

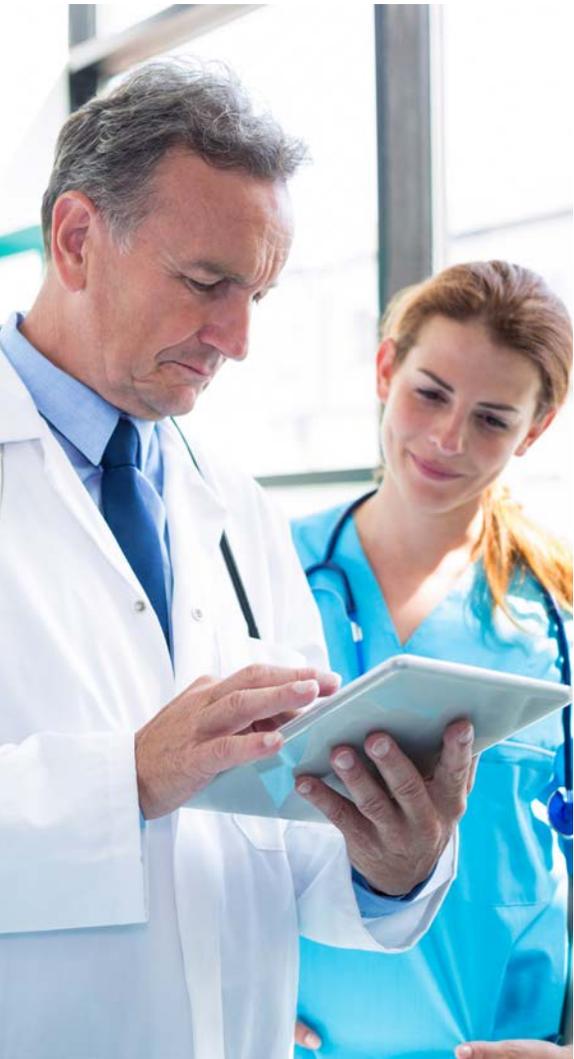
# STATISTICA®



## Big data analytics transforms the operating room

Predictive analytics helps transform patient care at the University of Iowa Hospitals and Clinics

Case Study



### COMPANY PROFILE

**Company**  
University of Iowa  
Hospitals and Clinics

**Industry**  
Healthcare



**Country**  
United States

**Employees**  
8,900

### BUSINESS NEED

Surgeons at the University of Iowa Hospitals and Clinics needed to know if patients were susceptible to infections in order to make critical treatment decisions in the operating room. Reducing the infection rate has major implications for overall patient health and cost savings.

### SOLUTION

The surgical team harnessed the power of big data analytics, coupled with other methods, to keep patients safe — reducing surgical site infections by 58 percent — while decreasing the cost of care.

### BENEFITS

- 58 percent reduction in occurrence of surgical site infections
- Merging historical and live patient data to predict infection likelihood
- Reduced cost of patient care
- Personalized healthcare based on patient's own characteristics
- Running predictive models and accessing results with a mobile application or web browser

**Surgeons step into an operating room needing to predict the answer to a potentially life-or-death question: Is their patient susceptible to infections? In the United States, roughly one out of every 20 patients admitted to a hospital will acquire an infection. Knowing if the patient is vulnerable can help doctors make critical decisions about treatment.**

At the University of Iowa (UI) Hospitals and Clinics, advanced analytics software is helping doctors make real-time predictions about the probability and/or propensity of a patient to develop a surgical site infection. According to the U.S. Centers for Disease Control and Prevention, surgical site infections are the most common, accounting for more than 30 percent of occurrences, and putting patients at risk of illness and prolonged hospitalization. Sometimes, people die.

The director of the division of gastrointestinal, minimally invasive and bariatric surgery, Dr. John Cromwell, came to the conclusion that a high percentage of surgical site infections were preventable by leveraging predictive analytics. He saw the potential to not only reduce risk for patients, but to also decrease costs of care. The total cost of hospital-acquired infections to the healthcare industry is estimated at \$10 billion per year.

*“Predictive analytics is allowing us to deal with the ever-increasing types of data that healthcare institutions need to deal with.”*

- Dr. John Cromwell, Director of Gastrointestinal Surgery, University of Iowa Hospitals and Clinics





Cromwell and his team at the university decided to deploy advanced analytics software to marshal disparate data sources and make real-time predictions. “Using these tools and other methods, we’ve been able to reduce surgical site infections by about 58 percent,” he says. “That’s a revolutionary concept in gastrointestinal surgery.”

## PERSONALIZED MEDICINE

The University of Iowa Hospitals and Clinics is one of the most highly regarded medical facilities in the United States. People throughout the state and region receive treatment for serious illnesses or injuries from its more than 1,400 physicians — almost 300 of them have been named “Best Doctors in America” in nationwide physician surveys. It was the state’s first-ever recipient of the Magnet Award for Nursing Excellence® and the 2014 recipient of the Magnet Prize®.

UI Hospitals and Clinics also ranks as one of the nation’s “most wired” hospitals for its level of IT adoption, and the 2014 winner of the HIMSS Davies Enterprise Award® for use of the EMR. This presents an opportunity for clinicians to take advantage of the insights that big data can provide and customize treatment to a patient’s own characteristics. “Our group is trying to personalize healthcare through the use of predictive analytics, allowing us to achieve effective, timely and appropriate healthcare for every patient who comes through the door,” explains Cromwell.

In order to do that, his team needs a predictive model that captures the complexity and dynamic nature of patient care in an operating room. “We’re able to take information from electronic medical records (EMRs) and other enterprise sources, including real-time data from the operating room, to determine whether patients are likely to get a surgical site infection. This allows us to modify and individualize the type of care that we’re delivering in the operating room.”

## IMPROVE HEALTHCARE, REDUCE COSTS

Jose Maria Monestina, senior application developer at UI Hospitals and Clinics, is the man charged with implementing the technology that predicts outcomes for Cromwell’s team. The first step was to connect to the disparate enterprise systems and bring the data into a common data set with embedded analytical tools. “This process has allowed us to deliver predictive analytics in a real-time environment to improve healthcare and reduce costs,” says Monestina.

*“ With the right analytics tools, a small group of people can deliver predictive analytics. It simplifies the deployment, execution, sharing of the models and the analysis of the data — all in one package.”*

- Jose Maria Monestina,  
Senior Application Developer,  
University of Iowa Hospitals  
and Clinics



In a pioneering effort, the team demonstrated the role previously untapped health data can play in the operating room. “Dr. Cromwell has a unique approach to predictive analytics,” says Monestina, “because he uses not only healthcare data and historical data to create predictive models, but also real-time data.” Running predictive models directly in the software tool, Dr. Cromwell can anticipate which patients are at risk for surgical site infections before they occur, and provide preventive care — in real time. The analytics tool also enables the team to store predictions in its database for future analysis and to aid in follow-up patient care.

According to Cromwell, these predictions enhance “the precision in the decision-making that we use for surgery.” The impact on patient care, he says, is “really incredible.”

## RIGHT DATA IN RIGHT PLACE AT RIGHT TIME

Monestina is quick to point out that it is no easy task to move from desktop to enterprise analytics, and to turn prediction theory into a life-enhancing

reality in the operating room. “We have complex workflows,” he explains, “and different data sources.”

The team faced a major roadblock in the sheer multiplicity of sources, but connecting to them is a prerequisite to looking across the data. “Predictive analytics is allowing us to manage the ever-increasing types of data that healthcare institutions are tasked with,” says Cromwell. “The number of sources continues to increase rapidly and these tools allow us to keep track of the various numbers of models that we need for that type of exercise.”

In order to actually improve the quality of care, the team needed to have a flexible, advanced analytics platform that encompassed the entire analytics lifecycle, from data aggregation and preparation, to model development and finally to model deployment and monitoring. “A small group of people can now deliver predictive analytics. It simplifies the deployment, execution, sharing of models and analysis of the data — all in one package,” explains Monestina. “You can store the data model in a server and then reuse it.

You can share the data models among different persons within your research group.” Part of that deployment is the power of mobility. “You are not bound to a specific PC or a server,” he says. “You can run those models using a mobile application or a web browser and access the results.”

## TRANSFORMING OUTCOMES

Ultimately, the team was able to demonstrate the revolutionary potential of data-driven healthcare by accessing the right data in the right place at the right time, and by making predictions about the future. Dr. Cromwell had leveraged predictive analytics previously, but realized that the division’s existing desktop analytics environment could no longer harness large volumes of data distributed across the enterprise. Nor did it have a robust way of deploying those analytics to frontline staff for real-time decision making. For Cromwell’s team to use statistics to answer questions they really care about, they needed an enterprise-grade solution that could work smoothly with its existing IT architecture. The



surgical team can now do more than just analyze disparate data (EMRs, registry and patient satisfaction data), the team can also merge it with live patient data in the operating room to make data-driven decisions about individual treatment.



“Big data and predictive analytics are transforming outcomes at virtually every point in patient care,” says Cromwell. “We see so many other areas where this could be useful, including drug delivery, population health, managing patient flow and every other aspect of medicine that allows us to deliver high-quality healthcare.”

## ABOUT STATISTICA

Statistica’s advanced analytics, big data and IoT offerings provide you endless possibilities to innovate your enterprise. Whether it’s uncovering the genetic basis of a disease, reducing hospital readmissions, mitigating financial risk, or ensuring procedural validation, Statistica enables organizations to transform in new and exciting ways. By embedding analytics everywhere and empowering a wider community of citizen data scientists, you’ll accelerate innovation, improve customer experiences, and streamline your enterprise for the future. <http://statistica.io>

[VIEW MORE CASE STUDIES AT STATISTICA.IO/RESOURCES](http://statistica.io/resources)

Statistica and the Quest Software logos and products — as identified in this document — are registered trademarks of Quest Software, Inc. in the U.S.A. and/or other countries. Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Quest Software disclaims any proprietary interest in the marks and names of others. Availability and terms of Quest Software, Solutions and Services vary by region. This case study is for informational purposes only. Quest Software makes no warranties – express or implied—in this case study.

© March 2017, Quest Software Inc. All Rights Reserved.

CASESTUDY-STATISTICAUNIVOFIOWA-US-AA-00000