# Central nervous system stimulants for secondary attention deficit-hyperactivity disorder after paediatric traumatic brain injury: a rationale and protocol for single patient (n-of-1) multiple cross-over trials.

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BACKGROUND: It is estimated that 22,800 children were living with an Acquired Brain Injury (ABI) (0.6% of children aged under 15 years) in Australia during 2003. Many children after a traumatic brain injury will experience difficulties with attention and concentration; a condition termed secondary Attention Deficit-Hyperactivity Disorder. There is conflicting evidence on whether treatment with stimulant therapy with medications such as methylphenidate or dexamphetamine will improve the attention and behavior of children with this condition.

METHODS/DESIGN: Single patient trials (n-of-1s or SPTs) evaluate the effect of titrated doses of psychostimulants methylphenidate or dexamphetamine compared to placebo on attention and behavior, in children with TBI and secondary ADHD. The aggregation of multiple SPTs will produce a population estimate of the benefit. Forty-two children will be registered into the trial through rehabilitation services at three large children's hospitals in Australia. Patients will complete up to 3 cycles of treatment. Each cycle is 2 weeks long comprising seven days each of treatment and placebo, with the first two days of each cycle considered a washout period and the data not analysed. The order of treatment and placebo is randomly allocated for each cycle. The Conners' Parent Rating Scales long forms will be employed to measure change in attention-deficit/hyperactivity and related problems of the child, and the primary outcome measure is the Conners' Global Index Parent Version. Secondary outcomes include the teacher and child (if aged > 12 years) Conners' Rating Scales, the Behaviour Rating Inventory of Executive Function among other measures. This study will provide high-level evidence using a novel methodological approach to inform clinicians about the most appropriate treatment for individual children. Through aggregation of individual trials, a population estimate of treatment effect will be provided to guide clinical practice in the treatment of children with secondary ADHD after a traumatic brain injury.

DISCUSSION: This study employs an innovative methodological approach on the effectiveness of CNS stimulants for secondary ADHD from a brain injury. The findings will both guide clinicians on treatment recommendations, and inform the concept and acceptance of SPTs in paediatric research.

Trial registration: Australian New Zealand Clinical Trials Registry. ACTRN12609000873224(https://www.anzctr.org.au/Trial/Registration/TrialReview.aspx?ACTRN=12609000873224).