Bournemouth University

ORIBU Orthopaedic Research Institute Bournemouth University

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The Big Give https://secure.thebiggive.org.uk/projects/view/24579

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Annual Review 2015-16

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Welcome to ORIBU

Professor Robert Middleton
Head of Orthopaedic Research Institute

It gives me great pleasure to present the first annual report of ORI. This is a combination of many years of work turning the concept of a research institute in orthopaedics into reality.

Our initial home is in the Executive Business Centre, with superb modern offices, research labs and access to the teaching facilities and meeting rooms in the building. As well as getting our offices up and running, we've already been investing heavily in equipment and facilities that can help us make a real difference in orthopaedic research.

Thanks to a Capital Grant from the Dorset LEP, we have purchased state-of-the-art equipment for ORI, including a Gait Lab and a virtual reality training simulator. The Gait Lab, one of only 23 in the world, allows gait to be analysed on a treadmill in an augmented reality environment. It's an amazing experience and one that has to be seen to be believed.

Our virtual reality training simulators allow us to train surgeons in the ORI labs, where in the past they would be going through a learning curve on real patients. It's a big advance and we're generating huge interest from around the country and abroad.

However, facilities and resources are nothing without great staff, and again we are lucky to have some of the best people in the sector involved with us from the start. Tom Wainwright has been appointed Associate Professor and brings a background in physiotherapy, as a manager in the NHS, and over ten years in clinical research.

The appointment of Tikki Immins as our Clinical Trials Coordinator has allowed us to partner with a multinational orthopaedic company to run a multi-centre clinical trial, while Shay Bahadori has been appointed as our laboratory technician thanks to support from the Wessex AHSN. He has done an incredible job on installing the new equipment, performing the safety and validation checks and getting it into clinical use.

As we have developed our offering, we've worked closely with our partners in the NHS. We've run a series of workshops for the nursing, medical and managerial staff at Royal Bournemouth Hospital, looking at theatre efficiency and enhanced recovery after surgery. Working with Poole Hospital, we arranged a tie up with a local IT company to work with us to design the software for virtual clinics in the NHS.

Our global engagement programme has seen research and teaching visits to a number of countries, including the USA, China and Switzerland, and we have also produced a number of papers and presentations during what has been a busy and exciting first year.

I would like to thank all our supporters and collaborators and look forward to the next year with great optimism.

ORI believes that no-one should suffer from arthritis

The Orthopaedic Research Institute (ORI) at Bournemouth University works with patients, the health service, colleagues at the university, the local community, and industry partners to prevent and treat osteoarthritis. It's led by Professor Robert Middleton and Associate Professor Tom Wainwright, who believe that in the future, no-one should suffer from arthritis.

ORI is driven by the needs of patients and society. We combine world-class research with the latest professional thinking to stimulate new ideas, learning and thought leadership. State-of-the-art scientific facilities help us develop new techniques and treatments for osteoarthritis, through high quality research and educational outputs that have a proven impact for patients, clinicians and society.

Our research and academic outputs have advanced the fields of orthopaedic surgery, related diseases, treatments and devices. We work to improve patient outcomes with local and international partners by engaging with clinicians, patients and the public, and involving them in our research, education and consultancy activities.

We can offer our expertise and services to partners through a variety of educational, research, professional practice, and consultancy related activities. If you think we could help you in any way, please get in touch for an informal chat.

Osteoarthritis in numbers

As our society ages there is an increasing and pressing need to find solutions to effectively manage the disease burden of osteoarthritis and musculoskeletal disease

8.75 million people in the UK have sought treatment for osteoarthritis

6.5 million by 2020
The number of people with osteoarthritis of the knee is estimated to increase to 6.5 million by 2020 (allowing for the size and ageing of the population and increasing levels of obesity)

Musculoskeletal conditions account for **30.5% of all years lived with disability**

Over 100,000 GP consultations every day in the UK about a musculoskeletal problem

The cost of treating and caring for hip fractures in the UK could rise to **£6 billion by 2036**

2015-16 in numbers

17
Peer-reviewed publications

23
International conference papers

£1,000
Euro prize money for best abstract award at World Congress of Enhanced Recovery after Surgery

2
invited international lectures

52,000
air miles travelled in 2015/2016 to attend conferences, visits and presentations

£957,295
in research grant funding

3.4FTE
current staff

10
cross faculty academic research collaborators at BU

9
active agreements/ partnerships with industry

Over 200
participants have taken part in ORI research studies

300+
members of the public spoken to at BU public engagement events

2
Undergraduate Research Assistants

30
companies have visited ORI to discuss research collaborations

Tom Wainwright presenting the ERAS Society guidelines

Enhanced Recovery After Surgery

Professor Robert Middleton and Associate Professor Tom Wainwright's work over recent years on Enhanced Recovery After Surgery (ERAS) is an excellent example of how we fuse research, education, and professional practice in order to make a real impact.

The successful implementation of ERAS has significant societal impact, as it improves patient outcomes and makes financial savings within the health service. Introducing ERAS requires leadership and inspirational professional practice, accompanied with high quality research evidence to support its introduction, and inspiring educational interventions to help train and enthuse staff.

Professor Middleton and Associate Professor Wainwright have influenced professional practice and promoted the introduction of ERAS by providing consultancy and training services to national bodies, private healthcare groups, and individual NHS hospitals. Customers have included the Department of Health, NHS Scotland, NHS Elect, The New Zealand Ministry of Health, The Victorian and New South Wales Health Boards in Australia, the State of Guernsey Health Board, Hinchingbrooke NHS Trust, and BMI Healthcare. They have also completed multi-city masterclass teaching tours of Australia and New Zealand.

This work has been heavily supported by research outputs, and over the past 3 years Professor Middleton and Associate Professor Wainwright have published 13 peer-reviewed journal papers, and presented 16 peer-reviewed papers at international conferences on the topic of ERAS. The publications detail the clear health gains of implementing ERAS within hospitals, such as a reduction in length of stay, a decrease in re-admissions, a decrease in mortality, a decrease in complications, and an increase in patient satisfaction. Subsequently, their work has been cited in national health policy documents in both the UK, and abroad in the USA and New Zealand.

What is Enhanced Recovery After Surgery?

Enhanced Recovery is a new, comprehensive, multidisciplinary, multimodal approach to improving care in patients undergoing surgery. It is a radical change from business as usual and challenges the status quo and surgical tradition. It works by the "aggregation of marginal gains"; by improving each step of the surgical pathway to improve surgical outcomes.

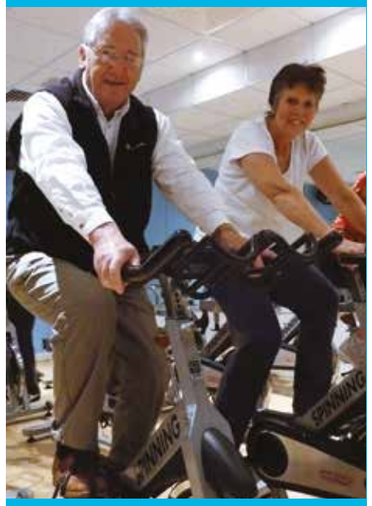
Non-surgical management of osteoarthritis – Cycling Against Hip Pain

Around a third of people aged over 45 years in the UK (8.75 million in total) have sought treatment for osteoarthritis, and 2.12 million people have done so for osteoarthritis of the hip. CHAIN, Cycling Against Hip Pain, was a 6-week programme conceived by Professor Middleton and Associate Professor Wainwright and developed with local partners in Dorset. It was designed as an effective way to implement NICE guidelines on hip osteoarthritis.

The programme provided a combination of education and static cycling, designed to improve mobility and increase people's confidence in managing their condition. It brought together a range of local partners in a unique and innovative partnership to provide the programme.

CHAIN programme content

Each week, groups of up to 15 people attended a 30-minute education session with a physiotherapist, followed by 30-minutes of exercise on static bikes at Littledown and Pelhams Park Leisure Centre operated by BH Live. Participants were given a home exercise programme, encouraged to cycle and asked to keep a diary. Over 78% of participants had improvements in function, and ability to carry out everyday activities, and 100% of participants said they would recommend the programme. Participants reported feeling fitter and stronger, having improved flexibility, less disturbed sleep and reduction in pain and their need to take analgesics. Participants also reported feeling more motivated to continue exercising.



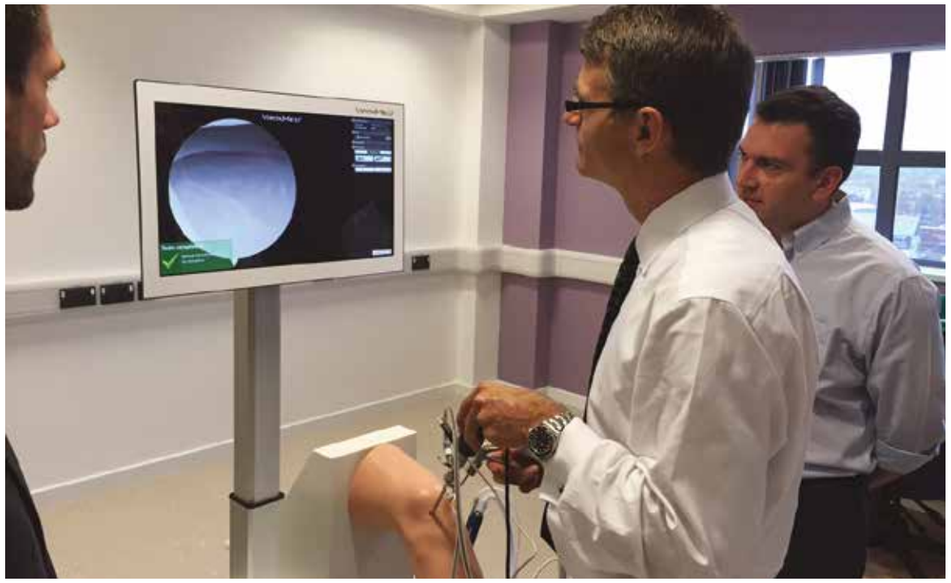
CASE STUDY:

71-year old participant with a complex range of comorbidities

"The programme made me realise that exercise was the best way to improve my pain and the use of my leg. It has made such a difference to me. I can now turn over in bed at night without having pain. I am determined to keep up with the exercise. Sometimes I don't want to go out and walk the dogs, but once I am halfway through my walk I realise that I am walking more easily".

The programme was a Finalist in UK Active Flame Award for Health Partnership of the Year awards, and has since been published and presented internationally to wide acclaim.

"Exercise was the best way to improve my pain and the use of my leg"



Prof Middleton trialing the VirtaMed ArthroS simulator.

Virtual reality surgical training

Professor Middleton has been involved in the development of robotic surgery and the use of computer navigation in surgery since 1997 when he published a paper titled "Active compliance in robotic surgery – the use of force control as a dynamic constraint."

More recently Professor Middleton and Associate Professor Wainwright have collaborated with colleagues from the Faculty of Science & Technology at Bournemouth University to publish a review of the current literature on virtual reality based training in orthopaedic surgery. Further work on the use of virtual reality training simulators in orthopaedics continues within ORI and with academic partners from the BU National Centre for Computer Animation (NCCA), and also leading industry partners.

ORI is now working in collaboration with Virtamed in the Netherlands and OSSIM Technologies in Canada in developing world leading virtual reality trainers. This has resulted in ORI having the only lab in the world to have both simulators, and the only OSSIM Technologies knee replacement simulator outside of north America, and the first Virtamed hip arthroscopy training simulator in the world.

Current research and educational projects on the simulators include the vital clinical validation studies required to further develop the simulators, so that they may be adopted into mainstream clinical practice.

geko™ circulation support

Helping to develop new technologies

The geko™ device

The geko™ is a battery powered, disposable, neuromuscular electro-stimulation device designed to increase blood circulation in the veins of the leg.

The product, and the technology behind it, is owned by a British start-up technology company called Firstkind Ltd. ORI research has been essential in helping them to develop the product so that it may be developed and sold internationally. Data from research conducted by Professor Middleton and Associate Professor Wainwright was a key contribution to the NICE application for the device in the UK, and was also used in the FDA approval process in the USA.

This work has been completed over the last three years and has been funded by the Medical Research Council and Technology Strategy Board as part of a £1.2million funding grant. Studies have been completed at local NHS and private hospitals on the device and have not only provided excellent data for Firstkind Ltd, but have improved outcomes and patient experience for those involved.

In the study at The BMI Harbour Hospital, the geko™ device was compared to Thromboembolism Deterrent Stockings (TEDS), to see if there were any differences in the blood flow and the formation of any blood clots after hip replacement surgery. Patients taking part in the trial have given very positive feedback about the geko™ device, with one participant, 68 year-old Jacqueline Darts reporting: "The geko™ is a brilliant alternative to the stockings. The stockings are hot, uncomfortable and a nightmare to put on. The geko™ replaces them completely. The device was so easy to operate."

[1] http://guidance.nice.org.uk/MT/196

The ORI Gait Lab

The ORI Gait Lab is a world-class facility utilising the Motekforce Link GRAIL system that uses an instrumented dual-belt treadmill, Vicon motion-capture system and synchronized virtual reality (VR) environment next to three video cameras and electromyography.

This is the best available equipment on the market and one of only 23 GRAIL systems in the world. There are only two other systems in the UK. ORI also has a fully equipped biomechanics lab with state-of-the-art equipment such as the PrimusRS for muscle testing.

At ORI we use the gait analysis equipment to monitor patient outcomes after surgery and we have proposed future projects with industry partners such as ZimmerBiomet, Stryker, Depuy, and Lima Corporate. It is a unique selling point that, combined with a proven 10-year track record of industry research, high volumes of surgery, and excellent clinical outcomes, makes ORI such an attractive partner for international orthopaedic multinationals.