

What is “Big Data” and What Does it Mean for Healthcare?

In today’s world, business, innovation, and improvement are largely driven by data. The abstract idea of “*big data*” was first encountered over 70 years ago, but not until recent decades have industries begun to actively take advantage of what has been termed the “*information explosion*”.¹ In this first installment of a four part series, the history and background of big data are discussed, and the increasing attention being paid to big data in healthcare is explored within the context of the Four Pillars: the regulatory, reimbursement, competition, and technological environments of the healthcare market. Part II of the series, due next month, will delve into additional detail regarding the impact of big data on the technology sector of healthcare, within the context of the HIPAA/HITECH era.

The amount of data that is captured by our current healthcare system is classified as “*big data*”, which can be generally defined as “...*datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze.*”² A more technical definition of big data “...*meets three criteria: volume, variety, and velocity*”, requiring that the data equate to the size of terabytes or petabytes (10^9 and 10^{12} the size of a kilobyte, respectively); contain largely unstructured or varying types of data (i.e., not easily categorized or sorted, which makes up an estimated 85% of information in “*today’s world*”); and, be as close to “*real-time*” as possible.³

Big data has been described as having “...*the potential to utterly transform the relationship that...patients [have] with the healthcare system...*” and further, has been likened to historical events “...*as great as the electronics revolution...perhaps even as great as the first and second Industrial Revolutions.*”⁴ One estimate predicts a reduction of \$300 to \$450 billion in healthcare spending with a system-wide adoption of big data innovation in healthcare.⁵

However potentially useful big data may prove to be to the healthcare industry, providers still must learn the most effective and accurate methods of collecting, managing, storing, and analyzing the data before its potential utility may become a reality. One concern is how to handle the sheer amount of data that can be collected for potential use, which ranges from clinical lab values to a range of diagnostic tests; quality and outcome indicators; billing; medication administration

orders; and, qualitative data captured in provider progress notes and consults, among others. One study estimated that in 2012, less than 3 percent of potentially useful big data underwent any type of analysis.⁶

Another challenge is how to interpret the wide variety of diagnostic information and medical terminology used across the industry today. In one example, the interpretation of a medical condition such as hypertension could also be interpreted as “high blood pressure” or “elevated blood pressure”.⁷ Related to the idea of standardizing methodology and validating data accuracy is the healthcare industry’s lagging movement away from reimbursement based on fee-for-service to value-based purchasing reimbursement methodologies. This movement also depends on providers’ willingness to change practice styles to utilize big data to facilitate evidence-based care as opposed to individual clinical judgment.⁸

Another barrier to the utility of big data is the inherent fragmentation created by the current infrastructure of the healthcare delivery system; competing entities often work in silos of information, which impedes data sharing that would improve the coordination and integration of care across various providers. But with increased integration of care, and the influx of big data, providers and consumers alike harbor concerns about health information security and privacy in regard to compliance with the Health Insurance Portability and Accountability Act (HIPAA).⁹ However, despite this myriad of potential barriers to the adoption of big data in healthcare, the industry is being subject to more and more regulation requiring reporting and sharing of information that draws upon big data that is already being collected, or is being requested for use.

On February 2, 2013, the Centers for Medicare and Medicaid Services requested information from medical specialty boards, societies, regional quality organizations, and other non-federal programs regarding the utility of data collected on eligible providers to a qualified clinical data registry in order to align such data with the existing Physician Quality Reporting System.¹⁰ This request, among other initiatives to harness and use big data in healthcare, e.g., implementation of electronic health records; mandated reporting of healthcare quality and outcome indicators; and, increasing adoption of mobile healthcare technology to improve timeliness and

efficiency of care, will likely continue to drive the adoption of big data in the future delivery of healthcare.

Uses for big data are virtually limitless, the bounds of which various healthcare providers and enterprises have already begun to explore. However, there currently exist several barriers within the current healthcare marketplace that significantly impede the system-wide adoption of interventions that harness big data for industry improvement and cost savings initiatives. The remaining articles in this series will explore, in further detail, some of these interventions and associated barriers within the four pillars of the healthcare industry.

¹ “A Very Short History of Big Data”, by Gil Press, Forbes, May 9, 2013, www.forbes.com/sites/gilpress/2013/05/09/a-very-short-history-of-big-data/print/ (Accessed 5/19/13)

² “Big Data: The Next Frontier for Innovation, Competition, and Productivity”, by James Manyika et al., McKinsey Global Institute, May 2011, p. 1

³ “Big Data is the Future of Healthcare”, Bill Hamilton, Cognizant 20-20 Insights, September 2012, p. 1-3; “Demystifying Big Data: A Practical Guide to Transforming the Business of Government”, TechAmerica Foundation, October 3, 2012, p. 10-11

⁴ “The Age of Big Data”, by Brad Peters, Forbes, July 12, 2012, <http://www.forbes.com/sites/bradpeters/2012/07/12/the-age-of-big-data/> (Accessed 5/16/13)

⁵ “The Big-Data Revolution in US Health Care: Accelerating Value and Innovation”, by Basel Kayyali, David Knott, and Steve Van Kuiken, McKinsey & Company, April 2013, p. 5

⁶ “The Digital Universe in 2020: Big Data, Bigger Digital Shadows, and Biggest Growth in the Far East”, by John Gantz and David Reinsel, IDC, December 2012, p. 11

⁷ “6 Big Data Analytics Use Cases for Healthcare IT”, by Brian Eastwood, CIO, April 23, 2013, www.cio.com/article/print/732160 (Accessed 5/19/13)

⁸ *Ibid*, Basel Kayyali, David Knott, and Steve Van Kuiken, April 2013, p. 5

⁹ *Ibid*, Bill Hamilton, September 2012, p. 5

¹⁰ “Medicare Program; Request for Information on the Use of Clinical Quality Measures (CQs) Reported Under the Physician Quality Reporting System (PQRS), the Electronic Health Record (HER) Incentive Program, and Other Reporting Programs”, Centers for Medicare and Medicaid Services, Federal Register, Vol. 78, No. 26, February 7, 2013, p. 9057



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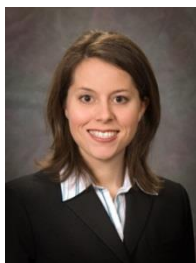
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