

Motivating Mobility - Clinical Evaluation of Two Case Studies developing new technologies to motivate rehabilitation post-stroke

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Introduction

A multi-disciplinary project aimed at co-designing rehabilitation technologies to motivate patients to self-manage an upper limb rehabilitation programme. (Baalam et al, 2010) Interactive computer based systems were developed by physiotherapists, human-computer interaction experts and engineering specialists. (Baalam et al, 2011) Two prototypes were deployed and results are presented here.

Purpose and relevance

Long term rehabilitation is not viable on the National Health Service. Technology is becoming increasingly important to enable more optimal recovery of patients. Self management through community based treatments is encouraged in several government proposals. Motivation and participation of these patients over a long period requires that systems are developed that respond to their own motivations.

Methods

The Medical Research Council framework for research into complex interventions encourages utilisation of in-depth case studies to test theoretical assumptions.

Prior to the reported deployment participants underwent design sessions and profiling to establish individual motivations.

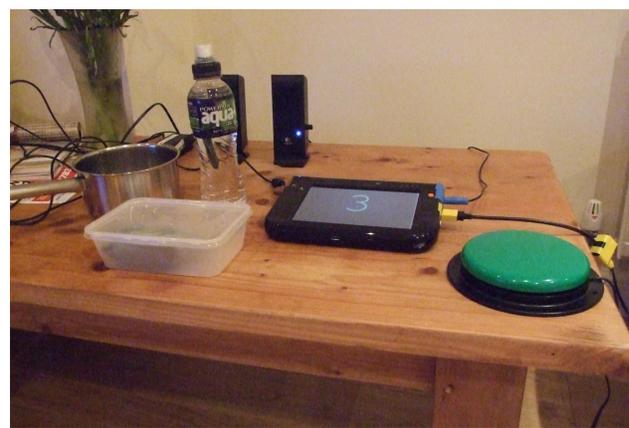
The designed computer systems were then deployed for an initial period of four weeks.

Participants

Two female stroke survivors presenting with sub-optimal recovery of the upper limb deficits were identified from a local stroke support group. Neither participant was completing upper limb exercise regularly.

System One

An exercise system to 'coach' participant through exercises using day-to-day items.



System Two

A reading system - to scroll through the text exercises with the hand must be completed.



Results

Figure One - Table demonstrating Fugl-Meyer scores

Subject	Pre deployment	Post deployment
Case study one- total motor function/upper limb score	40/66	56/66
Case study two - total motor function/upper limb score	32/66	47/66

Figure Two - TELER changes - case study one

Indicator	Pre deployment	Post deployment
Changes for release an object placed in left hand	0	4*
Changes for pincer grasp	0	2
Changes for grip	1	3
Changes for reach and grasp	1	4

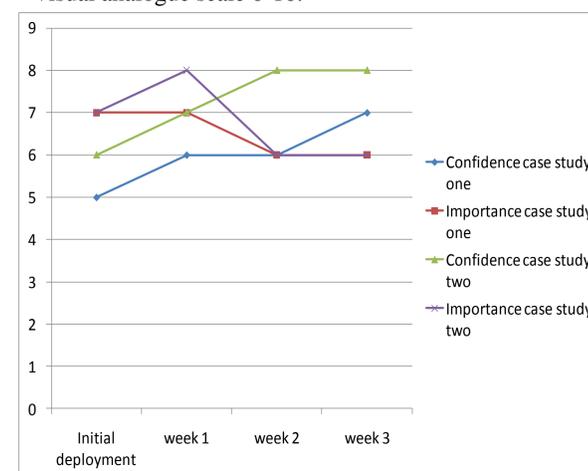
* indicates statistical significance at 95% confidence intervals

Figure Three - TELER changes - case study two

Indicator	Pre deployment	Post deployment
Changes for open all bottles and jars	1	4
Changes for pain free shoulder	2	5*
Changes for activities	2	5*
Changes for activities of daily living	0	4*
Changes for turning taps on and off	2	4

* indicates statistical significance at 95% confidence intervals

Figure Four - Confidence and Importance Ruler Scores - Visual analogue scale 0-10.



Psychosocial Impact of Devices tool was used and demonstrated scores over 2 (out of 3) for competence, adaptability and self esteem suggesting that the subjects had benefitted from use of the device.

Discussion & Conclusions

User centred methodology was used in development of two customised computer systems to motivate rehabilitation. The case studies demonstrated:

- Importance of customising computer based rehabilitation technologies
- An increase in number of exercise repetitions and a change in upper limb function for both participants
- Users reported positive experiences and impact over a short period of time

Whilst these changes cannot be solely attributed to the system use it does indicate potential value of such systems for self management of rehabilitation programmes.

Recommendations

The study suggests the value in identifying individual motivations and matching technology to them to ensure optimal results. The potential use of individualised technology to motivate ongoing exercise is suggested.

References

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