Author's response to reviews

Title: The efficacy of SMART Arm training early after stroke for stroke survivors with severe upper limb disability: A protocol for a randomised controlled trial.

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Dear Dr Majithia

On behalf of my colleagues, I would like to submit to BMC Neurology this protocol paper entitled ‘The efficacy of SMART Arm training early after stroke for stroke survivors with severe upper limb disability: A protocol for a randomised clinical trial’.

Recovery of upper limb function after stroke is poor. The acute to subacute phase after stroke is the optimal training time window to promote the recovery of upper limb function. The dose and content of training provided conventionally during this phase is however, unlikely to be adequate to drive functional recovery, especially in the presence of severe motor disability. The protocol submitted is for a study that concerns an approach to address this shortcoming. The SMART Arm, a non-robotic device, will be used to engage stroke survivors with severe upper limb disability in intensive and repetitive practice of reaching. This will be the first prospective trial to compare the effect of dose-matched volumes of SMART Arm training, with or without electrical stimulation, and usual therapy versus usual therapy alone during inpatient rehabilitation following stroke. The findings of this study have the potential to improve the opportunity for functional upper limb recovery after stroke by this cohort.

This manuscript has been read and approved by all authors. All authors have contributed to the preparation of the manuscript and International Committee of Medical Journal Editors (ICMJE) criteria for authorship have been met. No person/s other than the authors listed have contributed significantly to its preparation. The contents of this manuscript are our original work and have not been published in whole or part prior to this submission. No other papers related to this study protocol are currently under review elsewhere.

We attest that we have disclosed all financial and other relationships that could be construed as a conflict of interest and that all sources of support for this study have been disclosed and indicated on the manuscript title page. Specifically, this study has been funded by a National Health & Medical Research Council Project Grant (ID: 511241) and KS Hayward was supported by an Australian Postgraduate Award scholarship and a co-funded National Heart Foundation National Stroke Foundation of Australia Biomedical Postgraduate Scholarship PB 09B 4847. We wish to acknowledge that SG Brauer, KS Hayward, RN Barker and RG Carson are currently involved in commercialisation of the SMART Arm device to retrain upper limb function after stroke.

As per journal instructions please find attached a copy of the manuscript, supporting figures, and a copy of ethical and funding approvals. Thank you for taking the time to review this manuscript. We look forward to hearing from you shortly. If any questions should arise regarding this submission or during the review process please contact the corresponding author as per the details above.

Kind regards

Professor Sandra Brauer