SJCC Management Research Review
Printed ISSN - 22494359
Vol: 5 No : 1 June 2015, Page No:1-10

DATA ANALYTICS: AN EMERGING CHALLENGE BEFORE INDIAN HEALTHCARE SECTOR

Dr. D. Shreedevi*

Abstract

The Indian healthcare industry is in a state of flux characterised by challenges like the need for quality healthcare at affordable costs to patients, but at the same time ensuring sustainable business models for hospitals and other healthcare providers. In such a scenario, it is imperative to have objective, evidence based decision making by physicians and administrators that helps in reducing inefficiency, wastage and improves patient care outcomes. This is where Big Data applications/Data Analytics comes in. These applications make use of numerous sources of healthcare data scattered across various stakeholders like physician notes, Electronic Medical Records, nursing charts, insurance claims, pharmaceutical Research and Development reports, clinical research data, social media trends etc., to generate actionable insights which can then be used to predict disease outcomes, plan treatment protocols and for strategic organisational planning. The study reveals that Data Analytics can help hospitals in human resource management, financial planning, supply chain management and quality care delivery. Decrease in readmission rates, predictive algorithms for disease diagnoses, real time monitoring of ICU vacancies are some of the practical applications of big data applications in hospitals.

The study concludes that the roadblocks in the widespread adoption of such applications include the high cost, data storage issues, status quo mentality of physicians and administrators, lack of data exchange standards and privacy concerns. Legislation linking insurance re-imbursements and accreditations to quality patient care, creation of data exchange platforms, development of indigenous IT applications to cut costs and allay the data security fears will go a long way in ensuring rapid adoption of data analytics by Indian hospitals in the very near future.

Key words: Data analytics, EMR, GDP, Quality care, WHO

**Professor, Apollo Institute of Hospital Administration, Academic Block, Apollo Health City, Jubilee Hills, Hyderabad. Telangana State. email-dsridevi93@gmail.com*

Introduction

Big Data is a huge, complex, heterogeneous, rapidly produced, longitudinal aggregate of data from numerous sources that cannot be processed using conventional data processing methods, techniques and systems. Data Analytics is the systematic study of a mass of data sourced from different sources, using a variety of statistical, quantitative, contextual, cognitive tools to help in objective evidence based decision making.

The Healthcare industry is undergoing major tectonic shifts in approaches to patient care management, clinical decision support systems and finding out newer ways to better health outcomes at costs that are reasonable and sustainable. As more and more people demand quality healthcare in a country as huge and diverse as India, healthcare organisations are being forced to innovate and come up with simple solutions to complex problems. Hospitals today are business entities that need to be efficient, effective and economical to be able to cater to the demand for affordable, quality healthcare while at the same time, maintain healthy bottom lines. According to a report by McKinsey five key areas with maximum big data potential in India are healthcare, public sector, retail, manufacturing and personal location data.

Review of Literature

The key objective of health analytics is to gain insight for making informed healthcare decisions. Raghupathi et al. discuss different definitions of health analytics, describe the four stages of health analytics, its architectural framework and development methodology. They conclude that health analytics is rapidly emerging as a key and distinct application of health information technology. Potter suggests that the use of advanced business analytics technologies can ensure that physicians and medical staff are no longer playing this “life and death” waiting game, because diagnostic and all current health information can be provided by healthcare analytics. This in turn will improve the quality of care by best care decisions.

Burghard defines big data and analytics as having four attributes: volume, variety, velocity and value. It has also been identified that the significant challenges to the deployment of big data and analytics technology are complexity, lack of funding,

staffing and data relevancy. Bollier examines how big data could be useful in improving health. He argues that data is an important tool in developing new types of personalized health care. White paper by Frost and Sullivan says that healthcare organizations in all subsectors—from providers and payers to pharmaceutical and device manufacturers and researchers need to develop strategies for managing the complexities and costs of Big Data. They concluded that virtualization and cloud computing provide affordable solutions to organizations faced with a flood of Big Data, but insufficient resources for managing it.

Objectives of the study

- To study the need for big data analytics.
- To examine applications and challenges in adopting big data analytics

Methodology

The present study is descriptive in nature. The data is collected mostly from secondary sources like books, journals, articles and websites. The study is a theoretical analysis of the need, benefits, challenges and opportunities of big data analytics in healthcare.

About Big Data Analytics

Decision making in hospitals, whether by clinicians or the management, has for far too long relied solely on various permutations and combinations of intuition, experience, value judgements and ad-hocism, tools which might have sufficed till the last century but have become ineffective, if not obsolete in the dynamic era that we live in. Medicine itself is increasingly becoming evidence based which illustrates how the need for objectivity in decision making is driving healthcare providers towards tools that can quantify problems and provide answers and trends that are not just prescriptive but analytical and even predictive. Digital information in India is estimated to grow to 2.3 million Petabytes (1petabyte = 1 million gigabytes) in the next decade with health related information contributing around 25% of this humongous amount of data (Ernst and Young). This is where data analytics has been ushering in a new paradigm shift by trying to make sense of the mountains of data generated every day. The big data analytics market in India is estimated to reach approximately $ 680 million by 2015 from about $ 320 million in 2011.

Applications

Increased disposable incomes, additional discretionary expenditure on health and demand for quality healthcare are leading to the importance of data analytics in the delivery side of health services. Consequently, data analytics is opening up other avenues and opportunities in healthcare, which include combating fraud, driving product design, and strengthening quality of service delivery etc. In a situation where a healthcare provider has information from numerous sources like the demographics of a patient, his genomic information, detailed medical history, previous hospitalisation records etc. on a single digital dashboard or platform, information which can help the physician predict the clinical outcome objectively and tailor the treatment protocol accordingly, resulting in cost and time savings. Some of the most important public health examples of big data applications are the human Genomics project, the ongoing Ebola Virus outbreak in West Africa where data analytics is being used to predict when and where the virus might spread next and even in predicting, way back in 2011, where the seventh billionth baby might be born. Some of the prominent data analytical programmes used widely across industries are the 'Apache Hadoop' and data analytics solutions by IBM, SAP, Microsoft and Oracle.

Need for Data Analytics

Healthcare is an expensive proposition, especially in India. It is estimated that private or out of pocket expenditure on health services contributes about 70% of the total health spending in the country. Health related expenses are the single most pressing reason for millions of people slipping under the poverty line every year. India's public expenditure on health is a meagre 4.1% of its GDP compared to 17.6% spent by the USA. India has 21% of the world's disease burden compounded by the rapidly expanding 'Dual Disease' burden of communicable and lifestyle diseases. The infrastructure required to serve the health requirements of our country is, shabby to say, the least with a Bed to Population ratio of 0.9/1000 compared to the WHO mandated 3.5/1000 population. Doctor to Population ratio is 1:1800 which is one third of the WHO recommended level. The Insurance penetration as illustrated by the amount of insurance premium collected as a proportion of the GDP is very low at around 3.17% of the GDP.

These figures point to the enormous challenges in front of healthcare providers in India in formulating healthcare delivery programmes that are cost effective, targeted, pro-active, objective and predictive in nature. The need of the hour, therefore, is to design clinico-administrative systems like Data Analytics that integrate all aspects of patient care, providing care givers with Actionable Insight, that combined with clinical skills and experience can help chart the future course of a disease based on predictive analysis, provide the best customised treatment, keep costs down by efficient utilisation of precious resources and consequently reduce the burden on the healthcare system. Data analytics uses techniques like Regression Models, Simulation and Natural Language Processing (NLP) to glean information that is useful from various streams of data that can be Unstructured like physician notes, nursing charts, pharmacy prescriptions, or structured data like hospitalisation records, EMR entries and insurance claims.

Benefits of Data Analytics

Data analytics has enormous applications in the diversified healthcare sector that consists of Hospitals, Physicians, Insurance companies, Research and Development firms, Pharmaceutical companies and public health agencies. This paper will confine itself only to physicians and hospitals.

For Physicians and other Healthcare Providers

Data analytics is a godsend for primary caregivers like doctors and nurses as it integrates all available information about a patient like Genomics, previous hospitalisation history, Insurance claims records, demographic profile etc to come up with a suitable course of action of treatment that is cost effective and customised. Real time data helps immensely in clinical decision support systems by making all the information available to physicians on an integrated digital dashboard. Specially designed algorithms for ICUs based on real time patient data like vital signs, Lab values, Imaging reports, medical devices data. Physician's notes are already being used to predict clinical outcomes, helping save precious lives and avoiding prohibitive ICU related costs. Predictive analysis can help doctors predict diseases even before they occur and plan treatment in advance, thus saving precious lives and reducing the burden on health resources. Physicians are using algorithms that provide doctors with a list of

possible diagnoses based on a patient's symptoms and clinical signs. Integration of data from research papers, technical reports, clinical trial studies, expert views, patient characteristics, etc., helps physicians in supplementing their knowledge and experience with data analytics generate insights, and thus in objectively planning the treatment pathways for patients.

Data analytics can help identify the reasons behind certain clinical events that may be hard to quantify otherwise, e.g. why does Doctor A have lesser post surgical complications than a similarly placed Doctor B, by going through patient profiles, risk factors, pre, intra and post operative protocols and coming out with evidence based reasons to explain the differences. This could also help hospitals with performance appraisal in the form of Physician Report Cards and Clinical Audits. Risk profiling of patients and focusing on the riskiest ones can help pre-empt medical events, e.g. a Diabetologist can use analytical models that use patients' medical and insurance claims data to find out how many have had eye checkups in the last one year to rule out retinopathy much earlier in advance. Physicians can monitor the efficacy of different drugs in different patients by getting real time reports on specified parameters. Serious adverse events like drug interactions can be avoided by integrating the pharmacy watch list data with physician's notes and creating 'firewalls' in the drug dispensing system that warn the physician whenever two drugs having propensity for interaction with each other are ordered for a patient.

Big data analytics facilitate sharing of patient care information across physicians and health systems. This can be a boon in a country like India where an overwhelming majority of the population does not have access to quality healthcare, either due to geographical isolation or the urban: rural divide. In such a scenario, Healthcare IT applications like Tele-health can be very useful in bridging the gap between the patients and healthcare providers. This can be made possible by collaborative sharing of patient data across healthcare systems and geographies using healthcare analytics applications.

Hospitals and Administrators

Hospitals have much to gain from using big data applications to streamline processes and increase efficiencies. Administrators can have access to real time reports on patient footfalls, nurse to patient ratios, bed utilisation rates, ICU vacancies, Physician availability, operation theatre utilization data and patient waiting times in the outpatient department (OPD) etc. Revenue and expenditure forecasting can be done in advance using simulation modelling which can help hospital administrators in strategic planning and pricing of services. Such insights are invaluable in the planning and organising of resources in an efficient and economical manner leading to reduced wastage and better patient care.

Big data mining can be helpful to administrators by reviewing current efficiencies and trend lines to forecast future requirements of human, material and financial resources which helps in long term, strategic planning. Customised human resource models help in allocation of manpower based on real time data, revealing what type of human resource is needed where and for how long. Long term manpower planning can be done in advance using simulation models that draw upon integrated data like hospital footfalls, physicians' market data and the expected financial statements in the future. Procurement can be made simpler and more scientific by quantifying demand way in advance, which helps in getting a better price from suppliers apart from forging long term relationships with them. Fraud and thefts are a major source of revenue loss in a hospital and can be detected early using data analytics.

High quality patient care, good management practices, patient satisfaction can all be profit drivers as illustrated by a McKinsey report which states that effective hospital management strongly correlates with high-quality care. When the quality of hospital management improves by one unit on a scale of 1 (worst) to 5 (best), the report says, the mortality rate for acute myocardial infarction (AMI) decreases by 7%. Moreover, the EBITDA (earnings before interest, tax, depreciation and amortization) per bed increases by 14%, and the percentage of individuals who would recommend the hospital increases by 0.8%. Big data applications thus make big business sense in an increasingly crowded healthcare provider space, especially in India where hospitals have huge inefficiencies, the margins are razor thin and customer satisfaction and loyalty are fickle at best.

Challenges in the adoption of Data Analytics

1) Data analytics programmes are expensive, at least initially and that is a big deterrent for hospitals in India. As a result, the adoption rates in even the developed countries are picking up slowly as hospitals are still wary of investing such huge amounts in a service which, promising though it might be, is still quite expensive.

2) Inertia and resistance to change are perhaps the biggest obstacles in the widespread adoption of data analytics. Physicians and health administrators are still reluctant to embrace newer technologies that might upset the status quo. Physicians in particular have reservations about what they perceive as 'yielding control' to technology that might undermine their skills, experience, knowledge and position.

3) The explosive growth of healthcare data in India will require sizeable data storage capacity in the form of terminals and server rooms apart from skilled professionals to maintain such networks. Hospitals, especially the small and midsized ones, might find these requirements insurmountable

4) The poor quality of healthcare data is a big problem in India. Most data is still unstructured in the form of doctor's notes, prescriptions, nurses' charts and lab results. Making sense of such data is quite a challenge even for sophisticated analytical software like Natural Language Processing (NLP). This is compounded by data entry errors which are quite frequent in hospitals. The fragmentation of data between users is another challenge that hinders the adoption of analytics.

5) The unwillingness to collaborate and share data between stakeholders like doctors, hospitals, insurance companies, research facilities etc makes it difficult to integrate all the relevant patient related data on a single platform.

6) Lack of data exchange and integration standards are another stumbling block towards creating a meaningful data analytics ecosystem among Indian healthcare institutions.

7) Privacy and security concerns with respect to confidential patient data are a major issue when it comes to data exchange. Data misuse is a legitimate cause for concern that hinders collaboration and restricts the scope of analytics.

The Road Ahead

The Indian health industry is poised for a massive take off in the very near future with technology as its engine propellant. It is imperative that the various stakeholders anticipate and embrace this change which might just be the difference between survival and extinction in the next few years. The government on its part can facilitate this transition by drafting laws along similar lines as The Patient Protection and Affordable Care Act (PPACA) that link insurance reimbursements and accreditations with quantifiable quality patient care. Healthcare information exchange centres that act as platforms for data integration and transfer between interested parties should be set up. Data privacy and misuse concerns must be addressed to ensure confidentiality and dignity of patient information. Indian healthcare IT companies should be encouraged to develop data analytics applications in partnerships with healthcare providers and research institutions. This will not only reduce the costs of adoption for hospitals and help in customised solutions but also allay some of the data security fears that the stakeholders might have. Cloud computing can be a panacea for data storage and maintenance problems, especially for small hospitals that might not have the space or the skilled manpower to maintain such data systems.

Conclusion

Doctors must be taken into confidence and the benefits of data analytics be demonstrated to them as ultimately they are the ones at the frontlines of healthcare delivery systems, and the success or failure of the plan hinges on their cooperation and convenience. When it comes to the scope and applications of data analytics, the possibilities are endless, restricted perhaps only by the limits of human imagination and creativity. Big data analytics and applications in healthcare are at a nascent stage of development, but rapid advances in platforms and tools can accelerate their maturing process.

References

1. Bollier D: The Promise and Peril of Big Data. Washington, DC: The Aspen Institute; 2010.
2. Burghard C: Big Data and Analytics Key to Accountable Care Success. IDC Health Insights; 2012.
3. Dembosky A: "Data Prescription for Better Healthcare." Financial Times, December 12, 2012, p. 19. 2012.
4. Frost and Sullivan: Drowning in Big Data? Reducing Information Technology Complexities and Costs for Healthcare Organizations.
5. Ohlhorst F: Big Data nalytics: Turning Big Data into Big Money. USA: John Wiley and Sons; 2012. 5. Complexities and Costs for Healthcare Organizations.
6. Ohlhorst F: Big Data Analytics: Turning Big Data into Big Money. USA: John Wiley and Sons; 2012.
7. Potter D (2010) Healthcare analytics: The Crystal Ball to Improving Quality of Care. Canadian Healthcare Technology.
8. Raghupathi W, Raghupathi V: An Overview of Health Analytics. Working paper; 2013.
9. Taylor J (2010) Transforming Healthcare Delivery with Analytics. Decision Management Solutions.

Websites

1. http://blog.ficci.com/data-analytics-healthcare/2392/
2. www.pwc.com/gx/en/ceo-survey/2014/**industry**/**healthcare**.jhtml