BUSINESS INTELLIGENCE: CRITICAL VEHICLE FOR OPTIMAL RESULTS IN HEALTHCARE

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ABSTRACT

Across the healthcare landscape incredible advances continue to evolve for the development of a digital healthcare system that envisions the delivery of high-quality care while minimizing medical costs. The paper examines the leading role of Business Intelligence in the deployment of a robust healthcare infrastructure, based on its capability to coordinate services, reduce costs and optimize performance. Some questions for further study are also comprised.

INTRODUCTION

The healthcare industry has dramatically been re-organized in recent years. Main contributors to this transformation are considered the enacted legislation and the technological inventions that concomitantly emerge to accommodate new industry directions. The paper objectives encapsulate Legislation, Transition, Clinically Integrated Networks, Business Intelligence, Data Analysis, Data Integration, Technology Compilation, Security, Violations, Outcomes, Performance Metrics, Inhibitors, Astute Measures, and Future Directions. The research type is purely descriptive.

LEGISLATION

The **Health Insurance Portability and Accountability Act (HIPAA)** came into effect in 1996 and enforces a set of Privacy and Security Rules for the protection of *confidentiality, integrity*, and *availability* of health information from fraudulent activity. Yet, HIPAA violations are not considered criminal. Therefore, they are prosecuted under civil statutes. [5]

The **Health Information Technology for Economic and Clinical Health (HITECH) Act**, enacted in 2009, advocates the *meaningful use* of Health Information Technology, while it highlights the significance of Health Information Exchange as its indispensable function. To gain broad acceptance, the Act provides enticing incentives in the form of payments to qualified participants, such as healthcare providers and stakeholders. As mandated, meaningful users need to prove that, among other things, they possess a certified EHR framework that is sufficiently agile to seamlessly exchange health information across medical boundaries. [3] This law also mandates stricter data protection rules, aiming to improve patient privacy and data security, while privacy breaches are considered criminal. [5]

TRANSITION

There is a spectacular transition that is currently diffusing the medical field. Thus, the traditionally solidified fee-for-service structures become incrementally outdated and obsolete, substituted for a *value-based* prototype that eventually evolves, concentrating on *care quality* and *cost-effectiveness*. [6]

CLINICALLY INTEGRATED NETWORKS (CINs)

The Healthcare reform enforces a new trend: The advanced *coordination* in health services, which is expected to contribute immense value to the overall healthcare performance, with substantive impacts on a variety of fronts. In this sphere, the broad range of clinical stakeholders, such as hospitals, physicians,

and providers are required to collaborate their efforts through the establishment of sophisticated systems called ***Clinically Integrated Networks (CINs)*** with focus on their individual Population Health Management, yet, in complete accordance with industry objectives. [7]

BUSINESS INTELLIGENCE

Business Intelligence comprises the *wide spectrum of digital communications* that organizations engulf in their mission to enhance their services, achieve competitive advantage and differentiate themselves in the marketplace. Functionally, Business Intelligence aims to *elaborate raw data* acquired from external sources, and subsequently compose succinct, yet, cohesive organizational records, thereby becoming organizational assets. To attain this objective, Business Intelligence activates the specific harvesting tools of ***data mining, online analytical processing, querying,*** and ***reporting***. [2]

DATA ANALYSIS

Conceptually, Population Health Management reflects the global view of network population health down to the individual patient health. In this context, Business Intelligence should be geared to achieve four milestones. **Network Health Analysis**: Population Health Analysis constitutes the fundamental component in the inter-operability of Business Intelligence structures. In the initial stage, it is vitally important to evaluate health trends and cost implications within network population. Thus, identifying chronic condition indicators, quantifying condition risk factors, and predicting condition treatment costs, are steps in this process. To exemplify: What is the population percentage that is diabetic, and what costs are predicted with respect to cardiology, endocrinology, and/or other services? [7] **Risk-based Cost Analysis**: Next, a risk-based cost analysis should be performed, while patients should be classified by risk degree. As a general rule, high-risk patients bear responsibility for the greatest costs, especially when they are hospital admitted. [7] **Performance Analysis**: As analysis evolves, programs with proactive controls should be developed, for tracking patient health, engaging providers, organizing interventions and gauging outcomes with metrics. [7] **Clinical Care Management**: The last milestone involves the construction of an infrastructure layer where clinicians utilizing IT techniques can coordinate patient care, if deviated, in full consistency with clinically established approaches. [7]

DATA INTEGRATION

Business Intelligence requires extensive data, thus, assembling it can be a technical challenge. The focus should be centered on two separate data sources: *Claims data* and *Clinical data.* **Claims Data:** Aside from financial information, health claims also provide clinical information associated with diagnoses, services and charges, and can be easily accessed from participating hospitals, physicians and providers within CIN networks. However, in the event that population received care outside of the network, claims data can be reached after approaching payers directly. [7] **Clinical Data** basically revolve around clinical metrics that actually guide clinicians to make intelligent decisions when emergencies arise. For instance, many organizations engage in hypertension metrics for their networks, which alerts them to appropriately interfere with customized care when patient condition necessitates it. As it is evident, clinical data remains segregated in various sources that include acute, ambulatory and ancillary systems. Therefore, it is of great importance to establish interoperable EHRs that communicate effectively with providers' workflow making use of Business Intelligence principles and tools. [7]

TECHNOLOGY COMPILATION

Business Intelligence applications use a multilayer technology that captures raw data and converts it into usable information. Basic components include *health information exchanges (HIEs), disease registries*, and *reporting systems*. **Health Information Exchange (HIE)** is the Business Intelligence capability to interact with multitudinal EHR systems across disparate networks, extract health information, consolidate a comprehensive view of patient health history and deposit it in the appropriate repository for future availability. Consequently, the efficacy of this function is based on two exclusive factors: *Advanced reliability and ability to coordinate care directions*. [7, 4) Virtually **Disease Registries** are data warehouses that gather data from various independent sources and assign them to individual patients through its feature called *Enterprise Master Patient Index (EMPI)*. Yet, in greater depth, a sophisticated disease registry can further sort data by drug classes (statin, etc.), and thereby enlist patients suitably under those classes. [7] **Reporting Systems:** Disease registries espouse a wide range of sub-networks with finalized information that subsequently feed reporting systems. Important reports are: *Population Health Signs, Organizational Performance, Interferences, and Expenditures*. [7]

The following image depicts an effective IT Platform for Business Intelligence in a healthcare organization. (Fig. 1) [7]
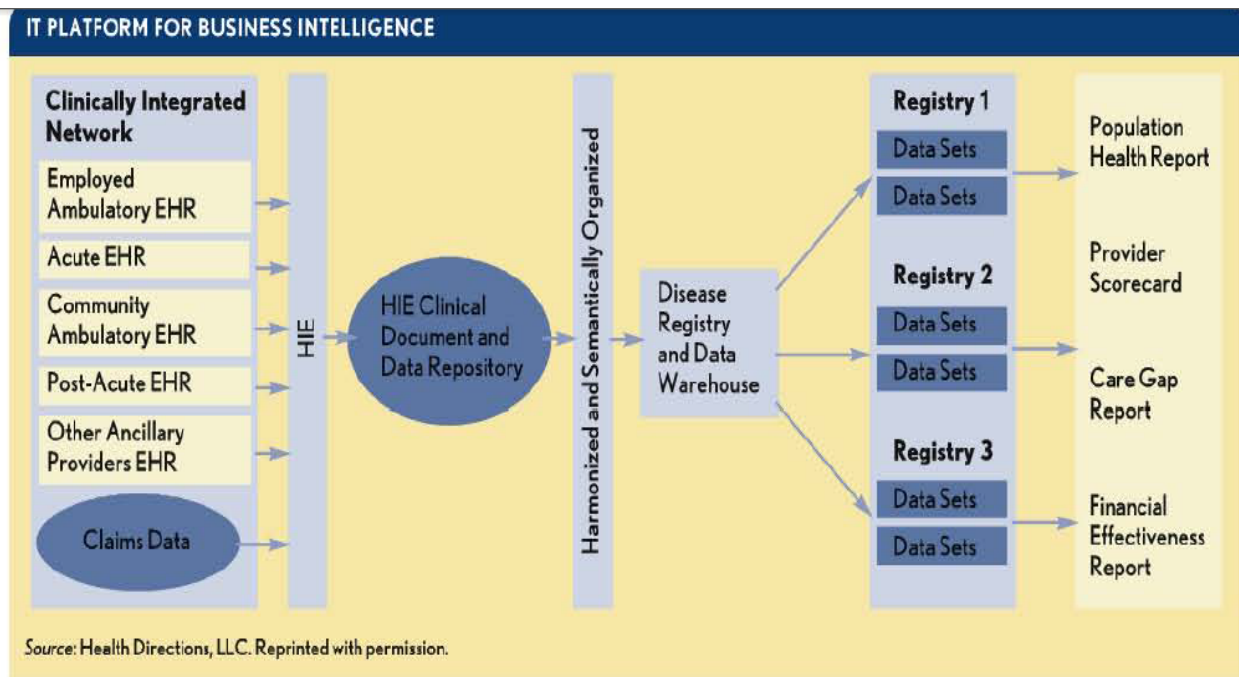
Fig. 1, IT Platform for Business Intelligence [7]

SECURITY

Unquestionably, advances in IT facilitate invasion of privacy. Consequently, without strong safeguards valuable data can inevitably be intercepted across networks. To ensure law conformity, health organizations are required to implement layered security applications using advanced encryption algorithms, so as through the provision of extensive controls at various points illegitimate interaction is prevented. [5] In essence, the HITECH Act extends the HIPAA requirements beyond just "*providers, payers*, and *clearing houses*" to also include **business associates** of all businesses and subcontractors, if any, dealing with health organizations. [5]

The HIPAA and HITECH Acts both enhance the practice of health data management to a more advanced level. As a result, IT professionals are liable for the creation of an expertly designed data governance system that delivers the needed specificity. As such, the architecture should embed proactive internal controls for data classification, storage, and protection - whether in transit or retained - similar to those in the financial industry. [5]

VIOLATIONS

Nonetheless security violations are realized. In the three here below infringement cases, lawbreakers, under the governance of the U.S. Department of Health and Human Services Office for Civil Rights, undertook responsibility for monetary settlement as well as corrective actions to bridge deficiencies in their HIPAA compliance programs.

Unencrypted devices always pose a comparatively increased level of breach risk. Within this context, Concentra Health Services has agreed with the U.S. Department of Health and Human Services Office for Civil Rights (OCR) to a HIPAA violation settlement in the amount of $1,725,000, after OCR received a breach report concerning the theft of an unencrypted Concentra laptop computer from its Missouri facilities. As investigated by OCR, Concentra was found to completely lack encryption processes in its laptop and desktop computers, medical equipment, tablet and other devices, where sensitive health information was stored. In the same domain, QCA Health Plan, Inc. of Arkansas has also agreed with OCR to a HIPAA violation monetary settlement in the amount of $250,000. In this case, OCR received a breach notice in February 2012 concerning the theft of an *unencrypted QCA laptop computer containing Electronic Protected Health Information (ePHI)* of 148 patients from a workforce member's car. [10] In a different environment, Parkview Health Systems, a community-based healthcare organizations located in the states of Indiana and Ohio, has agreed with the U.S. Department of Health and Human Services Office for Civil Rights (OCR) to a *HIPAA violation* settlement in the amount of $800,000. As the incident unfolds, in September 2008 Parkview undertook the duty of guarding approximately 8000 medical records, assisting a retiring physician (who actually reported the violation) to transition her patients to new providers, while also considering purchase of some of the physician's practice. On June 4, 2009 Parkview employees, with notice that the physician was not home, left 71 cardboard boxes of medical records unattended and accessible to unauthorized persons on the driveway of the physician's home, within 20 feet of the public road and a short distance away from a heavily trafficked shopping center. [1]

OUTCOMES

However, there are fruitful approaches toward cost-effective healthcare services that are worth noting. In the summer of 2012, the State of Washington implemented a mandatory statewide database called the Emergency Department Information Exchange, requiring all state hospitals to adopt it. As assessed, this

powerful architecture yielded measurable improvement in state health expenditures, reducing the overall Medicaid Emergency Room costs by $33.7 million in 2013 fiscal year. Specifically, the Medicaid Emergency Room visits were reduced by 10%, while the rate of Medicaid Emergency Room non-acute diagnoses was decreased by 14%. Needless to mention how immensely this construction also facilitates Washington hospitals to extend patient care beyond emergency room discharge. In particular, hospitals contact patients – especially those at high risk – within two days after discharge. [11]

PERFORMANCE METRICS

Studies published in the Health Affairs journal reveal that in 2013, 59% of hospitals had adopted *Electronic Health Record* technology with certain advanced features in their networks, while 78% of office-based physicians had adopted basic EHR applications, and only 48% of them had adopted advanced EHR capabilities in their practices. [9] In 2013, *Health Information Exchange* was low among physicians, where 39% of them had exchanged data with other providers, while only 14% of them had exchanged data with external ambulatory service providers or hospitals. [9] In 2013, hospitals in their greatest part, had been properly equipped with electronic capabilities to meet regulatory requirements, yet, the infrastructures were not actually being used, as intended. Conversely, only 10% of hospitals enabled patients to electronically manage their health information pertaining to hospital admissions. [8] Also, in an overall review released by the U.S. Centers for Medicare and Medicaid Services (CMS), as of July 1, 2014 972 (34%) out of 2,823 eligible providers, while 10 (8%) out of 128 eligible hospitals had both attested to *Meaningful Use, Stage 2*. [9]

INHIBITORS

Performance lag is owed to **Incompatibility in data standardization** across disparate networks, which essentially inhibits the production of accurate reporting results across the industry. As identified, health data still reside static in proprietary systems, unresponsive to elicit targeted insights. [6] In a similar vein, a report from the U.S. Government Accountability Office (GAO) reveals that health services providers and stakeholders in four states encounter rigidity obstacles in the HIE grave process, originating from the prevalence of *inadequate data standards* across state boundaries. This report also cites other major concerns expressed by health organizations such as *Privacy standards that inevitably differ among states, Inability to actually correlate, adjoin, and link patients to their respective records*, and *Initial investment expenditure required to adopt EHR technology,* since cost is always a constrained measure of success [3] In addition, there is *Lack of highly-configured IT infrastructures* with embedded capabilities to manage huge data volumes in a meaningful way, thus leading to improved metrics. [6]

ASTUTE MEASURES

The path to successful Population Health Management necessitates deployment of essential mechanisms, such as **Resilient EHR Platforms** with sufficient capacity repositories to provide the solid foundation for transparent interface across multiple networks, and **Integration of Enhanced Features of Functionality across Platforms** to enable Business Intelligence activities to fulfill their goals. [6]

FUTURE DIRECTIONS

Question 1: Is there a possibility that there could ever be flawless data transmission in the medical field? **Hypothesis 1**: Flawless data transmission could be achieved across industry boundaries with strict security controls and after longer time of infrastructure experimentation

Question 2: How could regional data breaches potentially affect national performance?
Hypothesis 2: Should regional data breaches occur, IT professionals should be prepared to isolate incidents within their scope, thus, disabling interference with national infrastructure.
Question 1: Could Business Intelligence potentially decrease healthcare employment?
Hypothesis 1: Given that the coordination of services could eliminate numerous processes in the medical field, Business Intelligence could potentially affect health administrator, or other associate employment.

CONCLUSION

In spite of rigorous measures, and the increased controversy around it, the development of a digital healthcare system is still functionally not quite adequate to provide reliability for superior performance. Significant reason is the inconsistency in data standards across boundaries which impacts the HIE process as freely achievable. In addition, the health infrastructure is not broadly integrated across the health industry so as to govern huge data quantities for more accurate results. Thus, building agile EHR technologies and integrating upgraded features of functionality across industry boundaries constitute the roadway to health services optimal results.

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