It is good to arrive at a common understanding of what “Business Intelligence” means since we hear “Business Analytics” (BA; also understood as Data Analytics) as frequently. Do these two terms have the same meaning?

Tim Biskup, Director of Customer Relationship Management, Progressive Business Publication, described “Business Analytics” as the collective set of methods and tools used by analysts to intelligently consume intelligence towards enabling smarter decisions about the business moving forward.

To Mark van Rijmenam, CEO / Founder of BigData-Startups, “Business Intelligence” tells you what happened while “Business Analytics” is looking ahead to understand what might happen in the future.

It seems fair enough, therefore, to say that Business Intelligence (BI) is about past and current data which help inform on what to do about present operational concerns while Business Analytics (BA), especially Predictive Analytics, forecasts the future.

In other words, BI is about what happened and what is happening; BA is about what will happen.

Hospitals use BI solutions to gain insights from customer, financial and operational data to make more informed decisions. The ultimate goal is to achieve efficiency, effectiveness and cost savings.
Ways in Which Business Intelligence Improves Your Hospital’s Bottom Line

Customer Satisfaction

Patients are a hospital’s customers. It would increase profits to discover patient behavioral patterns, understand what they want, when they want it and how they want it, and deliver exactly that. Admissions, re-admissions and ward experiences can be improved by using past and current data to gain customer insights.

Case Study 1

Hypertension suggests risk of stroke or heart attack. Through the use of EMR, NorthShore University Health System was able to better identify hypertensive patients who were undiagnosed or at risk, then created algorithms to assess which patients needed additional follow-up. Since the new program went live, the system has been used to identify, test and diagnose over 500 patients with previously undiagnosed hypertension.

Case Study 2

Inventing new healthcare practices could lead to lower costs. Seoul National University Bundang Hospital (SNUBH), with about 1,800 beds and 3,100 medical workers, has been able to reduce the usage of antibiotics before surgery by using in-memory computing technology to improve pre-operative care.

Case Study 3

A single healthcare platform simplifies IT and lowers total cost of operation. MemorialCare Health System in Fountain Valley, California, a $2.2 billion not-for-profit integrated health system that operates six hospitals and 200 care sites, also uses in-memory computing technology to analyze massive data sets speedily and provide a single data mart to handle transactions and detailed questions such as “Which patients received drug X last year?” and “What is the average dose and duration of a particular drug?”.

Resource Optimization

One of the most obvious expenditures is inventory. Excessive inventory often chips away at a hospital’s financial health. A BI solution with a good dashboard can support hospital administrators in assessing what needs to be replenished and when. Costs can also be cut by sharing information, re-directing patients, and allocating resources most optimally. Our case studies provide examples.

Case Study 4

Hospitals can use BI to aid coordination and improve bottom lines. The High Value Healthcare Collaborative (HVHC), a collective of 70,000 physicians and 7 million patients across the U.S, found contrasting costs and processes for total knee replacements among four hospital sites, with one site performing significantly better than the others. When the site’s best practices were shared with the other three, all four cut their lengths of stay for knee-replacement procedures by an entire day.

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Fraud and Anomaly Detection

Frauds can exist in the form of claims for patients who do not exist or for a medical procedure which is more expensive or not performed at all. By deploying BI to study people networks and genetic algorithms, it may be possible to detect potential frauds and anomalies.

Customized Presentation

BI’s presentation capability can enhance communication by making it faster, even instant, and highly interactive. It is able to display online analytical processing and generate insights in different ways to make them easy to grasp and to utilize. Dashboards allow users to customize the information they would like to monitor and display.

Disease Identification and Handling

BI can be used to identify and treat diseases by improving diagnosis.

Healthcare systems are huge, if one considers that healthcare could start in the research laboratory and reach beyond secondary caregivers.

Data could give insights to solve problems but data itself is getting more complex. What problems and challenges do we face? We will apply a simple approach to discussing this difficult topic.

Players in Healthcare

How many persons are involved in the care of a single person? Many, though the players are not always visible or even detectable. Here’s a pictorial representation:

There is a wealth of data on the benefits of Business Intelligence. We have only glimpsed through a window at an ocean. To reap the most out from the benefits of Business Intelligence, we will need the key fundamental resource – proper and quality data.

Continuation of Ways in Which Business Intelligence Improves Your Hospital's Bottom Line

Many persons could have some sort of information about the patient. However, they do not always share this information with one another. In the absence of a common data platform, the caregiver may not have the chance to share with the attending physician that the patient tends not to finish prescribed medicines while the anesthesiologist may not be able to inform the external specialist or pharmacist of a peculiar drug allergy.

Mobile app developers, lifestyle and fitness device suppliers have become part of the healthcare systems. The human variables and the way they interact with one another change all the time. How does one keep track of all these?

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Continuation of The Harsh Truth: Healthcare Data is Complex ... Challenges Exist

**Different Types of Data on Multiple Devices**

Healthcare data can be structured and unstructured, inconsistent, high volume, and perhaps, unstable, in a complex and ever-changing environment.

The most basic type will be the patient's personal health record. Patients in developed countries presumably practice a high degree of self-management in this area. Even then, the personal health record is often mistaken for the medical record. This is the difference:

The medical record is a complicated entity with components including the following:
- Patient's identification details
- Doctor's narrative and notes
- Consent for treatment
- Admission nursing history
- Family history
- X-ray and other digital/image records
- Medical diagnosis
- Ward records
- Treatments and drugs
- Operative procedures
- Specific instructions or referrals
- Discharge plan and summary

![Medical Record vs. Personal Health Record](chart.png)

Other than records kept by healthcare providers, wireless remote monitoring devices and applications also generate important data along the continuum of care. Some information is also created and trapped on social media such as Facebook, Twitter and whatsapp.

Could healthcare providers mine and download patient-related data into the central patient information system at sufficiently low costs? How could patient privacy and Internet security be upheld?

In addition, tele-conferences between the physician and patient may not necessarily translate into information which could be analyzed together with text data. Medical imaging data posed another challenge. It is estimated that medical image archives are growing by 20%-40% each year.

**Multiple Systems**

Informatica highlighted in their White Paper (November 2013) titled “Healthcare Data Management for Providers” that fragmented data across multiple systems made it difficult for master data to be possible. This resulted in key operational problems such as inaccurate reporting for quality improvement which compounded the problem of collecting master data.

Robert J. Szczersba, CEO of X Tech Ventures, wrote in his 19 August 2015 article on www.forbes.com that “without interoperable technology in place to manage and analyze this data, much of its value will be lost.” Szczersba believed that much of the information became mired in separate “silos” while medical records remain incomplete with inaccuracies. He exhorted patients to become their own health advocates, demand access to their health data and empower themselves to improve their health.

**Data Errors**

A stroke can be labeled a “cerebrovascular accident,” “cerebral occlusion,” “cerebral infarction” or “apoplexy.” Do different entries lead to different analysis or outcomes for patients?

In a CompAct Electronic Newsletter (Issue No. 42/February 2012) titled “Why Is Health Care Data So Challenging?”, David Cusick and Nathan Mathews reasoned that changing code schemes need to be updated and changed regularly to ensure data integrity. It was reported that as ICD (International Classification of Diseases) codes get assigned to cases at the point of care, their error rates can range from 20% to 50%.

Cusick and Matthews also stated non-standard time dimensions as another unstable data field. Different healthcare personnel have different ways of interpreting and entering dates. For example, the date supplied in the data may be based on the date the medical cost was incurred rather than the date the claim was paid. In some cases, the gap could be as long as a year.

Data errors insidiously enter analytics. The problem of “garbage in, garbage out” makes it very challenging to get useful information.
Problems and challenges exist but the trend of growing healthcare data is here to stay. All in the health ecosystem—organization or individual, public or private—have a role to play in balancing the risks and rewards of harvesting and harnessing the data.

A Hospital’s Roadmap to Business Intelligence Success

What are the key targets to hit in order to achieve BI success? You may wish to consider the following:

<table>
<thead>
<tr>
<th>Goals</th>
<th>Set strategic goals for the short term</th>
<th>Set strategic goals for the long term</th>
<th>Get stakeholders’ agreement on BI goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>Assess current collection and analysis</td>
<td>Assess quality of data</td>
<td>Integrate data to create a quality data warehouse</td>
</tr>
<tr>
<td>People</td>
<td>Select best data experts</td>
<td>Select BI drivers with enterprise-wide visibility and empowered to make decisions</td>
<td>Create a dedicated department with specific projects and timelines</td>
</tr>
<tr>
<td>Platform</td>
<td>Scrutinize options for BI platform</td>
<td>Choose BI platform most suitable for your enterprise</td>
<td>Test and refine</td>
</tr>
</tbody>
</table>

Measure and monitor for outcomes
Re-align and refine

These are further pointers to build up your roadmap:

**Goals**

A mix of top-down and bottom-up design approaches is necessary to obtain enterprise-wide acceptance, understanding of individual and group roles, and ultimately, success.

Strategic plans should include key areas such as organization and system change management, quality assurance, risk management and communications.

The following customer’s diagram cited in Guy Garrett’s presentation titled “How to Create a Business Intelligence Strategy” at the SAS Global Forum 2012 may be rather useful:

**Stakeholder Management Subject Matter Analysis**

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Data

It would help to read this segment in conjunction with our article on “The Harsh Truth: Healthcare Data is Complex … Challenges Exist!” For analytics to be possible, hospitals have to go beyond clinical repositories which do not allow analysis to function effectively.

To consider are the databases in a hospital which could be integrated into a single warehouse. A preliminary list would include the following:

- EMR
- Inventory system
- Ambulatory
- Surgery
- Radiology
- Pathology
- Claims
- Financial system
- HR system

To create a data warehouse that works, stakeholders should be clear on reporting requirements, as well as technical ones.

Reporting requirements:
Reports are required for angles ranging from financial, operational, inventorial, logistical, EMRs, claims and billings to customer service.

Technical Requirements: If your hospital seeks flexibility in its reporting or BI tool choices, keeping this layer de-coupled from your integrated view of data will give you the option to make changes later on. Relational databases offer flexibilities in several areas.

A hospital’s data will outlive its choice of reporting tools, hence storing integrated data in the database layer is a way to design for future needs.

People

BI is a direction and a trend which is unlikely to be reversed. It is not hard to believe that data experts of different sorts will be as necessary as physicians. Data personnel should possess strong analytical skills with an in-depth understanding of how health data is used. Much more can be said, but it is a topic we can explore again another time.

Platform

The platform could be very complex in the back-end, very different from the presentation-end. But in visual representation, the parts make up a neat integrated whole:

In terms of qualities, you will need at least the following:

- Standardize-ability
- Adaptability
- Scalability
- Secure
- Ensure accuracies
- Maintenance-ease

Conclusion

Building a BI seems daunting. But with fortitude and patience, combined with a great roadmap, we will reap the rewards of the system.