

# Building a Methodology to Evaluate Spine Surgery Outcomes Using Healthcare Analytics

## HEALTHCARE ORGANIZATION

Large Medical Center

## RESULTS

- Defined and built Spine Registry
- Driving patient engagement through patient portal usage
- Integrated data from a multitude of quality of life surveys
- Developed healthcare analytics platform to measure spine surgery outcomes

## PRODUCTS

- Late-Binding™ Data Warehouse
- Population Analytics Advanced Application – Spine Module

## SERVICES

- Installation Services
- Implementation Services



Back problems are a common issue in the United States with a profound effect on healthcare costs. Consider these facts:

- Low-back pain (LBP) is second only to upper respiratory problems for the number of physician visits each year.
- A small percentage of patients who see a doctor for their back pain will develop persistent, disabling LBP — the estimated cost of which approaches \$50 billion per — year in the U.S.
- Spondylosis, intervertebral disc disorders and other back problems were among the top 20 most expensive inpatient conditions in 2011 across all payers, accounting for \$11.2 billion dollars spent. This figure represents just the hospital's costs for the services and does not include physician fees.<sup>1</sup>
- Back pain is the primary cause of disability in people under 50 years of age.

“The Neurology-Spine team now has a healthcare analytics solution to compare the patient's quality of life pre- and post-surgery. Over time, this data will provide meaningful insights for our surgeons to improve patient outcomes and increase patient satisfaction.

Director, Business Intelligence

Faced with the high cost of surgical spine care in an industry transitioning to value-based payments, a renowned health system is implementing a solution to analyze the effectiveness of its surgical interventions — and improve patient engagement and the quality of spinal care.

## THE PROBLEM OF MEASURING SURGICAL SPINE OUTCOMES

To improve quality and cost throughout the organization, this health system partnered with Health Catalyst to:

- Build a healthcare enterprise data warehouse (EDW)
- Deliver advanced analytics applications that help clinicians on the frontlines of care measure and improve outcomes, and lower cost

Analyzing data in the EDW using Catalyst's key process analysis (KPA) application, the health system discovered that surgical spine care was among one of the highest variable direct cost care process families in the organization.

Neurosurgeons in the health system's spine clinic wanted to analyze the clinical effectiveness of their procedures — both invasive and minimally invasive — and compare them to noninvasive treatment options. To do so, they decided to implement the Health Catalyst Spine Module.

The first step in analyzing surgical spine care outcomes was not technical but organizational. The health system formed a workgroup — a permanent, integrated team of clinicians, technologists, analysts, IT and quality personnel tasked with turning insights derived from data into better clinical outcomes. The surgical spine workgroup consists of a physician, nurse practitioners, a business analyst, data architect, and a representative from patient quality and safety.

The second step was to create a surgical spine registry. Analytics applications provided by Health Catalyst can group patients by CPT, DRG and ICD codes — a complex process since each spine procedure may involve multiple codes. This billing data can be supplemented with clinical data such as medications and stratifiers (age, gender, co-morbidities, etc.) to refine the grouping process, resulting in a more accurate registry.

However, even with this registry in place, the team had a significant roadblock to overcome: They had very little outcomes data to work with. In fact, the healthcare industry lacks a single, accepted, standard measure for quantifying spine surgery outcomes. The team was therefore tasked with:

- Determining the best method for evaluating spine surgery outcomes
- Gathering outcomes data to establish a baseline for outcomes analysis
- Developing a healthcare analytics platform for assessing the effectiveness of surgical procedures

With the ability to consistently measure outcomes, the team would be able to reduce variation in care — and improve quality and cost.

“The ability to integrate clinical, patient satisfaction and financial data is extremely helpful. We are using the latest technology to help providers supplement pain scores with more objective measures to assess their patient’s progress.

Data Architect”

## CREATING AN INSTRUMENT FOR MEASURING OUTCOMES

The health systems’ baseline data consisted primarily of pain scores reported by patients before and after surgery — a very subjective measure of surgical success. Although the team wanted to continue to capture data about how much pain patients experienced, they needed to add more objective measures that would reflect the patients’ functional status, satisfaction and quality of life (QOL). This information would help them understand whether a chosen procedure maximized patients’ QOL.

The team researched and vetted a number of tools and surveys currently used to assess surgical spine outcomes throughout the healthcare industry. These various QOL instruments measure the physical, emotional and social well-being of the patients undergoing treatment for spinal disorders.

Because they didn’t find any of the tools alone to be sufficient, the team decided to integrate several QOL scores to create a more comprehensive evaluation of spinal treatment. Thus far they have integrated four QOL measurement tools:

- Patient Health Questionnaire-2 (PHQ-2) — designed to screen for depression
- Patient Health Questionnaire-9 (PHQ-9) — used for screening, diagnosing, monitoring and measuring the severity of depression
- Oswestry Disability Index (ODI) — designed to assess limitations of various activities of daily living, primarily targeted for low-back patients
- Neck Disability Index (NDI) — designed to measure the impact of neck pain on the patient’s ability to manage in everyday life

The team will also integrate a fifth QOL measurement tool — the EuroQol five-dimensional (EQ-5D) questionnaire — in the near future. The EQ-5D is a general QOL measurement tool, in contrast to the ODI and NDI, which are targeted to specific spinal conditions.

Establishing this measurement framework has enabled the health system to move from qualitative measures to quantifiable assessment using QOL tools. However, before this measurement was possible, the team had to establish a methodology for gathering QOL data that could be smoothly integrated into the enterprise data warehouse (EDW).

## ENGAGING PATIENTS TO ASSESS QUALITY OF LIFE

To gather the QOL data, the team had to engage patients to complete the surveys. For this, they turned to their electronic medical record (EMR) patient portal — integrated with the Health Catalyst Late-Binding™ EDW. The team devised a straightforward, streamlined and effective process to engage patients and collect the data.

Patients coming in to the clinic before their surgical spine procedure use an iPad to log in to the patient portal and complete the survey. Clinic staff are on hand to help anyone who is unfamiliar with using iPad technology. Baseline QOL data is gathered by the staff during an office visit approximately thirty days before the surgical procedure. Due to the nature of surgical spine procedures and the

time associated with recovery and physical therapy, staff engage the patients to complete the survey again at three months, six months, nine months and one year post procedure.

Using this automated, integrated approach for capturing data — as opposed to relying on paper surveys — reduces the inefficiencies and chances for error associated with paper data capture. The digitized information flows directly from the patient portal into the EDW, where it is immediately available for analysis.

The approach has also played an important role in driving measurable patient engagement. Gathering QOL data digitally has created a meaningful way to engage the health system's patients with its patient portal. The percentage of patients activated in the portal is continuing to increase.

## EVALUATING AND ANALYZING QOL DATA

The data capture process has been implemented in the spine clinic and will soon be rolled out to include the patient population of four additional surgeons in a second clinic. The spine team will need to capture a full year's worth of QOL assessments before it has a full spectrum of data.

To analyze this data, the team has worked with Health Catalyst to implement their spine population module that enables them to visualize the outcomes data, evaluate trends and analyze outcomes.

Coupled with the EDW, this healthcare analytics application pulls in data from the QOL surveys and other sources to enable the spine care team to better quantify symptoms, functional status and patient satisfaction associated with their surgical interventions. Not only does it enable the clinical team to see clinical outcomes and trends, but it also integrates this clinical data with financial and patient satisfaction measures such as:

- Length of stay
- Readmissions
- Likelihood of recommending the practice, provider and hospital
- Provider explanation of problem/condition and pain control
- Overall rating of care

The health system's long-term goal for this healthcare analytics platform is to use the physiological, patient and QOL scores to ascertain evidence-based practices that drive improved patient outcomes. This will empower clinicians to reduce variation in care — and improve both quality and cost. 💡

## SAMPLE VISUALIZATIONS

1. Integration of multiple QOL instruments, including depression screening, low back, neck and general measurement tools.
2. Outcomes include integration of financial measures — such as length of stay and readmissions — and patient satisfaction scores.
3. Patients update their health information and take QOL surveys using an iPad at the provider's office, providing automated integration into their EHR via their patient portal.
4. Ability to view information by CPT and DRG codes.
5. Filters that enable data views by a number of variables including admission type, discharge type and affected spinal area.



Figure 1: Dashboard



Figure 2: Readmissions

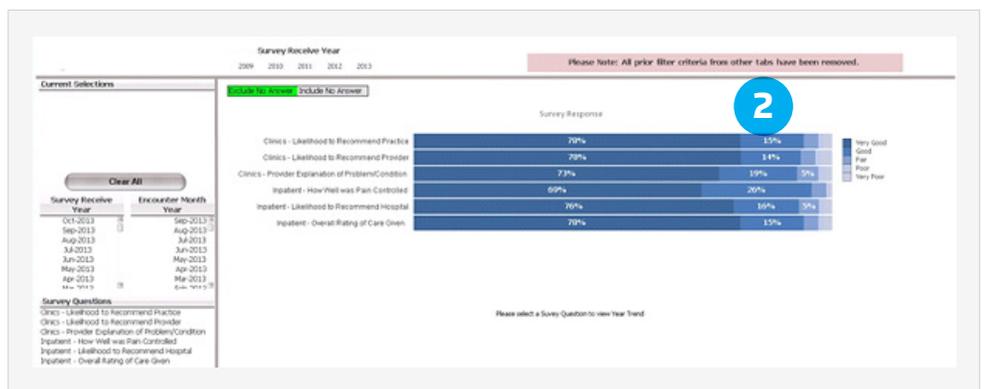


Figure 3: Patient Satisfaction

## References

1. Becker's Hospital Review. "Top 20 Most Expensive Inpatient Conditions" retrieved 11-Nov-13 from <http://www.beckershospitalreview.com/racs/-/icd-9-/icd-10/top-20-most-expensive-inpatient-conditions.html>.

## ABOUT HEALTH CATALYST

Health Catalyst is a mission-driven data warehousing, analytics, and outcomes improvement company that helps healthcare organizations of all sizes perform the clinical, financial, and operational reporting and analysis needed for [population health](#) and [accountable care](#). Our proven enterprise data warehouse (EDW) and analytics platform helps improve quality, add efficiency and lower costs in support of more than 50 million patients for organizations ranging from the largest US health system to forward-thinking physician practices.

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