

# Quality and value in radiology.

The role of analytics in balancing the equation  
and improving outcomes.

## Introduction

What is the definition of value within radiology, and what is the role of business analytics? How can radiologists meet today's challenges while delivering value-based care?

This paper explores these topics and presents real-world examples of how analytics has been used to achieve demonstrable value and financial benefits in radiology while delivering optimal care quality and fostering improved patient outcomes.

## Defining value in radiology

The term "value" is heard every day, but what does it really mean, and how do we get there? The traditional equation

$$\text{Value} = \frac{\text{Quality}}{\text{Cost}}$$

is one way to look at value. By increasing quality and/or decreasing cost, value is increased.

However, a broader look into the three classes of value<sup>1</sup> leads to a more instructive perspective.

### 1. Cost reductions

This is straightforward: reduce costs and you increase value. Obvious strategies include improving efficiency, eliminating unnecessary activities, and utilizing time-saving technologies.

### 2. Decision improvements

Making better decisions and improving the decision-making process by providing access to actionable quality and operational data can increase value and improve clinical and financial outcomes.

### 3. Improvements in products and services

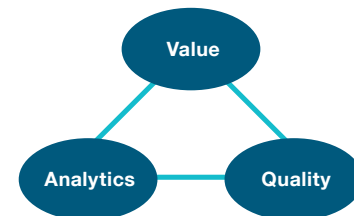
Improving products and services by using advanced and safer imaging technologies and protocols, providing quicker and easier access to patient data, and implementing clinical decision support tools can positively impact patient care and outcomes, thereby increasing value.

## A challenging environment

Challenges faced by healthcare providers today are formidable, driven by intensified competition, new payment models, and rapidly evolving and complex quality reporting requirements. Radiologists face additional pressures including increasing volumes and decreasing reimbursements. These burdens add stress, result in excessive workloads, and contribute to a sense of burnout. In this transition from volume- to value-based care, there's an urgent need for radiology to operate more efficiently and effectively, demonstrate real value, and drive better financial and clinical outcomes.

## The link between analytics and improved outcomes

With these three classes of value in mind, the question becomes: what tools are available to help reduce costs, support better decision-making, and improve products and services? The answer to this question starts with understanding how value, quality, and analytics are linked together to provide insight, direction, and desired outcomes.



## Business analytics and radiology

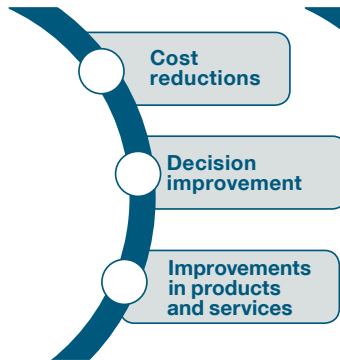
Business analytics/business intelligence (BI) can be defined as a set of techniques and tools to analyze an organization's raw data to produce meaningful and useful information and accomplish three main goals:<sup>2</sup>

- Cut costs
- Improve decision-making
- Identify and develop new business opportunities

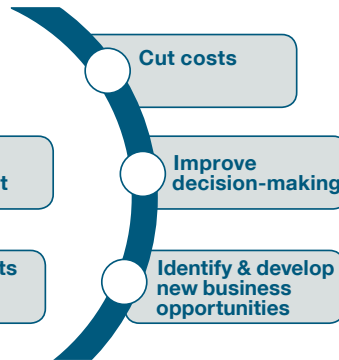
Thus, the three classes of value and goals of business analytics are closely aligned. The logical corollary is that applying business analytics will increase value.

<sup>1</sup> Thomas H. Davenport, Big Data at Work: Dispelling the Myths, Uncovering the Opportunities, Harvard Business Review Press, February 25, 2014  
<sup>2</sup> Ryan Mulcahy. Business Intelligence Definitions and Solutions. CIO. March 6, 2007. (Accessed from <http://www.cio.com/article/2439504/business-intelligence/business-intelligence-definition-and-solutions.html> on July 13, 2016).

## What is value



## What is BI



## Value-based care for radiology

Business intelligence and data analytics support value-based care in many ways. In a complex radiology environment, data analytics must go far beyond evaluating metadata to calculate volume, turnaround time, and RVUs. The narrative of the radiology report is the product of the radiologist. The analytics solutions must have advanced capabilities to analyze text with clinical language understanding to extract concepts and structure from the underlying free text. Analyzing the unstructured report text and extracting data and clinical measurements will reveal a wealth of actionable information that will improve both quality and value, ultimately resulting in better patient outcomes, more efficient service delivery, and potentially more appropriate reimbursement.

## How data analytics can help

- Follow-up recommendations
- Compliance
- Actionable result communications
- Appropriate imaging utilization
- Revenue
- Report quality

## Follow-up recommendations

Identifying overdue follow-up recommendations using analytics and data mining improves patient outcomes and increases revenue. By identifying recommended exams or other aspects of patient care that were not performed, members of the care team can be alerted and actions taken to bring the patient back for his or her appropriate follow-up to avoid delays in care. Recent literature has shown there are high failure rates in medical imaging follow-ups.

For example, a 2014 JACR study<sup>3</sup> showed that 71% of incidentally detected pulmonary nodules were not followed up appropriately. With the ACR's and CMS's increased focus on follow-up recommendations, this becomes a key piece of value-based care. Furthermore, reduction of follow-up failure rates increases revenue as these patients return for needed care.

Enhancing the ability to identify specific measurements within the radiology report can help radiologists compare those measurements in prior studies as well as more easily pinpoint actionable findings that require follow-up.

Moreover, analytics can help improve consistency in follow-up recommendations, thus reducing variance between radiologists. Reducing variability can have positive downstream clinical and financial impact, including reducing inappropriate imaging.

## Compliance

Analytics can greatly ease the burden of complex reporting measures such as MIPS, participation in data registries, and compliance with radiation dose management standards. Attempting to satisfy these requirements manually would be a daunting, if not an impossible, task for most organizations. The ability to quickly and accurately search reports and extract data on specific measures will become imperative.

## Actionable result communications

Failure to communicate is a common cause of medical malpractice litigation. Analytics can identify instances where actionable results were not properly communicated. With this knowledge, individual behaviors, as well as systemic issues, can be addressed. By identifying outliers, e.g., radiologists who tend not to comply with the proper notification requirements, additional quality improvements can be attained and patient care improved.

## Report consistency

Analytics can help identify inconsistencies within the radiology report and, more importantly, across reports. Consistency reduces variability, leading to higher quality, which translates to value.

## Data mining and sequential searches

Sequential search is a powerful data mining tool that allows queries to be generated to evaluate for clinical outcomes and imaging utilization. Sample queries include:

- How many patients who underwent a CT biopsy had a subsequent pneumothorax on a follow-up chest radiograph?
- How many pediatric patients get ultrasound to evaluate for appendicitis before CT?
- How often do emergency department physicians order a CT of the pelvis followed by a radiograph of the pelvis within 24 hours?

Analytics can also be used to identify reports that contain certain phrases that should be avoided, such as “as above” in the Impression section, or “cannot exclude.” With this knowledge, quality improvement initiatives can be implemented, behaviors modified, report quality enhanced, and patient care improved.

## Using analytics to drive value: real-world outcomes

### Appropriate follow-up and revenue capture

- Analysis of pulmonary nodule follow-up conducted at a large private practice showed a follow-up recommendation failure rate of 75%. This translates to a potential annual loss of \$1.3 million in technical and professional revenue that could have been collected had these patients been brought back for their follow-up examinations.
- After performing a manual analysis of its exam records, the University of Rochester in Rochester, New York, was able to recover 153 additional exams associated with follow-ups, thereby capturing additional revenue equal to four times the cost for the clerical staff to perform the follow-up tasks. Automation of recommendation capture using an analytics solution would have tripled the number of recommendations tracked, increasing the value generated (margin/profit) by nearly \$100,000 annually.

### Reduced length of stay (LOS)

- By using analytics, Aultman Hospital in Canton, Ohio, reduced average LOS for patients who underwent inpatient IR procedures by three days by proactively scheduling patients. This resulted in savings of nearly \$360,000 for the hospital during 2014 compared with 2013.

### Reduction in inappropriate imaging

- Aultman Hospital also conducted an analysis of its CT angiography exams from the emergency department to evaluate for pulmonary embolism (PE), identified outliers, and subsequently reduced unnecessary ordering and increased positive rates. This quality improvement initiative resulted in a savings of over \$200,000 for the hospital.

### Critical results communication

- Historically, the Hospital of the University of Pennsylvania monitored critical results manually by

taking a very small sample of reports and reading them individually. Now it uses data analytics with natural language processing (NLP) functionality to monitor all reports for all of its critical results to ensure proper notification and documentation.

### Laterality mismatches

- Elkhart General Hospital in Elkhart, Indiana, now uses advanced analytics to look for laterality errors in its radiology reports. In 2016 alone, it saved over \$27,000 by identifying and correcting left and right documentation errors.

## The path to achieving value

Nuance® mPower™ Clinical Analytics lets you look into your data in new and meaningful ways to uncover actionable information that can improve operational efficiency, increase revenues, streamline compliance, and deliver quality care for optimal patient outcomes. Improving data knowledge is a major step in the transition to value-based care.

HealthCheck is a complimentary service, provided by Nuance, that can help your organization get started with advanced data analytics. Using a snapshot of your PowerScribe® 360 database, HealthCheck will include an analysis of your organization’s quality and performance metrics, including failed follow-up recommendations, LOS analysis, compliance outliers, reporting errors, evaluation for imaging overutilization, and more. Obtaining this baseline information and applying advanced analytics can drive operational and clinical excellence, as well as improve patient and financial outcomes.

To learn more about Nuance Healthcare solutions, please call 1-800-805-5902 or visit [nuance.com](http://nuance.com)

### Contributing Executives:

#### Woojin Kim, MD

Musculoskeletal Radiologist  
and Chief Medical Information Officer  
Nuance Communications

#### William Boonn, MD

Cardiovascular Radiologist  
Adjunct Assistant Professor of Radiology  
Hospital of the University of Pennsylvania  
and Chief Medical Information Officer  
Nuance Communications

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