

NICON

LIFE SCIENCES

BEYOND MOTION

CASE STUDY



Changing athlete
rehabilitation
practices

Rehabilitation from injury is often guided by a time threshold and 'one-size-fits-all' approach. The Sports Medicine Department of Dublin's Sports Surgery Clinic (SSC) aims to change this methodology.

For the SSC, Vicon's motion capture technology offers insights into kinematics and kinetics to enhance its practice. With Vicon's technology, the physicians can understand an injury by understanding possible underlying mechanisms.

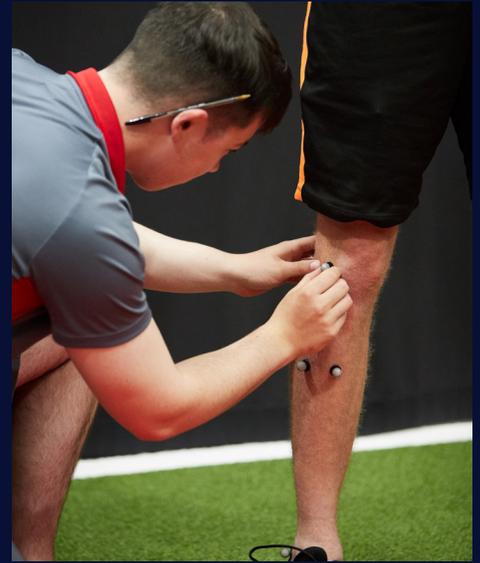
Getting granular

"The vision was to build a center where we could be precise, individual and personalized around the movement that we needed to restore," says Dr. Andy Franklyn-Miller, Director of the Sports and Exercise Medicine Facility.

Dr. Chris Richter, Head of Data and Innovation adds: "We use research to identify sources of injury so we can address those sources and, consequently, the symptoms."

The patient experience in the SSC starts with diagnosis in one of three motion analysis laboratories – all of them equipped with Vicon Vantage or Vero cameras and Nexus software. Two laboratories are based on lower limb change of direction and one is based on upper limb assessment. This is where the biomechanics team gets to work on assessing the patient, beginning with motion capture using Vicon's leading-edge technology. On the reason why the team chose Vicon, Dr Richter says: "We were looking for an accurate and easy-to-use system that provides established models, low post-processing and the ability to be customized."

The SSC not only chose Vicon because it sets the industry standard in accurate motion capture, but also because Vicon makes movements quantifiable. Dr. Katherine Daniels, Head of Biomechanics, adds: "We can have lots of people collecting the data and still have confidence in the results."



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Using motion data is what enables the SSC to rise above the limits of standard practice and shape treatment around the individual based on the evidence. Dr. Enda King, Head of Performance, uses the information that the biomechanics team have gathered to 'draw a line' between the data and the athlete. Using kinematics and kinetic measurements from the Vicon system helps the SSC's interdisciplinary team to identify problems with a patient's movements and allows for a research-based action plan for the athlete.

"The way Vicon fits in with our practice is to really allow us to objectify what we're doing. It gives us a basis to see whether our interventions are changing what we think they're changing," says Dr. King. Vicon enables the biomechanists and physicians at the SSC to go beyond their biases and ensures impartiality. One example is the ankle joint: kinesiologists have traditionally seen it as relatively less important from a motility point of view, but the analysis of Vicon data has suggested otherwise and convinced the SSC's team of the role of the ankle joint and its importance during rehab.

The process of recovery doesn't end with a eureka moment; it doesn't stop when treatment begins, it's iterative. Treatment at the SSC Sports Medicine Department is a data-driven and ongoing process that is constantly questioned and improved. The SSC has multiple research projects ongoing because, in the words of Dr. Daniels, "The obvious question is: 'What does rehabilitated look like?'" Every study published by the SSC is used to either confirm the treatment pathway or to identify further areas to explore.

Data is captured at six and nine months post-surgery or before and after rehab. Patients are consulted after one, two and five years so that the team can understand the long-term outcomes and identify unwanted outcomes (re-injury). The results are entered into a database and advanced machine learning techniques are used to find commonalities between patients who suffer from further pain or re-injury and surgical techniques.



The bigger picture

This grounding of treatment in the data has another beneficial knock-on effect. The process of diagnosis and treatment is collaborative. Data can be shared among the team as well as with other parties. For top-level athletes, that means recovery doesn't have to be something that begins and ends at the door to their physiotherapist's practice. It can be holistic; managers, coaches and club doctors all pulling in the same direction.

There's also a bigger picture at play, though. Vicon is allowing the biomechanics team to tread new ground and make new discoveries. "We've built a database that's allowing us to start answering questions that we haven't been able to before. We've got systems in place that mean we can design new studies, design new protocols, answer new questions going forward," says Dr. Daniels.

The biomechanics team of the SSC is seeing as many as 10 patients per day. This adds up to around 1,000 ACL reconstructions and 4-500 knee injuries addressed over the course of a year, creating a wealth of data to enhance surgical insight and rehabilitation methods.

In the future, the SSC team plans to expand its analyses towards healthy populations, focusing on injury prevention and general wellness. By looking at musculoskeletal problems in those who aren't well, it aims to help those who are.

"Not every patient or human moves the same way, so every human needs a different intervention," says Dr. Richter. Ultimately, Vicon helps the SSC to help patients by delivering reliable and objective data that allows the treatment of an individual, not just an injury.

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