



CASE STUDY

Diabetes Pre-Op Management Application Created At UCSF

Robert J. Rushakoff, MD is Professor of Medicine and Medical Director for Inpatient Diabetes at University of California San Francisco where he heads a group that focuses on improving outcomes for diabetes patients undergoing surgery. In 2012, he conceived of and successfully completed a project to create an on-line decision support application publicly available to physicians and healthcare professionals to guide them through the proper protocol for preparing patients with diabetes for surgery.



Patients with diabetes are particularly exposed to factors that increase the likelihood of surgical complications. For example, the typical pre-operative routine of simply fasting during the 24-hour period prior to surgery is not possible for diabetic patients because of the uncontrolled effects on blood glucose levels. Instead, the patient needs to off-set the effects of reduced food intake with precisely timed adjustments to medications. For treating physicians, calculating the proper regimen during the pre-op period is extraordinarily complex as each patient is different and has unique requirements depending on medication, dosage, delivery method, and a range of other factors.

Dr. Rushakoff and his team at the UCSF Diabetes Research Center developed a knowledge base and series of

algorithms that, if made easily accessible to physicians, could greatly improve their patients' pre-op preparations and reduce the rate of complications during surgery. However, the algorithms involved hundreds of discrete decision nodes and pathways. How could they capture this complex and dynamically changing model using traditional programming approaches?

Dr. Rushakoff realized that configurable decision support software would be the key for his staff to capture their expertise in an application that could be used outside his lab. He chose LogicNets as the Decision Support Platform in which to build and deploy the UCSF Pre-Op Preparation App. From a development standpoint, he recognized that the platform had to allow his staff members to capture their specialized expertise themselves, rather than having them engage with a separate programming group. LogicNets provides a visual design environment where non-programmers can draw their decision-making processes in the same way they would draw decision trees on a white-board. The system then converts the visually modeled logic into a web-browser compatible application that can be accessed over the internet on any device. Users can answer questions, be guided to the correct outcome, and receive a dynamically created report for review and distribution to the patient.

"It took my colleagues and me a whole year to write our diabetes preoperative algorithm and less than 10 days to get it up and running on LogicNets."



Dr. Robert J. Rushakoff
Medical Director for Inpatient Diabetes



THE PROBLEM

- ▶ Sophisticated UCSF-developed pre-operative protocols that could significantly improve outcomes for diabetes patients are not available to clinicians and patients
- ▶ Algorithms developed but not viable to automate or make available online using standard programming approach

THE SOLUTION

- ▶ Algorithms visually modeled by UCSF clinicians into visual decision support system
- ▶ Clinicians and patients have real-time access to algorithms on any browser-enabled device
- ▶ Users guided transparently through complex decision trees answering only relevant questions and quickly reaching a report customized for their specific condition and circumstances
- ▶ System prints and emails results for easy patient access


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As Dr. Rushakoff explains, selecting LogicNets was a major factor in bringing this project to reality: "After writing our program, we thought it would be easy to find an online program or site where we could quickly convert our lengthy complex algorithm to a simple interactive site for medical providers. To our surprise, at first we found no solution, no companies – only programmers that would need months to make it happen. We then came across LogicNets and it was the perfect match. It was as if their programming had been developed just for us. After the initial conversion of our algorithm, making updates or changes remains simple and quick."

The UCSF Diabetes Pre-Op Preparation App published through LogicNets has been in production since 2012 and has garnered praise from physicians from around the world. The application has made it possible for physicians to properly prepare patients for surgery and avoid complications that would result without clear access to effective protocols. LogicNets looks forward to continued work with Dr. Rushakoff and his colleagues as they seek to expand their efforts and enhance their app in the future.

Dr. Rushakoff also identified critical functionality that over the life-time of the project would enable adoption of the application on a scale that could indeed improve outcomes for diabetic surgery patients.

