



PRECISION REHABILITATION

The University of Birmingham is providing a step change in the development and delivery of patient-specific rehabilitation programmes across a spectrum of disorders ranging from rehabilitation of individuals following acute trauma, through to rehabilitation of athletes following injury.

By integrating science and innovation, we are developing and validating new assessment protocols to objectively characterise the presentation of individuals leading to patient-specific targeted interventions.

Researchers at The University of Birmingham are fostering a radical new approach to rehabilitation, which takes into account individual variability in presentation, functional deficits, genetics, environment, work and lifestyle, which is enabling people to maximise their recovery and work potential.

New interventions are being developed that are based on detailed quantitative measures of functional status, performance, pain mechanisms, psychological features and social factors. Precision rehabilitation takes a holistic approach to understanding the biopsychosocial make up of a patient and applying this knowledge to develop a personalised rehabilitation programme.

The University's Centre of Precision Rehabilitation for Spinal Pain (CPR Spine) was established in 2016. The Centre, which brings together current multidisciplinary expertise at the University of Birmingham, is the first Centre dedicated to spinal pain research in the UK.

Within CPR Spine, research is being conducted to identify predictors of chronic long-term pain and disability which will support the development of a prognostic tool. This in turn facilitates the development and implementation of precision rehabilitation approaches that match interventions to projected risk of recovery, with the aim of preventing poor long-term outcomes.

Background

- ❑ Over 8000 people a year require rehabilitation following trauma, costing the UK over £95 million. An increasing number of these people are experiencing polytrauma (multiple complex neuromusculoskeletal injuries) exemplified by road traffic accidents and civilian disasters including the consequences of terrorism.
- ❑ A rise in adverse lifestyle factors such as sedentary behaviour and obesity have led to greater numbers experiencing chronic pain and functional disability
- ❑ Sickness absence related costs to employers and taxpayers in the UK are currently estimated at £22 billion per year
- ❑ Long-term sickness absence often leads to unemployment and is a major predictor for all types of exit from the labour market, including disability pension and early retirement, which are all major financial burdens for the workplace and society

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The Evidence

- ❑ The University has a long established record of pioneering work in the life sciences, combining discovery science with translational imperatives supported by cutting edge enabling technologies
- ❑ Our high impact and innovative research is leading to advanced and accelerated rehabilitation, spanning rehabilitation following acute trauma through to rehabilitation of athletes
- ❑ Our newly established Centre of Precision Rehabilitation for Spinal Pain (CPR Spine) utilises cutting edge technology and multidisciplinary expertise to collectively advance the assessment of patients with spinal pain through the development of new assessment tools, and by establishing valid and reliable clinical testing protocols and evidence informed decision making frameworks, to inform safe and efficacious interventions
- ❑ We have a number of established partnerships including the MRC-ARUK Centre for Musculoskeletal Ageing Research, the NIHR Surgical Reconstruction and Microbiology Research Centre, and the NIHR Trauma Management Healthcare Technology Co-operative
- ❑ We also benefit from successful partnerships with key industrial stakeholders to accelerate the route to impact development and assessment of innovative rehabilitation MedTech Cooperative
- ❑ Our strong links into the Defence and National Rehabilitation Centre (DNRC) push the boundaries of clinical rehabilitation and raise the national profile of the speciality
- ❑ A number of our continuing partnerships support optimising functional recovery in athletes, including the English Institute of Sports and the English Football Association
- ❑ We are ranked 1st for Sport Science in The Sunday Times and The Times Good University Guide 2017 and 1st for Physiotherapy in The Complete University Guide 2018
- ❑ Internationally, we are ranked 5th in the world in the QS World University rankings for sport-related subjects in 2017
- ❑ We boast one of the largest custom-built sport and rehabilitation science facilities in the UK, including laboratories for neurophysiology of movement, physiotherapy, pain science, biochemistry, psychophysiology, biomechanics, sport psychology, motor skills, immunology, and muscle mechanics

Key projects

QUANTIFICATION AND ASSESSMENT OF DEFICITS AND RESIDUAL FUNCTION

The quantification and assessment of the residual function of an individual should be an ongoing and real time process allowing for a continuous evaluation and, by feedback, adaptation of the rehabilitation programme. There is often the requirement for this to take place in the 'work/home'

environment, remote from the clinical setting. The intent is improvement in the effectiveness of a rehabilitation programme, delivering the right dose of the right rehabilitation, in the right place, at the right time. This continuous analysis will allow the design of highly optimised and specifically tailored interventions, and to continuously and dynamically adapt them to the actual adherence of the patient. This will be achieved by providing continuous feedback to both the patient and the professional team.

AN INNOVATIVE APPROACH TO UNDERSTANDING MECHANISMS IN THE TRANSITION FROM ACUTE TO CHRONIC PAIN FOLLOWING TRAUMA

Pain is a common sequela of musculoskeletal trauma, yet there is poor understanding as to why some patients develop chronic and disabling post-traumatic pain. Rehabilitation is widely regarded as an important component of post-trauma healthcare; however, the current position of equipoise means that precision rehabilitation has not yet been achieved. Understanding mechanisms that underlie the transition from acute to chronic pain is essential to moving beyond this position. With evidence that precision rehabilitation can improve effectiveness of pain management, identifying prognostic factors related to long-term pain and disability outcome may facilitate targeting of effective interventions. Our research, conducted within the NIHR Surgical Reconstruction and Microbiology Research Centre (Trauma Centre), applies a unique and comprehensive combination of patient reported outcome measures, psychophysical testing and biomarkers, which are applied to help elucidate the transition from acute to chronic pain following musculoskeletal trauma.

ADVANCING THE ASSESSMENT OF INDIVIDUALS WITH SPINAL PAIN FOR ENHANCED SAFETY AND PRECISION REHABILITATION

Assessment and management of chronic spinal pain disorders is an international challenge and comes at great individual and societal cost. Treatment of chronic spinal pain is challenging and many established interventions have limited efficacy. Appropriate identification of patient-specific, safe interventions are a major priority and comprehensive assessments, taking into consideration the multidimensional nature of spinal pain, are warranted to inform safe and precise rehabilitation. Our new approaches to assessment have offered unique opportunities to objectively characterise patients with spinal pain. As a result, this has enabled appropriate identification of patient-specific interventions.