

How Big Data and Health Care Analytics Reduce Costs and Improve Care: 5 Use Cases

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Introduction

We live in the era of “big data.” Mass digitization and our ever-increasing interconnectedness means that we are all constantly generating a dizzying amount of information, at a volume and complexity that overwhelms traditional methods of analysis.

The health care space is no different. Today, a provider might generate and collect data from a vast array of internal sources: electronic health records (EHRs), pharmacy sales, prescription information, lab tests and insurance claims data, to name but a few. Add external sources, and analysts can find themselves with some genuinely massive data sets.

Just staying on top of the information onslaught is one issue; figuring out how to exploit it successfully is where the real challenge—and value—of big data lies. Organizations that master their data can benefit, with pressure increasing on health care providers to do so.

For instance, Dr. David Delaney, chief medical officer of software giant SAP, cites a study by health care consultancy The Advisory Board. It shows that the difference between a well-managed population of 5,000 patients versus a loosely managed population of the same size can amount to \$10 million a year in care-delivery costs.

Business intelligence (BI) and analytics tools can help providers better manage patients by transforming health data into actionable insights. But with so many possible applications of this, it can be difficult to know where to begin.

That’s where Software Advice comes in: Every day we advise BI buyers on which tools are best suited to their organizations. In this e-book, we explore five real-life use cases and speak with experts on the front lines of data analytics and health care to discover how BI can be deployed successfully in three crucial areas:

- 1. Reducing costs**
- 2. Increasing efficiency**
- 3. Making care more patient-centric**

By learning about the innovative ways other health care providers are exploiting big data, we hope to inspire you to do the same at your own organization—and perhaps even uncover further innovations.

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1. Big Data Saves One Health Care Provider \$1.2 Million in Knee Replacement Costs

Jamie Oswald is the associate principal data analyst at Mercy Health. A health care provider with 46 acute care and specialty hospitals—including heart, children’s, orthopedic and rehab hospitals—Mercy Health has more than 700 physician practices and outpatient facilities.

Oswald describes a scenario familiar to anyone working in health care: “Margins are tight. Health care costs keep going up, and the money that people are interested in spending on health care keeps going down. It provides a lot of downward pressure on those margins.”

BI and analytics tools enable health care providers to boost efficiency and reduce costs without sacrificing quality of care, Oswald says. As an example, he cites a recent analysis his team conducted upon a single type of surgery: total knee replacement. To perform their analysis, they used two tools:

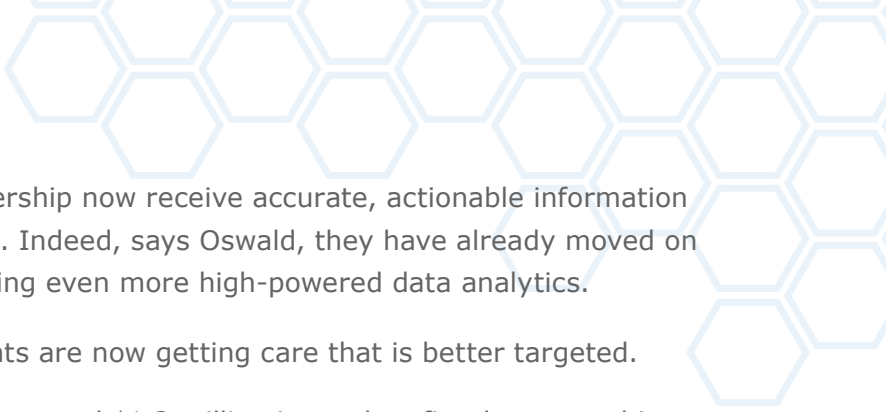
- **SAP HANA**, an in-memory platform for processing large data sets at high speed in real-time
- The **SAP Business Objects** suite, used to conduct analysis on these large data sets

Mercy analyzed all of the data related to total knee replacement perioperative care, where errors and inefficiencies can lead to readmissions, patient discomfort and waste. A major problem was the vast array of artificial knees on the market.

“For instance, you don’t put the same knee into an NFL running back as you do into a 95-year-old—they just don’t have the same strength,” Oswald explains. Worse, he adds, pricing is equally complex, as “you can buy a similar artificial knee from a hundred different vendors.”

It’s impossible for a doctor to analyze all the possible permutations surrounding this procedure—unless, of course, he wants to dedicate months of his time to the task. But with patients constantly arriving at the hospital in need of the right care right away, time is a precious resource.

To solve this problem, Mercy used its BI tools to pull together information from various sources to look at which supplies were used by different surgeons for a single procedure, along with their costs. The goal? To identify the appropriate supplies for the correct patient at the best price possible.



As a result, doctors and operational leadership now receive accurate, actionable information through an interface that is simple to use. Indeed, says Oswald, they have already moved on past the first high-level dashboards to using even more high-powered data analytics.

By analyzing this single procedure, patients are now getting care that is better targeted.

What's more, Oswald says, "We've already saved \$1.2 million in our last fiscal year on this single procedure."

2. BI Predicts ER Workflows Using Internal and External Data Sources

Hospital workflows are another area where BI and analytics tools can be used to combine and analyze disparate data sources to boost efficiency, reduce costs and improve quality of care.


Jason Bean is the vice president of BI and analytics for Messina Group, a consultancy based in Chicago, where the summer is a time of heightened emergency room activity. Everybody "knows" the reason on an anecdotal level—Schools are closed, and more kids are outside playing, which results in a higher incidence of ER visits.

With BI and analytics tools, however, health care providers can go beyond the anecdotal level to make specific predictions, both for the types of treatment they will need to deliver and the resources they will need to have at hand. Analysts can combine information from a hospital's own historical data with weather predictions and data from police departments and ambulance services.

By integrating and analyzing this data using BI software, says Bean, health care providers can predict and plan for who will be coming through the ER doors—including how many and which staff they will need, the right number of beds and equipment and the right workflow for who's going to show up with which kinds of injuries. The result? Patient care that is more efficient and less costly for the provider.

In addition, says Bean, hospitals with multiple facilities can analyze previous incident rates and patterns in different geographic areas to plan their operations and workflows better over multiple facilities.

"It's not just that there's generally going to be more injuries based on the season," says Bean. Rather, hospitals can predict the specific types of injuries they will have in their emergency rooms, and allocate resources on that basis.



“There’s a lot you can do with that kind of historical data set to see the future and weave [it] into your operations so you can plan better,” Bean adds.

3. A Look at How Big Data Moves Doctors Beyond the Era of Artisanal Health Care

SAP’s Delaney argues that big data analytics is changing the practice of health care by helping doctors move beyond gut and intuition—or what he calls “artisanal” medicine—to making treatment decisions based on data.

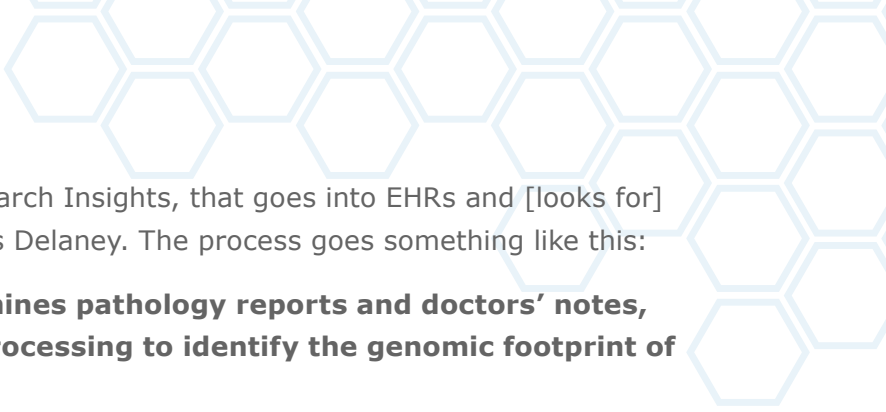
As an example, Delaney points to a big data analytics project SAP is developing with the American Society of Clinical Oncology (ASCO). Since only 3 percent of U.S. cancer patients are enrolled in clinical trials, data on all the others is lost to researchers, Delaney explains. ASCO’s goal is to leverage this data, and thus, improve the quality of the information available to doctors.

Delaney cites the example of his father-in-law; a survivor of stage-four lung cancer. The survival rate for this type of cancer is only 2 percent, and the oncologist had only ever seen a few respond to the treatment in the same way as Delaney’s father-in-law over the course of his career.

“That doesn’t make data—that’s anecdotal,” Delaney says.

Imagine, however, a world where all the data on all the lung cancer survivors seen by oncologists across the U.S. was available for access and analysis. Oncologists would be able to access real, statistically significant data on survival rates and the efficacy of specific treatments—eliminating a lot of the guesswork, and reducing the reliance on limited personal experience.

To this end, working with SAP, ASCO has started to analyze very large data sets that contain patient information.



“We created an application, Medical Research Insights, that goes into EHRs and [looks for] the mutation of the patient’s tumor,” says Delaney. The process goes something like this:

- **The application locates and mines pathology reports and doctors’ notes, performing natural language processing to identify the genomic footprint of the tumor.**
- **Then, this information is used to retrieve a micro-cohort of patients with similar mutations, perform statistical analysis and compare the application’s findings with a cloud-based tumor registry of patients.**
- **It then further filters the information to produce a list of similar patients based on categories such as age, gender, ethnicity and other disease characteristics.**

The result, says Delaney, is that oncologists can see—in real time—the different survival rates for different treatments of patients similar to their own. The outcome? Statistically meaningful, data-driven treatment decisions, better tailored to the individual and with a higher likelihood of working.

According to Delaney, NCT, a research center in Heidelberg, Germany, is currently piloting the technology. Meanwhile, ASCO is leveraging this foundational work to create even broader capabilities, which it ultimately plans to use to extract insights from much larger data sets.

“Once expanded to a broad enough data set,” Delaney says, “the results could be revolutionary.”

4. BI Dashboards Boost Accountability and Productivity

Huge, complex projects are not the only way health care providers can use BI tools, says Jonathan Kucharski, enterprise sales manager of BI dashboards firm iDashboards. These solutions can also be used to consolidate and exploit multiple data sources to boost efficiency and improve results on a smaller, everyday scale.

In the past, analysts had to pull individual reports out of each data source, such as patient satisfaction surveys, billing and collections information and radiology records. They would then have to analyze these reports individually, drawing conclusions based on data that might have already been out of date by the time they completed their analysis.

A BI dashboard tool, however, can connect to these disparate data sources, pull the

desired information and then display multiple key performance indicators (KPIs) in a single dashboard, viewable on any device. These can be set up and staff can be trained to use them in a matter of days. As a result, trends and inefficiencies are revealed in real time—not weeks after the fact.

Kucharski points to St. Joseph Mercy Oakland (SJMO) hospital, located in the metro-Detroit area, as an example of how tools such as iDashboards can be applied.

SJMO's leadership wanted to use BI to boost transparency, provide insight into key metrics, drive positive results and encourage accountability. Today, the CEO has three LCD screens in his office that refresh every 30 to 45 seconds, pulling the latest data from the hospital's EHRs and other sources. At any moment, he can access real-time information such as:

- **How many patients are in the ER**
- **The average length of patient stays**
- **The average cost of patients per day**
- **How many nurses are currently on staff**
- **How many outpatient surgeries were performed in the last week**

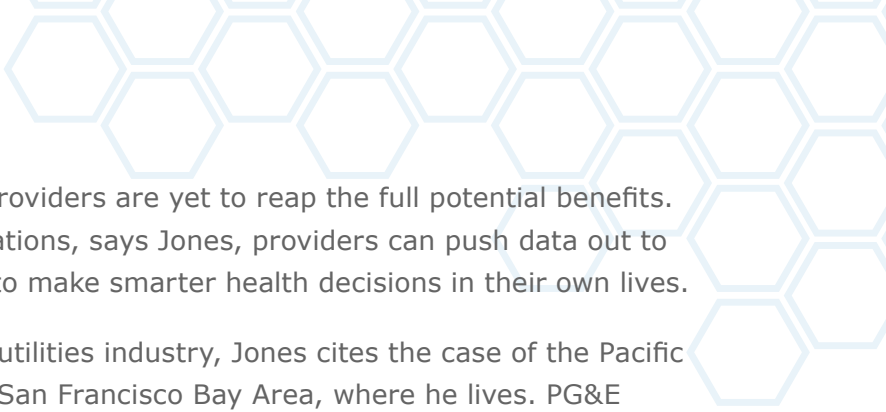
In this way, hospital leadership can identify and address issues as they arise. To further boost accountability and provide staff with easy access to information, SJMO also displays dashboards that track these KPIs on screens throughout the facility. There are dashboards in executive boardrooms; lobby areas; the IT call center; the nursing area; the scheduling area and beyond.

Meanwhile, other hospitals in the same network as SJMO are studying the project with great interest.

"We find that when others see it, they want the same thing that St. Joseph Mercy is doing," says Kucharski.

5. How Embedded BI Can Empower Patients and Improve Results

As these use cases demonstrate, health care providers today use BI tools in diverse ways to improve efficiency, reduce costs and make care more patient-centric. However, providers can learn not only from each other, but also from other industries. For instance, says Southard Jones, vice president of product strategy at cloud BI vendor Birst, embeddable



analytics is one area where health care providers are yet to reap the full potential benefits. By embedding analytics into other applications, says Jones, providers can push data out to patients themselves—empowering them to make smarter health decisions in their own lives.

As an example of how this is done in the utilities industry, Jones cites the case of the Pacific Gas and Electric Company (PG&E) in the San Francisco Bay Area, where he lives. PG&E provides its customers with detailed analytics based on their electricity usage. This data is easily accessible through the company's website.

"I'm curious about [my own usage]," says Jones. "I log in, I look at it and it helps me decrease my usage. PG&E [has] given me analytics to get engaged with how I use my power so I can be smarter about it."

Jones argues that embedding health care analytics into a patient-facing Web portal could boost patient engagement. BI tools can pull anonymized data showing trends across people with similar conditions. Patients could then log in and see (for instance) historical information on their blood pressure and heart rate, and compare it against anonymized data pulled from individuals in the same age group and demographic in their region.

Jones suggests that this would not only make patients more informed, but would also tap into people's naturally competitive spirit: "[Patients could say,] 'what does the average look like? What do the healthiest people look like? Hey, wait a minute, I'm below the average, so maybe I need to do something about it!'"

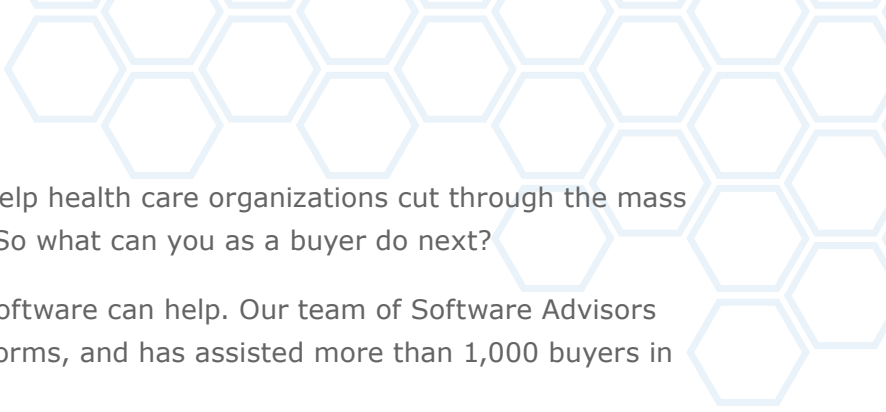
Embeddable BI represents an opportunity for health care organizations to think more broadly—outside the internal boundaries of the organization—about how they can expand and exploit the data they collect. It's essential that analysts and doctors be able to use this data to its full potential, but why not let patients do the same?

"Would that make health care more efficient? Yes," says Jones. "And it's definitely more patient-centric."

Conclusions

Data may be increasing at an exponential rate, but so is the power of the tools available for successfully exploiting this data.

The examples in this e-book illustrate the diversity of BI: We explored combining a super-powerful data processing system such as SAP Hana with an analytical tool, such as BusinessObjects; using a dashboard solution such as iDashboards, which can be deployed quickly and distributed to non-tech users; and using a cloud-based BI system, such as Birst.



There are many other tools available to help health care organizations cut through the mass of big data to reveal actionable insights. So what can you as a buyer do next?

Finding a trusted resource for choosing software can help. Our team of Software Advisors has expert knowledge of over 40 BI platforms, and has assisted more than 1,000 buyers in finding solutions that are right for them.

Here are three things you can do right now:

- **Read [reviews](#) of BI tools written by real users, and discover what your peers think of specific platforms.**
- **Chat with a Software Advice BI expert, who can provide a free consultation and pricing information to connect you with the best BI software for your business.**
- **Take a BI solution for a test drive with a [free demo](#).**

Follow these steps, and you, too can tap into the powerful insights that BI and analytics platforms offer health care organizations.

Created by:

Daniel Humphries

Daniel Humphries is a Market Research Associate covering the business intelligence and IT security markets at Software Advice. He interviews experts, writes reports and conducts behind-the-scenes research into the world of data, with a special focus on cutting through hype to identify practical solutions that work. Prior to joining Software Advice he spent over a decade as a freelance journalist working for major media in the U.S. and U.K.



[Software Advice profile](#)

daniel@softwareadvice.com

[\(512\) 582-2323](tel:(512)582-2323)

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