

“What-if” analysis revolutionizes orthopedic patient care

A groundbreaking interactive dashboard for physicians helps injured athletes maximize their chances of returning to the sports they love.

After injuring her knee in a skiing accident, Sara gets news that elite athletes like her dread hearing: she needs surgery. Anxious about her prognosis, she bombards her doctor with questions. What’s the best surgical approach? How long will it take to recover? Is there anything she can do to minimize complications and maximize his recovery? And, most importantly, will she ever ski again?

A previous patient of the renowned Steadman Clinic in Vail, Colorado, Sara knows she’s trusting her care to one of the country’s top clinics. What she’ll soon learn is that her treatment experience this time around will be far more personalized and easier to navigate thanks to a new, data-driven physician dashboard that the Steadman Clinic and SPRI built in partnership with Intuition+ and Google Cloud.

The Steadman Clinic and SPRI has always kept a secure database of patient treatments and outcomes. They’ve also built vast repositories of information from their EHR systems, biomotion lab, imaging research group, and regenerative medicine lab, as well as many peer-reviewed scientific papers with applicable data science models. But each dataset was siloed in a different system and as a result, none of it was easily accessible to doctors.

The research scientists at SPRI knew that bringing all the data from the clinic and the institute together would enable analytics engines to compare every detail of a clinic patient’s record against that of every other patient, and against every research study the institute has ever performed, revealing patterns and nuanced connections impossible for any human to discern on their own. If doctors could instantly access

About The Steadman Philippon Research Institute (SPRI)

The Steadman Philippon Research Institute (SPRI) is globally recognized for its pioneering research in sports medicine, patient-centered research, osteoarthritis, regenerative medicine, and injury prevention. Since 1993, SPRI’s database (one of the largest in existence) has been collecting patient information that has led to significant treatment advances in these areas.

About Intuition+

Intuition+ builds leading-edge architectures on Google Cloud Platform to create business value from data, combining world-class data skills with client intuition to create innovative results.

the combined data during patient visits to run “what-if” projections, they would have an incredibly valuable tool for working with patients like Sara.

“We want to use all of our diverse sets of data to help the physician make the most informed decision on how to proceed with this patient, whether it be choosing among a set of surgical pathways, or pursuing conservative (non-surgical) care,” says Grant Dornan, Director of Clinical Outcomes Research at The Steadman Clinic and SPRI.

An integrated architecture designed by an integrated team

Diverse teams collaborated to bring the SPRI scientists’ dream to life: the SPRI team contributed its knowledge of the data and physician workflow; Google Cloud supplied the HIPAA-compliant environment, along with data ingestion and transformation tools like the Cloud Healthcare API and BigQuery; Intuition+ supplied data design and BigQuery expertise; Looker provided data analytics and development expertise; and Y3ti used its web development skills to build custom visualizations. “Immediately we hit it off and started geeking out about what we could do with this project together,” Dornan remembers. “It became a cohesive team.”

The resulting solution coalesces data from multiple sources: the Steadman Clinic’s Electronic Health Records from Modernizing Medicine and DICOM images from MERGE, as well as patient and physician research information stored in Formsite and Mi-Form.

A fifth source, Looker, supplied data in an unconventional way. “Looker is a regular BI tool and doesn’t do data capture,” explains Tammy Henderson, President of Intuition+, “but working with the Looker team, we did the impossible. We use Looker as a data capture tool to feed the algorithms, and then render the results in the Looker dashboard.”

The result of all this data integration was something unprecedented in the clinical world: real-time, evidence-based healthcare predictions. Using the data capture feature added to Looker, doctors can adjust data values, such as the patient’s weight. “They hit a calculate button and this is where the magic happens,” says Henderson. “Seamlessly and in a blink of an eye, the doctor can have that conversation with the patient.” Sara could see, based on data from many other procedures performed at the clinic, how much better her outcome would be, for example, if she lost weight before surgery and was diligent in performing her post-surgical physical therapy.



Grant Dornan,
Director of Clinical
Outcomes Research,
The Steadman Clinic
and Steadman Philippon
Research Institute

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“The data has to be available and the doctor has to be able to do what-ifs with the information, to work with the patient to determine the best surgery protocol for them,” says Henderson. The staggering number of variables to consider, and the resulting complexity of decision making, make this real-time modeling capability a godsend for clinic doctors.



Evidence-based dashboards to strategize surgery and track recovery

When a patient like Sara arrives, her doctor uses the pre-op evidence-based dashboard to get up to speed quickly. With Sara's demographic information and details about her injury, along with the most relevant peer-reviewed research instantly selected from vast data lakes, her doctor has everything she needs to run predictive models customized for Sara. As Dornan describes, "Our physicians are able to sit side by side with a patient and in real time—with newly, freshly collected data—they're able to make informed decisions, talk with the patients about what their care is going to look like in a more precise manner, and make predictions for the prognosis of these patients after their surgery."

When Sara returns for a followup appointment post surgery, her doctor brings up the post-op evidence-based dashboard, which tracks her recovery progress. At her fingertips, she has Sara's patient information, her treatment chronology, data summaries on similar cases, and perhaps most significantly, a patient "report card" that allows her to index Sara's recovery against those of other patients in her peer group.

The report card scores "different components of a patient's recovery in terms of function, pain and satisfaction with their procedure," says Dornan. Sara's doctor can compare her scores with the ones from her last appointment, and graph her overall progress. "We're able to present that against a cohort of similar patients presenting the 25th and 75th percentile to understand when a patient is overachieving or underachieving and might need special attention," adds Dornan.



Tammy Henderson,
President, Intuition+

"Looker is a regular BI tool and doesn't do data capture, but working with the Looker team, we did the impossible. We use Looker as a data capture tool, and then render the results in the Looker dashboard. All of this is seamlessly integrated from the end user's perspective. It just looks like one workflow."

Better patient-doctor teamwork for better outcomes

Because the new dashboard platform is centralized, doctors can access it from any clinic location. And because the algorithms provide immediate feedback, patients can make faster, more well-informed decisions with their doctors all along their medical journey.

When a top athlete sustains an injury, the care they receive determines whether they will ever again participate in the sport they love. The immense power and agility of SPRI's new interactive dashboard can give injured athletes like Sara a better chance of returning to form, safely and soon.



To learn more about
Google Cloud Healthcare and Life Sciences visit:

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