PERSPECTIVE

BIG DATA ANALYTICS IN HEALTHCARE – TAMING THE ELEPHANT IN THE ROOM

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Analytics – The Next Big Thing in Healthcare

Analytics will have a large role to play in helping healthcare payers redefine themselves and engage consumers by helping them manage their healthcare experience from beginning to end. According to a leading analyst firm, analytics is the 3rd leading investment driver for payers in the year 2013-2014, with 50 percent of the health plans reporting investment in consumer analytics.

This is not to say that payers didn't use analytics in the past, or aren't doing enough at present. Payers have used analytics before for triggering simple mail for policy renewal, in internal analysis (such as member segmentation using factors like Medical Loss Ratio, age, gender, length of policy, etc.) and the like. However, survey feedback as mentioned below, portrays a stark picture in the payer industry. A leading analyst firm states that up to three-quarters of consumers say that they are not satisfied with the documents and materials they use for making healthcare decisions. Another report says that consumers rank health plans last among 14 industries on consumer experience, trailing even television and Internet service providers, and well behind other insurance providers.

Since analytics is the key to consumer experience, it is clear that payers must take a different approach to analytics to close the gaps in consumer experience that are highlighted by the surveys. Two aspects need to change going forward:

1) Consumers expect health plans to provide the same consumer experience as mature industries like retail, telecom, and banking. Hence it would be useful to adopt and apply the analytics concepts used in those industries, in healthcare.

2) Healthcare analytics must learn to leverage Big Data to achieve the outcomes of better patient care, consumer satisfaction, etc.

Let's talk about the issue of consumer retention in a competitive environment. Most Blues don't have a CRM-based approach to understand which members are likely to attrite. Commercial payers are more advanced in that they do have statistical models which use different factors to develop attrition lists.

Let us see how cross-industry experience and big data may be leveraged in this context.

Cross-Industry Experience: Following the lead of industries such as retail, health plans could employ member profiling, product recommendation algorithms, and extensive factor A/B testing for products to tailor their product and message outreach strategy to different users.

Big Data: They can modify the outreach strategy further using big data by factoring contact center and member portal data fields, if statistically significant, in the model.

In our experience, the adoption of analytics concepts from other industries has started in earnest. However, big data analytics is still a new idea in the industry, and will take some time to gain traction. This topic will be discussed in some detail in this paper.

A leading consulting firm estimates that big data analytics can enable more than $300 billion in savings per year in U.S. healthcare and first mover advantage will ensure significant gains over a longer period.

According to another survey by a leading consulting firm, 95 percent of healthcare CEOs are exploring better ways of using and managing big data; however, only 36 percent have made any headway in coming to grips with it. All agree that big data analytics has the potential to improve the quality and cost of care, but many are still struggling with finding the right ways to infuse analytics into everyday operations.

Not many examples of big data analytics in healthcare are quoted publicly since many firms are still experimenting with it. Carolinas HealthCare System recently mentioned using data, which includes purchases a patient has made (using a credit card or store loyalty card), into predictive models that assign a risk score to patients. The score would be regularly passed on to doctors and nurses who can suggest timely interventions to high-risk patients before they actually fall ill. To quote an example of the analytics that's possible – ***"For a patient with asthma, the hospital would be able to assess how likely he is to arrive at the emergency room by looking at whether he's refilled his asthma medication at the pharmacy, has been buying cigarettes at the grocery store, and lives in an area with a high pollen count".***

This example is quite futuristic and should be within the realms of achievement in some years. However, there are other opportunities that can be tapped in the present itself. In our experience, given the huge volumes of varied data, there is an opportunity to find insights to answer questions that were previously considered beyond reach by the payer industry. On the consumer experience front, let's consider the role of analytics in member renewal or prospect solicitation. Integrated data based on member demographics, medical claims, and social media activity can throw up immense possibilities for analytics of the following type:

1) **Data discovery** – Initiatives focused on identifying which policies work for which specific segments of the population from multiple perspectives – cost benefit, value-based benefit care, administrative effectiveness, etc.
2) **Predictive analytics** – Initiatives around recommending policies to prospects based on the analytics of behaviour, preference, and other factors uncovered in the data discovery phase.
3) **Prescriptive analytics** – Based on data discovery and predictive analytics, provide a range of marketing intervention strategies for policies required through the member life cycle.

Or let's take another area of consumer experience from a care coordination and management perspective. Typically, this is an area where different entities responsible for care don't have appropriate hand-offs, which adds to readmission cost and patient discomfort. According to research from 2012, the top reason for readmission among the Medicare fee-for-service patient population is heart failure; more than 25 percent of patients hospitalized for heart failure will be readmitted to the hospital within 30 days of discharge. It is here that big data analytics can be effectively leveraged for reducing heart failure patient readmission by:

1. Understanding current readmission rates.
2. Establishing 30 and 90 day readmission measures to prevent looking at old data.
3. Identifying and then stratifying patients with a primary diagnosis of heart failure, so that multidisciplinary teams may examine the root cause of readmissions to implement evidence-based, best-practice intervention plans for patients. The teams can implement these interventions and track their impact on readmission rates.

Context	Traditional Care Models	New Care Model
Member /Patient Centricity	Lack of provider integration, member data, channel data, etc., leads to operational silos.	Data interchange, exchange, and coordination allow for higher degree of customizable care for members / patients.
Care Delivery	Fragmented and disjointed – redundancies and gaps in care.	Integrated, coordinated care across entire care continuum via proactive disease identification, mapping care program to patient and care management.
Accountability	No accountability for care delivered.	Ability to incorporate pay-for-performance for care delivered.

Nearly one-third of Americans have two or more chronic conditions, and individuals with chronic diseases drive more than 75 percent of healthcare costs. Payer health plans and insurance companies can significantly reduce the cost of care by addressing some of the following areas with the aid of big data solutions:

- Time sequencing – longitudinal analysis of care across patients and diagnoses
- Cluster analysis on influencers of treatment for chronic conditions
- Analysis of clinical notes (multi-structured data)

Technical Challenges

The benefit of using big data is well understood. But performing analytics on big data presents its own set of unique challenges. The Carolinas Healthcare System story has had a huge impact on the possibilities of using big data for analytics. However, on the flip side, many payers are concerned that the amount of amassed data is so large that it is difficult to find the most valuable pieces of information. Here are some of the questions that IT / Business personnel frequently grapple with when analyzing big data.

- **Should we store all our data for doing analytics?**

  Setting aside the need to maintain certain healthcare data by law, the decision of what and how much data to store depends on the final purpose. For e.g., any initiative to study effectiveness of care needs a long term trend investigation into data going back several decades. However, if the purpose is to improve understanding of members' portal usage behaviour, it may not be relevant to store data that is more than a few months old.

- **Should we analyze it all?**

  This question, in the context of big data, is parallel to that of the correct sample size in predictive analytics. When we are talking about data of the order of Petabytes and Zettabytes, understanding it becomes a huge challenge. The guideline here is to understand that since computation is cheaper than storage, an inherent differentiation of data which will be stored / data lakes from the real time incoming data / data streams should be made. An upfront data evaluation of the incoming streams can help reduce the size of stored data and provide a cleaner set of data for analytics.

- **Which areas should we focus analytics on while managing the data deluge?**

  The key to obtaining effective insights from analytics lies in identifying the appropriate areas where this insight would be used. Segregating the sheer volume and variety of data to identify those areas that are vital from an analytics point of view is of grave importance. An indicative diagrammatic representation of the data which can be used across the consumer lifecycle and the benefits this entails is given below:

Acquire & Retain	Involve & Empower	Inform & Service
Indicative data to be used: Consumer demographic information along with products selected information	**Indicative data to be used:** RX and medical data	**Indicative data to be used:** Collecting and analyzing trends from mobile app interactions
Use: Offer suggestions to new prospects based on their demographic information	**Use:** Identifying consumer need and providing relevant / allied information	**Use:** Monitor and gather cardio / diabetes related data
Outcome: Increase in prospect to member conversion	**Outcome:** Ability to pre-authorize for medical and pharmacy and display co-pay information associated with specific pharmaceuticals	**Outcome:** Allows medical professionals to provide care options using remotely gathered data

We had already indicated an example of payers using big data analytics for soliciting prospects. Here's another example of how integrating Rx and medical data can throw up immense possibilities for analytics under the "service" area of the consumer lifecycle:

1) **Data discovery** – Initiatives focused on identifying utilization patterns of drugs with clinical diagnoses to understand if utilization is appropriate from a safety and spending perspective.
2) **Predictive analytics** – Initiatives around analysis of cost of care over identified treatment paths to identify the most effective one.
3) **Prescriptive analytics** – Based on data discovery and predictive analytics, provide a range of intervention strategies, from enabling provider education to requiring perquisite trials to restricting diagnosis codes as a way of managing drug utilization.

Each payer might focus on a different part of the consumer life cycle based on their internal set of objectives, priorities, budget constraints, et al.

- **How can we find data points which are really significant?**

Once the hurdle of which area(s) to focus on in big data analytics is crossed, data scientists / BI personnel need to be able to define questions on key performance indicators (KPIs), which analytics should answer in order to be both strategically and operationally meaningful. 95 percent of big data is "noise" that contributes little or nothing to business intelligence. So, understanding business strategy – what is trying to be accomplished at the highest levels, and how this strategy plays out in operations / outcomes is important.

- **How fast can I capitalize on big data?**

In our experience, enterprises are looking for the ability to quickly discover, analyze, and act on information to drive business decisions as a way of capitalizing on the opportunities of big data analytics and addressing its technical challenges. Technology teams need the flexibility to rapidly develop industry-specific big data applications, whereas business needs agility of insights and actions. This requires deep evaluation of available products as well as identifying, hiring, and training resources (data scientists, modelers, etc.) to do the analytics, which can be a huge task, regardless of the time frame.

There is a need for a platform like Infosys BigDataEdge for empowering both technology and business to rapidly develop industry-specific insights. An ideal solution is one that enables technology and business users to work together to integrate, aggregate, manage, analyze, disseminate, and act upon large volumes of multi-structured data. With a repository of over 250 algorithms, 50+ visualization options, and industry-specific applications, Infosys BigDataEdge can help businesses generate insights up to eight times faster and action decisions in real time.

The final decision of how analytics will be used will depend on the individual payer's requirements and constraints of budget, time, and personnel, and therefore must be based on a thorough understanding of these elements.

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About the authors

Dr. Deepti Mehtani

Healthcare Consultant, Infosys Public Services

Deepti Mehtani is a healthcare consultant working with Infosys Public Services. She has wide experience of working on both Payer and Provider domains and is an SME on Provider Revenue Cycle Management.

She can be reached at Deepti_Mehtani@infosys.com

Madhumitha Swaminathan

Senior Associate Consultant, Infosys Public Services

Madhumitha Swaminathan is a Senior Associate Consultant, working with the healthcare vertical in the Infosys Public Services. She has worked extensively in the healthcare payer domain, for both Blues and Government clients. She has mainly worked on Health Insurance Exchanges and Payer Portals.

She can be reached at Madhumitha_S03@infosys.com

Anand Madhavan

Senior Practice Lead, Infosys Public Services

Anand Madhavan is a Senior Practice Lead with Infosys Public Services responsible for analytics in healthcare. He has a decade-long experience in helping organizations navigate strategic business problems using analytics and driving tangible business impact.

He can be reached at Anand_Madhavan@infosys.com

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