HIMSS Clinical & Business Intelligence Community

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transforming health through IT

Bridging Non-Traditional Data Sources into Meaningful Decision-Making

Introduction

Today, the massive volume and complexities of health care data generated from disparate unconnected, systems require sophisticated information technologies for storing, aggregation, and analyses. Despite the corresponding increase in the use of computers to capture, store, and retrieve the information to meet these requirements, a great deal of complexity exists in the process of the actual collection, and the goal of reusing the data for multiple purposes often remains elusive. Data-driven healthcare decision-making is possible only when individuals have the analytic tools and appropriate view of information to determine the most effective paths to choose.

Challenges, Issues, and Barriers

Those who work with data tend to think in structured, linear terms. Healthcare data are not that way. It is both diverse and complex, making linear analysis ineffective. Here are a few of the various challenges, issues, and application areas that impact utilization.

- **Disparate sources**. Healthcare data resides in multiple electronic systems. The data comes from within the organization using different source systems (e.g. EHR, financial, human resources), but also outside the organization (e.g. insurance claims, air quality, census data). Aggregating these data into a single, centralized platform is needed to make data accessible and actionable.

- **Disparate formats**. Healthcare data also occurs in different formats (e.g. structured, unstructured, free text, numeric, scanned paper, and multimedia-digital pictures, videos). Sometimes the same data exists in in different formats depending on the system (e.g. dates, degree Celsius vs Fahrenheit, inches vs centimeters).

- **Disparate quality**. Data quality issues often overtake the use of analytics and business intelligence. The lack of quality data is one of the key factors impacting the results from analytics. It is unfeasible for an organization to resolve all their data quality issues quickly. More likely, data quality issues get addressed as part of a phased approach.

- **Standardization**. As electronic systems and natural language processing improve to support mapping to structured taxonomies (SNOWMED CT, LONIC) and clinicians/users become trained to standard workflows, we should see a trend toward more and better data for analytics.

- **Data management**. Because healthcare data are so uniquely complex, it is clear that traditional approaches to managing data will not work in healthcare. A different approach is needed that can handle the multiple sources, the structured and unstructured data, the inconsistency, the variability, and the complexity within an ever-changing regulatory environment.

- **Rights and access**. Privacy of records and use of patient information is also an obstacle for data mining in healthcare. A sizeable number of records are required for data mining to be accurate and actionable. Healthcare records are private information and patients have the right to opt-out or refuse their information to be shared with care providers and researchers. Yet, those records are needed to provide effective treatment and prevention of diseases.

Use Case Examples

This paper presents an approach to bridge the discussions between the CXO suite who are seeking answers to key strategic questions and the practical application of understanding the sources and types of data needed. Providing more than a hope and promise, this structured process is intended to answer the important questions that impact your business by providing a list (see APPENDIX A) of public data sources you may want to consider and use case exemplars (see APPENDIX B) that demonstrate strategic vision through practical application.

Facility Expansion

As healthcare organizations and providers seek to expand healthcare services to underserved areas while also taking on risk-based contracts, data management is no longer merely a reflection of your organization's administrative competency, but rather a strategic differentiator that can mean the difference between success and failure. The Facility Expansion Use Case describes the variety of data needed to predict sufficient demand for services and market capacity for a new primary care facility.

Population Health

As our healthcare system transitions from fee-for-service to fee-for-value and risk-based models, and providers go at-risk in payment models such as accountable care organizations (ACOs) in the Medicare Shared Savings Program (MSSP), commercial ACOs, etc., it becomes very important for them to identify their high-risk patients and undertake interventions to manage these patients. This entails managing the patients effectively both in the ambulatory care settings as well as the hospital. The Population Health Use Case identifies various initiatives to undertake in a population health campaign and the leadership that would be responsible to impact these use cases, and then delves deeper into the disparate sources of data that are required, and the best approach to locate them.

Workforce

Labor represents the largest part of healthcare systems operational budget, and nurses account for the highest proportion of direct care providers, making them the largest single labor cost for healthcare systems. A clear and compelling case has been made for the association between nurses and nursing care with clinical, quality, and financial outcomes. The Workforce Use Case brings forth the several questions. How to use data to best coordinate the assignment of a nurse to a patient based on the patient's specific needs? What are nurses' factors (education, credentials, certification or experience) that should be considered to achieve better patient outcomes? Data sets, sources, and data elements from disparate sources (EHR, staffing & scheduling, human resources, etc.) are described to answer these important questions.

CONCLUSION

The demand for big data is skyrocketing because of the competitive advantage big data insights give to organizations. One of the characteristics of big data is that it allows you to bring together different types of data for analysis. There is a growing list of new types and sources of data coming from many directions. The Internet of Things, for example, now makes it possible to gather data from any device that you can connect to the Internet, such as mobile phones, personal devices, and safety belt use in automobiles. Patient data – such as genomics as well as patient reported data (personal goals) – provides a standard way to monitor disease progression, therapeutic response, and outcomes and/or symptoms of a population. The number and types of alerts from physiological monitors, ventilators, IV pumps, smart beds, and call lights are being used to ensure proper use of devices and the health and safety of patients.

Of course, the larger and more diverse the data sets, the harder it is to capture, curate, store, transfer, and visualize the data. However, this opens up new possibilities for analytics and the ability to uncover more meaningful answers to complex business questions.

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