

## Business Intelligence: Mining for Information

Lou Pinella, the Cubs manager, is chomping on his unlit cigarette. It is the bottom of the ninth inning, and Fenway Park is a screaming madhouse. It is game seven of the 2007 World Series and the Cubbies have a one-run lead over the Boston Red Sox. With two men out, the bases are loaded with Coco Crisp on third, Julio Lugo on second, and Kevin Youkilis on first. The Cubbies are just one out away from their first championship since 1906.

David Ortiz, “Big Papi,” steps up to the plate. A base hit wins the game while an out ends a century of misery for the fans on the north side of Chicago. Pinella walks to the mound to speak with Ryan Dempster, the Cubs closer, about how to pitch to Ortiz. The infielders crowd around to get instructions from Pinella on where to position themselves to best field any balls hit by Ortiz. Pinella barks out his instructions and walks back to the dugout. How does Pinella know what to say to his team?

Every major sports team utilizes business intelligence to guide how they approach each contest. In the example above, the Cubs manager relies upon a huge database of statistics that is analyzed to provide insight into every imaginable situation. For example, Ortiz, a left-handed hitter, hits most of his balls to the right side of the infield. Therefore, many teams line up their infielders shifted to the right side of the dia-

mond. This analysis does not guarantee success, but it does increase the probability of a desired outcome—in this case an out for Ortiz and a championship for the Cubs.

After the introduction of inexpensive personal computers and database software, sports teams began collecting and analyzing data to obtain up-to-date “tendencies” on opposing players. The Oakland Athletics pioneered business intelligence in baseball. Their effort is well documented in the Michael Lewis book (2003) *Moneyball: The Art of Winning an Unfair Game.*

### Reducing Crime

In Richmond, Virginia, business intelligence techniques provided the police chief with valuable information about crime patterns. Software helped analyze neighborhood demographics, payday schedules, weather, traffic patterns, and sporting events. This work identified a high rate of crime in a Hispanic neighborhood where fewer people use banks, and where people leaving check-cashing services were easy targets for robbers. The police chief deployed extra police on certain days at specific locations based upon the analysis. This effort delivered a 20% reduction in crime in Richmond last year (Lohr, 2007).

With the expansion of information technology applications throughout healthcare, data is now collected on

numerous aspects of care. Electronic medical records record clinical patient information that greatly transcends basic demographics. Scheduling applications build databases of referral patterns and service use. Computerized provider order entry collects detailed data on physician ordering patterns. In fact, every information technology application stores valuable data that, when intelligently analyzed, offers insight into processes and their delivered outcomes.

### Expanding Care Focus

Linking databases across applications provides a view of care delivery that is broadly patient centered and expands beyond the narrow focus of a single application. For example, the care a patient receives for an acute myocardial infarction includes services provided by physicians, nurses, and cardiac rehabilitation therapists. The overall care delivery process encompasses everything from the emergency department visit, to care in the coronary care unit, to rehabilitation on the cardiology floor, to discharge from the hospital.

Business intelligence techniques allow organizations to evaluate each of these areas on a variety of factors while also linking the results to obtain a more complete picture of the entire care stream. A hospital may find that a shortage of cardiac rehabilitation therapists on weekends leads to delayed discharges (increased lengths of stay) for patients admitted late in the week. Due to the lack of available beds, patients in the coronary care unit on a Monday linger there longer due to the unavailability of rehabilitation beds on the cardiology floor. In addition, analysis of physician ordering patterns may help identify those physicians that fail to order timely and appropriate echocardiograms.

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## Four Steps of Business Intelligence

Successful use of business intelligence requires four steps:

1. detailed documentation of care processes,
2. evaluation of available data sources,
3. linking of data sources to produce reports (e.g., scorecards) that offer actionable monitoring information, and
4. modifying processes based upon that information.

As monitoring and improvement activities never cease, steps three and four are continuously repeated, while steps one and two are completed periodically.

By documenting the care process, organizations discover how activities (i.e., process steps) are linked, and what data might be useful to monitor both the activities and the overall process. Review of transactional applications provides insight into what data is available from those systems (e.g., EMR, scheduling). Further analysis then identifies what available data is deemed useful for monitoring activities and processes.

Just identifying the useful data is not enough. Business intelligence requires the proper analysis and presentation of the data to managers so that they can easily evaluate and act upon the information. Processes and their underlying activities must be tightly linked to the information presented in business intelligence scorecards and reports. Functioning as a surveillance tool, the scorecard may utilize colors (e.g., green=good, yellow=caution, red=warning) and easy-to-interpret graphics to convey information and focus the manager on the items that require attention.

Although scorecards have been used for many years in various industries, the new opportunity for healthcare is the access to a greater breadth of databases filled with clinical and transactional information covering a wide range of activities.

Organizations that formerly needed to invest significant resources to monitor physician ordering patterns, use of staff resources, or clinical outcomes can now obtain accurate data that links all

three. Most importantly, the collection of the data is now part of the regular transactional processes that are a normal function of hospital activities. Additional resources are only required for analysis, a small amount when compared to the cost of previous data collection utilizing chart review or time-motion studies.

As healthcare embraces electronic medical records and other digitally based tracking and record keeping, business intelligence offers a valuable tool in managing towards improved quality of care and financial outcomes. Organizations that embrace business intelligence will truly be able to measure and then successfully manage. **IPSQH**

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## FURTHER READING

- Chaiken, B.P. (2007, May/June). Patient flow: A powerful tool that transforms care. *Patient Safety and Quality Healthcare*, 4(3), 6-7.

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