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How does the Assisting Hand Assessment relate to relative upper limb movement measured by actigraphy in children with hemiplegia?

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Background
The Assisting Hand Assessment (AHA) is a well-established measure of spontaneous use of the affected hand during bimanual activities in children with hemiplegia. Whilst it measures quality of hand use, it does not quantify use, and it is unclear how AHA scores relate to hand use outside the assessment session. Complementing this approach, actigraphy can quantify movement of each arm over a prolonged period in a real-world setting, using wrist-based accelerometers.

Objective
To determine the relationship between AHA scores and relative upper limb movement as measured by actigraphy in children with hemiplegia.

Methods
Participants were 38 children age 6-15y with hemiplegia. Children undertook the AHA assessment and then wore lightweight tri-axial accelerometers at each wrist continuously for 3 days. AHA scores were converted to logit-based AHA units (range 0-100). Actigraphy data (sampled at 50Hz) were cleaned and signal vector magnitude (SVM) calculated over each 2s epoch. The area under the curve of the S.D. of the SVM (to avoid artefactual mean differences from altered orientation in the hemiplegic arm) was measured. The ratio of this activity on the unaffected vs. affected side ("AHAR") was calculated, and the relationship between "AHAR" and AHA scores determined using Pearson's correlation coefficient.

Results
Mean AHA score was 61.4 (S.D. 17.0). The mean "AHAR" score was 0.761 (S.D. 0.135).
A positive correlation was observed between AHA and "AHAR" scores (Pearson's correlation coefficient 0.474, $p=0.003$).

Conclusions
Accelerometry provides an objective way of monitoring upper limb motor activity in everyday life. Whilst accelerometry and AHA scores provide complementary information, a positive correlation was observed between AHA scores during a brief formal assessment and relative upper limb activity measured over a 3 day period in a real world setting. Further studies should examine the relationship between accelerometry and other conventional upper limb function assessments.

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