NIHR | Trauma Management MedTech Co-operative

0007

CASE STUDY

REX:

ROBOT ASSISTED PHYSIOTHERAPY FOR REHABILITATION, EXERCISE, AND WALKING

REX BIONICS

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PROJECT SUMMARY

The NIHR Trauma Management MedTech Co-operative (NIHR Trauma MIC) is collaborating with Rex Bionics on the development of an exoskeleton to aid early mobility in critical care patients.

CLINICAL NEED

The National Institute of Clinical Excellence (NICE) clinical guideline *"Rehabilitation after critical illness in adults"* emphasises the importance of starting rehabilitation as early as clinically possible for patients who are critically ill.[1] Despite this, physiotherapy provision within Europe and the UK remains varied and inconsistent and is identified as a priority through the James Lind Alliance Priority Setting Partnerships (PSPs).

Survivors of prolonged critical illness can experience significant physical, cognitive and mental health impairments, a process recently termed "post-intensive care syndrome". At least half of patients discharged are unable to return to pre-morbid levels of activity due primarily to weakness and lack of endurance. These effects can last months to years after hospital discharge, with a negative impact on employment and income in ICU survivors and their care-givers.

The weakness experienced by survivors of critical illness is thought to be multifactorial which includes premorbid conditions, ICU acquired weakness and prolonged bed rest. Muscle mass has been shown to decrease at a rate of between 2 -4% per day during the first 2 to 3 weeks of ICU admission and has been reported to be as much as 6% per day. Muscle atrophy is also positively correlated with prolonged weaning from mechanical ventilation, longer ICU and hospital stays, and increased mortality levels.

THE SOLUTION

REX is a hands-free robotic exoskeleton designed to help aid rehabilitation for people with mobility impairments. With assistance from clinicians, the device can lift patients from a sitting position into a supported standing position, facilitate walking and perform a menu of basic exercise moves known as 'Rexercise'.

The device provides patients, with varying degrees of impaired mobility, with the opportunity to stand and move around, helping to reduce the risk of developing numerous health complications associated with prolonged periods of sitting.

HOW WE SUPPORTED

- Aided a usability study at Moseley Hall Hospital, comprised of healthy volunteers (physiotherapists and occupational therapists working within the hospital) to explore how REX can support the rehabilitation of stroke patients.
- Supported with a service evaluation of the device within a rehabilitation hospital.
- Conducted post-study analysis and interviews.
- Applied for National Research Ethics, National Regulatory Body Approvals and R&D approvals.

One of the endpoints of the study is to assess the comfort and ease of use of the device. Volunteer feedback in the form of adapted questionnaires to capture opinions and criticisms, videos of the usability studies, and one-to-one interviews all helped to identify user needs and drive further development efforts towards a comfortable, practical and usable early mobility aid.

Jeremy Newton, Specialist Neuro Physiotherapist at Moseley Hall Hospital, said:

"REX was designed for patients with spinal injuries and we were asked to help assess the usability of the equipment for rehab patients, in particular people who have had a stroke, but also for people with other conditions that affect their movement.

This evaluation has been a great chance for clinicians and patients to gain an insight into the potential for the use of exoskeletal equipment in rehabilitation and for their opinions to form part of that development work."

OUTCOMES

The service evaluation and usability study, led by Dr Tadvi Jukliflakhan and his team, successfully recruited:

- 5 patients who evaluated the device from a user perspective. 80% of these patients found REX beneficial and the exercises easy to implement.
- 27 staff members who evaluated the device after attending a comprehensive training session. Almost 70% of these participants agreed that Rexercises would be beneficial within a rehabilitation programme

Several abstracts have been shared locally and nationally looking at the results of the service evaluation. Rex Bionics are now working with the West Midlands Academic Health Science Network (WMAHSN) to accelerate adoption into the NHS.

REFERENCES

[1] National Institute for Health and Clinical Excellence (2009) Rehabilitation after critical illness in adults. NICE guideline (CG83)