Functionality Variables and Accelerometry Energy Expenditure Estimate Improvement in Individuals with Locomotor Dysfunction

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Functionality Variables and Accelerometry Energy Expenditure
Estimate Improvement in Individuals with Locomotor Dysfunction

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ABSTRACT

The act of walking is a complex series of actions involving a number of different body systems and is considered a critical contributor to quality of life. One’s gait, the manner of walking, can therefore be used by healthcare providers to evaluate patient health, functionality, and prognosis.

Accelerometers serve as both a valid and reliable instrument to measure activity level in able-bodied persons over extended periods of time. Currently, the Actical® (Mini Mitter, Bend, OR, USA) accelerometer is the most popular, including gender, weight, and height data in its calculation. These variables consist of locomotor dysfunction, however, current algorithms do not suffice for accurate estimates as they underpredict actual energy expenditure. Thus, there is a need for a variable(s) to take into account the magnitude of gait impairment and produce a revised equation to accurately estimate energy expenditure.

BACKGROUND

- Accelerometers calculate individual EE by taking into consideration several variables: -age, sex, weight, and height
- *Current Actical algorithms underpredict EE estimates in individuals with abnormal gait-
- an enhanced equation is required to expand Actical® use to this population

BACKGROUND II

- *4 key considerations for implementing a clinical test or measure:
  - safety, cost effectiveness, ease in administering, ease in grading/interpreting results
- Enhancing EE estimates and VO2 actual EE could then be compared from the 6MWT
- *10 trials- preferred- a quick but safe speed

RESULTS

- *Regression equations A through E produced significantly similar predictions of AEE (r²=0.525) and used all variables except 10mW (Table 6) -Equation A had the highest R² (r=0.525) and used all variables except 10mWp -Equation B had the lowest R² (r=0.507) using 6 variables -Equation D seen as the most appealing
- *Used 7 variables
- Did not sacrifice much in terms of R² value (0.516) in comparison to Equation A (0.525)
- *Model data centered around the mean more tightly than the AEE data
- *Very good correlation

CONCLUSIONS

- *Actical® accelerometers underpredict energy expenditure estimates when used by individuals with locomotor dysfunction (abnormal gait)
- *Regression equations with variables of the 5 functional tests (30CS, 4SB, TUG, 10mW, and 6MWT) — as well as with the conventional age, sex, weight, and height — provide improved energy expenditure estimates for gait impaired individuals in comparison to Actical® estimates —these standard and simple tests are fitting variables to be incorporated into Actical® calculations for those with abnormal gait
- *Future studies with much larger sample sizes would be desired to improve R² values