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#### User centered design and rehabilitation robotics: Have we done enough?

**Statement of the Problem:** Neurological disorders, including stroke and cerebral palsy are a large burden on society and negatively affect the individual. In the United Kingdom 150,000 people every year are affected by stroke, whilst cerebral palsy is the commonest form of severe physical disability in children affecting 2.08/1000 of live births. Neurological disorders often cause upper limb difficulties, which limit activity. The goal of rehabilitation is to improve the patients' independence in activities of daily life and therefore quality of life. The paradigm of rehabilitation-robotic therapy for the upper limb involves a patient utilizing a robotic manipulandum and playing motivating games on a computer, which enables a greater intensity of useful therapeutic practice. Maciejasz et al (2014) identified over 120 systems for the rehabilitation of upper limb function after neurological impairment. What is not clear from the literature is has this technology been developed through user, in this case therapist and patient, involvement? Furthermore, what are the design requirements for a rehabilitation robot? It is widely acknowledged that the engagement of users in healthcare technology design leads to an increased likelihood of producing devices that are safe, usable and clinically effective.

**Methodology & Theoretical Orientation:** We have undertaken a scoping review of the literature to identify the level of user engagement in the development of rehabilitation robotic devices for improving upper limb function in the neurologically impaired. We have identified several key themes.

**Findings:** We have identified fewer than 20 papers, which describe the design requirements of patients or therapists in relation to upper limb rehabilitation robotics. Analysis of the literature leads to the grouping of these requirements into safety and usability, recording of performance, movements and tasks promoted and individualized therapy.

**Conclusion & Significance:** There are a limited number of papers describing the design requirements for upper limb rehabilitation robotics. It may be that systems for upper limb rehabilitation are based on user requirements but this has not been communicated effectively. In order to ensure upper limb rehabilitation robotic systems are optimal more research should be conducted in this area.

#### References

1.Preston N, Weightman A, Gallagher J, Holt R, Clarke M, Mon-Williams M, Levesley M, Bhakta B (2014) Feasibility of school based computer-assisted robotic gaming technology for upper limb rehabilitation of children with Cerebral Palsy. *Disability and Rehabilitation: Assistive Technology*, 11(4): 281-288.

#### Biography

Andrew Weightman has expertise in the development of medical mechatronic and robotic systems with a strong emphasis on the use of user centered design techniques. The quality of his research has been recognized by the National Institute of Clinical Excellence. He has previously received a best paper award by **Nortest** Engineering Design 2010 and an Editor's choice of the issue award from *The Journal of Rehabilitation Medicine*.

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