The Great Confluence

How a unified healthcare data repository can help us find the insights we need for a better future

Finding new answers to improve outcomes and lower healthcare costs
With the right integration and analytics tools, healthcare organizations can create a unified data set for the advanced analytics now available. With this new paradigm of unified data and analytics, we can find new answers to solve continuing problems, improve outcomes, prevent disease, lower cost and give our healthcare institutions a better chance for long-term survival.
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Creating a unified data stream
Near Pittsburgh, Pennsylvania, the Allegheny and Monongahela rivers come together at a point that some refer to as The Great Confluence. These two rivers, both notable in their own rights, become the mighty Ohio River at this point. There are thousands of such confluences around the U.S. and around the world: every great river is a confluence of other, smaller streams.

These great rivers have been gathering points for humans throughout the ages and have brought forth civilization. What gives each of these rivers majesty is the channeling of many streams into one mighty flow with the power to carve canyons and the resources to sustain the lands along its banks.

Note that last phrase: resources to sustain the land. It is not just the volume of the water that is important; the quality of the water, the minerals it carries and the plant and animal life within it provide the raw materials that allow the birth of civilization along the banks.

Healthcare data is like the many tributaries of a great river. The data comes from multiple sources, each separate from the other. What is missing is a meeting point where all of these data sources are channeled into one stream. What we have now is many streams flowing in parallel. If we can create a great confluence that integrates these many data streams, we can create a river of data that can be harnessed by analytics. It is this great river, rich in resources, which will sustain the health and wellbeing of both healthcare organizations and the people they serve.

Healthcare organizations are struggling with data integration
Poetic metaphors aside, healthcare is in the midst of a data crisis. As capitation, accountable care organizations (ACOs) and outcome-based reimbursement models replace fee-for-service payments, data integration will be the single most important enterprise capability for survival. Without the ability to integrate data, healthcare organizations will be groping in the dark, tripping over unseen risks and missing the opportunity to improve care, cut costs and create a sustainable business.

Unfortunately, data integration is poor across the industry. ACOs have cited lack of integration as one of the biggest challenges for success. An August 2014 survey of 62 ACOs by the provider alliance Premier, Inc., found that “88 percent of the ACOs responding face significant obstacles in integrating data from disparate sources, and 83 percent report challenges integrating technology analytics into workflow — barriers that become more acute as ACOs add new platforms or build on their expansive network of medical settings.”

A September 2014 survey by eHealth Initiative found that 88 percent of ACOs face significant obstacles in integrating data from disparate sources and 83 percent of ACOs report challenges integrating analytics into workflow. 95 percent of ACOs said interoperability of disparate systems is a significant...
challenge and the problem could be inhibiting them from exchanging data to the best of their abilities.iii

Despite these challenges, private insurers are not backing away from these payment models and ACO participation is growing. In a 2013 survey by Premier, 76.5 percent of the organizations responding indicated they were or would be participating in an ACO by the end of 2014.iv Much of this will be driven by private health plans. For example, UnitedHealthcare announced in July 2013 that it expects to more than double its use of ACO contracts, with a target of $50 billion in reimbursements tied to outcomes by 2017.v Cigna is also moving strongly toward ACOs, with 75 collaborative ACO initiatives covering 760,000 commercial insurance members.

Along with ACOs, insurance providers are increasingly moving toward capitation. According to the American Medical Association, “Physicians are, once again, receiving invitations from commercial payers to enter into capitated arrangements. Governmental payers and federal policymakers are also reconsidering the possibilities of capitation as a means of controlling the growth of health care costs.”vii

Even with access to a wealth of data about patients, costs, operations, risks, claims, social networks and population trends, hospitals and health systems, with few exceptions, are unable to use this data to manage patient outcomes, costs and financial performance. While almost every hospital can look at operational data within its internal silos, few have access to a global view of their organization, their patients or the risks they face in the market.

Health plans are not faring much better on this issue than health providers. The same lack of interoperability that plagues providers limits data integration across health plan networks. This impairs their ability to compare risks and outcomes across their patient populations, a key capability for setting competitive premiums and evaluating the quality and effectiveness of providers.

Interoperability is also a challenge for life sciences organizations. A 2014 survey of 114 organizations by the IMS Institute for Healthcare Informatics found that 85 percent of respondents said that “integration of point-solutions or systems across the organization for improved workflow” was needed.vi

According to another eHealth Initiative survey in October of 2014, cost and technical challenges are the key barriers to interoperability.

The legacy dilemma: big investments in systems that don’t communicate

At the heart of the interoperability challenge lies the chaotic market for electronic medical records (EMRs) and other clinical applications.

Let’s consider EMRs first. These were born in an era of fee-for-service reimbursement and were intended to capture isolated events for billing purposes. Their architecture still reflects that original orientation. Though many have been adapted for more longitudinal views of patient histories, few provide what primary care physicians in capitated or ACO contracts really need — an EMR oriented toward keeping patients healthy rather than an episodic record of sick care.

Though EMRs are oriented toward structured data that should be easy to search and aggregate for analytic purposes, they also contain massive amounts of unstructured data and customized fields that make straightforward aggregation difficult. The average physician EMR has been so customized to meet individual needs that interoperability is not possible even between EMRs supplied by the same vendor.
Added to that mix is the proliferation of best-of-breed EMRs and systems that are specific to a particular function. These are used in emergency departments, surgical centers, pharmacies, labs, therapy departments, diagnostic imaging centers and other specialty areas. Each contains valuable patient data that is largely opaque to other applications without some sort of integration interface.

The lack of a universal way to track patients also means that a single patient could have multiple patient identification numbers, each tied to a specific provider. For patients with complex conditions, creating a unified patient record is nearly impossible.

The simple answer to this dilemma is to set national standards for EMRs and other clinical applications with common nomenclature and create a master patient index (MPI) that spans all healthcare facilities. Unfortunately, the simple answer is also impractical for most healthcare organizations, which have invested millions of dollars in their current applications and infrastructure. They can’t afford to simply rip and replace their systems. Resources are too scarce and users are unwilling to start over. A national master patient index would also require consensus among legislators — a goal that is unlikely to be achieved in the current political climate.

A second possibility is for EMR and clinical application vendors to agree to common standards and a universal MPI system and update their applications to reflect these changes. The reality is that they have little incentive to do so. Though they are at least talking about interoperability, no real change is likely in the near future.

A third option is probably the most practical solution: creation of a new cloud-based clinical data repository that incorporates advanced data integration and analytics capabilities. Such a repository would use full for an individual health system with multiple locations and applications and would grow in value as more health systems add data to the system.

The repository would start with a master patient index that keeps track of all patient identifiers associated with an individual. Any record for an individual stored in the repository could then be accessed, even if the requestor doesn’t know the ID number or where the care was obtained.

Healthcare providers (such as hospitals, physicians or therapists) could upload records to the cloud, which would then cross-reference each patient to create a unified record. For example, a health system with hundreds of physicians, hospitals and allied health providers could upload all data to the repository, making possible for each patient in the system a unified record that could be accessed by the patient as well as any authorized provider.

If many healthcare systems uploaded data to the cloud repository, a truly universal patient record could be provided, even for patients who received care from providers thousands of miles apart.

**Search and sort: finding data hidden in clinical applications**

Because of the customization and use of unstructured text in many EMRs, relevant data is often lost to all but the original recorder of the data. Few healthcare providers today have the time to carefully read past notes and hunt through multiple screens to find data stored in custom fields.

A recent and critical example of this was the Ebola case at a Dallas, Texas hospital. That hospital was using a widely adopted EMR, and the initial nursing notes included information about the patient’s recent exposure to Ebola. But...
the physician who subsequently saw the patient didn’t see those notes, despite using the very same EMR that the nurse used. The Ebola diagnosis was missed, and treatment for the patient was delayed by several days, greatly reducing the patient’s chance of survival and exposing dozens more people to the risk of infection.

Following this event, many EMR vendors updated their systems to prevent a recurrence. But how many other pieces of important and even critical data are hidden within the systems? A good analogy is to imagine the internet without search engines: tons of data with little way to access it.

One answer to this problem is the use of automated search tools with sophisticated algorithms that can read unstructured notes and all data fields (standard as well as custom fields) to present relevant data to caregivers who are reviewing the patient record. With the right algorithms in place, clinicians could be alerted to any and all data pertinent to each encounter, while relegating unrelated data to lower levels. That filtering could greatly speed a clinician’s review of the record, improving productivity and reducing the chance of missing something important. A clinical data repository could apply these tools to all records stored within it.

By adding a layer of integration and analytics, as such a repository will do, the U.S. health system could continue to use the IT applications and infrastructure in which it has so heavily invested. Also, users could continue to employ the tools they have become accustomed to (often with great personal effort), while having the advantages of a whole new system that is more rational and useful than the fragmented and chaotic environment they now inhabit.

Aggregating data for predictive and prescriptive analytics
If a clinical data repository contained millions of patient records, with the proper permissions and de-identification, those records could be used to predict risk on an individual and population level. This is especially true if the repository pulled in data from outside sources — such as social media, census surveys, weather bureaus, air quality indexes and other organizations that collect data with health and behavioral implications.

You can see the power of aggregated data and analytics in a project at the University of Iowa Hospitals and Clinics. A group of gastrointestinal surgeons there are making real-time predictions about the probability of a patient developing a surgical site infection using advanced analytic software that aggregates data from a wide array of sources. By identifying at-risk patients and providing preventative care, the doctors have reduced surgical site infections in gastrointestinal patients by 58 percent. According to the U.S. Centers for Disease Control and Prevention, surgical site infections are the most common hospital-acquired infections and put patients at increased risk of prolonged hospitalization and mortality.

The ability to combine the vast knowledge contained in treatment records with individual patients’ genomes offers enormous possibilities for more effective diagnostics and treatments. Think of the improvements in outcomes and savings in time and money that could be realized if we could better predict which treatments would be effective for an individual patient.

Translations Genomics Institute (TGen) is starting down this path with some innovative analytics that relate past patient outcomes, patient biometric data,
treatment data and patient genomic data to help discover new treatment options and research opportunities in addition to fine-tuning treatments for individuals.

On a more prosaic but equally important level, health systems could find more effective ways to prevent hospital-acquired infections and unnecessary readmissions — two of the most challenging problems for hospitals.

The possibilities are nearly endless. The biggest challenge in this scenario would be deciding which problems or issues to tackle first.

Why a cloud-based repository is better than an on-premise repository
The most obvious reason for a third-party, cloud-based repository is the ability to aggregate data. While a health system could greatly benefit from an on-premise repository like this, its ability to aggregate data would be limited. A third-party repository could aggregate data from multiple systems, increasing the value of the data sets and the validity of the analytical results it produced.

It could also serve the health insurance industry. Improved data integration and analytics would likely reduce financial risk and overall costs. This would improve the bottom line for health plans and help prevent exposure to the kind of catastrophic expenses that could cause total failure of the business. With lower costs, premiums could be reduced, benefiting everyone who pays for health insurance, including individual plan members, employers and taxpayers.

The other big reason is cost. Even a large health system would be stretching its resources to create such a repository. The infrastructure and intellectual property needed to create a fully functioning repository, with the integration and analytics that would make it valuable, are substantial. Security for such a system would need to be airtight and could be prohibitively expensive.

A third-party repository, however, could spread these investments over many users, giving all customers access to industry-leading technology without the enormous expense that would otherwise be required.

Such a system would make these tools affordable for even the smallest hospital or physician practice, and could also provide a better universal record for individual patients.

Why this issue is an existential problem for healthcare providers
While lack of integration and analytics capability is certainly challenging, for some healthcare providers and health plans this issue could well be existential.

Chronic disease costs are currently 75 percent of health expenditures. With an aging population, the need to reduce chronic disease and its complications becomes more urgent. To reduce costs, we need to reduce obesity rates and improve lifestyle choices and treatment effectiveness. Better understanding, made possible through better data integration and analytics, is the clearest path forward for achieving this goal.

Health plans and health providers who learn to integrate and use data effectively will out-compete those who don’t.

For providers, the risks of being a lower-quality, higher-cost player can mean exclusion from health plan networks. Particularly at risk are specialists and hospitals. As health plans invest more in better primary care services and disease prevention, there will be less need for inpatient beds and specialist care. Providers who cost too much or produce worse outcomes may find themselves to be unneeded in the future. To prevent that eventuality, providers need to use all tools available to lower costs and improve patient outcomes.
For health plans, those that are better at helping their members prevent expensive conditions and complications will have lower costs and will be better positioned to hold down premiums and out-compete in the market.

**Next steps: using existing tools to create a repository**
The intellectual property and tools needed to create such a repository exist today. What is required is for a vendor to step up to the plate and put all the tools together in a complete package and offer it to customers.

That’s no small undertaking; in part, due to the financial investment needed, along with the careful design and planning that would be needed to get all the tools working together seamlessly.

One area of concern — security — is actually not the hurdle it may seem. Current experience with healthcare clouds has shown that security is actually increased with the use of cloud technology. Because of the economies of scale, a cloud vendor can spread security expenses across many tenants, making far more resources available than are usually applied to a single-enterprise data center. With extra resources, the cloud vendor can hire expert security staff and maintain constant, proactive surveillance.

The bottom line is that a unified clinical data repository is on the near horizon. And it would allow the U.S. health system to leapfrog the interoperability barrier while maintaining and using the IT investments already in place. That would create a best-of-all-possible-worlds scenario, in which past investments remain valuable but clinicians can move into the future unencumbered by the flaws and difficulties presented by past decisions.

For most clinicians, that future can’t come too soon.

**References**

Survey: Interoperability, Cost Continue to Hold Back ACOs

Health Initiative, 2014 National survey of ACOs – The landscape of accountable care and connected health, September 2014

Providers developing core ACO capabilities, including partnerships with payers and employers, investments in IT

UnitedHealthcare to double ACO contracts

AMA Physician Advocacy Program: Evaluating and negotiating payment options

IMS Institute for Healthcare Informatics: Riding the information wave in life sciences, March 2014