

How an Enterprise Data Warehouse Can Make for Happier Patients, More Productive Staff, and Healthier Bottom Lines

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For healthcare systems, mining data and analyzing information to drive decisions has presented its share of challenges. From community hospitals to regional health systems, it is a story with an all-too-familiar theme:

- Data tends to exist in departmental silos and is not easily accessible for analysis by all who want it.
- Information is not always readily available when people need it the most.
- When data is available, it might not provide the most up-to-date snapshot of financial, clinical, or other information.
- An organization-wide data governance structure often is lacking, leading to potential issues with accuracy of information.

In short, many hospitals and health systems find that their internal efforts to make data-driven and analytics-based decisions are limited by their organizational and technological realities.

But the good news is it doesn't have to be this way. Increasingly, with the advent of the healthcare enterprise data warehouse (EDW), health systems are able to gain greater access to information in ways that previously were unimaginable. An EDW aggregates and organizes data from throughout the entire organization. End users with access to the EDW can analyze the data to gain deeper insights and create information-rich reports across the financial, administrative, clinical, and research functions.

This access to information in near real time and the highly organized manner in which it is presented amounts to a new level of healthcare business intelligence that empowers hospitals to improve decision making from the bedside to the boardroom. As a result, business leaders, financial managers, physicians, and clinicians can be proactive on a daily basis, making decisions that can influence and direct the organization's future course in a positive manner. To gain deeper insight into how this higher level of business intelligence brings significant value in terms of efficiency and cost savings, it is worthwhile to explore the amount of time and resources that many hospitals and healthcare systems are expending now to gather and analyze relevant data.

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Challenges of data aggregation and analysis in the current environment

End users – department heads, physicians, financial analysts, and many more who rely on data – typically face two major roadblocks: 1) they do not have direct access to all the data they need to analyze information to impact their daily decision making; and 2) they do not possess the required skillset to manipulate and analyze organizational data to create reports themselves. Therefore, end users must rely on business analysts to aggregate data and

provide them with reports on the information. From the report developer's perspective, he or she faces mounting pressure to provide timely reports of relevant information. Yet, report developers often do not clearly understand all the information that might be helpful and insightful to end users. Compounding the challenge for the report developer is the fact that much of an organization's data is not easy to obtain, as it resides in disparate departmental source systems, the intranet, electronic medical records system (EMR), spreadsheets, and other files. Report developers cull the source systems to generate reports that are e-mailed to end users daily, weekly, or monthly. This unwieldy, lengthy process results in hospital decision makers not having the information they need when they want it to plan for better care and reduced costs.

Beyond these process difficulties are business repercussions. One needs to look no further than the new world of pay-for-results versus the fee-for-service model as evidenced by the introduction of Value-based Purchasing (VBP) from the Centers for Medicare & Medicaid Services. A timely report on VBP scores might show specific process of care or patient experience measures in need of improvement. If this information is readily available, steps can be taken immediately to improve both clinical outcomes and patient satisfaction. If such information is delayed, the health system loses valuable time to make decisions that can increase its score and could mean less earn-back from Medicare.

Additionally, because data resides in systems driven by individual departments, data governance issues arise. Inconsistencies in definitions used to identify patient gender, specific procedures, and

processes become commonplace. For example, one department's system may refer to male patients with a numeral "1" while another may use "2". Such inconsistencies can lead to reports being generated that misidentify gender information. This means data might not be fully accurate, and end users might not even be aware the discrepancy exists. In the absence of an enterprise data governance structure to establish organization-wide data definitions and guidelines, an enormous amount of manual effort is required to verify and reconcile data.

An EDW solves the challenge of aggregation and analysis by providing an underlying data model to organize organization-wide data, then making it available to all those who need and want information for daily decision making. Further, the EDW implementation presents an opportunity to create a standard for data governance, which serves to further increase the quality of the data that is inputted into the EDW.

Three real-world examples of cost savings and patient satisfaction

To get a better sense of how an EDW can lead to more timely and informed decisions that contribute to a return on investment, here are three ways a major health system relied upon its EDW capabilities to reduce costs and improve patient satisfaction.

Analysis available in drill-down capabilities of the EDW identified excessive ordering of lab tests from specific departments and physicians.

Redundant laboratory orders

Redundant lab orders were becoming a costly proposition for a hospital system, amounting to nearly \$1 million annually in unnecessary costs. Prior to the implementation of its EDW, data was not easily available to monitor and analyze the cause of the problem, i.e., reasons for multiple lab orders and from where the redundancies emanated the most. Analysis available in drill-down capabilities of the EDW identified excessive ordering of lab tests from specific departments and physicians. To deal

with the problem, an education program was developed to mitigate repeat lab orders, and reports were routinely reviewed to monitor usage and ordering patterns. Through a combination of regular monitoring and proactive education, lab charges fell by more than 7 percent.

Average length of stay

Analysis conducted through EDW reporting identified nearly \$200 million in costs associated with patients staying beyond their expected length of stay in a single year. To address the situation, organization leadership launched an initiative to bring down the average length of stay, readmissions, and average cost per visit. Within the EDW, a subject area was created to analyze the average length of stay impact on ancillary services not available on weekends. Additionally, a dedicated portal was created to monitor and manage length of stay data. Because the EDW gave the health system more knowledge to improve processes, readmissions dropped 7 percent in the first year, followed by 8 percent in the second year. The average length-of-stay costs dropped by more than \$80 million.

Patient satisfaction

A major hospital system discovered through EDW data analysis that it faced a few challenges:

- Low patient satisfaction scores
- Lack of accountability
- Physician unresponsiveness

The capabilities of the EDW enabled the hospital system not only to identify it had a problem, but also to determine the causes. The organization developed an accountability and reporting program aimed at improving scores and involving stakeholders in the process. Here is how the program worked:

- The EDW included a dashboard with views for department chairs and division heads to monitor patient satisfaction in nearly real time and identify top and bottom performers.
- The Chief Medical Officer held the chairs responsible for satisfaction levels. The chairs were given a view of the dashboard and top and bottom performers so they could create strategies to improve scores and target the bottom performers for improvement.
- A transparency campaign was launched for the chairs to share each other's data. Results from all departments were regularly discussed in CMO and chair meetings, with an emphasis on improvement and accountability.

As a result, it achieved double-digit percentage increases in patients rating their experience at the highest level (9 or 10).

EDW provides analytics for everyone

The power of the EDW lies in its ability to centralize data from across the healthcare organization – including financial, administrative, clinical, and research data – and then organize it in an easily accessible manner. The ability to analyze this information in near real time empowers decision makers at all levels to make more informed decisions. Here is a sampling of departments/areas that benefit from an EDW on a daily basis:

- Finance
- Quality
- Nursing
- Revenue Cycle
- Clinical
- Business Planning and Development
- Resource Management
- Medical Records Management
- Case Management

Decision makers and end users are able to leverage an EDW for proactive decision making through the use of prebuilt content and dashboards, drill-down features, and specialized queries. They are able to access information from their computers when they want and need it. Here is a snapshot of how it works:

Prebuilt content and dashboards for easy access to information and reports

High-level and organization-wide reports are generated daily to provide a quick view of performance across the entire hospital or health system. Information is available on a broad range of indicators, such as revenue cycle, patient experience, clinic quality, patient population analysis, and much more.

Drill-down features for deeper analysis and to determine areas for improvement

Users have the ability to dig deeper into specific areas to determine the root cause of performance issues and identify where improvements can be made, even down to the level of specific physicians and departments. This enables end users to be proactive and quickly create

improvement plans that have a direct impact on quality of care and revenue. For example, if costs in a nursing unit rise significantly, drill-down features enable the end user to determine why.

Specialized queries to expand the knowledge base

Those with access to the EDW can run their own queries to seek more information beyond what is available in reports and drill-down features. This often is referred to as an ad hoc capability. For example, if a decision maker wants to take a look at mortality rates, queries can be run to determine mortality rate trends and examine the factors influencing them. Decision makers can also run queries for other functions that might not normally be top of mind, e.g., queries could be made to help a healthcare system make a more informed decision about investing additional capital into its maternity ward vs. its oncology department.

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Clearly, there are tremendous savings and efficiencies that can be realized from an EDW. It is important to note that even for hospital systems relying on a majority of data source systems interoperating within their organizations, an EDW can be implemented in a manner that can contribute to significant financial returns. An EDW truly maximizes the organization's business intelligence, empowering end users and decision makers to contribute to increased profitability, higher-quality outcomes, improved patient satisfaction, enhanced cost effectiveness of new treatments, and so much more.

About the Author

Jyoti Kamal, Ph.D., is president of Health Care DataWorks, Inc. (HCD), where she is one of the key visionaries behind the technology that became the foundation for KnowledgeEdge™. Leveraging her deep business intelligence expertise, she helps guide the strategic product direction at HCD and she assists clients in developing strategic healthcare business intelligence roadmaps leading to greater value and return on investment. Kamal is one of the company's founders. A foremost expert in healthcare analytics and speaker on all aspects of an Enterprise Data Warehouse, Kamal has more than 15 years' experience as a healthcare IT executive.

About Health Care DataWorks

Health Care DataWorks, Inc., a leading provider of business intelligence solutions, empowers healthcare organizations to improve their quality of care and reduce costs. Through its pioneering KnowledgeEdge™ product suite, including its enterprise data model, analytic dashboards, applications, and reports, Health Care DataWorks delivers an Enterprise Data Warehouse necessary for hospitals and health systems to effectively and efficiently gain deeper insights into their operations. For more information, visit www.hcdataworks.com.

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