Measuring physical activity levels and intensity using an ActivPal™ accelerometer, a cardiac holter monitor and a behavioural map in a stroke population.

A phase 1 validation study - Work in progress

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1- Background

- Early onset of physical activity post stroke will prevent neurovascular disease and improve outcomes, however research shows that stroke patients spend their time in hospital inactive and alone (Bernhardt et al 2004, Saunders et al 2013).
- Quantitative data about physical activity intensity has not yet been collected.
- It is important to collect information about the amount, type and intensity of physical activity of acute stroke patients, to develop, implement and evaluate a physical activity intervention. In order to collect this information we must use a set of validated tools.

2- Aims

To validate in a stroke population:
- The ActivPal™ Accelerometer against video.
- A behavioural map against video.
- A behavioural map physical activity intensity categories against cardiovascular responses using the Lifecard CF holter.

3- Method

Design: Observational study.
Setting: Hospital simulation lab at Glasgow Caledonian University (Figure 1).
Participants: 22 stroke participants recruited from stroke support groups.

Data collection: Data was collected using the unique and comprehensive tool kit that has been developed (Figure 2). Testing was conducted in 3 stages as follows:
- **Stage 1**: Participants carried out a 10 meter walk test while wearing an ActivPal™ accelerometer aiming to validate the step count.
- **Stage 2**: Participants carried out a sit to stand test while wearing an ActivPal™ accelerometer aiming to validate transitions.
- **Stage 3**: Participants took part in a behavioural simulation. This stage re-creates movements that are probable within an acute stroke ward.

4- Preliminary results

1. To date 13 participants have been tested and preliminary analysis has been undertaken on the ActivPal™ and heart rate data.
2. **Step count (Figure 3)**
   - Preliminary data suggest that differences in step count were small.
   - **Step count (Figure 3)** shows that in most participants the ActivPal™ underestimates the number of transitions.
   - However if the raw data (Fig. 5) is analysed, preliminary analysis suggests the ActivPal™ is 100% accurate in recording transitions. The underestimated is likely due to a software algorithm based on default settings used in the analysis.

3. **Transitions (Figure 4 & 5)**
   - Preliminary data suggest that differences in step count were small.
   - Preliminary analysis of the transitions recorded by the ActivPal™ (Fig. 4) shows that in most participants the ActivPal™ underestimates the number of transitions.
   - However if the raw data (Fig. 5) is analysed, preliminary analysis suggests the ActivPal™ is 100% accurate in recording transitions. The underestimated is likely due to a software algorithm based on default settings used in the analysis.

4. **Intensity (Figure 6)**
   - Heart rate analysis (Figure 6) examines cardiac responses to different activity levels. Initial results suggest that standing up increases heart rate to recommended levels (50% of HR max) in some participants.

5- What’s next?

Once these tools have been validated, they will be used to measure the amount, types, and intensity of physical activity within an acute stroke ward, and develop an intervention to increase this.