Rehabilitation using virtual gaming for Hospital and hOME Based training for the Upper limb post Stroke (RHOMBUS II): a feasibility randomised controlled trial

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Introduction: Stroke survivors can experience persistent upper-limb (UL) weakness. Intense practice and repetition of movement are key to effective UL rehabilitation. Yet, practice falls short of the dosage needed to drive recovery. Technology offers solutions to increase training opportunities. The NeuroBall is a co-designed portable device for all-in-one arm training through a uniquely designed rehabilitation gaming app, displayed on a tablet computer. This study aimed to determine the safety, feasibility and acceptability of the NeuroBall in the subacute inpatient and ESD stroke pathways when practice can be most effective.

Method: Single-site feasibility RCT with non-blinded outcomes at seven weeks. Twenty-four sub-acute stroke with new unilateral weakness were randomised (Intervention n=16; control n=8). Both groups received UL usual care; the intervention group, once trained, used the NeuroBall for seven weeks. Outcomes included arm impairment, arm function, pain, fatigue and self-efficacy for exercising alone, participant satisfaction, device usage and adverse events (AEs) and missing data.

Results: Twenty-four participants were recruited, eighteen completed all stages. Outcome measures were suitable, and there was minimal missing data (less than 10%). Participants undertook an additional 13 hours of UL rehabilitation, completing an average of 15, 133 UL repetitions. The mean satisfaction score (QUEST) was 35/40. Eight AEs were reported, six in the intervention group and two in the control, five were unrelated, one related, one probable and one possibly.

Conclusion: The NeuroBall is safe, enjoyable and easy to use for training the UL in the subacute stroke pathway both as an inpatient and early weeks at home.