

# Data Analysis and its Importance in Health Care

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*Abstract — Data Analysis is very important in each and every field particularly for the assessment of performance. This research paper throws light on the importance of data analysis in the field of health care. Investigation has been performed on the various aspects of data analysis and its fruitfulness for improving the health care services. This research paper can serve as a reference for budding researchers and health care personnel to analyse the importance of data analysis for making the health care sector more efficient and effective.*

Keywords— *analysis, data, care, health.*

## I. INTRODUCTION

The healthcare data quality affects every decision taken along the patient care process. The need for correct and reliable data has become very important. The healthcare data sharing has increased considerably today. Healthcare data originates at the source by people such as physicians, hospitals, nursing and pharmacies as part of their normal practice. The data is then converted into secondary data where it can be shared with people like the payers, clearing houses, vendors of third party, public & private health agencies, governmental agencies, health information related organizations and also, the consumer. Each data may have different requirement for collecting and usage. The purpose can vary from the health care, administrative or financial matters [1].

Data is gathered in several methods and formats using different technologies and standards. Technologies and data standards may vary depending on the pharmacies, laboratories and acute care facilities. Generally, each is likely to have a different technology and complying on different data standards like RxNorm, LOINC and C-CDA. Healthcare organizations also collect some data that may never be used. Estimates show that healthcare data generally consists of 50 petabytes. One petabyte is sufficient to store the DNA of the total population of the US and then, cloning them, twice. Data should be gathered and aggregated with an objective in mind [2].

## II. RELIABILITY OF HEALTH CARE DATA

The reliability ensuring of a given healthcare data generally is based on the accuracy and the

completeness of the data recorded in the patient's health record (also known as source data). This process also includes components like information governance in which the information is identified as an asset. It is necessary to note that the established policies, procedures and the staff education must exist so that these processes can achieve and maintain a high degree of compliance. With the growing pressure of payment reforms and decreasing healthcare costs of all the healthcare organization's agenda, performing the data analysis and analysis to show value in data is very important. To stay competitive and viable, healthcare organizations need to use the data to positively affect the quality of health care, reduce costs, and to manage the patient populations [3].

Measurement of quality healthcare data can be done in different forms like face validity checks or even more complicated methods such as the descriptive, predictive and prescriptive analysis, quality runs via the health information management (HIM) information life cycle of capturing, processing, storing and disposing of the patient information. The HIM professional will prioritize on the collection and maintenance of quality data which will, in turn, give rise to a reliable information and responsive health care [4, 5].

## III. INDIAN HEALTH CARE SECTOR

India was considered as the sixth largest healthcare market globally on the basis of size in the year 2014 and is known as one of the fast growing industry in healthcare sector. Growing levels of income, rising awareness of health and the changing approach in the side of preventive healthcare is expected to increase the demand of the healthcare facilities in future. India has evolved as a pivot for the medical and healthcare activities for all the global players owing to its relatively lesser cost of health care research which directly affects the medical tourism. Presently, healthcare organizations all over the world have been challenged by the burden to minimize the costs, improve the management as well as the results and be more patient centric. Building the analysis competency can serve these organizations in increasing "big data" to actionable data, set their vision properly, improve the results and also to reduce time incurred.

Some of the major challenges of the Indian health care sector faces are as follows:

- The deluging of the digital data.
- Lack of data scientists.
- More confinement of electronic health records than expected.
- Change is liked by none.
- Inter-operability of device and data integration.
- Issues of security and privacy.

The role of a data analyst to overcome the challenges is as follows:

- Management of the data flow.
- Using analysis in reducing the administrative costs.
- Using analysis for the health care decision support.
- Cutting down on the fake and abuse.
- Using analysis for a better health care coordination.
- Using analysis for a better wellness of the patient.

The future of a healthcare data analyst is as follows:

- Application of statistical techniques to find solutions to healthcare and medicine related questions.
- Analysis of a large volume of data rapidly and quite effectively.
- Effective usage of healthcare data for measurement of urban and rural development.
- Usage of real time data from patients and development of analytical tools.
- Aiding in the medical decision making and ensuring the patient safety.

#### **IV. SWOT ANALYSIS**

Tactical planning requires convincing and an unbiased assessment. Transforming healthcare organizations need to incorporate frequent changes to maintain the optimum functionality. For deciding the areas where corrections are required to be made, a number of methods can be utilized.

One of the crucial methods is SWOT analysis which is yet to be completely explored in healthcare that takes an organization from an unbiased viewpoint to a complete discussion of the organization's Strengths, Weakness, Opportunities and Threats (SWOT). The strengths and weaknesses of the organizations are their determined by their internal factors whereas the opportunities and threats usually are dependent on the external factors [6].

So it can be said that though the data experts actively participate throughout the development and research cycle of healthcare, they need to be vigilant of following challenges:

- Why analytic proficiency is more imperative than before?
- With the changes in healthcare sector, is it important to give stress on data analysis for creating new research strategies?
- Do we have a strategy to gather maximum amount of the patient-generated health data?
- How can we use this information for patient or community development?
- What are the barriers encountered while implementing these issues?

#### **V. TRACKING INSURANCE EXPENSES**

The Insurers have been working on numbers for years to find out which patients are most likely to generate very high costs. Now, other groups are calculating the probabilities of relapses and the likelihood of a patient's not consuming his or her medicine. On the basis of models that draw on massive chunk of medical and other data, some are also capitalizing on seemingly healthy individuals and trying to prevent the problems before they can occur. Several insurers, including the United Health Group Inc. and WellPoint Inc. are working to pinpoint on who will develop conditions such as diabetes. Pharmacy-benefit managers like the Express Scripts Inc. and CVS Caremark Corp. are working on programs for predicting medication compliance. Care providers, meanwhile, are striving to identify who is the most likely to be admitted—or readmitted—to a hospital and are manipulating their care to prevent such return visits. Proponents believe each of these activities can significantly improve care and prevent further expensive health problems, thereby, reducing costs for the companies and the patients [7].

Perhaps, one of the best-known health-care analysis push is the WellPoint's partnership with the International Business Machines Corp. IBM created a supercomputer that can respond to voice commands and by quickly scrutinizing its database for the right answers. WellPoint plans to use this data-crunching technology to help suggest the treatment options to doctors on the basis of medical records, research databases and the other sources.

#### **VI. APPLICATIONS IN PHARMACY**

A firm named Express Scripts has made plans for rolling out a program which can study the data about patients in its customer data base—which includes the employers, government agencies, unions and health plans—to find out and deal with patients who are less likely to take their prescriptions correctly. The program will start with the medicine for high blood pressure, diabetes, high cholesterol, asthma and osteoporosis and later it will include multiple sclerosis. For plan sponsors that want to participate, Express Scripts initially runs its predictive models.

After looking at about 400 variables, including the enrollees' prescription history and the economic background, the program tries to find out who is more likely to stop consuming their medicine and why?

Patients identified as the ones who are likely to be noncompliant then get tailored interventions to help overcoming their specific barrier. Some patients will receive help over-the-phone. Pharmacist consultations help signing up for auto-refills and other programs that simplify the adherence procedure. For patients not who are taking their medicine because of some behavioral reasons, mainly forgetfulness, timers are attached to their caps of prescription bottles for reminding them to take their medication [8-11].

## VII. CARE PROVIDERS

Many care providers try to use analysis to identify who is at risk of a hospital admission. Heritage Provider Network, a Northridge, Calif., physicians group that develops health-care delivery networks, is sponsoring a competition to figure out the best algorithm to identify which patients are likely to be sent to a hospital within the next year, based on Heritage patient data. The competition, which has a \$3 million prize, will end in April 2013. "Hospitalizations are very expensive and cost this country a lot of the resources we're using in health care," says Richard Merkin, president and chief executive of Heritage. "Imagine if you could effectively predict who was going to be hospitalized," Dr. Merkin says. "You could reallocate resources to prevent unnecessary hospitalization and put those resources to use for cure rather than care."

Health Management Associates Inc., which operates nearly 70 hospitals across the U.S., also is working with technology partners on predicting readmissions. It is looking for patterns in its own patient and operational data and ranking the likelihoods of admission associated with different factors. The company, based in Naples, Fla., is also trying to predict demand for certain services, such as the emergency room and lab work, to help it better staff its hospitals. "Companies have to do more with less," says Eric Waller, chief marketing and strategy officer for HMA. "We're being incentivized as an industry to improve health care care and increase customer satisfaction and improve margins with lower reimbursements. It's driving people to be much more interested in the use of analysis." As more patients seek care, analysis will also help providers offer more efficient preventive care. "There's a huge amount of waste in the system," says Dr. Nease, the Express Scripts chief scientist. "Advanced analysis allows you to be much more sophisticated in where you intervene and with what." [11-14]

## VIII. PREDICTIVE ANALYSIS

Physicians are smart, well trained and do their best to stay up to date with the latest research. But they can't possibly commit to memory all the knowledge they need for every situation, and they probably don't have it all at their fingertips. Even if they did have access to the massive amounts of data needed to compare treatment outcomes for all the diseases they encounter, they would still need time and expertise to analyze that information and integrate it with the patient's own medical profile. But this kind of in-depth research and statistical analysis is beyond the scope of a physician's work field. That's why many physicians – as well as insurance companies – are utilizing predictive analysis. Predictive analysis utilizes statistical methods for searching the huge amount of information, analyzing it for predicting outcomes for the individual patients. That information can also include data from the past treatment outcomes as well as the latest medical research already published in the peer-reviewed journals and databases. Not only can predictive analysis helps a lot with the predictions, but it can also reveal many surprising associations in data that a human brain would never doubt. In medicine, predictions can widely range from responses to medications to hospital readmission rates. Examples include predicting infections from the methods of suturing, determining the likelihood of a disease, helping a physician with diagnosis and even prediction of future wellness [15-17].

The statistical methods are known as *learning models* because they can increase in precision with additional cases. There are two major ways in which predictive analysis differs from the traditional statistics and from evidence-based medicine:

- Firstly, the predictions are made for individuals and not for groups
- Secondly, predictive analysis does not rely on a normal bell-shaped curve.

Prediction modeling uses techniques like artificial intelligence to create a prediction profile (algorithm) with reference from from past individuals. The model is then applied so that a new individual can get a prediction easily and instantly for whatever the need is, whether it may be a bank loan or an accurate diagnosis [18-19].

## IX. SUMMARY AND CONCLUSION

Healthcare has changed a lot from giving a reactive response to standard, isolated incidents by subjective decision making. We have moved to a better form of care that is based on the available personal information and medical history of a given patient. Health care data is obtained from a variety of sources, including electronic health records, disease registries, patient surveys and information exchanges among the health care providers.

Effective analysis makes this highly exhaustible data more useful and as per the requirements of actionable medical history for a given patient. Below are three ways, health care data analysis is making healthcare better simultaneously, reducing care costs.

**1) Health care data stresses on preventive care as compared to reactive care** – Reactive healthcare is comparatively costlier as compared to preventive healthcare and the existing trend depicts that people are tending to go for healthcare whenever there is some problem. By using health care data analysis, preventive care can be easily implemented. With the help of preventive care, hospitals can manage to keep the patients out of the costly emergency room care and reducing their healthcare costs. Predictive modeling is a component of health care data analysis and is used widely by caregivers to calculate the risk percentage of an individual's health. With the help of these numbers, analysis can guide the caregivers on providing precautionary care that can help in preventing the problem before it becomes severe for a patient.

**2) Health care data analysis enables evidence based treatment to patients** – With more and more patients depending on the electronic health records for sharing their data with caregivers, hospitals are now in a better position to make better health care decisions for patients. Using relevant historical information about patients and their medical history, caregivers can work on the risks of post operation problems such as surgical site infections, poor physical functioning, reaction to medicines and allergies. Traditionally, such problems have paved a way for unforeseen financial burden to hospitals and caregivers through unreimbursed costs and have hampered patient satisfaction post the operations. With the help of health care data analysis, such instances can be minimised to decrease costs and increase satisfaction.

**3) Analysis of health care data helps in improvement of personalized care** – Patients have frequently got problems the vicious cycle of changing doctors and then, getting stuck with the same set of tests, questions, and procedures over and over again. Usually, this type of care wastes time, money and effort, and does not bring any drastic improvement in patient's health condition. Through the available data, doctors can generate a rounded view of the patient's health and can drive better diagnosis and timely treatment. Other than reducing recurring costs of follow up care and hospital resources, caregivers can hope to provide a better care experience to patients by this personalization.

## X. FUTURE SCOPE

Collectively, health care data analysis can transform the healthcare industry from a subjective, case by case approach to an objective oriented and quantified approach that enables the doctors to take better decisions. With the help of this objectivity,

caregivers can significantly reduce costs by reducing readmissions, emergency department visits and waiting times. The detailed insight using health care data breakdown not only helps business by improving health care outcomes but it also leads to higher patient satisfaction and an improved care. Hospitals and health care givers have already begun investing in health care data to provide a better, more efficient care to their patients. As the hospitals improve healthcare by reducing costs and increasing patient satisfaction, the health care industry will get sufficient momentum for incorporating health care data analysis in their base strategy.

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