinical work on the basis of Single Case Experimental Designs.
Inner SCED: A child with a brain injury referred to Recolo UK Ltd for neuropsychological rehabilitation will receive intervention delivered by an Associate Psychologist.
The intervention will be delivered within normal litigation funded therapy.

"OUTER" RESEARCH FRAMEWORK: RECOLO SERVICE DEVELOPMENT

Recolo UK Ltd, a provider of community based paediatric neuropsychological rehabilitation for children and young people. Predominantly the work is litigation funded. Recolo provide holistic neuropsychological rehabilitation that supports the young person with brain injury, their family and their wider network.

PARTICIPANTS

Clinician: Associate Psychologists, (Clinical Psychologist, Educational Psychologist)
Researcher: Research Lead Recolo (Clinical Psychologist)
Research consultant: Senior Lecturer, Clinical Neuropsychologist, University of Exeter
Independent raters: Clinical Psychologists with experience of developing and evaluating single-case experimental designs.

ETHICS

Research ethical approval was sought via the Health Research Authority. The project was considered to be research but does not require review by an NHS Research Ethics Committee.

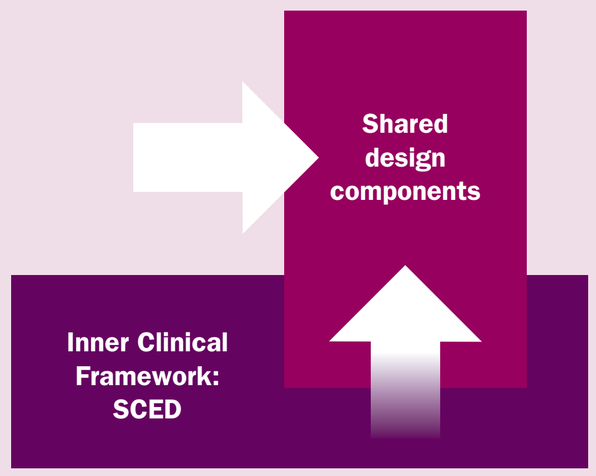
ORGANISATIONAL MEASURES

- Measures of clinical and business team activity – clinical activity of the Associate on the Northwick Park Therapy Dependency Assessment (NPTDA, Turner Stokes et al. 2009); costs and business team activity and costs using Recolo costing spreadsheet.
- Measures of research output – validity of experimental design evaluated using Risk of Bias in N-of-1 Trials (RoBiNT, Tate, Perdices, et al., 2013).

SERVICE DEVELOPMENT PROCEDURE

1. Recruitment: For the initial pilot an Associate is approached.
2. Research report: the researcher writes up the intervention and outcomes for publication. This will be drawn up separately from the clinical context.
3. Research evaluation: this research report and process will be rated by independent raters against the critical appraisal framework for single-case reports (RoBiNT, Tate, Perdices, et al., 2013).
4. Procedural fidelity: The Recolo Associates' handbook will serve as a guide for normal clinical practice. SCRIBE will be used as a report template.

Outer research framework: Recolo service development



Independent raters will evaluate the process using the RoBiNT tool, and report independently to the Research Consultant.

5. Replication: A review between clinical and research teams will provide guidance and learning points for the next round of recruitment to the project.
6. Discussion: Results will be discussed in relation to the research question: "Is it feasible to produce publishable results from normal clinical practice in neuropsychological rehabilitation?" Limitations, affordability and transfer of the process will be considered. Issues including clinical versus research priorities, time and cost of design, assessment, delivery and evaluation will be discussed.

'INNER' CLINICAL FRAMEWORK: SCED

A child with a brain injury referred to Recolo UK Ltd for neuropsychological rehabilitation will receive intervention delivered by an Associate Psychologist.

EXPERIMENTAL DESIGN

Associate and Researcher will design the SCED using Single-Case Reporting Guideline In BEhavioural Interventions (SCRIBE; Tate et al 2016).

The Single-Case Reporting guideline In BEhavioural interventions (SCRIBE; Tate et al. 2016)

Item Number	Topic	Description
METHODS	**DESIGN**	
5	**Design**	Identify the design (e.g., withdrawal/reversal, multiple-baseline, alternating-treatments, changing-criterion, some combination thereof, or adaptive design) and describe the phases and phase sequence (whether determined a priori or data-driven) and, if applicable, criteria for phase change
6	**Procedural changes**	Describe any procedural changes that occurred during the course of the investigation after the start of the study
7	**Replication**	Describe any planned replication
8	**Randomisation**	State whether randomisation was used, and if so, describe the randomisation method and the elements of the study that were randomized

The experimental design will be selected on the basis of the clinical question: (e.g., withdrawal/reversal, multiple-baseline, alternating-treatments, changing-criterion, some combination thereof, or adaptive design) and describe the phases and phase sequence (whether determined a priori or data-driven) and, if applicable, criteria for phase change.
The clinical intervention will be within a goal setting framework, with rehabilitation planning, and clinical delivery via Goal Attainment Scaling GAS (Turner-Stokes 2009).

PARTICIPANTS

The recipient of the intervention may be a child or young person, or parent of the child. Selection will be on clinical need and the ability to identify target behaviours amenable to change. Demographic characteristics relevant to the research question will be noted.

CONSENT

Informed consent or assent will be obtained from the child and family by the Associate. This will be tailored to the participant's developmental stage. A Research Consent Form will be signed by the child, young person and family member. This will be kept securely on Sharepoint and in a locked cabinet. Identifying data will be kept separate from research data and anonymized in dissemination.

MEASURES

Data, Rehabilitation Plans and Monthly Clinical Summary Reports will be uploaded to Recolo Sharepoint in the normal clinical process within Recolo.

The dependent variable will be idiosyncratic to the clinical need. This may be:

- Response specific – some feature of the behaviour in interest is observable by parent, other observer, care worker
- Psychophysiological – physiological measure
- Self-report – client's report of behaviour, perception, thoughts, feelings.

Data may be collected by the child, young person, parent, support worker or other therapist.

If relevant a normative instrument relevant to the dependent variable may be implemented as a pre-post/phase change measure (e.g. Child Behaviour Checklist if the dependent variable is of a behaviour). The instrument's reliability and validity should high or at least moderate.

MATERIALS

Equipment used to measure target behaviour/s and other outcome/s or deliver the interventions may be low or high tech e.g., technological aids, biofeedback, computer programs, intervention manuals or other material resources.

INTERVENTION

Dependent on the need the neuropsychological intervention may be: Cognitive rehabilitation; Behavioural (e.g. Positive Behaviour Supports; Applied Behaviour Analysis); Cognitive behaviour therapy; Social skills training; Behavioural family therapy.

ANALYSIS

All data will be visually analysed and supported by statistical analysis where appropriate. Both the statistical and clinical significance of the outcome data will be presented with any associated effect size.

RESULTS

Process and outcome data including dependent variable (frequency, intensity, duration of target behavior) will be analysed using methods relevant to the data.

Adverse events or deviations from the initial plan will be reported to the research and clinical teams and will be included in the final dissemination.

Results will include evaluation of the outcome of the intervention, process data such as completion of sequences, fidelity to the procedure and adverse events.

DISCUSSION

As per normal clinical practice, the outcome, interpretation and limitations will be reported by the Associate in the clinical goals review. Reflection on the goals will include the use of generalization and replication of the interventions. Limitations, affordability and transfer of the process will be considered Results will be discussed in relation to this question:

"Is it feasible to produce publishable results from normal clinical practice in neuropsychological rehabilitation?"

References:

Tate, R.L., McDonald, S., Perdices, M., Togher L., Schultz, R. & Savage, S. (2008). Rating the methodological quality of single-subject designs and n-of-1 trials: Introducing the Single-Case Experimental Design (SCED) Scale. Neuropsychological Rehabilitation, 18 (4), 385-401.

Evans, J.J., Perdices, M. & Manolov, R. (2014). Single case experimental designs: Introduction to a special issue of Neuropsychological Rehabilitation. Neuropsychological Rehabilitation, 24, (3-4). 305-314.

Turner Stokes, L. (2009). Development and initial validation of the Northwick Park Therapy Dependency Assessment. Clinical Rehabilitation, 23, 922-937.

Tate, R. L., Perdices, M., Rosenkoetter, U., Wakim, D., Godbee, K., Togher, L., & McDonald, S. (2013). Revision of a method quality rating scale for single-case experimental designs and n-of-1 trials: The Risk of Bias in N-of-1 Trials (RoBiNT) Scale. Neuropsychological Reha- bilitation, 23(5), 619–638.

Tate, R., Perdices, M., Rosenkoetter, U., McDonald, S., Togher, L., Shadish, W., ... for the SCRIBE Group (2016). The Single-Case Reporting guideline In BEhavioural interventions (SCRIBE) 2016: Explanation and elaboration. Archives of Scientific Psychology, 4, 10–31.

Turner-Stokes, L., (2009). Goal attainment scaling (GAS) in rehabilitation: a practical guide. Clinical Rehabilitation, 23: 362-370.

Tate, R.L. et al. (2016) The Single-Case Reporting guideline In BEhavioural interventions (SCRIBE) 2016 statement Journal of School Psychology Volume 56, Pages 133–142.