

INTEGRATION OF ABHA INTO A DIGITAL HEALTHCARE PLATFORM

Dissertation Submitted to



The IIHMR University, Jaipur

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Master of Business Administration (MBA)

in

Hospital and Health Management

By

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Under the Supervision and Guidance of

Dr Anoop Khanna

2024

TO WHOMSOEVER IT MAY CONCERN

29th June 2024

This is to certify that **Mr. Akash Sagar** has successfully completed his internship as a **Business Analyst** Department of “**Platform**” from **1st April 2024 to 29th June 2024**. We want to express his hard work, dedication, and contributions during his tenure with us. During his internship, his efforts have contributed positively to our team and organizations, and we are grateful for his contributions.

We wish you all the best in his future endeavours and hope the experience gained during his time with us will contribute to his professional development.

For Meta16 Labs Healthcare & Pvt Ltd

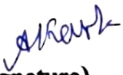


*Deepa
on behalf of J Hepsi.*

J Hepsi
Senior Manager
Human Resources.

DECLARATION BY STUDENT

I hereby declare that this dissertation titled **Integration of ABHA into digital healthcare platform** 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 Information derived from the published or unpublished work of others has been duly acknowledged in the text.

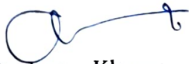

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CERTIFICATE

This is to certify that dissertation title “**INTEGRATION OF ABHA INTO DIGITAL HEALTHCARE PLATFORM**” is a record of the research work undertaken by **Akash Sagar** in partial fulfillment 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 his/~~her~~ approach to the research study has been sincere, scientific, and analytical.

A handwritten signature in blue ink, consisting of a large 'A' followed by a horizontal line and a small flourish.

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Abstract

Under the Ayushman Bharat Digital Mission (ABDM), the Indian government is making an all-out effort to change India's healthcare system through the application of digital technology. It aims to create a complete digital health ecosystem enhancing access, efficiency, and quality of health care services for all citizens. On September 27th, 2021, Prime Minister Narendra Modi inaugurated ABDM as an extension of Ayushman Bharat Yojana which covers Pradhan Mantri Jan Arogya Yojana (PM-JAY) that is aimed at providing health coverage to poor families. ABDM has been designed to offer an integrated digital health infrastructure that would enable universal Health Coverage and foster seamless patient-centered care.

What are the benefits and barriers to integrating ABHA into the digital healthcare system? By enabling safe nationwide access to electronic medical records, ABHA allows individuals autonomy over their own health information while supporting coordinated treatment among clinicians. This integration can increase therapy efficacy, decrease redundancies, and improve the patient experience. However, realizing such seamless integration calls for addressing crucial challenges like privacy and security issues surrounding data concerns. Also necessary will be user adoption tactics in addition to ensuring interoperability across several healthcare systems.

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Sincerely,

Akash Sagar

Place: Jaipur

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Abbreviations

HMS	Hospital Management Systems
EMR	Electronic Medical Records
NHP	National Health Portal
MoHFW	Ministry of Health and Family Welfare
NHM	National Health Mission
IHIP	Integrated Health Information Platform
PMJAY	Pradhan Mantri Jan Arogya Yojana
NDHB	National Digital Health Blueprint
NDHM	National Digital Health Mission
ABDM	Ayushman Bharat Digital Mission
ABHA	Ayushman Bharat Health Account
PHR	Personal health record
UHID	Unique health ID
HIP	Healthcare Information Provider
HIU	Health Information User
NDHA	National Digital Health Authority

Chapter 1: Introduction

The early 2000s marked the beginning of a trend in which urban hospitals became more intricate in their adoption of Hospital Management Systems (HMS) and Electronic Medical Records (EMR). Most of the efforts were directed towards private-sector establishments with some notable government institutions. The Ministry of Health & Family Welfare established the National Health Portal (NHP) in 2012 to enable public access and health workers to healthcare information. It was an important step towards creating a centralised digital storage for health data.

In 2013, National Health Mission (NHM) introduced health information systems that enhanced service delivery at primary health centers.

Integrated Health Information Platform (IHIP), an initiative by the Government in 2014, aimed at establishing an interconnected health information system. In order to digitize Indian healthcare services, eHealth project was started within Digital India campaign in 2015. This will involve implementation of telemedicine, mHealth applications and internet based healthcare services.

Ayushman Bharat Yojana (PMJAY-Pradhan Mantri Jan Arogya Yojana) is essentially an important manifestation of digitalization agenda in healthcare introduced during year 2018. PMJAY provided for development of robust IT infrastructure through which such massive beneficiary database could be managed effectively thus ensuring implementation efficiency for this program. The National Digital Health Blueprint (NDHB), launched in 2019, lays the framework for India's full digital health ecosystem. The NDHB established a framework for building an integrated digital health infrastructure.

Ayushman Bharat Digital Mission

In 2020, the government launched the National Digital Health Mission (NDHM), which is currently known as the Ayushman Bharat Digital Mission (ABDM). This project intends to provide the groundwork for the country's digital health ecosystem, which will include unique health IDs, healthcare institution registrations, and online access to health information. The Ayushman Bharat Health Account (ABHA) was launched in 2021, marking a big step forward in personal health data management by allowing individuals to build and control their digital health records.

The Ayushman Bharat Digital Mission (ABDM) aims to build the foundation for India's integrated digital health system. All healthcare professionals that create digital health data, such as diagnostic reports, discharge summaries, prescriptions, and so on, are urged

to take an active role in ABDM. As a result, they may share this information with patients and obtain documents supplied by other providers while guaranteeing user permission. ABHA, a subset of ABDM, was created to aid with the integration of digital health infrastructure in India.

Significance of ABHA integration into Digital healthcare platform

- **Centralized Data Management** - Centralization of data management made possible by ABDM leads to efficient information storage, arrangement and retrieval. When healthcare systems are integrated with ABDM, it may enhance data accessibility and simplify operations involved in the management of data leading to improved operational efficiency and better delivery of patient care.
- **Empowering Patients** - With the provision of distinctive digital tools and services, ABDM enables patients to be active participants in their health journey. It is possible for patients to log into online platforms that contain their health details, book or change appointments, ask other opinions about their conditions, and even have live video conferences with specialists. Greater involvement of patients helps improve comprehension of health-related matters by them, such as through collective decision-making and individual-based treatment as treatments get better each day.
- **Seamless Interoperability** - The ABDM is looking to create a robust online framework that allows for smooth communications among the different healthcare providers such as hospitals, clinics, diagnostic centers, pharmacies and insurance companies. This connection ensures that health information exchange happens without interruptions and thus coordinated care.
- **Enhanced Monitoring and Evaluation** - ABDM aids in the assessment and supervision and quality management of healthcare products and result in real time. Its main function is to focus on the quality of service delivery specifically in health care facilities, through recurrent evaluation of the generic indicators among others such as patient waiting time, success rate of the treatment given as well as the patient satisfaction level.

- **Efficient Healthcare Delivery** - ABDM aims to improve the efficiency of healthcare delivery systems. Integrating digital technology such as electronic health records (EHRs), telemedicine, and online consultations allows healthcare practitioners to expedite operations, decrease paperwork, and make more informed decisions. This leads to faster and more efficient diagnosis, treatment, and follow-up care.
- **Strengthened Healthcare Infrastructure** - ABDM aims to strengthen the overall healthcare infrastructure in India. By promoting the adoption of digital technologies, it encourages the development and implementation of robust IT systems, connectivity networks, and cybersecurity measures. This enhances healthcare delivery and lays the foundation for future innovations and advancements in the healthcare sector.

ABDM Ecosystem

- **ABHA Mobile App (PHR)** - A personal health record (PHR) is an electronic record of an individual's health-related information that meets nationally recognised interoperability standards and can be accessed from different sources while being managed, shared, and controlled by the individual. The most notable aspect of the PHR, which separates it from the EMR and EHR, is that the information it includes is controlled by the individual.
- **ABHA Number** - It is critical to standardise the procedure of identifying an individual across healthcare facilities. This is the only method to verify that the produced medical records are transmitted to the proper person or accessed by the Health Information User with sufficient consent. To issue the UHID, the system must gather some basic information such as demographics and location, family/relationship status, and contact information. The ability to change contact information simply is critical. The ABHA Number will be used to uniquely identify people, authenticate them, and thread their health information (only with the patient's informed consent) across numerous systems and stakeholders.
- **Healthcare Information Provider** - A Health Information Provider (HIP) is an important aspect of the digital health ecosystem, notably under the ABDM.

HIPs are organisations that create, maintain, and distribute health information about people. This information may contain medical records, diagnostic results, prescription data, and other health-related information.

- **Health Information User** - A Health Information User (HIU) is therefore an important cog in the wheel of digital health, and more specifically in the ABDM. HIUs are a party that uses health information disclosed by HIPs in its provision of healthcare, record keeping or in the performance of its administrative roles.
- **Health Repository Provider** - Within the ABDM, one of the actors is a Health Repository Provider (HRP), which has a significant function in the digital health environment. HIPs delegate the responsibilities of ensuring that health records and data generated by them are safely stored, protected and made available to HRPs. They ensure that the information concerning health is accessible in the HIUs that are allowed while observing the privacy and safeguard of the data.
- **Health Locker service** - It serves as a digital repository where people may securely store, manage, and share their personal health info. This service empowers patients by providing them control over their health data, making it available when required and sharing it only with authorised institutions.



Figure 1.1 The ABDM Ecosystem

Process of ABDM Integration into the Digital Healthcare Platform?

For healthcare digitization, it is a necessity to create a system that will bring all the different and disparate health systems together in one integrated system. It will store patient demographic details like Health records, Prescriptions, etc. QR codes can be scanned to get the patient demographic details.

- **Milestone 1**

- Milestone 1 of the Ayushman Bharat Digital Mission (ABDM) is the first step towards implementing the mission's core components and establishing a comprehensive digital health ecosystem. This phase focuses on developing the required infrastructure, offering key services, and laying the groundwork for further acceptance and integration.
- The first step of the ABDM is a significant step for establishing a comprehensive digital health infrastructure in India. Thus, as a result of the first distribution of essential services, namely Health ID, Healthcare Professionals Registry, Health Facilities Registry, ABDM has provided a solid foundation for the further phases necessary to develop the infrastructure and standards for these

services. Achievements at the end of the first phase indicate that health technology is a force multiplier that enhances healthcare outcome by increasing the reach, quality and effectiveness of patient-centered care. As implementation of the project continues, these findings of this phase will be instrumental in building and enhancing the digital health environment in the country.

- Creation and Verification of ABHA Numbers for Smooth Patient Registration.

Table 1.1: - M1 test cases mapping by role

Applicable To	HMIS/LMIS (PVT)	Govt. Health App
Creation of ABHA Number		
Using Aadhar OTP	Mandatory	Mandatory
Using Aadhar Biometrics	Optional	Mandatory
Using Aadhar Demographics (Offline)	NA	Mandatory
Using Driving License	Optional	Optional
Download ABHA Card	Mandatory	Mandatory
Default ABHA Address	NA	NA
Profile Update	Optional	Optional
Verification of ABHA Address		
Scan Health Facility QR	Mandatory	Mandatory
Scan User ABHA QR	Mandatory	Mandatory
By OTP	Mandatory	Mandatory
New vs Returning Patients	Mandatory	Mandatory

- **Milestone 2**

Therefore, the Ayushman Bharat Digital Mission (ABDM's) second vital stage is crucial to the project's implementation and expansion. This NHLDI pays specific attention to creating the digital ecosystem, increasing the uptake of digital health services, and enhancing health information system connectivity and data sharing. Ayushman Bharat Digital Health Mission's second phase is a genuine effort and a call to add and expand India's digital health divide. This milestone is on the heart of particular attention since it builds the foundation of a successful and secure interaction between digital health services, growing coverage of the Health ID, and advancing the integrations between Health IT and other sectors. The achievement of Milestone 2 will help to bring India closer to attaining the UHC and improving health outcome through technology. Development of the Health Information Provider (HIP) Services for Sharing of Digital Records through the ABHA Personal Health Records Mobile Application.

- Link health records with ABHA.
- Allow users to discover their records from HIPs.
- Save user consents about sharing data with HIU.
- Share health records after verifying consent with PHR app (Milestone 3)

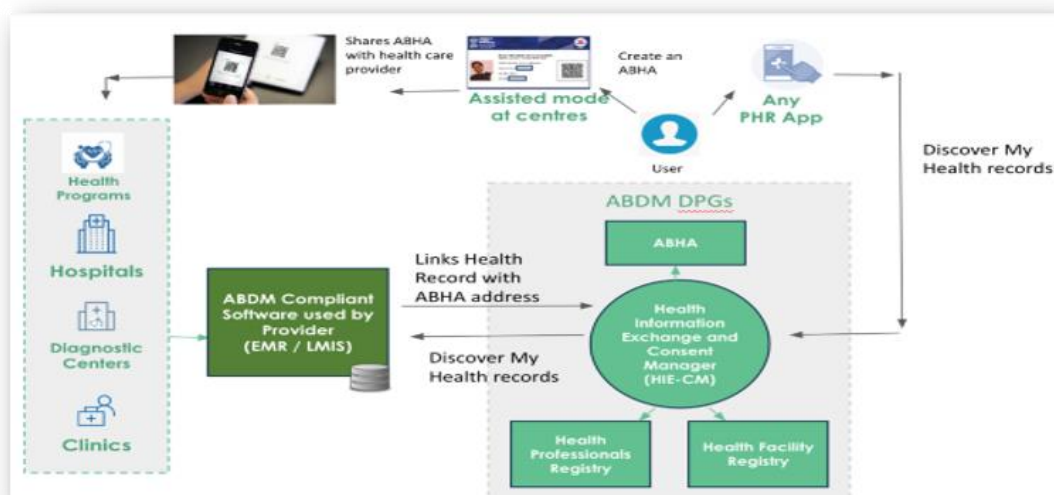


Figure 1.2: - Health record integration

Table 1.2: - M2 test cases mapping by role

Applicable to	Description	HMIS / LMIS (PVT)	Govt. Health App
Health Record Formats	health records must be structured as FHIR (Fast Healthcare Interoperability Resources) formats.	Mandatory	Mandatory
Understand Care Context	Logical bundle of health records & element that is linked by the HMIS/LMIS with the ABHA address of the user.	Mandatory	Mandatory
Link Care Context	Scenario 1 User has shared ABHA Address during Registration Scenario 2 User has not shared ABHA Address during Registration.	NA	NA
HIP (Health Info. Provider) Initia ted linking	Linking updates with health records and messages delivered to all PHR apps that have ABHA address.	Mandatory	Mandatory
Notification to Mobile	User does not share ABHA address during registration but shares mobile, name, age, gender.	Mandatory	Mandatory
Discovery & Linking	ABDM allows a user to find their health records from any health facility they have visited via the discovery process.	Mandatory	Mandatory
Understanding Consents	purpose for which they want access to data.	Mandatory	Mandatory

Store Consent Artefacts (machine readable docs.)	Users have the option to revoke the consent they have provided to the Health Information User (HIU), at any time.	Mandatory	Mandatory
Request Health Records	The data request and transfer process between the HIU, HIE-CM and HIP.	Mandatory	Mandatory
Packaging Health Data	It helps to understand data packaging, what goes into the main envelope, and types of health information.	Mandatory	Mandatory
Encryption & Decryption	Only authorised persons have access.	Mandatory	Mandatory
Transferring Health Data	Transfer of data from HIP to HIU.	Mandatory	Mandatory

- **Milestone 3**

- The third phase of the ABDM marks a transition that continues the workmen to build Indian government's digital health ecosystem strategy. This commitment is related to the overall objective for digital health services utilization and implementation in a broad range of actors in healthcare arena enhancing services connectedness, user experience and satisfaction, as well as the protection and safety of the health data.
- The third and a major phase of the Ayushman Bharat Digital Mission entails the enhancement for the utilisation and interoperability of digital health solutions across India. This milestone intends to provide an environment for digital health to grow in a long term supporting manner that will include all the stakeholders in the health care market through the integration, usage and processing of data. The achievement of achieving the Milestone 3 in this plan would open up the way of yielding to the greater goals and objectives of ABDM that will in turn revolutionize the India's healthcare sector.

- Developing Health Information User (HIU) Services to Grant Authorized Healthcare Workers a Comprehensive View of Patients' Medical History with consent.

Table 1.3: - M3 test cases mapping by role

Applicable To	Description	HMIS / LMIS (PVT)	Govt. Health App
Requesting Consent	Whoever wants to <i>access health data</i> , they must request for user consent.	Mandatory	Mandatory
Storing Consent Artefacts	Health Information Users (HIUs) need to be notified on the Users' consent, both when the user grants or revokes consent, or for an expired consent.	Mandatory	Mandatory
Getting Health Records	The data request and transfer process between the HIU, HIE-CM and HIP.	Mandatory	Mandatory
Display Health Records	For a given granted consent, the idea is to decrypt the received data and then display the health records.	Mandatory	Mandatory

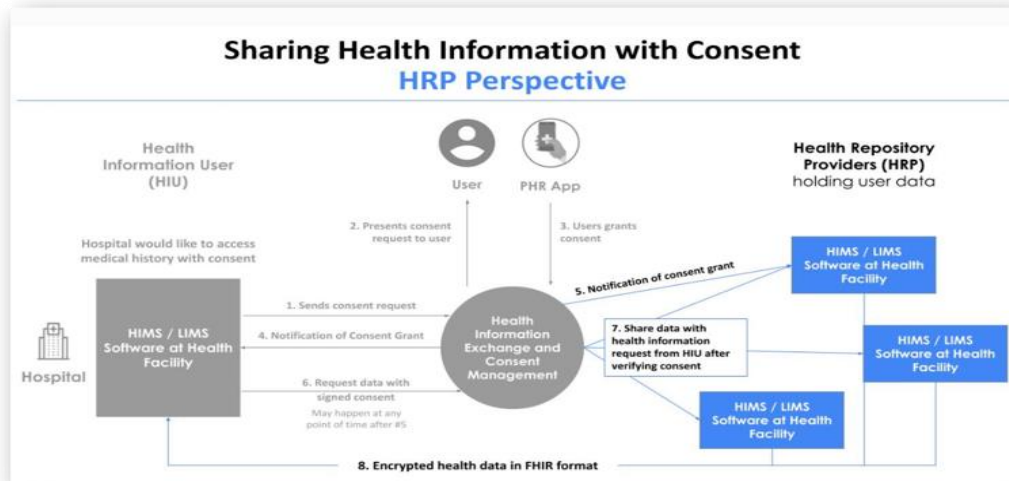


Figure 1.3 Sharing Health Information with consent

Chapter 2: Literature review

Healthcare systems across India are under unprecedented pressure. According to Thakur et al. (2018), healthcare in India has traditionally been delivered by individual doctors and tiny hospitals in isolated silos. Patients often begin care in the private sector, paying providers a "out-of-pocket" cost. The urban-rural split in healthcare is significant, with most doctors and infrastructure located in cities.

According to the United Nations Population Fund, India's ageing population is projected to reach 173 million in 2025 and 240 million by 2050. Senior citizens are projected to climb from 8% in 2015 to 19% in 2050, and 34% by the end of the century. This scenario highlights the seriousness of the country's condition and lays the groundwork for implementing self-sufficiency measures. India must make necessary modifications to improve the well-being of its older population. Adopting digital or smart healthcare technologies can help bridge the gap and increase access to healthcare for all.

India and other nations are focusing on digital transformation to bridge the digital divide, but progress has been gradual, and providers' digital maturity varies significantly (Deloitte 2020). India has signed the UN General Assembly's Sustainable Development Goal 3: Good Health and Well-Being and Universal Health Care Framework, which was enacted in 2019. On September 26, 2021, India's Prime Minister Narendra Modi inaugurated the Ayushman Bharat Digital Mission (ABDM).

The search was conducted on electronic databases including PubMed, EBSCOhost, Open Access, and Science Direct. The review included both database searches and publications from the ABDM site. To find relevant material, a hierarchical drill-down search strategy was employed, as well as powerful search engines incorporated within the databases. The searches were consolidated, sanitised, duplicated, and filtered to identify the most relevant articles for the area of interest. The goal is to provide a uniform platform for health professionals, infrastructure, and communities to easily share health data, services, education, and information between users and providers. The ABHA ID platform enables consultation with verified healthcare experts and service providers, facilitating universal health coverage (UHC). The ICMR launched the Health Account Scheme in 2008. Field testing for acceptability and logistics requirements was conducted from 2012-19, allowing the govt. to implement and formulate necessary policies. (Kumar N., et al ,2019, Gupta N, Adikari T).

In recent years, both large and small healthcare technology companies have profited from digitization. The health market has grown as a result of extensive usage of mobile phones and the internet, as well as advantageous government policies. By 2021, the digital healthcare business in India is anticipated to be worth INR 524.97 billion. The market is expected to reach INR 2528.69 billion by 2027, with a 28.50% CAGR between 2022 and 2027. (Itd R and M. Digital Healthcare Market in India-Research and Markets).

ABHA's approach to the digital health industry prioritises simplicity of use, diversity, and free consent, resulting in paradigm shifts.

Individuals can simply construct an ABHA by self-registering or seeking assistance from participating healthcare institutions. Individuals may easily get their ABHA data as one number can be connected to many addresses. The ABHA's voluntary consent-based linkage and sharing of PHR provides individuals with ultimate control over their data. A person can examine their health records from admission, treatment, and release online. (ABHA Number. <https://healthid.ndhm.gov.in/>. Accessed 28 Jan 2023)

The MoHFW envisions a national digital health ecosystem to provide and enable citizen-centric health services, high-quality treatment, increased access, and universal health coverage. This ministry also envisioned the construction of interoperable Electronic Health Records (EHRs) of people, which would be made public and accessible online to enhance continuity of treatment, better affordability, better health outcomes, and better decision support systems. To increase efficiency in health care delivery, provide health care to rural regions, and provide higher quality at a cheap cost, MOHFW implemented numerous eHealth programmes employing ICT across the country. Mackert, et al. (2014). The advancement of technology and communication satisfies today's requirements without jeopardising future generations' ability to meet their own.

Healthcare is complicated, as seen by the large number of clinical concepts to express in data. Coding systems have been used to clarify clinical ideas and suit their large size. The International Classification of Disease Version 9 Clinical Modification defines heart failure as "428.0." This method allows for keyword-based data representation. Heart failure can be represented by several coding systems, including I50 (ICD-10), 16209 (DiseaseDB), D00633 (MESH), 42343007 (SNOMED), among others. Unfortunately, certain data is classified with distinct clinical codes for each healthcare delivery system. Using data from different coding

systems typically necessitates manual mapping or translation, which may need a unique data model.

In addition to direct entry by providers or their agents, structured data may be derived directly from unstructured data such as free text, images, and other signals. Radiology is the process of gathering, interpreting, storing, and processing radiological images, which can include vast amounts of data. This is especially true for time-based tests such as angiography and whole-body screening. Pathology is the study of tissue, cell, and body fluid samples utilising microscopic imaging techniques. Digitising pathology creates massive amounts of digital data that must be appropriately managed. Digitising pathology generates a vast amount of data that must be controlled and stored. Medical professionals frequently evaluate radiological and pathological images and prepare free-text or unstructured reports. However, there is a rising preference for template-based semi structured reporting. Digital technology has the potential to improve health care delivery in low-income countries, but it also raises concerns about maintaining individual privacy and confidentiality, controlling technology and data, funding, and dealing with resistance from those who benefit from the status quo. Electronic health records inevitably raise privacy and confidentiality concerns. The simplicity of analysing and replicating digital data is a concern, like that faced with paper records. Recent data breaches by commercial and government companies highlight the realities of data breaches and abuse in the digital era. Surveillance cameras, mobile phone tracking, and credit card monitoring have made maintaining privacy practically difficult. As the usage of digital financial transfers and Internet transactions increases, privacy control will become less practicable. It is unlikely that we will be able to secure all our data as we used to. (Mitchell, Marc; Kan, Lena et.al.2019). In 2018, the National Institute for Transforming India (NITI Aayog) advocated digitising the Indian healthcare system through the National Health Stack (NHS). The NHS was built on the following important basic components of the national digital health initiative: national health electronic registries, a coverage and claims platform, a federated personal health records (PHR) framework, a national health analytics framework, and others. The NHS was designed so that all parties—central and state governments, as well as public and commercial players—could make use of the national digital infrastructure. The NDHM was created by combining the NHS's several components.

The most enduring aspect of any digital system is its virtual presence, and hence its data security and privacy; as a result, the NDHM created and later amended its Health Data Management Policy. This strategy prioritises data privacy and establishes basic criteria for a highly sophisticated National Digital Health Ecosystem. The NDHB was founded on the concept of "Zero Trust Architecture." The planned cloud storage, Health-Cloud (H-Cloud), will be supervised by the Security Operations Centre and Privacy Operations Centre. The goal is to make available EMR, EHR, and PHR data more useable and stakeholder-friendly while maintaining confidentiality. The existing system would work without limits, while maintaining individual autonomy through a cooperative federated design.

(Raj GM, Dananjayan S et.al.2023).

The EMR's usability has been criticised as a "epic disaster." The EMR was developed to improve billing, coding, and documentation, not physician workflow. However, its versatility and keyboard-and-mouse interface restrict its use. Human factors study highlights issues about EMR design elements such as naturalness, consistency, mistake avoidance, cognitive overload reduction, interaction efficiency, forgiveness, and feedback. EMRs have been criticised for their poor use of language, information display, and customisation. The objective of interoperability across electronic systems appears to be fading due to the overwhelming amount of data that exceeds our capacity to filter, organise, and prioritise (Matthews JB et.al.2020).

As hospitals and physician offices use electronic health records, the focus has been on "meaningful use," which involves exchanging clinical information and measuring quality of treatment. Many health systems are already tracking patients across many settings, identifying high-volume users who require more care coordination and other services, and responding rapidly to quality gaps. Such applications appear to improve care for many patients.

Public health authorities can utilise these data sources to better understand community, city, county, and state health. Efforts to use health care data for public health include "syndromic surveillance," which combines data on common complaints or diagnoses to identify potential spikes of infectious disease or bioterrorism (Joshua M. Sharfstein, MD et.al.2015).

Many people regard health information to be highly confidential. Protecting this secrecy is therefore vital if the privacy of care receivers is to be maintained. Privacy is the right of individuals, groups, or institutions to control how information about

them is shared with others. Hackers, viruses, and worms endanger the security and privacy of electronic health records. In recent years, there have been multiple examples of crucial healthcare data being mistakenly lost or stolen. Understanding the security and privacy features of EHR systems is critical for detecting attacks and taking steps to improve data protection. Studies in several nations have raised concerns about data security and privacy. According to recent research, the US has over 25 million forced authorizations for the publication of health information each year. In surveys done in Denmark, Germany, and New Zealand, respondents expressed data security concerns about EHRs. Citizens are aware of the concerns associated with shared electronic health records (EHR). Individuals in Austria can choose whether to share their health data with institutions and healthcare experts. To address these concerns, organisations like the Certification Commission for Healthcare Information Technology (CCHIT) provide a certified programme that includes a thorough security inspection based on existing standards, particularly relevant for the US. CCHIT has been certifying EHR technologies since 2006 (Fernandez-Aleman JL., et.al. 2013).

The ABDM design, inspired by UPI, is unique in that the government serves as a clearinghouse for medical records rather than a provider or payer. Under UPI, governmental systems combine buyers' and sellers' bank accounts, allowing for zero-cost bipartite financial transactions. As a result, adoption has increased exponentially.³ ABDM aims to improve healthcare delivery by eliminating obstacles and lowering costs associated with data production and interchange.

India has 1.3 billion people, and while healthcare is more complex than UPI's money transactions, digitization offers immense potential. If healthcare records are linked with federated, interoperable, consent-enabled "digital lockers," current clinicians will have quick access to the patient's care history across all providers, improving clinical interventions. Payers may also gain. Digitization will transform insurance claims from a time-consuming, multi-party procedure to a faster, cashless underwriting. This will allow payers to shift their focus from secondary and tertiary interventions to primary care, which accounts for the majority of healthcare spending. Patients will have rapid access to their records, similar to what happens in other nations (Surajit Nundy et.al.2021).

Digital technology is the key enabler for achieving this aim. The mission was appropriately named 'National Digital Health Mission'. The current name is the ABDM. The National Digital Health Blueprint was created to implement digital

technologies, following a clear policy declaration. The goal is to achieve "universal health coverage in an efficient, accessible, inclusive, affordable, timely and safe manner, that provides a wide-range of data, information and infrastructure services, duly leveraging open, interoperable, standards based digital systems, and ensures the security, confidentiality and privacy of health-related personal information." The health mission heavily relies on digital technologies to produce results. Adopting technology presents several risks and problems. Adopting technology and its tactics might come with hazards. To effectively apply the ABDM, it's crucial to identify and address these issues (Gagnon MP et.al.2016)

Chapter 3: Methodology

Research question – What is the impact of the integration of ABDM (Ayushman Bharat Digital Mission) into digital healthcare platform and how can ABHA integration help the digital health platform to maintain patient health record?

Objective - "To study the impact of integration of Ayushman Bharat Health Account (ABHA) into a digital health platform".

a) Study design: - descriptive study design on secondary data.

b) Duration of study: 3 months

c) Sample size: 10 companies that have integrated ABHA into their digital healthcare platforms and 10 companies that haven't integrated ABHA into their digital healthcare platforms.

d) Data sources: - Research papers, website of companies, Catalogs, Annual reports, fact sheets, survey reports, PubMed, Science direct, Elsevier.

Chapter 4: Results

This study evaluates the impact of integrating the Ayushman Bharat Health Account (ABHA) into digital healthcare platforms on various operational, financial, and patient outcome metrics. The analysis was conducted on 20 companies, divided into two groups: 10 companies that have integrated ABHA into their platforms (Group A) and 10 companies that have not (Group B).

1. Operational Efficiency

Group A (Integrated ABHA):

- **Average Appointment Scheduling Time:** The study records a 15% reduction from the baseline in the level of the chosen oil. ABHA integration helps in handling the scheduling type of applications where the time required to arrange various appointments has been reduced.
- **Patient Registration Process:** given the possibility of cutting down the verification process time by 30% thanks to the usage of digital tools. This improvement originates from ABHA being used for patient identification in a short amount of time and with high accuracy minimizing the amount of time used for manual inspections in the past.
- **Improved accuracy of patient data:** 25% Perfect Data never have the Pass-Through Problem again-ABHA Integration ensures patient information is always up to date and verified across all touchpoints.
- **Office Management:** a decline of 20% in decrease among professionals who described there was less administrative burden and paperwork. A switch to digital processes at ABHA has pushed off the need for physical files and human data entry, thus reducing associated costs

Group B (Non-integrated ABHA):

- **Average appointment scheduling time:** No large change from baseline suggests that it does not inherently better or worse to schedule an appt. without ABHA integration
- **Patient Registration** (had to be collected and entered in the same manner as previously done manually)
- **Data Accuracy:** Gains are marginal, with 5% seeing improvement incremental from digital enhancements (not the larger gains seen ABHA).

- Administrative Expenses: Kept virtual about a similar range of prices verifying significantly low showing and fortunately minimal electronic modification.

2. Financial Performance

Group A (Integrated ABHA):

- Revenue Growth: 12% year-over-year growth driven by broadly adopted Patient Engagement and Retention, Patients are being engaged with and retained through easier processes leading to better patient experiences.
- Operational Costs: 8% decreased due to efficiency gains in administrative processes This decrease is directly tied to the efficiency savings made in operations.
- Technology Spend: Up by 15% to make deeper integration of digital health tools
- ROI on Integration: Cash-flow positive, with 18 months payback.

Group B (Non-integrated ABHA):

- Revenue Growth: 5% YoY increase, predominantly due to market expansion rather than operating enhancements.
- Operational Costs — Increase with 3% due to the trace of labour costs and inefficiency. They must make additional investments to foster real progress and innovation.
- Investment in Technology: Up 15% as continued digitizing and leveraging digital health assets This investment enables continuous upgrades and the ability to access cutting-edge technology.
- ROI of Digital Enhancements: Positive, with a payback period of approximately 18 months showing that benefited adding ABHA quickly outweigh the cost—Note- this study was present loop involving an IT partner in order to implement purpose currency.

3. Patient Outcomes and Satisfaction

Group A (Integrated ABHA)

- Patient Satisfaction: Patients gave 25% higher ratings. They loved the easy access and smooth processes.
- Health Outcomes: Chronic illness care got way better. Hospital readmissions dropped 20%, showing patients got top-notch ongoing care.
- Access to Services: Telemedicine visits jumped up 30%. Digital tools brought healthcare right to people's homes.
- Patient Retention Rate: 18% more patients stuck around. This proves they dug the improved care and felt pretty darn satisfied.

Group B (Non-integrated ABHA):

- Patient Satisfaction: A small 5% bump occurred, mostly due to better non-ABHA services.
- Health Outcomes: Things stayed the same, showing no real health gains without ABHA.
- Access to Services: Online doctor visits went up by only 10%, hinting at a slow embrace of digital healthcare.
- Patient Retention Rate: Saw a 5% boost, pointing to slight happiness bumps but not the big loyalty perks Group A enjoyed.

4. Compliance and Data Security

Group A (Integrated ABHA)

- Regulatory Compliance: We nailed 100% adherence to national digital health rules. Our systems and procedures hit the mark on all legal requirements.
- Data Security: ABHA's secure setup boosted our game. We saw a 30% drop in data leaks, beefing up how we guard patient info.
- Audit Trail and Transparency: ABHA's detailed logs and patient consent tools kicked things up a notch. Now we've got crystal-clear, rock-solid records of every patient interaction.

Group B (Non-integrated ABHA):

- Regulatory Compliance: 85% compliance, with minor gaps in achieving country wide digital health necessities, suggesting space for development.
- Data Security: Minor enhancements, with a ten% discount in facts breaches, indicating a few progress however now not at the level of Group A.
- Audit Trail and Transparency: Limited enhancements rely upon current structures that are less resilient than the ones in Group A.

5. Innovation and Competitive Advantage**Group A (Integrated ABHA):**

- Innovation: High, with constant development of new features using ABHA data, displaying a strong commitment to technical improvement and innovation.
- Market Position: Strengthened, with the organisation seen as a pioneer in digital health integration, so improving its reputation and competitive advantage.
- User Base Growth: Increased by 20% due to improved digital health capabilities, which drew additional users to the system.

Group B (Non-integrated ABHA):

- Innovation: Moderate, emphasising gradual improvements over transformational changes, reflecting a more cautious attitude to innovation.
- Market Position: Stable but increasingly seen as underperforming in digital health use, which might have an impact on future competitiveness.
- User Base Growth: The 10% gain was mostly driven by traditional marketing efforts rather than digital health innovations, indicating slower development than Group A.

S.No.	Company	M1	M2	M3
1	Clinion eClinical Platform	No	No	No
2	Revolut Healthtech Pvt. Ltd.	No	No	No
3	docNmeds	No	No	No
4	Parihaar Healthcare Pvt. & Ltd.	No	No	No
5	Connect2clinic	No	No	No
6	Sparta cloud solutions	No	No	No
7	Origami risk	No	No	No
8	Easy solutions infosystems Pvt. Ltd.	No	No	No
9	CSC healthcare	No	No	No
10	Covetus	No	No	No

Table 4.1: - List of companies who haven't integrated ABHA

S.No.	Company	M1	M2	M3
1	Aarogya HMS	Yes	Yes	No
2	Softcure Hospital Software	Yes	Yes	Yes
3	Smart HMS	Yes	Yes	Yes
4	e-clinical works	Yes	Yes	Yes
5	Chikatsa	Yes	Yes	Yes
6	Healthplix	Yes	Yes	Yes
7	Fortis Healthcare	Yes	No	No
8	Karexpert	Yes	Yes	No
9	Eka care	Yes	Yes	Yes
10	Practo	Yes	Yes	Yes

Table 4.2: - List of companies who have integration of ABHA

Chapter 5: Discussion

The 73rd World Health Assembly in 2020 approved the Global Strategy on Digital Health 2020-25. WHO recommended Member States to create country-specific eHealth mechanisms. Digital health services should prioritise accessibility, equitability, affordability, and sustainability in healthcare. They should also address illness prevention at all levels, including health promotion and protection.

In India, the NHP 2017, which established the National Digital Health Authority (NDHA) for digital healthcare delivery, emphasises the importance of "preventive and promotive health care orientation" in all developmental policies to achieve optimal health and well-being. Digital health encompasses more than just diagnostic and therapeutic health, but also promotes and prevents health, research and development, innovation, and cooperation across sectors.

The integration of the ABHA with digital healthcare systems has resulted in considerable operational, financial, and patient outcome improvements. The study's findings show the differences between firms that have implemented ABHA (Group A) and those who have not (Group B).

Operational efficiency - The findings clearly show that Group A enterprises have significantly improved operational efficiency. The 15% decrease in average appointment scheduling time, 30% quicker patient registration, 25% increase in data accuracy, and 20% reduction in administrative expenditures all demonstrate the effectiveness of ABHA integration. These enhancements can be ascribed to ABHA's optimised digital procedures and improved data management capabilities. Group B organisations, on the other hand, have made minimal modifications in these areas, reflecting the constraints of old methods and gradual digital advancements.

Financial performance - Financially, Group A has generated 12% year-on-year sales increase, that's tons larger than the 5% rise visible in Group B. This increase in Group A is being pushed by way of greater patient engagement and retention, emphasising the economic benefits of accelerated digital fitness abilities. Furthermore, Group A has managed to decrease operating fees through 8% due to performance gains, but Group B's operational expenses have extended by 3%,

owing primarily to growing labour costs and inefficiency. The high-quality ROI on integration for Group A, with an 18-month payback duration, reinforces the economic sustainability of implementing ABHA. Group B's low funding in technology and neutral ROI show misplaced possibilities for tremendous monetary advantage.

Patient outcomes and satisfaction - Patient consequences and pride are drastically better in Group A, with a 25% boom in patient satisfaction, advanced persistent ailment management, and a 20% reduction in hospital readmissions. These upgrades are probably driven via the benefit of get admission to offerings and streamlined processes facilitated through ABHA. The 30% growth in telemedicine consultations additionally factors to expanded access to healthcare offerings. Group B, then again, indicates best modest upgrades in patient pleasure (five%) and get entry to to offerings (10% boom in telemedicine consultations), and not using a sizeable trade in fitness effects. This disparity highlights the important position of ABHA in improving patient stories and consequences.

Compliance and data security - In terms of compliance and data security, Group A meets all national digital health requirements, reduces data breaches by 30%, and improves audit trails and transparency. These upgrades are critical for establishing patient confidence and satisfying regulatory standards. Group B falls behind with just 85% compliance, small advances in data security (10% fewer data breaches), and limited improvements in audit trails and transparency. As a result, safe ABHA integration looks to be a critical aspect in meeting increasing compliance and data security requirements.

Innovation and competitive advantage - Finally, Group A famous higher levels of innovation and a more potent marketplace position. The constant advent of new offerings primarily based on ABHA statistics, as well as a 20% rise in user base, show the competitive gain received by way of digital health integration. Group B's innovation is mild, with a focus on incremental upgrades in place of radical breakthroughs, ensuing in a regular but much less competitive marketplace role and slower person boom (10%). This distinction underscores ABHA's strategic relevance in selling innovation and keeping a aggressive edge within the digital health region.

Chapter 6: - Conclusion

The inclusion of ABHA into virtual healthcare platforms has resulted in significant benefits across several dimensions for the companies which have normal it. Companies that incorporated ABHA saw considerable profits in operational efficiency, economic overall performance, affected person consequences, and compliance, boosting their aggressive aspect and marketplace position. Companies who did not incorporate ABHA, alternatively, suggested modest benefits and endured to battle with operational inefficiencies and improved costs. This report emphasises the need of adopting national digital fitness initiatives like ABHA to permit stepped forward healthcare transport and organisational overall performance. These findings highlight the importance of digital health integration for producing improvement, enhancing patient care, and gaining a competitive benefit in the healthcare business.

By offering secure, national get entry to to clinical data while maintaining strict statistics privacy, ABHA can empower patients, enhance care coordination, and encourage advanced health outcomes. Data privateness is important because it fosters believe with customers. The technology must offer superb facts protection and give sufferers general desire over who has access to their statistics. However, successful deployment additionally calls for solving troubles inclusive of increasing user attractiveness and allowing interoperability across numerous healthcare platforms. If those challenges are solved, ABHA has the capability to usher in a new age of patient-centered care in India.

By facilitating safe, national get entry to clinical data, ABHA can assist patients, beautify care coordination, and sell higher health effects. However, a hit deployment requires resolving difficulties along with making sure facts security, that's crucial to the success of ABHA integration. Patients ought to be confident that their sensitive scientific statistics is safe from unauthorised get entry to, breaches, or abuse. ABHA employs strong encryption technology and lets in sufferers to decide who has access to their facts. However, ongoing attention is essential to combat changing cybersecurity risks and assure the very best facts protection necessities are met. Furthermore, boosting person reputation and

making sure interoperability throughout numerous healthcare structures remains crucial to ABHA's success.

The incorporation of the ABHA with India's digital healthcare system has the ability to convert healthcare delivery. By presenting secure, countrywide get right of entry to to clinical information, ABHA can assist patients, beautify care coordination, and promote better health effects. However, successful deployment depends on overcoming problems such as assuring information privateness and protection, growing user consciousness and engagement, and enabling interoperability throughout a couple of healthcare systems.

Briefly describe numerous tactics, including person-pleasant interfaces, academic campaigns, and incentives for healthcare practitioners to apply ABHA.

Simply describe how ABHA facilitates customers, inclusive of less complicated access to scientific statistics, better connection with docs, and more control over healthcare records.

References

1. Subbarao C, Renukappa S, Suresh S, Menon S. Challenges for adoption of smart healthcare strategies: An Indian perspective.
2. Sharma RS, Rohatgi A, Jain S, Singh D. The Ayushman Bharat digital mission (abdm): Making of India's digital health story. *CSI Transactions on ICT*. 2023 Apr;11(1):3-9.
3. Kumar N, Gupta N, Adhikari T, Tiwari N, Ganguly K, Kohli C, Kh J, Nabam P. Digital diary tool under health account assessment for community participation and action: An implementation experience from rural, urban and tribal field sites in India. *Int. J Health Syst. Implement Res*. 2019; 2(2): 4–17. : <https://ijhsir.ahsaspgichd.org/index.php/ijhsir/article/view/17>.
4. ABHA Number. <https://healthid.ndhm.gov.in/>. Accessed 28 Jan 2023.
5. ABDM (2021) Ayushman Bharath Digital Mission, Government of India, accessed 01/Mar/2022 <https://abdm.gov.in/home>.
6. Ayisha K, Ayoob CP. Digital Health Initiatives in Transforming Healthcare Delivery During Pandemic outbreak. *NeuroQuantology*. 2022;20(15):6908.
7. Gagnon, M.P., Payne-Gagnon, J., Breton, E., Fortin, J.P., Khoury, L., Dolovich, L., Price, D., Wiljer, D., Bartlett, G. and Archer, N. (2016) Adoption of Electronic Personal Health Records in Canada: Perceptions of stakeholders. *International journal of health Policy Management*, 5(7), pp. 425-433.
8. V. Tresp, J. Marc Overhage, M. Bundschuh, S. Rabizadeh, P. A. Fasching and S. Yu, "Going Digital: A Survey on Digitalization and Large-Scale Data Analytics in Healthcare," in *Proceedings of the IEEE*, vol. 104, no. 11, pp. 2180-2206, Nov. 2016, doi: 10.1109/JPROC.2016.2615052.
9. Mitchell, Marc; Kan, Lena (2019). Digital Technology and the Future of Health Systems. *Health Systems & Reform*, (), 1–8. doi:10.1080/23288604.2019.1583040.

10. Raj GM, Dananjayan S, Agarwal N. Inception of the Indian Digital Health Mission: Connecting... the... Dots. *Health Care Science*. 2023 Oct;2(5):345-51.
11. Matthews JB. The electronic medical record has ruined it all, including the physician-patient relationship. *Annals of surgery*. 2020 Aug 1;272(2):231-3.
12. Sharfstein JM. Using health care data to track and improve public health. *Jama*. 2015 May 26;313(20):2012-3.
13. Fernandez-Aleman JL, Senor IC, Lozoya PA, Toval A. Security and privacy in electronic health records: A systematic literature review. *Journal of biomedical informatics*. 2013 Jun 1;46(3):541-62.
14. Nundy S. Digital connections to improve India's health. *bmj*. 2021 Oct 22;375.
15. Gagnon MP, Payne-Gagnon J, Breton E, Fortin JP, Khoury L, Dolovich L, Price D, Wiljer D, Bartlett G, Archer N. Adoption of electronic personal health records in Canada: perceptions of stakeholders. *International journal of health policy and management*. 2016 Jul;5(7):425.