Training Surgeons of the Future

By Zoe Williams

Think of simulation training and pilots may come to mind. It’s a tool pilots can use at any point during their career to brush up on skills. The simulator places the pilots in perilous situations, without putting people’s lives at risk. But what has this got to do with arthroplasty and the MSk Lab, I hear you ask?

This technique has now been developed for surgical training practices, to ensure patient’s safety and to reduce training times for surgeons, (as a result of the European Working Time Directive). Until this came into effect, training was being compromised by a number of factors;

• Enforced changes in postgraduate medical education was resulting in doctors attaining less experience than their predecessors – compromising patient safety and training
• Surgical procedures are increasing in complexity and surgeons are relying more and more on computer assisted approaches, yet little training has been provided in this area until now
• Data showed that trainers were becoming more reluctant to let their trainees operate independently, for fear of the growing number of medicolegal claims going through the courts, resulting in some very large pay-outs from the NHS to patients

The good news is that this is all changing, with the help of Mr Chinmay Gupte (Senior Lecturer and Consultant Orthopaedic Surgeon) and his team at the MSk Lab:

“We are excited about this project and the data/results it is already producing. We are receiving really positive feedback on the courses we have developed. Our work focuses on “Training Surgeons of the Future”, and we aim to do this by:

• Teaching methods – adopting a ‘hands-on’ apprenticeship model, that ensures the safety of patients, as trainees are not working on live models
• Communication – using holograms to make the experience more dynamic and memorable
• Technology – creating novel simulators in a number of specialist areas so that procedures can be practiced in a safe environment

In addition to the MSk Lab FRCS Revision Course and one day saw bone courses, we now offer simulation training in fractured hips, cruciate ligament reconstruction and knee arthroscopy. It is an area we are passionate about and we are investigating other opportunities to raise the standards of trainee and surgeon training.

Our number one priority is the safety and well-being of the patient and this can only be safeguarded with well-trained surgeons.

As the saying should go: Practice does not make perfect, perfect practice makes perfect.

Donate

A big thank you to Mr Flood for his generous donation, getting our fund on Just Giving going.

We don’t just want your body, research is expensive, and the speed of our development is restrained by what we can afford, so financial contributions are very welcome. Imperial college is a registered charity and there are a number of ways you can give: please either visit our Just Giving page (http://www.justgiving.com/Justin-Cobb) or contact Miss Zoe Williams on either: z.williams@imperial.ac.uk or 020 3311 5217.

www.imperial.ac.uk/medicine/msklab
Kickboxing, kayaking and a telescopic leg

By Zoe Williams

At the end of July, Richard Williams, an ex-patient of Professor Cobb came to the Lab for gait analysis on the treadmill and have a tour of our facilities. A highly motivated and competitive individual, managing his own personal training business, he pushed himself to the point where Victoria Manning (Research Associate) was almost begging him to slow down/stop! Aside from the fun that was had, it produced some interesting data from a man with a telescopic device in his leg. Professor Cobb had told me a little about his story and that Richard was a wonderful individual but I wasn’t prepared for such a positive and spirited person, given the start he had...

"From the age of 14 I remember numerous visits to the doctors about pains in my leg which was initially attributed to ‘growing-pains’. However as the discomfort intensified and I started missing school on a regular basis, I had an x-ray to investigate the cause of the pain and was diagnosed with an osteosarcoma (a malignant bone tumour) in my left tibia.

Just before diagnosis...the last shot of my left leg before I went bionic, 1994.

I was a ‘guinea-pig’ for six months; participating in a medical trial, which administered a new chemotherapy treatment. It was a very busy period of my life and I had to give up some of my passions; volleyball, basketball and running for the school. I do remember the amazing team at Middlesex Hospital Teenage Cancer Ward – Kate, Julie and Alan, who put a smile on my face every day. Years later I found out that only about 45% of us taking part in the trial survived – I am a survivor!” recalls Richard.

One element of the treatment involved removing the tumour with a safe margin of surrounding bone and soft tissue. This was followed by removing the entire top half of his tibia and knee joint and inserting a massive titanium prosthesis which could be expanded as necessary as he grew.

“I was in hospital for about a week following the surgery and the recovery process began. I slowly became more mobile and despite the pain, I was determined to regain mobility. The implant was telescopic (not quite Inspector Gadget), so it could adapt with me – I was only 15 and still growing! I had a further five surgeries to gradually lengthen the device and it has been in for now for eighteen years.

An x-ray of my bionic leg.

My ‘unusual tibia’ has not prevented me from doing much, however I have had to adapt my interests to a degree. For the last 10 years, I have owned and run Hans Fitness. Having survived cancer, I know the value of staying strong, mentally and physically, as well as being healthy. They can have a significant impact on recovery and everyday life.

I love my work and believe in sharing what I have learnt and empowering individuals through my training. I have been given a new lease of life with my telescopic leg and partake in many adrenaline fuelled activities in my spare time, such as kickboxing, kayaking, powerlifting and I have a keen interest in motorbikes.

Kickboxing practise

Me during a small power lifting competition pulling a 200kg deadlift.

It was great visiting the Lab, meeting Professor Cobb again and seeing the full extent of the beneficial research going on. The testing on the treadmill was fascinating and resulted in some highly interesting data about my gait patterns – I’ll certainly be more aware of how I am walking now!"

Many thanks to Richard Williams for his story.

A shot during a charity truck pull

Hans Fitness (http://hansfitness.com/) and the MSk Lab are currently planning a fundraising event which could involve – kayaking, the wilderness and/or hiking! Details will be announced on our blog over the next few months, so please keep an eye out and let us know if you would like to sponsor, or maybe even take part – but we do not want anyone wearing themselves out!

Engage

There are a number of ways you can keep up to date with the MSk Lab and what we are working on:

http://www2.imperial.ac.uk/blog/msklab

@Great_Debate_UK

http://www.flickr.com/people/84938068@N03/

http://www1.imperial.ac.uk/msklab/

http://www.justgiving.com/Justin-Cobb

Please contact Miss Zoe Williams on: z.williams@imperial.ac.uk or call 020 3311 5217

MSk Lab > Advancing musculoskeletal research and treatment

www.imperial.ac.uk/medicine/msklab
**Mr Kash Akhtar and the Winston Churchill Fellowship**

Mr Kash Akhtar, Clinical Lecturer in Trauma and Orthopaedic Surgery

Recently Mr Kash Akhtar was awarded a prize at the British Association for Surgery of the Knee (BASK) 2013 Annual Conference for his work on assessing surgical skills using a Virtual Reality knee arthroscopy simulator, which is just one of his many achievements of late. The most prestigious was receiving a Winston Churchill Memorial Trust Fellowship.

"I was surprised to be awarded the Fellowship as there is stiff competition with over 1200 people applying from all walks of life with wide ranging and fascinating projects. The process was rigorous and included an initial application, followed by a more detailed written project proposal after shortlisting and then final interviews. I feel greatly honoured to be associated with one of the most influential and inspiring people in history".

The Winston Churchill Memorial Trust was established after his death in gratitude for his inspired leadership in order to create a living memorial that would benefit future generations of British people. The purpose of the Fellowship award is to recognise and support Britons of great promise to travel overseas, to bring back knowledge and best practice for the benefit of others in their professions and communities.

Mr Kash Akhtar, Clinical Lecturer in Trauma and Orthopaedic Surgery, currently works with Mr Chinmay Gupte and Professor Justin Cobb in the MSK Lab, Imperial College London, specialising in the education and training of surgeons using simulation and technology. Mr Akhtar will be undertaking a project called "Mind the gap: ensuring effective continuity of medical care". Talking about what his Fellowship entails, he commented:

"I will be visiting centres of excellence in Orthopaedic surgery in the United States for two months to see how they manage their patients peri-operatively to improve clinical outcomes, minimise complications and reduce unnecessary readmissions and burden on the system. The 'Patient Protection and Affordable Care Act', commonly known as 'Obamacare', has put a great emphasis on preventative healthcare and electronic medical records. There are several US hospitals leading the way on this. Hospitals with excessive readmissions will face significant penalties and I am intrigued by how the use of electronic health records might address this by facilitating better communication between primary and secondary care.

I am looking forward to working closely with US surgeons and engaging with my hosts for the sharing of best practices and future collaboration. I hope to be able to bring home new ideas and ways of working that will benefit patients undergoing orthopaedic surgery here in the UK".

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**Holographic Assisted Lecturing in Orthopaedics**

**Dr Kapil Sugand**

Dr Kapil Sugand graduated from Imperial College in 2010 with an intercalated BSc in Surgery and Anaesthesia. Alongside his clinical training, Dr Sugand is currently pursuing a PhD in surgical trauma simulation and educational technology under the supervision of Mr Gupte and Professor Cobb in the MSK Lab. As part of his studies, he is currently conducting research with multi-disciplinary team within a number of multimedia modalities to train safer surgeons and to ultimately enhance patient safety.

He is the Co-founder and Co-chair of the Holography Assisted Medical Learning and E-Teaching (HAMLET) group which has created quite a media buzz due to the innovative ground breaking research and has been covered by:

- BBC UK ([www.bbc.co.uk/news/technology-22860678](http://www.bbc.co.uk/news/technology-22860678))
- BBC Brazil
- Portuguese Expresso national newspaper
- Australian News Limited outlets
- Spanish La Razon news
- YouTube ([http://www.youtube.com/watch?v=pljGymfiz0](http://www.youtube.com/watch?v=pljGymfiz0))

"It is a really interesting and exciting project to be working on, not only because of the academics involved, but also due to the scope this application has if proved a valuable and reliable teaching channel. The initial study was conducted on students, giving them an enhanced learning experience from which objective and subjective feedback was collated to assess the impact and value of holography-assisted lecturing. It will be interesting to see if this new learning experience will actually become the ‘gold-standard’ in levels of teaching/presenting," Dr Sugand comments.

The team are not just looking at the impact this has on graduate teaching but how it can be used in the wider medical world too. Holograms have the power to visually communicate with greater immersive impact than other presentation modalities so it may facilitate patients being able to understand the disease process and management options more effectively. Something to watch for the future; but we could see holography used as a means of patient engagement, improving compliance to management and being part of the ‘pre-habilitation’ phase of enhanced recovery programmes.
Back to the future
By The Bone Boffin

Bone health
Measuring bone health is important for diagnosing age-related disease, such as osteoporosis (brittle bone), and analysing a patient's response to treatments, such as hormone replacements or bisphosphonates. In particular GPs need to be able to predict the risk that a person will fracture a bone after a fall, so that patients with brittle bones can be treated.

What's wrong with DXA?
Skeletal mass only accounts for about half of bone strength. The shape and structure of the bone contribute the other half. A suitable analogy is the balancing of a book on a piece of card. A flat sheet of card cannot support the weight of a book, fold into a V-shape and the card might, but roll the card into a cylinder and the shape is strong enough. Same card, same mass but strength varies with structure.

The first one was taken of a hip at the Atkinson Morley Hospital. The scanners have been used in hospitals for more than 40 years to diagnose brain tumours and image fractured bones. The 3D CT scans could potentially be used to measure skeletal mass and structure together. However, the images created by CT scanners are very low resolution (0.5mm) because X-rays can cause cancer and the scans have to be collected in a short time.

At the MSk lab we have been trying to devise a way of measuring bone structure at low resolution. A clinical fellow Dr Chandan Seth has found that it is possible to measure the mass and distribution of bone in a CT scan. We have to confirm the finding by testing bone samples to make sure that our measures of bone mass and structure correlate with strength. We should know in the next few months. If we are successful then we can try a clinical trial...over to Prof Cobb...

Involve:
We are recruiting for a number of studies investigating the impact of flexibility upon factors important to exercise. At the moment studies include:
1. Investigating the difference in cortical and reflex control between groups of people with and without knee pain who have a normal flexibility or who are particularly flexible. We are using surface EMG, transcranial magnetic stimulation and electrical stimulation of a peripheral nerve to explore the control of quadriceps. This takes about 45 minutes.
2. Kinetics and kinematics of knee movement during walking, using stairs, jumping and hopping in healthy people and people who are particularly flexible with and without knee pain. We are using the 10 camera VICON system to track knee movement during these tasks. This takes about 45 minutes.
3. We are comparing the rate of change of muscle strength between people who are particularly flexible with knee pain and people with average flexibility and knee pain. This requires you to undertake a specific strength programme over 16 weeks. Your quads strength will be measured every two weeks using the Cybex. This requires a long standing commitment over this time and is only suitable for people with knee pain.

If you are interested in taking part in these studies, or you wonder if you are particularly flexible please contact Dr Caroline Alexander by email: caroline.alexander@imperial.ac.uk.