Dissertation

At

Karkinos Healthcare Pvt.Ltd

A study on implementation process of healthcare interoperability :An ABDM approach

By

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PG/20/050

Under the guidance of

Dr.Nikita Sabherwal & Manish Sharma

PGDM (Hospital and Health Management)

2020-22

International Institute of Health Management Research, New Delhi

INERNSHIP CERTIFICATE

KARKINOS

Date: 12-May-2022

Internship Completion Certificate

To Whom It May Concern

This is to certify that **Prativa Priyadarshini,** has worked as **"Product Intern"** with Karkinos Healthcare Private Limited and has successfully completed the internship under the guidance of Manish Sharma.

Internship Duration: 1st February-2022 to 11th May-2022.

We wish all the best.

Karkinos Healthcare Pvt. Ltd.

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Name Of The Student: Prativa Priyadarshini

Dissertation Organization : Karkinos Healthcare Pvt.Ltd

Area of Dissertation: A study on interoperability implementation in India and to find gaps and challenges associated with it

Attendance:100%

Objectives Achieved: Yes

Deliverables: Research to find current implementation status of interoperability in Indian healthcare industry and suggesting measures for its better enactment.

Strengths: good research skills,user interactive ,good in taking initiatives

Suggestions for Improvement:

N/A

Suggestions for Institute

N/A

Signature of the Mentor

Date: 18/06/2022

Place: Karkinos Healthcare

Certificate from Dissertation Advisory Committee

This is to certify that Ms. Prativa Priyadarshini, a graduate student of the PGDM (Hospital & Health Management) has worked under our guidance and supervision. He/ She is submitting this dissertation titled "**A study on implementation process of healthcare interoperability: an ABDM approach**" at "**KARKINOS healthcare**" in partial fulfillment of the requirements for the award of the PGDM (Hospital & Health Management).

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Dr.Nikita Sabherwal
Associate Dean(Training)
Associate Professor (Hospital Administration)
IIHMR ,New Delhi

Manish Sharma
(Chief Product Officer)
Karkinos Healthcare Pvt.Ltd

Certificate of Approval

The following dissertation titled **"A study on Implementation Process of Health care Interoperability: An ABDM Approach"** at **"KARKINOS"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of PGDM (Hospital & Health Management) for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

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IIHMR DELHI

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NO DUES CERTIFICATE

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PART-I

Certified there is nothing outstanding against this student.

IT: no dues Mukesh 22/6/22
(Signature of the Head of Department)

Library:
(Signature of the Head of Department)

Administration: No dues 27/6/22
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Canteen: No dues 30/6/22
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Accounts:
(Signature of the Head of Department)

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Alumni (Portal Registration- Ms. Anju):

PART-II

Submitted to PGDM Office

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It is my esteemed pleasure to present this research project by thanking each and everyone who helped me in this task.

I would like to express my sincere gratitude towards my guide **Mr Manish Sharma, Chief Product Officer, Karkinos Healthcare, Bengaluru** who helped me immensely throughout the tenure of my internship. He inspired me greatly to work in this project with his valuable guidance, support, interest, encouragement, involvement and advice.

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Abbreviations

SDO-Standard Development Organisation

HMIS- Healthcare Management Information Systems

LMIS- Laboratory Management Information Systems

NHA-National Health Authority

ABDM -Ayushman Bharat Digital Mission

NDHM-National Digital Health Mission

HL7-Health level 7

FHIR- Fast Healthcare Interoperability Resources

IndEA -India Enterprise Architecture Framework

NDHB-National Digital Health Blueprint

PART A : OBSERVATIONAL LEARNING

KARKINOS HEALTHCARE

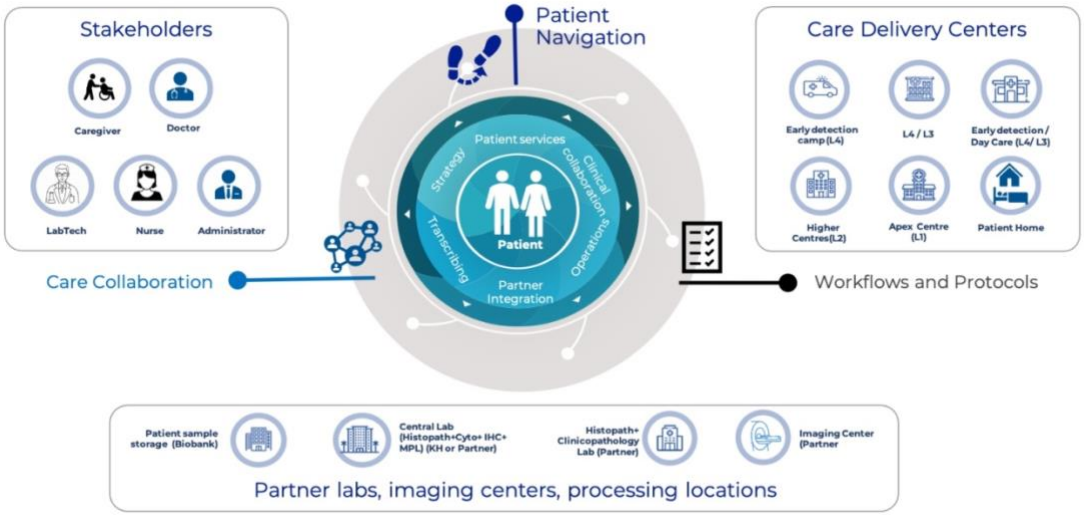
Karkinos healthcare is technology driven oncology platform with a wide vision of early detection of cancer and provide care continuum by providing technology platform .A guesstimate shows that over 2.25 million cancer cases is found in India every year .Among which maximum number of cases is detected on late stages and thus leading to high mortality rate .One of the major reason behind high mortality is lack of standardizes care .

Karkinos Healthcare address these problems with an end-to-end technology platform which coordinates cancer care continuum; medical center for treatment of complex cancers; and research center which leverages technologies such as genomics, synthetic biology, sensors, and AI to analyze data and leading to the development of affordable cancer interventions.

Karkinos 4 D vision-

Detection & Diagnosis –Early detection through outreach services and risk assessment and also help patient with on time diagnosis.

Deliver managed health care -2 million+ patients served annually 10 million+ patient hours saved annually.
Data and research Contribute towards Atmanirbhar Bharat



METHODOLOGY: -

Study design	A descriptive cross sectional study using a self – administrative question will be applied.
Study area	Employees of different healthcare organization who have working knowledge of Healthcare standards.
Study Duration	1 May 2022- 10 June 2022
Study population	Employees of different health IT companies who have working knowledge of Healthcare standards.
Sample size	Got 155 responses. After inclusion and exclusion Criteria final sample size was 110
Source of data collection	Google form was circulated in LinkedIn and community circle
Study tool	Google Form

GENERAL FINDINGS ON LEARNING:-

1. Most of the healthcare professionals are in initial stage of their interoperability journey in proportion to experienced professionals in the field of health data exchange process. Therefore, reflecting the lack of healthcare technology experts.
2. Enhancing and updating transactional workflow can make significant difference in India's current interoperability environment.
3. Presence of multiple data exchange format, lack of real time none standardize information exchange across various organization is found as a major barrier.
4. It is important to find right technology partner and identifying correct use case for FHIR enablement in the organization.
5. Majority of Indian Health organization are using FHIR/HL7 standard and few still have their own API based data exchange platform.
6. ABDM can put milestones in India for encouraging organization for adapting similar standard and formats for better care delivery,

LIMITATIONS:-

1. Time limitation for the study
2. Technical aspects for left uncovered

PART- B : PROJECT REPORT

BACKGROUND:

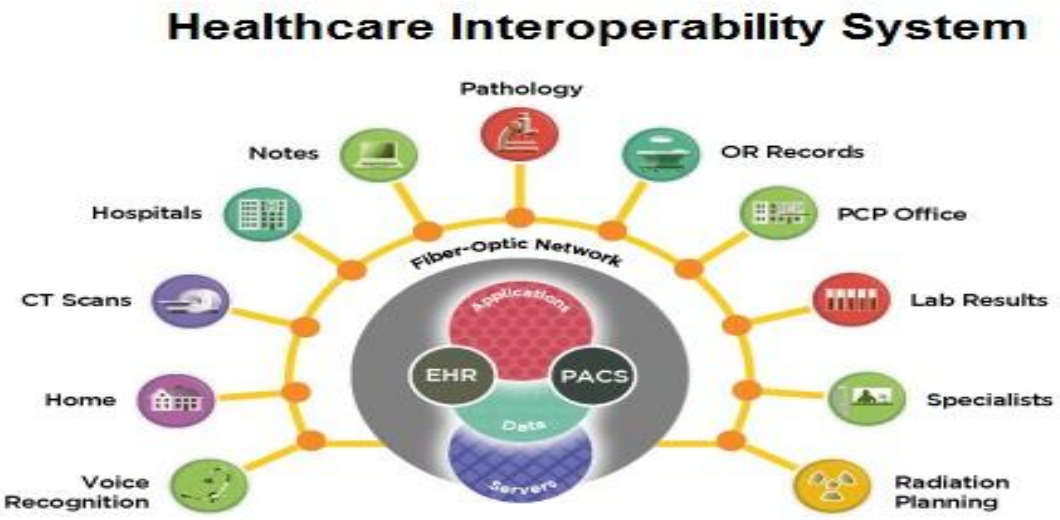
The advancement in healthcare and information technology bring the integration of the two. In Health IT, standards enable a common language system and set of expectations that make it possible that different systems or devices are interoperable with each other. As per IEEE Standards Computer Dictionary, Interoperable systems are two devices that can share information and use the information that has been shared.

Standards are confined to security, data transport, data format /structure and also associated with some terms.

What is interoperability in healthcare?

The healthcare industry has seamlessly got involved in health information transmission and communication btw departments and organization as well. This is helping the industry to eliminate the organization challenge for data flow and interoperability is playing an important role in adding new value to the workflows and thus leading to delivering better patient outcomes.

Now suppose a patient is travelling to some hospital for the first time.The hospital now is able to access patient past medical history ,demographic details ,whether the patient is having any allergies etc simply but entering his health Id .



Why having healthcare standards?

Standards are defined, maintained and updated by various standard development organization(SDOs).This enable sharing of medical data and also large data subset. It also helps

providers to give quicker insurance claims payment in time of need. It also encourages participation and adoption by all vendors and stakeholder. Consider best practices, experiences, policies and frameworks to fulfill accreditation needs and provide quality service

Time has evolved with the development of various kind of standards. These are mainly-

- Transport standards like HTTP,SOAP SMTP etc
- Security standards like Oauth ,jwt
- Content standards like HL7 ,DICOM,CDA,CCD,C-CDA, Fhir(current version in use)
- Code standards like LOINC,SNOMED,ICD-10etc

The ultimate goals of intropera bilty is ensuring continuity of care, provide timely and effective patient centeric care.

Very recently govt of India and taken a great initiative which is Ayushman Bharat Digital Health Mission (ABDM). Under the mission, citizens can create there own health account and they can link there previous health records and health data. This step will be very important for healthcare providers as they can easily access the health records when necessary and better optimize the care of the patient.

EDI (Electronic Data Interchange) is just about what it sounds like: guidelines or standards for exchanging data between electronic systems in healthcare. These rules define how information is formatted and transmitted between systems.

One way to think about this is via the example of faxes. You can transfer information electronically via fax. But you are really just transmitting an image of your document when you send a fax. If the fax contains lab results, for example, that information is readable by a human, but it will most likely have to be keyed into a computer item-by-item if you want to manipulate that information electronically (e.g., charting results of multiple tests over time.)

Benefits of Interoperability-

- Interoperability has reduced the patient waiting time and allows practitioner to spend more time with patients.
- Hits in productivity has reduced the treatment cost
- Advantages of using a decision support system has enhanced patient centric care.
- Reduce error
- Better quality in health data can be achieved.

- By taking COVID-19 as example we can see how important interoperability is. Non standardize system and multiple sources of data leads to many problems. So we can say that, if there were standardize systems and quality data a better decision about the pandemic could have been made

INTRODUCTION:

The evolution of digitalization in the healthcare industry has been significant over the past few years' .Digital software and hardware is leveraging clinical workflow and successfully treating their patient more efficiently. Interoperability helps in healthcare information exchange across or within organization and thus hugely impacting healthcare workflow by reducing medical error rate, enhancing patient experience, and lowering healthcare cost.

Ayushman Bharat Digital Mission (ABDM) which is a flagship initiative by National Health Authority had 27 integrations govt. and private sectors which includes HMIS, LMIS, health locker and other digital services as well. Many Healthcare IT organizations is capaciously working to centralize and streamline access to clinical and administrative data. "Health Information Exchange" allows clinical information to be moved electronically to different healthcare information systems. This facilitates access to clinical data to provide safe, efficient, effective, and equitable patient-centered care. Interoperability is helping to boost patient care in better way but still there are many challenges hindering the process to work more efficiently.

It guides both enterprises as well as government agencies to develop and implement architecture. The same model is used by both public and private agencies so it is considered as standard model. Same architecture also helps in planned development.

NDHB shall be developed adopting India Enterprise Architecture Framework (IndEA) The artefacts prescribed by the IndEA Standard will be prioritized and sequenced. The design of the building blocks of NDHB will adopt and conform to IndEA by default. Other national and international standards will be adopted in areas not covered by IndEA. NDHB may, when appropriate, adopt the Agile IndEA Framework, which combines the Vision of IndEA with the Speed of Agile methodologies of development.

New wealth of opportunities can be achieved by streamlining the healthcare deliverables. But with growth lies challenges underneath.

GENERAL OBJECTIVES:

- To find out current implementation status of interoperability in India among various healthcare organization.
- To find out gaps and challenges for interoperability implementation In India.

LITERATURE REVIEW:-

1. Samal L, Dykes PC, Greenberg JO, Hasan O, Venkatesh AK, Volk LA, et al. Care coordination gaps due to lack of interoperability in the United States: a qualitative study and literature review. BMC Health Serv Res. 2016 Dec;16(1):143

This article sows HIT use for several care coordination activities and explains gaps associated with it.It also speaks about several patient level care domains that can be improved through interoperability . The main hindrances in healthcare info exchange between e health records, community institute platform.

2. Nsaghurwe A, Dwivedi V, Ndesanjo W, Bamsi H, Busiga M, Nyella E, et al. One country's journey to interoperability: Tanzania's experience developing and implementing a national health information exchange. BMC Med Inform Decis Mak. 2021 Apr 29;21:139.

The key barrier to effective HIT interventions is the lack of interoperability among EHRs, patient HIT tools, and network agencies' HIT equipment. As we design destiny levels of Meaningful Use and other HIT coverage, we should fastidiously compare the impact of HIT on care coordination and incentivize sizable adoption of effective HIT tools.

3. Huang C, Koppel R, McGreevey JD, Craven CK, Schreiber R. Transitions from One Electronic Health Record to Another: Challenges, Pitfalls, and Recommendations. Appl Clin Inform. 2020 Oct;11(5):742–54.

Identified challenges consist of monetary burdens, employees assets, affected person protection threats from confined access to legacy records, facts integrity at some point of migration, cybersecurity, and semantic interoperability. Transition teams need to overcome insufficient human infrastructure, technical challenges, safety gaps, unrealistic vendors' expectations, workflow changes, and insufficient education and aid—all factors affecting potential clinician burnout

4. Shivers J, Amlung J, Ratanaprayul N, Rhodes B, Biondich P. Enhancing narrative clinical guidance with computer-readable artifacts: Authoring FHIR implementation guides based on WHO recommendations. J Biomed Inform. 2021 Oct;122:103891.

The article is on implementation guide on interoperability standard mainly FHIR standard and the challenges associated for creating such machine learning guidelines.

It also emphasise on the process for creating data dictionary and creating new implementation guides need for improvising and expanding FHIR interoperability

Mode for data collection is:

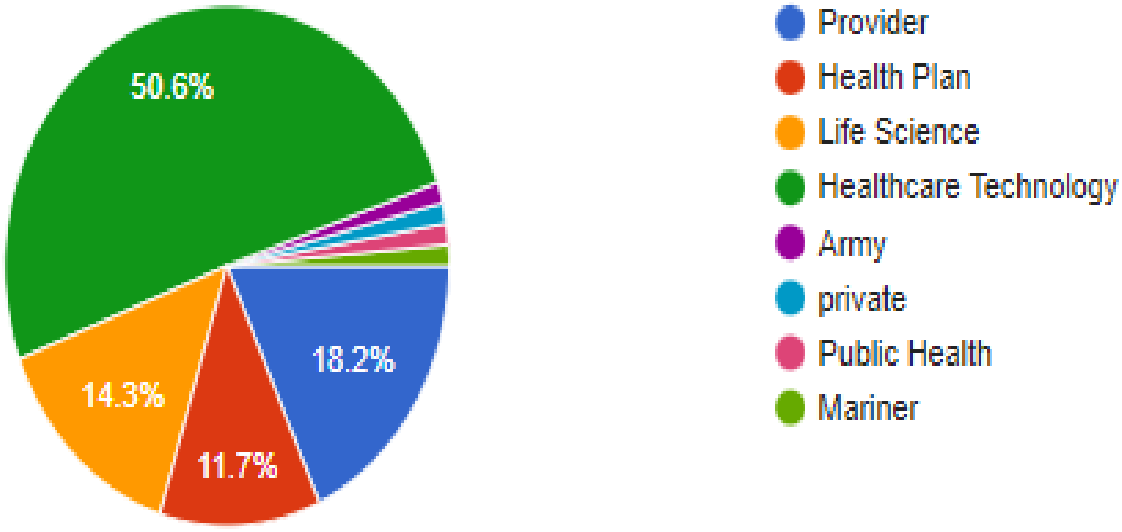
A self -administered survey questionnaire was circulated to healthcare IT professionals in LinkedIn and community circle.

Response of the people who are associated with Healthcare organization with who are either in initial stage of learning or who is working experience of health interoperability standards was considered .

Total response collected was 155 initially. After applying inclusion criteria the finalized response were 110.

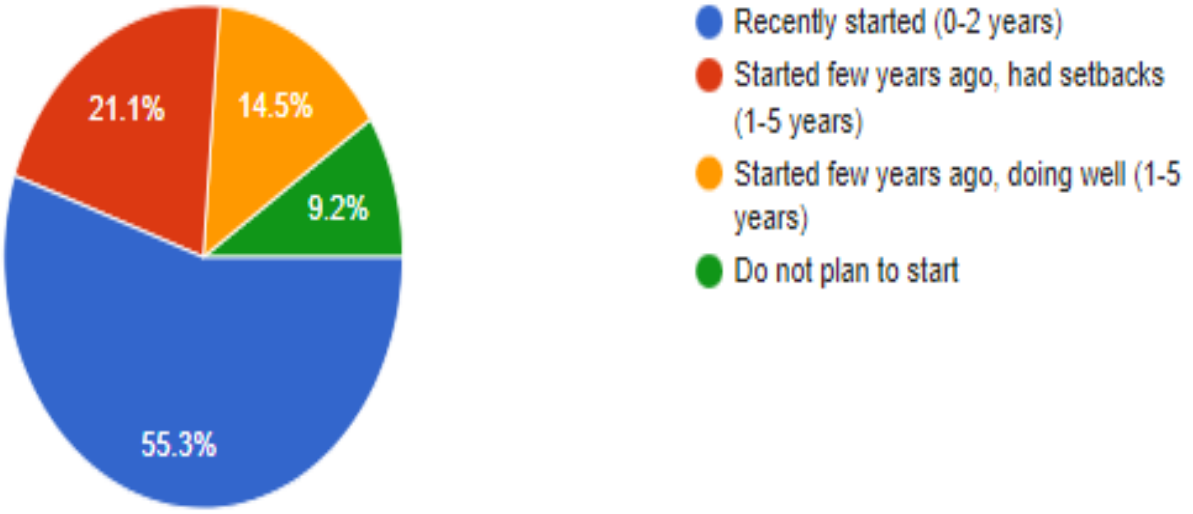
ANALYSIS:-

1 Organization types of various respondent-



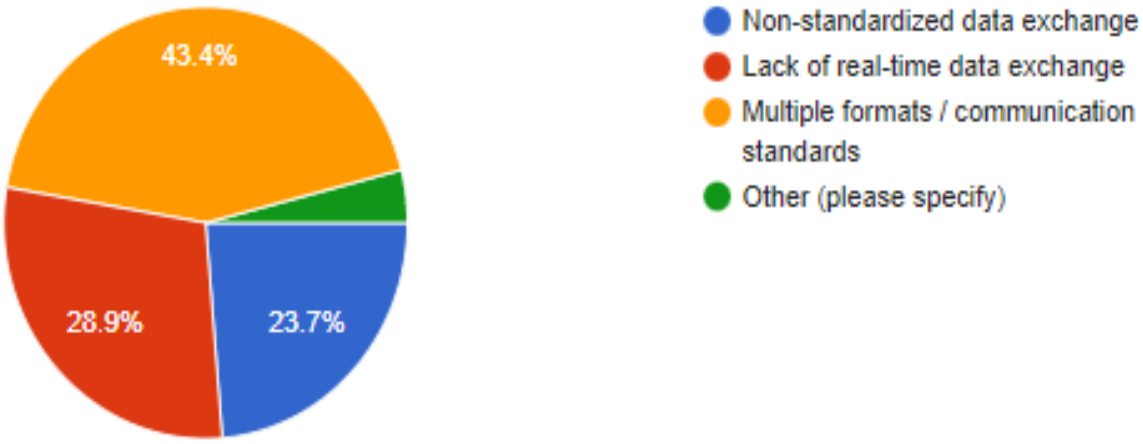
On analyzing the respondent organization type 50.6% of them belong from health IT companies,18.2% are healthcare provider ,11.7 % are heath planner ,14.3 % life science are in majority.

2 Interoperability journey of respondent



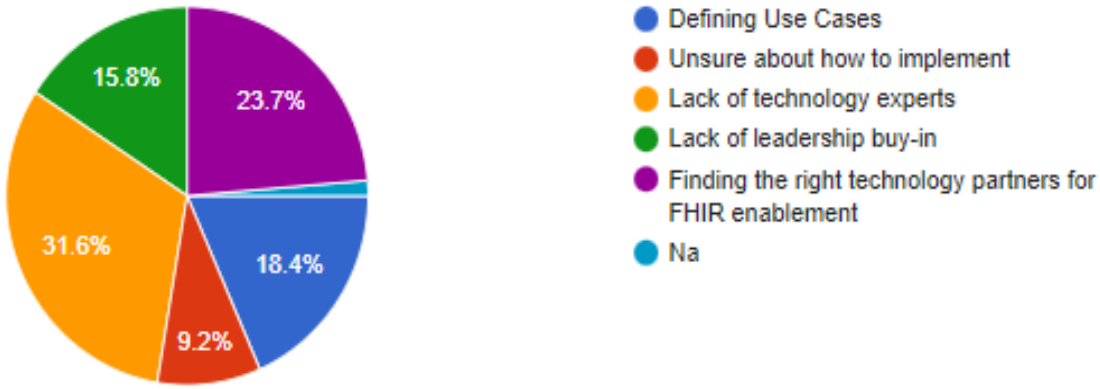
The report shows that 55.3% of the people recently started learning about interoperability .21.1% started few years ago. Only 14.5 % of people started few years ago and becoming expertise of interoperability.

3 Response on Biggest challenges in interoperability in India



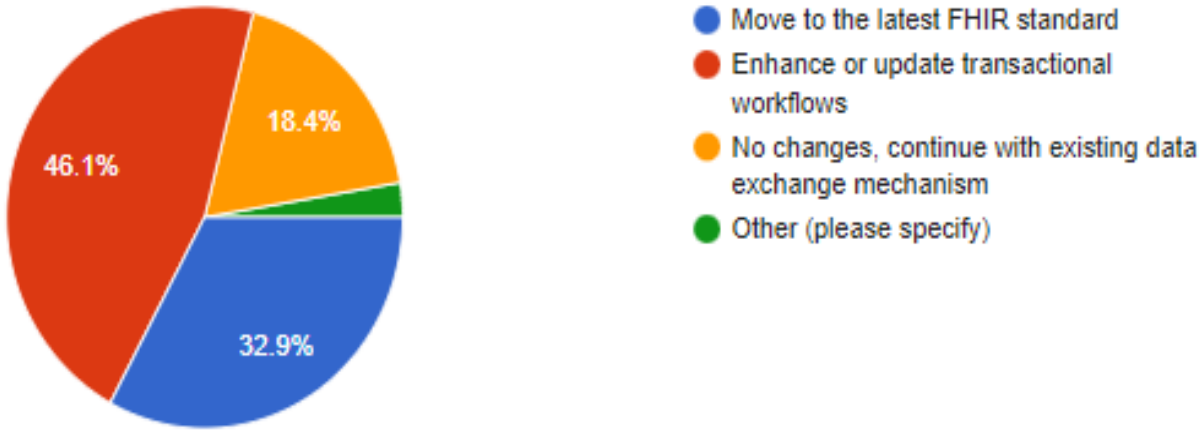
The analysis shows that multiple formats and different communication standards is a major hindrance in interoperability in India. Non standardized data exchange and lack of real time data exchange is next major reason covering 28.9 % and 23.7%

4 Biggest challenge to shift to a FHIR-based interoperability platform

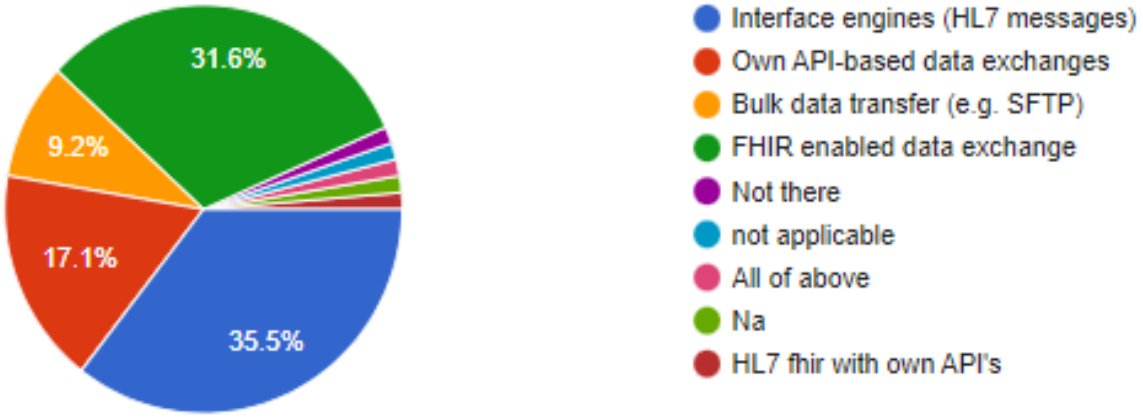


The analysis shows Lack of technology expert (31.6%) and finding tight technology partner for FHIR enablement (23.7) are the biggest challenge to shift to FHIR based interoperability platform. Lack of leadership buy-in and defining use case are few more challenges here.

5 Changes required in the current Interoperability environment used in Indian healthcare organizations

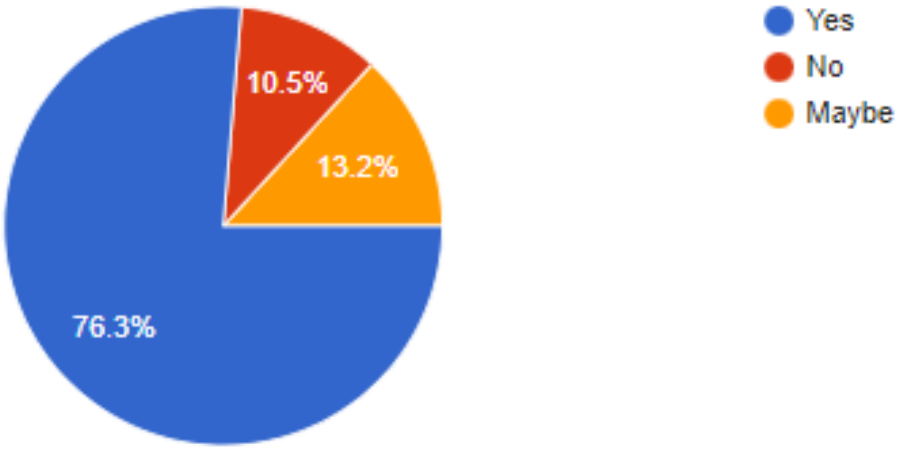


6 Interoperability Standards currently used in Indian Health Industry

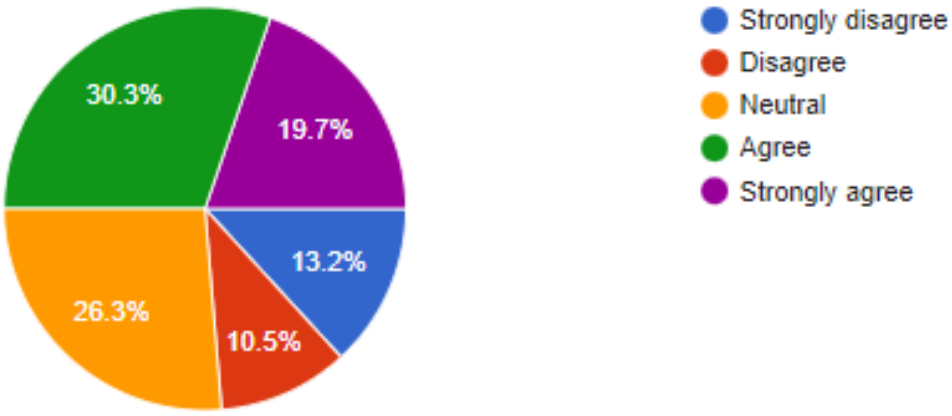


The report shows that Hl7 interface engines, FHIR enabled data exchange, own API based data exchanges and bulk data transfer are currently more in use.

7 Interoperability for enhancing the patient experience and improvising clinical outcomes

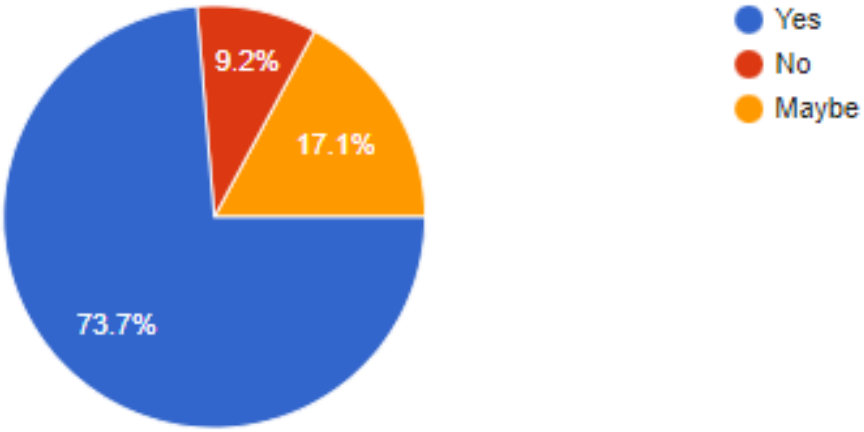


8 Block chain for medical records confidentially



The analysis show that maximum percentage of people considers block chain important for maintaining medical confidentiality.

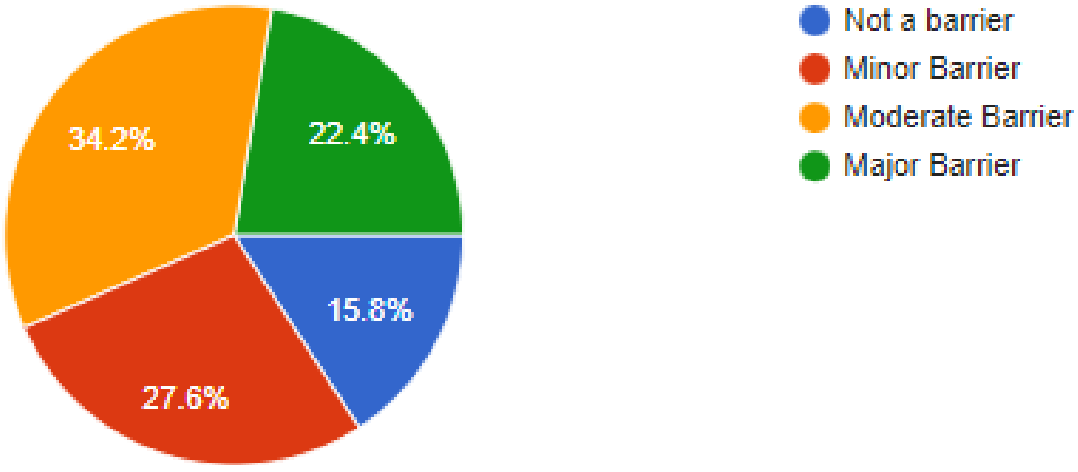
9 **NDHM Effectiveness**



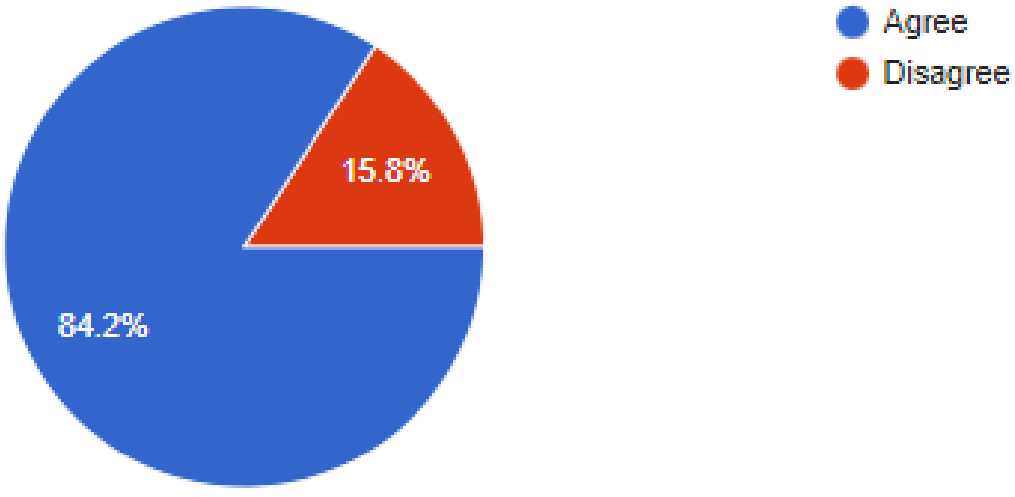
73.7 % of people find ABDM effective for improvising healthcare and leveraging the existing gaps in healthcare data exchange.

10 Regulation Barrier

Regional, national, or state level regulations, or variations in policies or regulations, increase burden and make interoperability difficult. Legislation is subject to interpretations and the lack of clarity blocks and delays interoperability implementation. The Pie chart shows people perspective on this barrier for data exchange.

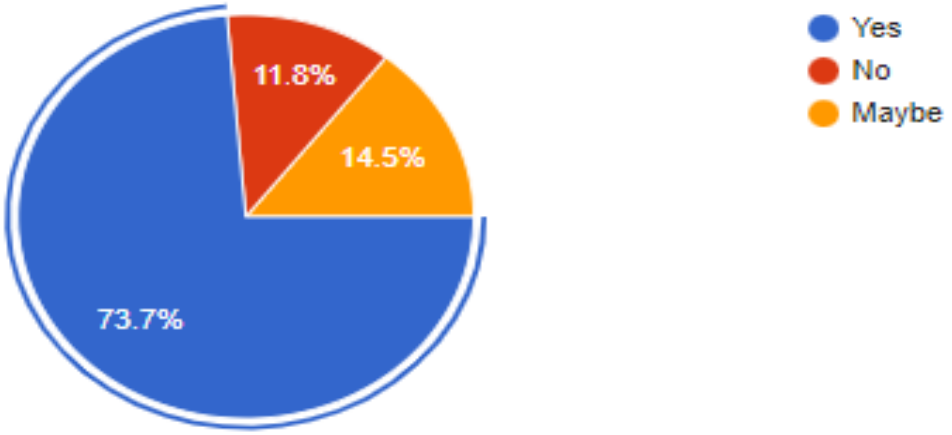


Missing data or irrelevant data can cause poor usability and negative impact on providers workflow



Standardized Summary Record

Majority of prople agree that standardized summary record are important for better transition and patient care



RECOMMENDATIONS:-

1 More training and learning sessions are needed for budding interoperability professional .

2 Single Norms on data exchange and data using format is required to reduce the gaps

3 Encouraging organization is needed to shift to FHIR enabled platform

CONCLUSION:-

Interoperability is prerequisite for taking healthcare sector towards advance technology. At first, they were concerned with achieving interoperability in particular domains, then with putting in place common infrastructure.

Ensuring end to end health information exchange with open standard presents new challenges.EHR and health information integration will win situation for patient,healthcare and life science industry.It is complex to take up ethical , legal semantic and geographical interoperability .

SURVEY QUESTIONNAIRE-

- Please select your organization type?
  A Provider
  B Health Plan
  C Life science
  D Healthcare technology
  E other(mention)
- Where are you in your Interoperability journey?
  A. Just started
  B. Started but had setback (one to five years)
  C. Experience of more than 5 years
  D. Not yet planed
- What according to you is the biggest interoperability challenge in India?*

A. Non-standardized health data exchange
B. Unavailability of real-time data
C. Different data formats
D. Other

- What can huddle an organization to move to a FHIR-based data platform ?

A. Selecting correct use case
B. Unsure on implementation
C. Less professional s
D. Less buy-in
E. Finding good partner
F. Other

- What expectation you have on Indian data exchange process?

A. Adopting fhir based technology
B. Upgrading workflows
C. Other
D. None

- Please select the health data exchange standard your institute is using?

A. Hl7
B. Bulk information exchange
C. FHIR supported data exchange
D. Institute owns API
E. Other:

- Do you think interoperability is important for enhancing the patient experience and improvising clinical outcomes?

a. Yes
b. No
c. Maybe

- Block chain can help in medical data security How much you agree with this statement ?

A. Strongly disagree
B. Disagree
C. Neutral
D. Agree
E. Strongly agree

- Do you find NDHM effective for interoperability?

A. Yes
B. No
C. Maybe

- Regional, national, or state level regulations, or variations in policies or regulations, increase burden and make interoperability difficult. Legislation is subject to interpretations and the lack of clarity blocks and delays interoperability implementation .Do you consider it as a barrier-

A. Not a barrier
B. Minor Barrier
C. Moderate Barrier
D. Major Barrier

- Missing data or irrelevant data can cause poor usability and negative impact on providers workflow

A. Agree
B. Disagree

- As we are making much progress in interoperability many providers are starting to send and receive a standardized summary record for better transition and continuity of patient care.Would you like to make standardized summary record as priority?

A. Yes
B. No
C. Maybe

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