

Functional electrical stimulation in upper limb rehabilitation for children with acquired brain injuries: A single case experimental design

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Background

- Children with acquired brain injuries (ABI) may present with upper limb (UL) impairments affecting their ability to participate in daily living activities (Komar et al. 2016).
- Evidence supports use of functional electrical stimulation (FES) to improve UL outcomes in adults following stroke (Farmer et al. 2014), and children with cerebral palsy (Bosques et al. 2016).
- There has been limited research exploring use of FES in children with ABI (Kapadia et al. 2014).

Method

- An 11 year old girl, 7 months post severe right mid cerebral artery infarct undergoing residential rehabilitation.
- She presented with a severe left sided hemiplegia, MACS level V equivalent with gross volitional movement in shoulder, elbow and wrist.
- Ethical approval and informed consent gained.
- Single case experimental design: ABAB design
 - A** (non-intervention) phases: standard rehabilitation.
 - B** (intervention): standard rehabilitation plus 30 minutes of grasp and release FES (stimulation of wrist and finger extensors, and thumb abductors) with task training daily.
- Each phase lasted 4 weeks.
- Twice weekly measures of Melbourne Unilateral Upper Limb Assessment 2 (MA2), Goal Attainment Scale (GAS), and active wrist extension were carried out.
- Visual analysis of level, slope and gradient of data and statistical analysis using two standard deviation band method were completed.



Results

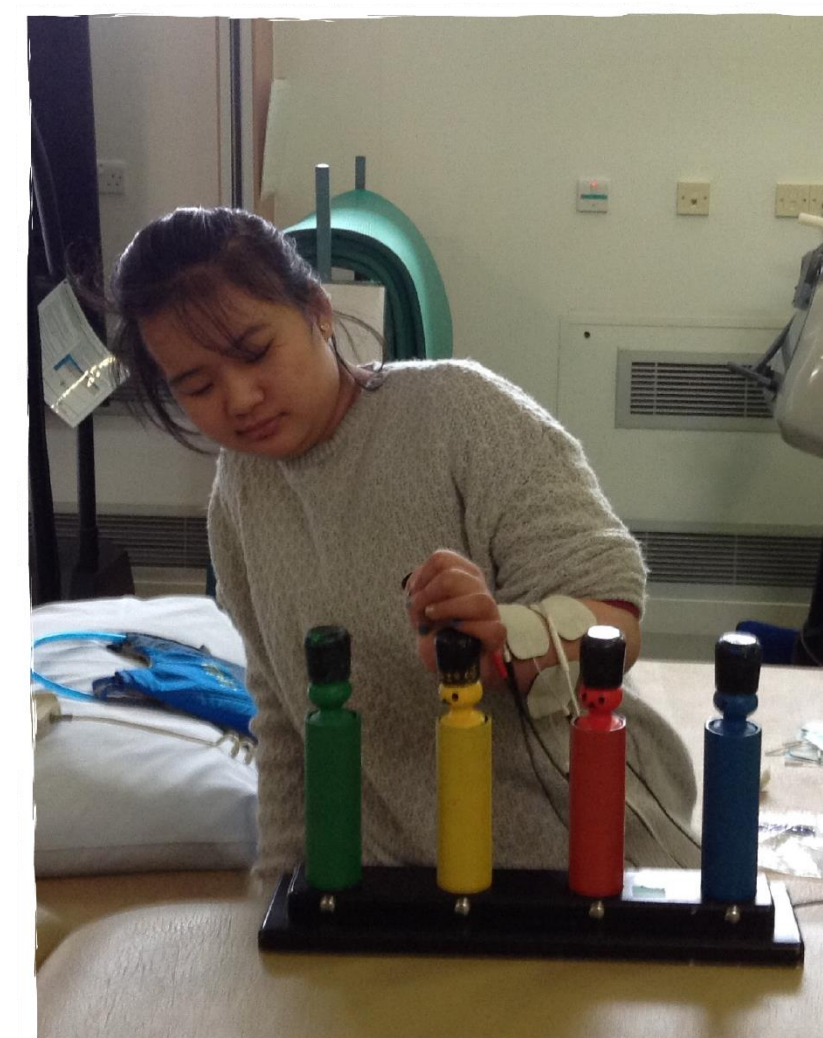
- FES improved gross range and accuracy of movement measured by MA2 and achievement of GAS goals (figure's 1 & 2).
- FES did not change wrist extension, or dexterity and movement fluency scores on MA2.

Conclusion

- FES with task training improved the gross motor activity of a child with a severe hemiplegia following ABI. This is consistent with existing evidence for other neurological conditions.
- It did not change active wrist extension despite the stimulation targeting these muscles.

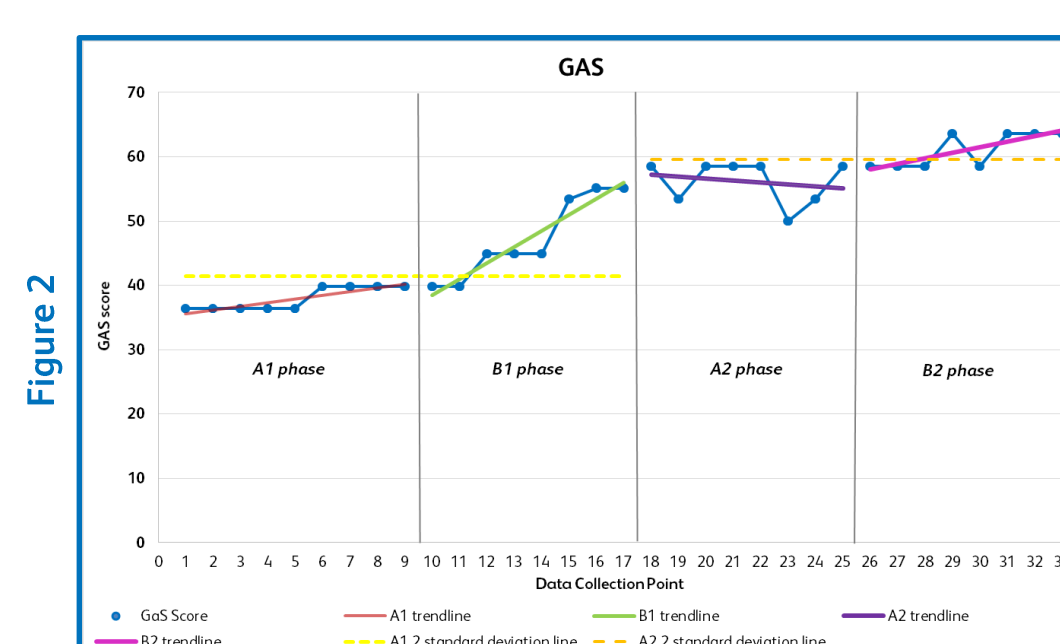
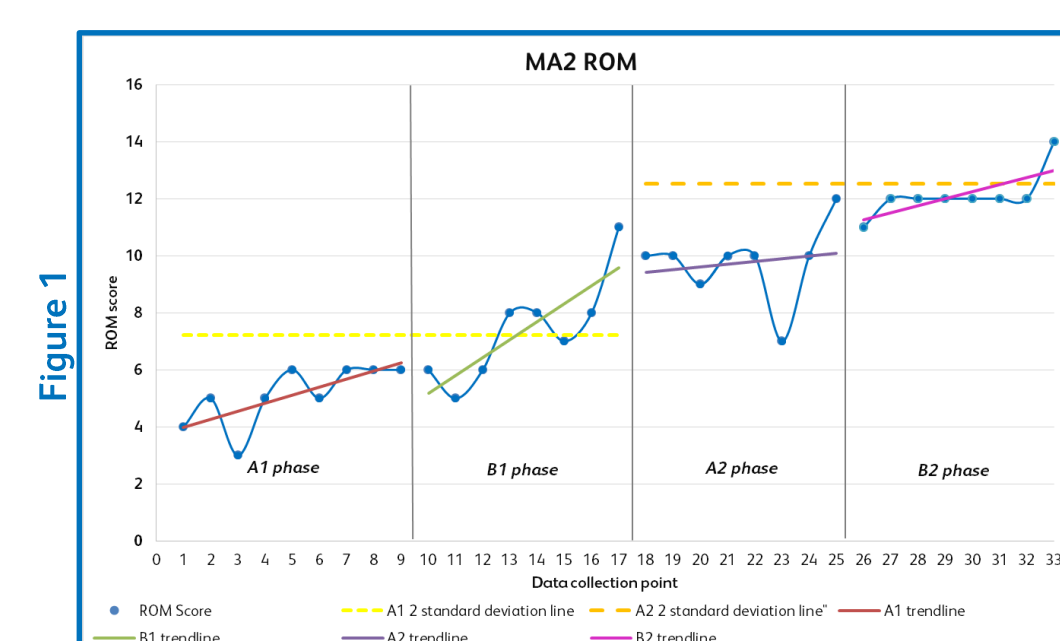
Aim

Investigate the use of UL FES in a child with severe hemiplegia following an ABI.



Impact for Children

FES with task training may be a useful technique to help children with ABI who have severe hemiplegia gain gross movement patterns and improve function.



References

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