

A STUDY ON PERCEPTION OF HEALTHCARE PROFESSIONALS ON IMPLEMENTATION OF DATA SCIENCE IN HEALTHCARE

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfilment for the award of the degree of
Master of Business Administration (MBA)

in

Hospital and Health Management

by

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Under the Supervision and Guidance of

DR. DEEPTI SHARMA

DECLARATION BY STUDENT

I hereby declare that this dissertation titled '**A study on perception of healthcare professionals on implementation of Data Science in healthcare**' is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

DR. Vidushi Bhardwaj

Name of Student

Date – JULY- 01-21

CERTIFICATE

This is to certify that DR. VIDUSHI BHARDWAJ in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur has successfully completed her/his internship at Fingertips Data Intelligent Solutions during May 15, 2021, to June 19, 2021.

Place: AHMEDABAD

Date: MAY-15-2021

Head of the Organization:

Mr. Sunil purohit

Name of the organization:

Fingertips Data Intelligent
Solutions

CERTIFICATE

This is to certify that dissertation titled '**A study on perception of healthcare professionals on implementation of Data Science in healthcare**' is a record of the research work undertaken by DR. VIDUSHI BHARDWAJ in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

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ABSTRACT

This is a study on doctors, conducted to learn about their perception on application of data science in healthcare. The study also focuses on understanding the willingness of healthcare professionals towards adapting a new AI based product named AI Prescription which will aid in autogenerating prescriptions and thus saving their time per patient. The end part of study focuses on current practices among doctors, where there are using data science in their clinical practice. This study has been conducted through a questionnaire generated based on the objectives of the study and circulated among doctors through various online platforms.

The responses from the survey have been recorded and the collected data has been analysed using MS Excel and presented at the end of this report.

ACKNOWLEDGEMENT

Working on this dissertation has certainly changed my outlook towards application of data science in healthcare. and at the same time, it has tried to strengthen my knowledge base regarding these subjects.

I would like to thank the management for providing us with this learning opportunity even in such odd situations prevailing due to pandemic.

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Table 1 – Review of Literature

ABBREVIATIONS

- ❖ EHR – Electronic Health Record.
- ❖ EMR – Electronic Medical Record.
- ❖ CT Scan – Computed Tomography scan.
- ❖ MRI – Magnetic Resonance Imaging.
- ❖ DNA – Deoxyribonucleic Acid.
- ❖ IOT – Internet of Things.
- ❖ AI – Artificial Intelligence.
- ❖ ML – Machine learning.
- ❖ DS – Data Science.

INTRODUCTION

Data science in simple terms can be defined as a field that utilizes strategies, cycles, and frameworks to infer some significant data and experiences from organized and non-organized information apply information and noteworthy bits of knowledge from information across an expansive scope of use areas.

Data Science has spread its wings to various industries, thus helping each business to grow in a more effective and efficient manner. When we talk application of data science in healthcare, we have prolific examples about how data science can help in upgrading quality of healthcare across the globe.

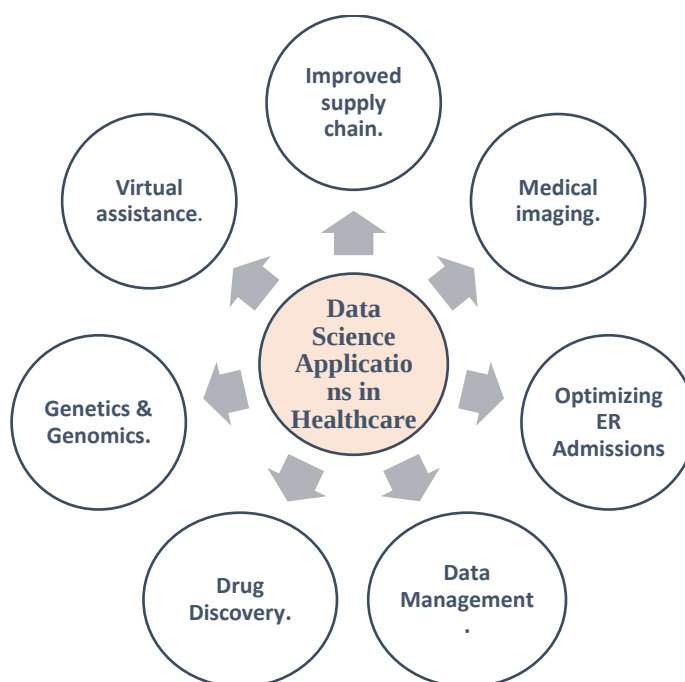
Healthcare leaders today encounter a lot of issues related to cost, revenue, and quality. These leaders are now turning to artificial intelligence as a key to better decision maker, believing it will deliver faster turnaround of insights with small margins of errors.

At the point when we talk about medical care industry, there are numerous wellsprings of enormous information like patient clinical records, medical clinic records, results from clinical assessments and aside from this gadget which are a piece of IOT that is web of things. Indeed, even biomedical exploration creates an enormous measure of information applicable to general wellbeing. This information requires legitimate investigation to assist with inferring significant understanding out of it.

Medication and medical care are the most basic piece of living souls. In past the field of medication has significantly depended in discrete counsel by specialists, notwithstanding we accept that this was not generally right and was inclined to some sort of human blunders. Yet, having a look at different progressions in PCs and uncommonly in the field of Data Science, it is presently conceivable to acquire exact demonstrative measures.

The actual image shows that data science in healthcare has brought advances in various fields in healthcare including drug discovery, predictive analysis etc.

Various Applications of Data Science in Healthcare (Fig -1)



Applications of Data Science in Healthcare

- **Imaging** - The major and extraordinary utilization of information science in the success business is through clinical imaging. There are assorted imaging techniques like X-Ray, MRI, and CT inspect. This pile of methods imagines the internal pieces of the human body.

Generally, experts would truly examine these photos and find asymmetry inside them. Regardless, it was ordinary difficult to find minute mishaps and accordingly, experts could not propose an authentic end. With the appearance of profound learning advances in information science, it is presently conceivable to discover such tiny distortions in the filtered pictures. Through picture division, it is feasible to look for deserts present in the filtered pictures.

- **Genomics** - is the investigation of sequence and examination of genomes. A genome comprises of the DNA and every one of the qualities of the living beings.

Prior to the accessibility of powerful computation, the associations invested a ton of energy and cash on examining the arrangement of qualities. This was a costly and dreary interaction.

Notwithstanding, with the high-level information science apparatuses, it is currently conceivable to examine and get bits of knowledge from the human quality in a lot more limited timeframe and in a much lower cost.

The objective of exploration researchers is to examine the genomic strands and quest for abnormalities and deformities in it. Then, at that point, they discover associations among hereditary qualities and strength of the individual.

By and large, specialists use information science to examine the hereditary arrangements and attempt to discover a connection between the boundaries contained inside it and the infection.

- *Patient Health Monitoring* – Various devices that collect heartbeat, temperature etc of users make use of IOT (Internet of things). The data collected using these devices is analysed using data science.

- *Enhancing hospital operations* – Healthcare set ups are cost-touchy and deal with complex operational issues, like the number of staff to appoint at specific hours to amplify effectiveness, how to guarantee sufficient medical clinic beds are accessible to fulfil patient need, and how to improve usage in the working room. Prescient examination can enhance planning and surprisingly venture to such an extreme as to tell medical clinic staff which beds ought to be cleaned first and which patients may confront difficulties during the release interaction.

Analytic software can smooth out trauma centre activities, guaranteeing that each conceded patient goes through the most productive request of tasks.

Looking at the above-mentioned examples we can clearly say that data science plays a vital role in enhancing healthcare by reducing operational cost, helping in accurate diagnosis, patient health monitoring etc.

EHR is one of the most widely used application of big data in healthcare which has made managing health records of patients and sharing them among doctors from different health institutes easy.

Key Benefits of Data Science application in healthcare

- Facilitate the work process of the medical services framework
- To lessen the danger of treatment disappointment
- To give appropriate treatment on schedule
- To keep away from pointless crisis because of the non-accessibility of specialists
- To lessen the holding up season of patients.

REVIEW OF LITEATURE (*Table no.1*)

Title	Author & Year	Location	Silent Features
Big Data and Machine Learning Based Secure Healthcare Framework	Prableen Kaur et al. (2018)	India	❖ The study Concludes that extensive work has been done on big data in healthcare. ❖ There have been different new advances in medical services data framework through execution of machine learning and progressed security system and along these lines help in better treatment of clinical information. The advancement lies in the joining of ideal stockpiling furthermore, information security layer used to keep up with security and protection.
Forecasts of Cancer and Chronic Patients: Big Data Metrics of Population Health.	Kuriyan et al. (2013)	India	❖ Authors proposed engineering for estimating malignancy and other persistent illnesses viz. diabetes, hypertension, elevated cholesterol, osteoarthritis, asthma, and bleak weight in patients. Large information investigation was utilized for productive determination additionally assists with decreasing the medical care cost.
Big Data in Healthcare: What is it used for?	Rebecca Hermon, Patricia A H Williams (2014)	Australia	❖ Purpose of this study was to gain an idea about the use if data in healthcare and also

			guides the readers the understand the hidden potential of data science to build a data driven healthcare industry. ❖ Study suggests that big data utilisation categories, which the existing literature can be classified into administration and deliver, clinical decision support, clinical information, behaviour/consumer, and support information
Health bank – A Workbench for Data Science Applications in Healthcare	(2015)	Sweden	❖ This study portrays various information science applications that have been created utilizing this data set, exhibiting the potential reuse of EHR information to help medical services and public wellbeing exercises, just as work with clinical examination. Nonetheless, to understand the maximum capacity of this asset, it should be made accessible to a bigger local area of analysts, just as to industry entertainers.
Big data in healthcare: management, analysis and future prospects	Dash et al. (2019)	India	❖ The study reveals that the collective big data analysis of EHRs, EMRs and other medical data is continuously helping build a better prognostic framework. The companies providing service for healthcare analytics and clinical transformation is indeed

			contributing towards better and effective outcome. With the progression of huge information inside the previous few years there has been significant development of its utilization in medical services area going from clinical information the board to medicate disclosure programs for complex human illnesses counting disease and neurodegenerative problems.	
Ethical Machine Learning in healthcare	Chen et al. (2021)		❖ The utilization of AI (ML) in medical services raises various moral concerns, particularly as models can enhance existing wellbeing disparities. Along these lines, the examination diagrams moral contemplations for even handed ML in the progression of medical services.	

RATIONALE:

Focusing on the core benefits of applying data science into healthcare, now is the right time for a data-driven healthcare industry for the benefit of both healthcare provider as well as healthcare seeker.

This study aims to gain an insight about the level of knowledge among healthcare professionals (doctors) related to data science application in healthcare.

RESEARCH QUESTION:

What is the perception of healthcare professionals on application of data science in healthcare?

RESEARCH OBJECTIVE:

- To gain understanding about the view of doctors on implementation of data science in healthcare.
- Explore attitude of doctors towards adapting, a new AI based device that is, AI Prescription.
- Gain insight about current practices of use data science in healthcare amongst doctors.

METHODOLOGY

This study is a descriptive study, that uses a cross-sectional study design to gain insight about the knowledge among healthcare professionals on application of Data Science in healthcare. The study was conducted using a questionnaire, made through google form, consisting of a set of 20 questions.

The duration of this study was one months.

Sample Size

The proposed sample size for this study was 150 healthcare workers (doctors). The total number of responses collected at the end of the study were 154.

Sampling Technique

Simple random sampling technique was for the purpose of collecting the data.

Study population

This study was conducted on doctors, working in various healthcare settings as well as private practitioners.

Analysis Tool

Data collected from the survey was analysed using Microsoft Excel.

Data collection tool

Questionnaire consisted of a set of 20 questions including both close-ended and open-ended questions.

The questionnaire was generated in the form of google form and was circulated to the target population through various social media platform.

Questionnaire comprised of four major sections

Section 1 – This section helped gathering demographic information about the respondents.

Respondent's Name

Age

Gender

Occupation

E-mail Address

Section 2 – This section comprised of question based on the first objective of the study and helped gathering information about the knowledge of doctors on application of data science in healthcare.

The questions included in this section were

1) Do you know about data science?

YES -----

NO-----

2) Do you think data science can be applied in healthcare?

YES -----

NO -----

3) How many applications of data science are you aware off?

1

2

3

More than 3

4) Name the applications you are aware off?

5) According to you, how can data science application help in managing the healthcare?

Help improve management of healthcare data -----

Help providing accurate diagnosis-----

Help eliminating treatment errors -----

All of the above -----

Section 3 – This section was developed keeping in mind the second objective of the study and had questions related to AI- Prescription.

If a new product named AI Prescription is launched in market, which helps you in autogenerating prescription for your every patient thus helping you examine a greater number of patients in limited amount of time and eliminating any kind of prescription error from your end: -

1) Will you be willing to use/buy such a product?

YES

NO

2) How much money can you invest for such a product?

3) Are you aware of any other product of similar kind?

4) If yes, how much did that product cost you?

5) Will you recommend this product to your colleagues?

YES

NO

Section 4 – This section was developed to target the third objective of the study and thus to gain an idea about the current practices of data science applications in healthcare.

1) Are you currently using any Data Science assisted application in your hospital or at your private clinic?

YES

NO

2) If yes, can you provide the name of the application you are currently using?

3) For what purpose are you using that application?

Healthcare Data Management _____

For diagnosis _____

For Patient monitoring _____

Any other use _____

4) Are you satisfied with the application you are currently using?

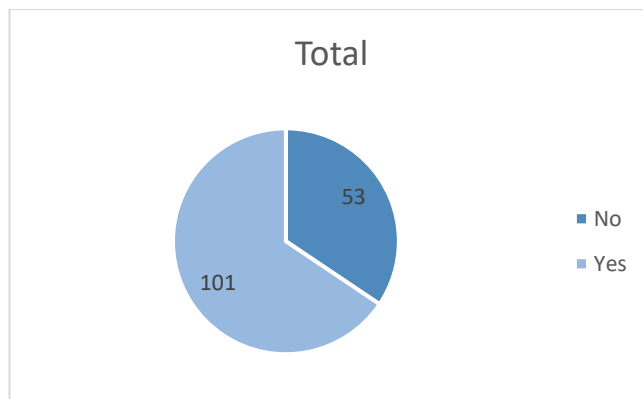
YES

NO

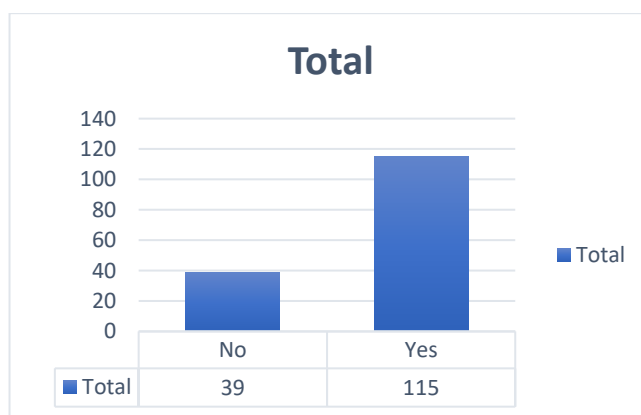
Google form was generated, and the link was shared to the target population through WhatsApp, and through professional groups on other social media platforms, owing to the current COVID scenario.

RESULT & DISCUSSION

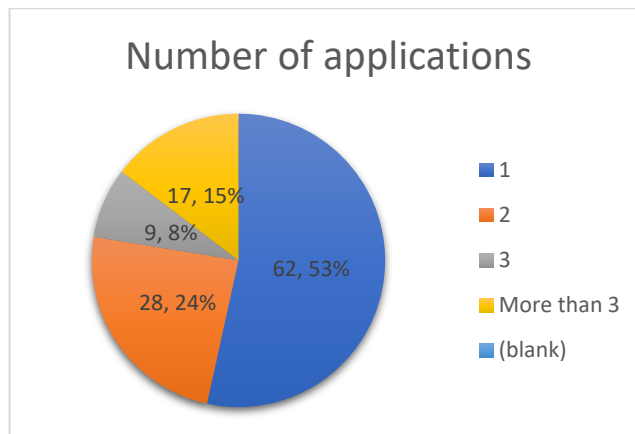
- *Objective 1 - To gain understanding about the view of doctors on implementation of data science in healthcare.*



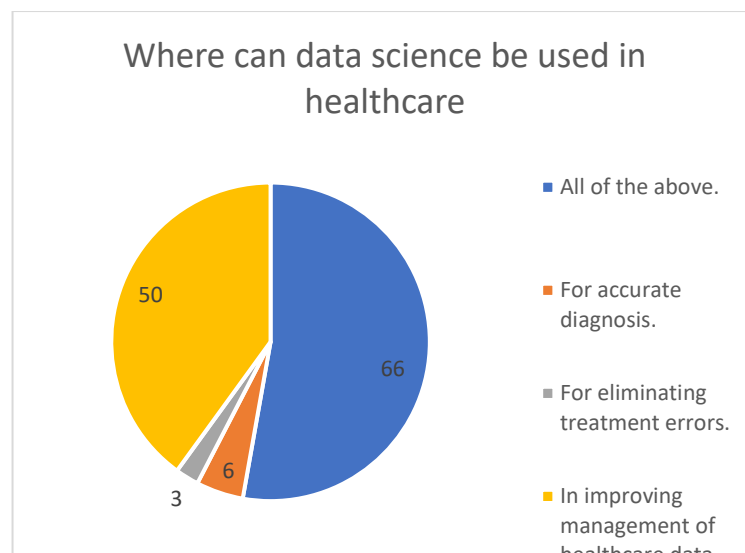
- Out of 154 respondents, 101 of the respondents are aware of data science & 53 respondents are not aware about data science. Thus, we can say that more than 50% of the doctors have an idea about data science.



- 115 respondents, believe that data science can be applied in healthcare. The inputs from the above charts clearly indicate, that majority of healthcare professionals are aware about data science application in healthcare sector.



- Majority of the respondents are aware of at least one, use of data science in healthcare.

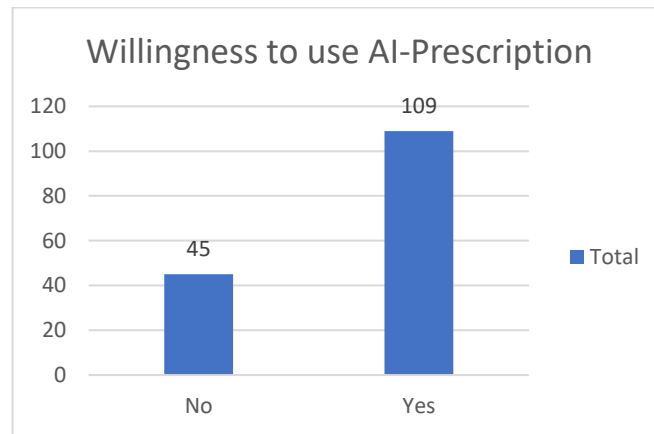


- Majority doctors believe that data science can be used for diagnostic, for elimination of treatment errors as well as for managing healthcare data.

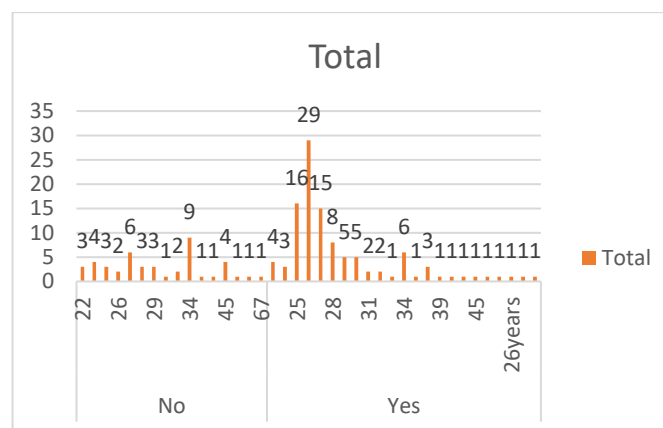
Based of the above analysis we can say that doctors possess fairly good knowledge about the application of data science in healthcare.

Putting slight efforts to raise awareness on application of this discipline in healthcare can help transforming the current healthcare industry to data-driven healthcare sector which is the need of the hour.

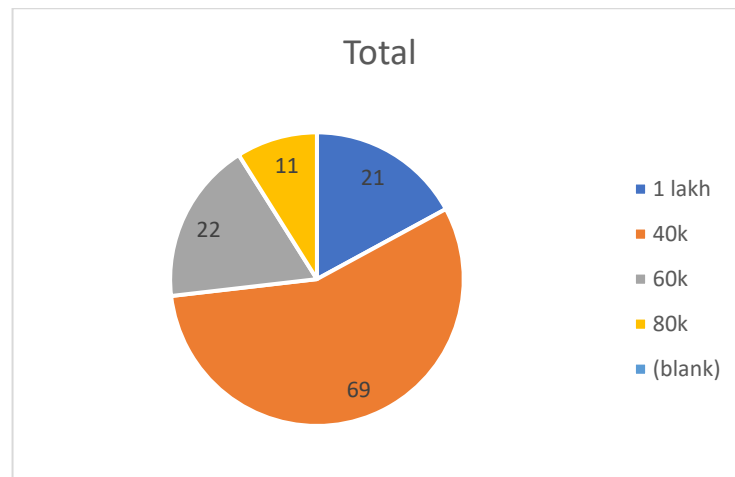
- *Objective 2 - Explore attitude of doctors towards adapting, a new AI based device that is, AI Prescription.*



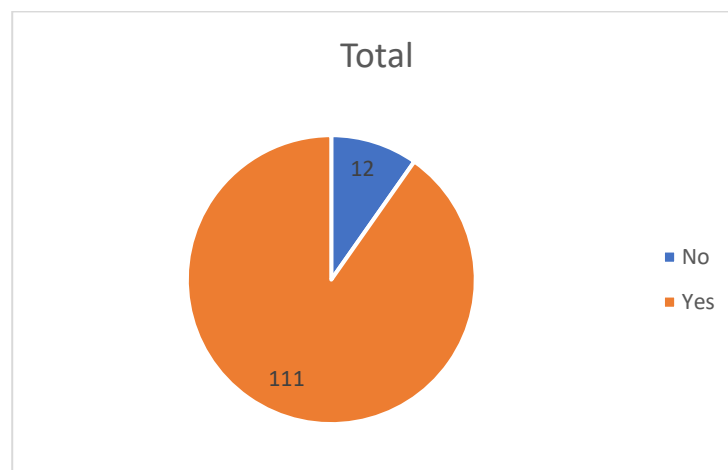
- Out of the total responses, 109 are willing to use AI- Prescription. This clearly indicates the need for such products in the market.



- High willing to adopt such technology is observed in 25 – 28 years of age group.



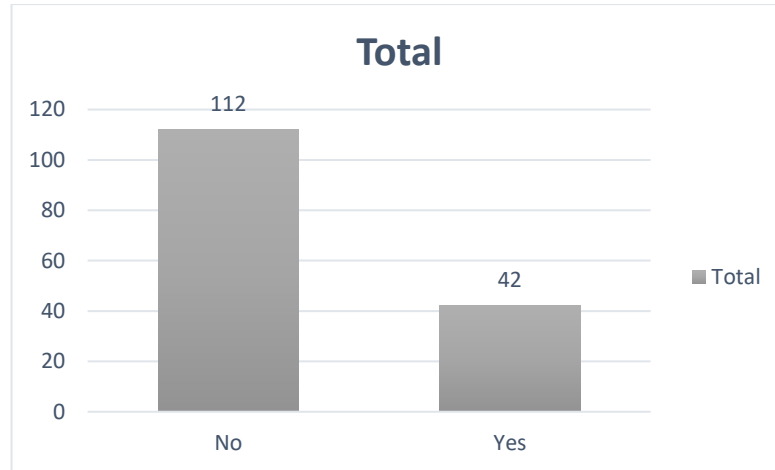
- A feasible cost for majority of respondents for such a product is around 40k. Which shows that while introducing any product like AI-Prescription in market a price range of between 40k to 60k can be considered.



- 111 respondents are willing to recommend this product to their colleagues.

Product like AI – Prescription holds a good market. Targeted population for this product should be doctors of age group 26 – 28 years. The product price range can vary somewhere between 40k to 55k.

- *Objective 3 - Gain insight about current practices of use data science in healthcare amongst doctors.*



- Majority of doctors are not using any data science-based application in their day-to-day practice. This indicates lack of awareness on currently available data science applications.

Data science is majorly being used for the purpose of healthcare data management only. Developing more data science-based applications for patient monitoring or diagnostic purpose will prove beneficial.

CONCLUSION

Insights from the literature available on application of data science in healthcare, showcases prolific examples as to how data science is extending its roots to healthcare industry as well.

There is an utmost need to raise awareness about the current available data science applications in healthcare among healthcare professionals, so as increase the use of such application which would in turn aid in development of better application based on the feedback from healthcare professionals.

The study clearly shows that doctors hold fairly good knowledge about application of data science in health and they hold a positive attitude towards adopting such advancements in the field of healthcare.

Targeting an age segment of 26 to 29 years, while launching any new data science application in healthcare industry will prove profitable, as the research clearly shows a positive attitude towards adaptability of such application among this age group.

Cost effective solutions have to be provided as in majority of countries high healthcare cost is one of the major issues being faced by major chunk of population.

Apart from healthcare data management, other areas such as patient monitoring,

Diagnosis etc should be kept in mind which working on developing new data science-based healthcare applications.

Aggregate enormous information examination of EHR and EMRs can help assembling a superior guess. Medication revelation programs for complex human illnesses including disease and neurodegenerative problems is one of the enormous commitments of information science to the field of medication.

To conclude, I would say that data science is a promising field and can prove helpful in building data driven healthcare industry, thus working on some major issues in healthcare such a high healthcare cost, and poor healthcare quality.

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