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Big Data in Healthcare: Big Problem or Huge Opportunity?

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The healthcare industry has its own set of big data problems and not all of them can be solved with technology. As the saying goes, it takes people, process and technology – and generally the technology part is the easiest. While the healthcare ecosystem decides how to deal with their big data challenge, other industries look at big data as a huge opportunity. So why can't the healthcare industry take advantage?



Today, healthcare IT is under fire for lagging behind other industries with deeper pockets, where technology innovation drives new business initiatives and revenue. Aside from obvious advances in diagnostic equipment and medical devices, hospitals and other healthcare facilities have generally been slow to embrace data-driven decision making or evidence-based medicine in clinical environments.

In addition, limited interoperability between electronic health record (EHR) solutions and, in many cases, a continued reliance on paper records or electronic images (TIFF) for maintaining historical patient records have hampered research efforts to uncover insights that are often contained in unstructured data or health records.

With new requirements for improving quality of care mandated by “Obamacare” or the Affordable Care Act (ACA), the federal government has been pressing for the adoption and development of technology-based solutions to support a variety of initiatives, including meaningful use which, depending on your view, may or may not be well named.

The key to the success of meaningful use rests on the ability of hospitals, healthcare information exchanges (HIE), physicians, patients and other key members of the healthcare community to transform static patient records into electronically accessible and useful information. This includes the adoption of EHR solutions – creating a multi-billion dollar opportunity for healthcare software vendors.

The Role of Data in Healthcare

Data has been a stalwart component of medical research for at least a century. But belief in and reliance on multiple sources of information to support clinical practices are very controversial despite the potential for automating processes and improving outcomes. So-called clinical decision support (CDS) solutions hold the promise of easy access to large volumes of patient and drug reaction data as well as easy reference to volumes of medical texts that may have an impact on improving health outcomes and lowering costs.

Two examples of the more visible and well-accepted automation solutions are clinical practice guidelines (CPGs) and computer-based physician order entry (CPOE). Both of these solutions support evidence-based medicine (EBM) or medical best practices. CPOE compliance is also a component of demonstrating meaningful use.

Scholarly articles and books have been written on the merits and drawbacks of EBM. David Bornstein, best-selling author of *How To Change The World* and frequent blogger and editorialist for the New York Times had this to say on the topic: “Only in recent decades has evidence-based medicine emerged as an important movement in health care, challenging the idea that the doctor always knows best.”

Dr. Jerry Osheroff, a recognized expert on clinical decision support (CDS) solutions and co-author of the book, *Improving Outcomes With Clinical Decision Support*, who has also served as chair of the HIMSS CDS Task Force, remarked, “You don’t need sophisticated technology, necessarily, to do clinical decision support, but it absolutely helps. It’s all about getting good data – and getting good clinical knowledge wrapped around the data – and integrating them together at some level.”

Kaiser Permanente, the largest HMO in California, has created the Care Management Institute (CMI) “where health care professionals and physicians work together to deliver the best evidence-based clinical approaches to improve care delivery.” Osheroff also argues that “CDS technology is a strong business intelligence tool that can do a lot more for meaningful use compliance than is spelled out in the regulations. Properly configured, it can enable compliance with clinical outcomes, quality measures and performance improvement initiatives, and it can even complete documentation required by meaningful use.”

Resistance to Big Data in Clinical Practice

Despite support from the federal government even prior to ACA, including the most recent Bush administration, proponents of EBM have met with multiple roadblocks. Articles on the role of technology in evidence-based medicine suggest EBM critics question the “limits” of CDS applications, physicians skills and confidence in system recommendations. EBM critics argue many caregivers have a limited understanding of statistical concepts, such as risk reduction, and are increasingly under time pressures.

Culture is also a factor as physicians and other healthcare practitioners have historically relied on their extensive medical training, individual experience and expert opinion to make decisions concerning the medical management of their patients. And few, including me, would argue that computers can replace the patient/doctor relationship or a highly trained and dedicated physician’s or health practitioner’s ability to “care” for their patients.

However, with the variability in medical practices and a significant occurrence of preventable medical errors along with the availability of newer technology solutions able to capture “expertise” from more experienced physicians, the practice of healthcare may have reached a tipping point. Add to this equation an aging population, higher costs and a critical shortage of new physicians and you have the makings for incorporating information sources based on validated and relevant clinical evidence as a way to support, but not replace, the medical decision-making process.

What Healthcare Can Learn from the Legal Industry

Resistance to relying on “expert” systems is not limited to the practice of medicine. **In the legal profession, there is a controversy over the use of predictive coding technology or what is referred to as technology-assisted review (TAR) being used in lawsuits for electronic discovery (ediscovery) of very large document sets.** Recent studies indicate that expert systems, when properly “trained,” are as accurate or more accurate than lawyers reviewing the same documents for “responsive” data. For more details, follow this link: [TAR can be more effective in ediscovery than exhaustive manual review.](#)

A major implication of TAR for the legal profession includes the use of fewer human experts to create more accurate data sets in selecting “seed documents,” thereby dramatically lowering ediscovery costs for litigants. The parallels between information access challenges and solutions capabilities for healthcare and ediscovery have not been overlooked by vendors with technology that supports both industries, including IBM with its content analytics and Watson solutions, financial and legal services giant Thomson Reuters via its spin-off Truven Health Analytics, Oracle’s Healthcare Analytics and many smaller vendors as well.

Enabling Technologies for Improving Healthcare Data Access

Medicare’s Blue Button is an interesting step toward **self-service patient portals**. Blue Button is a feature that provides an easy and “secure” way to download your personal health information to a file and import it into other computer-based personal health management tools. Ironically, this tool is available to the portion of the population which, for the most part, is the least computer savvy – people over 65 and those with disabilities. Still, it’s a step in the right direction and offers a roadmap to EHR solution providers with less than portable or easy to use patient-facing capabilities.

With the adoption of smart phones and tablets enabling caregivers virtually ubiquitous access to large volumes of healthcare information sources and patient records, the need for affordable, near-real-time information access and the ability to accommodate multiple device types has driven adoption of **virtual desktop infrastructures (VDI)**. Storage plays a significant role in VDI performance as the number of I/O requests or Reads and Writes increases dramatically with VDI deployment.

Recent advances in affordable, more durable **solid-state drives (SSD)** or flash storage drives and the attendant management software allow multiple terabytes of data to be accessed many times faster than traditional storage solutions allow. SSD technology has been the standard for mobile phone storage for at least two decades. Now, for smart phones and tablets. WHIPTAIL is one such SSD provider that offers multi-terabyte storage arrays ranging in price from \$50k to \$250K.

Too often the adoption of new EHR solutions drags antiquated processes and workflows along, especially when it comes to getting historical or longitudinal patient records and physician notes online. While capturing images of older patient records in the TIFF format helps to meet compliance and meaningful use requirements as well as compressing files to minimize storage requirements, “tiffing” has the unintended consequence of rendering the information inaccessible to researchers and analytics solutions.

There are several solutions in the market that can extract, index and search data or unstructured text locked in these images, including StoredIQ, which also works extensively in the legal ediscovery space. **Information governance – focusing on unstructured data quality, security and portability – is critical to maintaining, accessing and sharing healthcare data.**

“Capturing” all of those historical handwritten notes and turning them into usable data and accessible text is the province of vendors such as A2iA, which recently announced a deal with an unnamed BPO vendor to provide technology to support the intelligent capture of up to 1.2 million pages of EHR records per day. Meanwhile, companies such as Nuance have offered voice recognition solutions in healthcare for many years.

Bottom Line

It is becoming increasingly evident that the intelligent application of information technology can positively impact healthcare outcomes and ultimately lower costs. While I would not go so far as to say technology and access to data can solve every medical problem, big data unquestionably will change the way medicine is practiced in the future.

More doctors and caregivers will come to rely on expert, intelligent systems to support clinical decision making. And I am not alone in believing that the more information you can gather as a patient or healthcare provider in the course treating an illness or creating a care plan, the higher your probability of obtaining a positive outcome.