RAPID ADOPTION OF ELECTRONIC HEALTH RECORDS
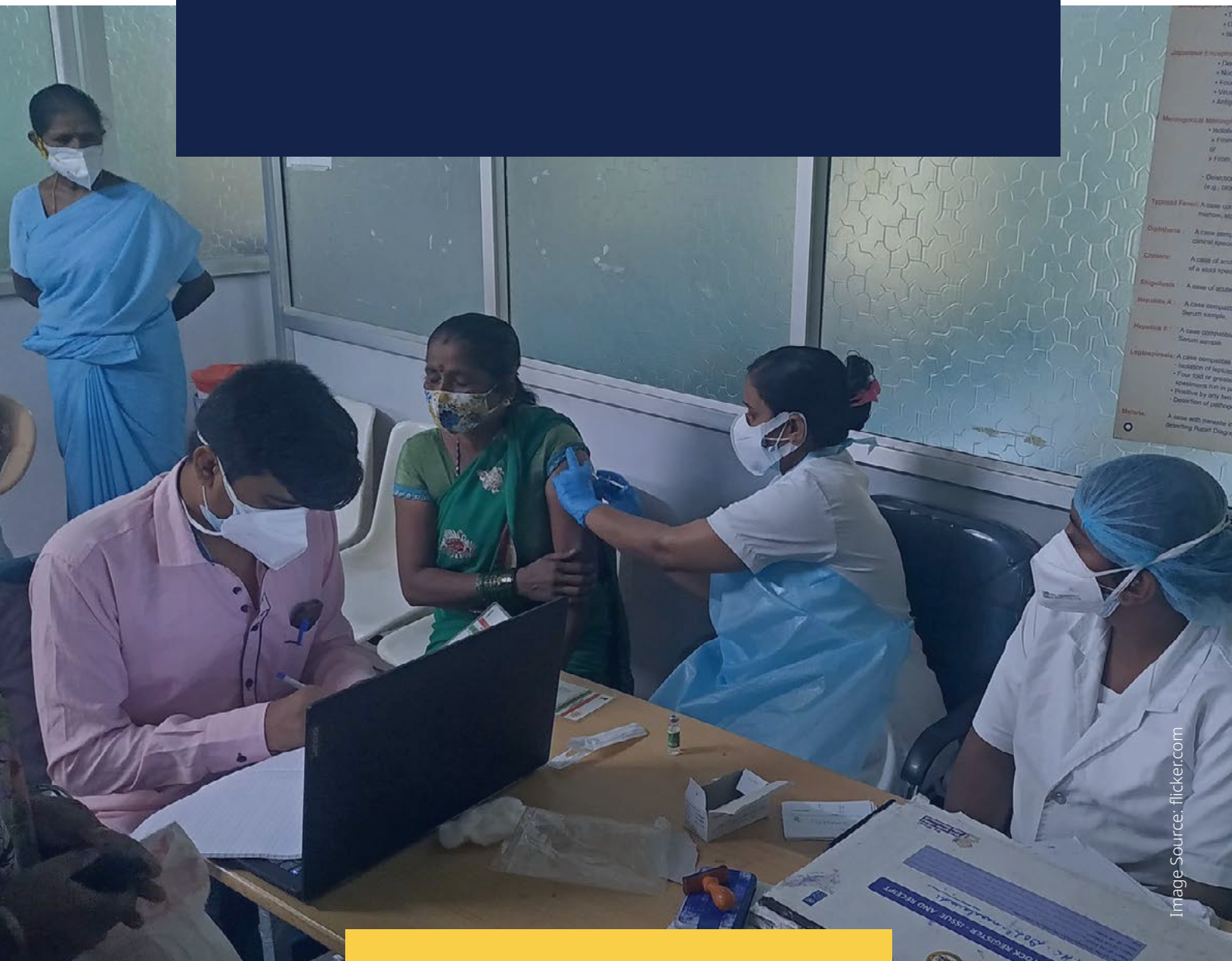
Paths and Pitfalls

Introduction

The pandemic made digital healthcare an integral part of our lives in various forms, including teleconsultations, exchanging digital records and now linking health outcome (vaccination) to identity, anywhere, anytime, through the Co-WIN site, which can also, inter alia, be accessed through the Aarogya Setu app. Now, visualise an ecosystem where, just like vaccination, all the medical tests and procedures related to an individual were stored in the cloud, available, anywhere, anytime, whenever demanded by the individual or someone authorized by the individual. That is the goal of a personal electronic health record (EHR) linked to a unique health ID – currently termed the ABHA Number (Ayushman Bharat Health Account number).

The thrust of this policy brief focuses on the various aspects of human interface with the EHR ecosystem, presents possible challenges to implementation, and possible actions to overcome those challenges.

Accessing the ABHA

The basic details necessary to create an ABHA account are name, date of birth, gender and a mobile number, as shown in Figure 1. One can use the Aadhaar number or driving license to create an ABHA number but it is not necessary.

The vaccination record in CoWIN is a good example of how ABHA is supposed to work. First, it is accessed through an OTP on your mobile or through a login and password. The user has to remember her ABHA number or ID (similar to an email ID) and the linked mobile number and have access to the linked mobile number (in case a password is not being used). A critical difference is that multiple ABHA IDs are permitted. To quote the Ayushman Bharat Digital Mission (ABDM): *"ABDM believes that users are rightful custodians of their data, and can make rational decisions associated with its use. Given that healthcare is a sensitive subject, ABDM does not want to restrict users from linking different sets of health data with different ABHAs. For instance, if a user wants to use a separate ABHA to access data related to their sexual history, ABDM will allow for such use. However, in order to establish a better continuum of care, it is recommended that users create & use only one ABHA."* [1]

In addition, the login process requires information on date of birth as well as the ability to navigate a captcha. The existing process of accessing ABHA will need assistance, especially for digitally challenged persons, who may be a large share of the older, less literate persons seeking care. This assistance could compromise privacy. Other access methods, e.g., autoscanning of QR codes could retain privacy if physical possession is with the patient.

Figure 1: Format of an Ayushman Bharat Health Account number

A critical issue is the impermanence of prepaid mobile numbers (the overwhelming majority of phone connections). Over time, people may realize the importance of retaining a number and this issue will be mitigated, but it is likely to be a challenge as ABHA is rolled out.[2] Even in the case of the CoWIN portal, it is important to retain access to the number through which a person has registered since the vaccination record is associated with the number.

[1] https://healthid.abdm.gov.in/FAQ

[2] Huddart, et. al (2021) located only 56% of a sample of TB patients when surveyed two years after treatment.

The ABDM Objective

Adoption of EHR is about collecting, storing, transferring, and analysing patient data over a period of time in order to improve health outcomes. This does not mean only "IT adoption", or "computerising records", but signals fundamental behavioural changes among the stakeholders involved, structural changes in institutions and legal frameworks, and a shift in how policymakers think about health as a subject, from providing facilities to managing care.

Adoption of EHR in countries like the US and UK is also driven by efficiency outcomes, i.e., improving health outcomes in an economically efficient manner.[3] **This is not currently the priority in India, where it is perhaps accurate to say that the focus of the effort is to expand access as widely as possible**. For example, it can help improve maternal and child health care provided by ASHA workers, tuberculosis management, etc. – interactions where patient information is collected but an accessible EHR may not be created.

Insurance providers affect the use of EHR in determining the course of treatment in two main ways – first, by suggesting procedures to avoid allegations of malpractice, and second, hospital administrators may want to assure themselves that the care being is covered by insurance. Some large corporate hospital systems who have implemented EHR have indicated that the absence of standardised patient treatment protocols in India has meant that **EHR has not been used to suggest treatment options to doctors, thereby obviating the risk of alert fatigue (at possible cost to quality of treatment),**[4] though this does not mean that data is not analysed and shared with physicians periodically (not real time), who may then adopt changes to their regime. So, even for those who are already part of the formal medical system, EHR could also improve outcomes.
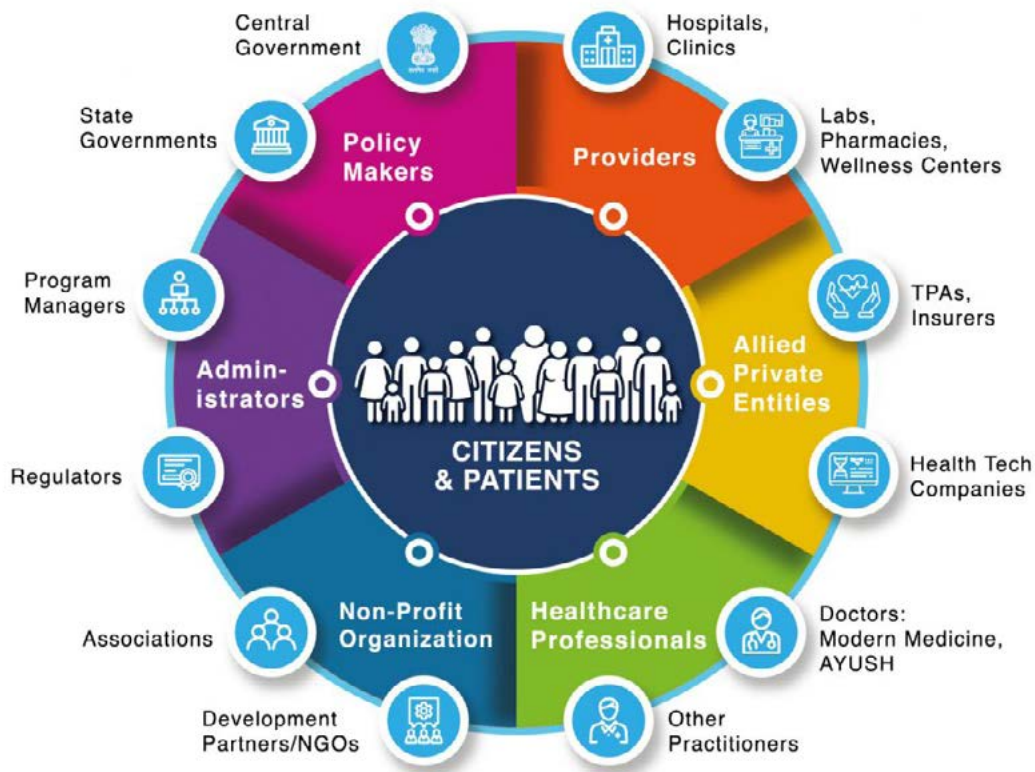
The ABDM Ecosystem

In India, the eight-stage Electronic Medical Record Adoption Model (EMRAM), introduced in 2005, helped healthcare organisations measure progress on EHR integration. This was followed by the incremental adoption of EHR by private hospitals in India. However, all patient data remained in silos, and was not shared as a matter of course, by hospitals with each other (Wadhwa, 2020). Patients can however request all (physical or electronic) records from hospitals where they have previously received care and share them with their current provider. Moreover, even today, most hospitals, barring large corporate entities, still maintain paper records (Mabiyan, 2020) (Sinha, Majumdar, & Mukherjee, 2021). There is also a difference between the complexity of adopting EHR for in-patient (IP) care and outpatient (OP) care (Swaniti Initiative, 2016). Recording OP care may actually be simpler, though more voluminous.

---

[3] The first (global) act of physical medical record-keeping and analysis of data from such records can be dated back to 1907, when a patient was registered in the Mayo Clinic, in the US. The first known EHRs were created in 1965, by Warner Slack and Philip Hicks at the University of Wisconsin (Narayanan & Bakshi, 2021).

[4] One concern in a scenario in which healthcare workers get real-time alerts with expert treatment suggestions based on patients' EHRs is the occurrence of "alert fatigue", which is harmful to doctors / nurses; and the probability of these alerts being ignored, which is harmful to patients.

Figure 2: The NDHM Ecosystem

SOURCE: https://nha.gov.in/NDHM

ABDM (launched in August 2020, just after the first wave of the COVID pandemic) is an ambitious effort to digitalise healthcare. Figure 2 represents the set of key stakeholders that ABDM considers part of the EHR ecosystem in India. According to this view, citizens and patients are the focus, with other stakeholders performing their roles to benefit this population. Different roles are envisaged for various stakeholders. This set forms the foundation of the digital healthcare ecosystem in India, and the National Health Authority (NHA) envisages this framework as crucial in order to bridge gaps between various stakeholders and improve system interoperability.

For smooth functioning, it is important to generate participation and willingness on the part of all stakeholders (Raghavan, 2020) for adopting EHR. Some stakeholders have already adopted it. For example, labs, given the extent of automation, generate electronic records by default. Many physicians maintain electronic records integrated with billing systems for their individual practices but could resist EHR in IP care settings in hospital due to the extra time and effort. Mental health professionals, who have repeated interactions with patients, would benefit from EHR. We

have already mentioned that ASHA workers collect data as part of their operating practices, but this information may not be organised into an integrated database.

Insurance

Private and public insurance providers routinely exchange records electronically with hospitals, but the records themselves may not be digitised (i.e., they may be PDF scans rather than FHIR[5] compatible data interchange). In this context, a major point of influence is the clinics in the United States of America (Luthra, 2016). There may also be excessive testing in order to fulfil insurance provider requirements (Bronsoler, Doyle Jr., & Reenen, 2021).

Ayushman Bharat Pradhan Mantri Jan Aarogya Yojana (AB-PMJAY) is an entitlement for households that meet certain criteria as part of the SECC (Socio Economic and Caste Census). As part of AB-PMJAY over 178 million cards have been issued as of March 2022. The manner in which such insurance providers adopt EHR could determine the pace of adoption to a large extent.

---

[5] Fast Healthcare Interoperability Resources (FHIR) is a data standard for electronic health records

Figure 3:
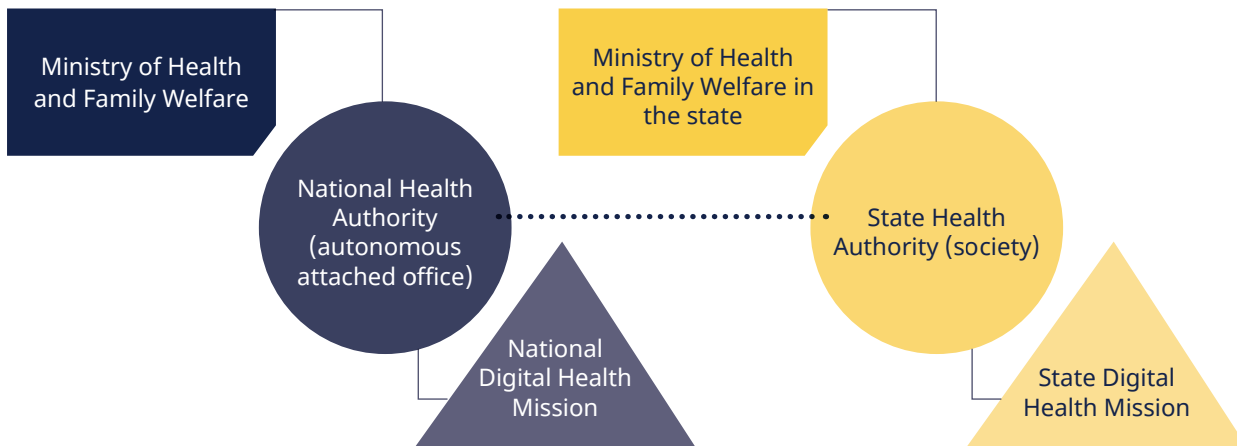
Complex Legal and Regulatory Framework governing EHR in India

Figure 3 represents the structure for digital health in India. NHA is the implementation body for Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) at the national level. It is a functionally autonomous attached office of the Ministry of Health and Family Welfare that is governed by a Governing Board chaired by the Union Minister for Health and Family Welfare. The other members include secretaries from health and expenditure departments of the Union government, the CEO of NITI Aayog, health secretaries of state governments and two expert members. The chief executive officer (CEO), who is also the ex-officio Member Secretary of the Governing Board is an officer of the rank of Secretary to the Government of India. The structure of the board, in principle, allows for co-ordination in decision making. The National Digital Health Mission (NDHM) is a programme of the NHA.

A similar implementation structure for the health mission exists at the state level, where state health agencies/authorities (SHA) are societies governed by a board chaired by the Health Minister, with secretaries from various functional departments, permitting co-ordination across government departments. The board also has a representative of the National Health Authority as a member to help facilitate inter-governmental co-ordination. The State Digital Health Mission (SDHM) is a programme of the SHA.

Moving from mission implementation to facilities, health and hospitals are in the State List, i.e., regulated by the state, while medical education is in the Concurrent List, where the National Medical Council (NMC, the successor body to IMC) and Indian Nursing Council (NCI). While there is a Clinical Establishments (Registration and Regulation) Act, 2010, it is applicable to only a few states and states can have their own laws on the subject. As of now, there is no consistent framework across states. The regulation of digital health data is governed by the Electronic Health Record Standards (2013), which were revised in 2016 (MoFHW, 2016).

This was followed by the launch of the Ayushman Bharat (National) Digital Health Mission (NDHM) in 2020, and the launch of the Telemedicine Practice Guidelines in March 2020 (MCI, NITI AYOG, 2020). Other relevant acts and rules outside the EHR ecosystem include:

a) The Information Technology Act introduced in 2000, and the Information Technology (Reasonable security practices and procedures and sensitive personal data or information) Rules in 2011 – both of which cover health data as well.

b) The Personal Data Protection Bill introduced in 2019 – but this does not cover specific digital health clauses.

Privacy is a fundamental right and as such the lack of separate laws covering digital health data privacy is a serious issue. As of now, the privacy framework for EHR is still evolving. It is not clear whether NDHM has sufficiently considered patient consent (especially with real-time data), privacy of health data (which is extremely sensitive), and preventing potential misuse of data (ND, 2020). Though the National Digital Health Blueprint (NDHB) tries to address this, it is not statutory (MoHFW, 2019). It was not until March 2021 that a consultation paper on a Unified Health Interface came out (NHA, 2021), which mentions that explicit consent of the patient is necessary for health service providers only and also assigns a "consent manager" role to monitor consent requests that are raised online. The National Health Stack (2018) specifies guiding principles for patient privacy: data control with the patient, federated approach over centralised approach, integrating privacy at the design stage, retrofitting to existing health records, built-in incentive structures for adoption, and open application programming interfaces (NITI Aayog, 2018).

There are existing programmes that collect extensive health data such as the National Tuberculosis Elimination Programme, the Janani Suraksha Yojana (a maternal health programme) and PM-JAY, the health insurance scheme. While the quality of privacy protection has been improving over time, it remains spotty (Krishnan, Bailey, & Jain, 2021). Additional issues can also occur while translating privacy structures from theory to practice.

It is unclear as to whether privacy is an issue that could slow down adoption of EHR or whether Indian patients are blasé about the loss of privacy and/or there is insufficient awareness among users about risks of privacy breach. A patient may unhesitatingly (and unthinkingly) share her OTP to allow the doctor's assistant to access her records from her ABHA. It may not constitute informed consent but it could be construed as such.

Apart from these, other health related rules (those concerning drug use, pharmacies, practicing medicine, etc.) are also applicable for digital health but not covered in this note. However, drug registration is a critical component of EHR, since it enables EHR systems to match prescription brand names to drug molecules. While this would be true for most allopathic prescription medication, AYUSH medications may need to be comparably documented and integrated. The same applies a fortiori to procedures.

Standards

The easy flow of data across authorised entities in the system, from and to patients, across providers and insurance firms, etc. needs the data to be in an interchangeable format. The NHA has mandated that EHRs need to be compliant to relevant FHIR standards. However, FHIR standards have been developed in the context of a certain system of medicine.

In China, the adaptation of EHR to Traditional Chinese Medicine (TCM) is a complex and ongoing process

requiring substantial research and validation (Zhang, et. al. 2019). A similar effort may be needed from the Ministry of AYUSH in the context of EHR adoption in India.

Challenges in Stakeholder Readiness for EHR Adoption

Among the many stakeholders in the EHR ecosystem, readiness of two main groups is perhaps the most important: healthcare providers (mainly comprising hospitals and their staff, i.e., doctors, nurses, and other patient-facing staff) and healthcare users (patients); given that their behaviour will define the success / failure of the system.

Healthcare Providers

A key issue among healthcare providers with respect to EHR adoption – especially those belonging to older generations – is resistance to change, given that they have been functioning in a certain manner so far, with

unfailing trust in the physical health record maintenance system. A connected issue, is, of course, the existing capacity of this group (and also paramedical staff) to adapt to digital means (Narayanan & Bakshi, 2021). It is possible that behavioural changes undertaken during the pandemic could have influenced both capacity and willingness to adapt.[6]

The process of EHR adoption takes time. Over 2007 to 2018, the adoption rates of the hospitals in China increased from 18.6% to 85.3%, compared to 9.4% to 96% in US hospitals over a slightly shorter period, 2008 to 2017. The number of hospitals that adopted EHRs in China exceeded 16,000, which was 3.3 times that of the 4814 non-federal US hospitals.

In comparison, in India, the Minister has stated on the floor of parliament that the "number of hospitals in other countries in comparison to India is not available."[7] However, even with this caveat of non-comparability, the National Health Profile 2020 documents over 6,000 public hospitals in India (including nearly 4,000 AYUSH hospitals) and over 35,000 primary and community health centres (about 5,500 in urban areas), not including 160,000 sub-centres.[8] There will be, in addition, a large number of private hospitals of varying sizes. The major private hospital groups in the country, e.g., Apollo, Fortis, Manipal, etc. have a discrete number of facilities and most hospitals are small and independently owned. **While the registration of doctors is consistent, the registration of hospital and hospital type facilities is a challenge.**

The Indian Nursing Council has initiated a digital Nurses Registration and Tracking System (https://nrts.indiannursingcouncil.gov.in/login.nic), where over a million nurses have already had their particulars verified and registered. This is similar to the online medical register in the UK (https://www.gmc-uk.org/registration-and-licensing/the-medical-register/), which has over 350,000 doctors registered. The NMC (National Medical Commission) is trying to collate the various state level medical registers and make them searchable, but this initiative is not yet fully developed (https://www.nmc.org.in/information-desk/indian-medical-register/). Both these would have to be integrated with the NHA's health service provider registration.

Healthcare Users

Access: As noted at the beginning of this document, capacity to adapt is a potential issue among healthcare users, especially among vulnerable populations such as old people, illiterate populations, people living in remote areas without internet connectivity and electricity, and others. This points to the likelihood of health inequities (Narayanan & Bakshi, 2021), which implies that support for such groups should be augmented as digital health platforms are introduced. This is in addition to already existing issues with access to health infrastructure (especially public health) in rural areas because of unavailability of quality doctors and diagnostic services (Barik & Thorat, 2015). However, it needs to be recognized that there is wide variation within some users, e.g., insured higher income urban users in metropolitan cities, being much more ready to benefit from digitalisation than others.

Privacy: An expressed concern among users, subject to caveats in Box 2, with regard to EHR adoption is the safety and security of their online identity and personal information (Filkins, et al., 2016). Possibilities of hacking, invasion of privacy, and loss of control on data could lead to patients receiving wrong information about treatment from multiple sources (UPD, 2021), especially in a poorly regulated competitive private market for healthcare.

Technical and Logistical Issues with Implementation

A hospital, clinic, or in fact, any other medical institution that seeks to adopt digital healthcare must naturally make some changes within the organisation in order to accommodate new ways of functioning. This does not necessarily mean that labour is replaced entirely by capital, but it does constitute a re-arrangement of roles – for example, while the "records" section might be rendered obsolete, data analysts might replace traditional roles in this regard. Data entry operators are still relevant, but their role may need restructuring; instead of entering data from scratch, they might be supporting and building the capacity of patients in entering the data into the system. These examples clearly point towards a need for organisational

---

[6] Digital connectivity could potentially contribute to poor work-life balance and affect healthcare workers. Patients have resorted / could resort to panic-calling, e.g., due to anxiety, misinformation, and uncertainty during the pandemic (Grimm, 2020). Conversely, data from the digital healthcare system could help identify where possibilities of such burnout could be prevented (Vaidya, 2021).

[7] https://pib.gov.in/PressReleasePage.aspx?PRID=1539877

[8] In the number of more than 40,000 hospitals given in the NHP 2020, "PHCs are also included in the number of hospitals" for some states.

Who is generating ABHA IDs?
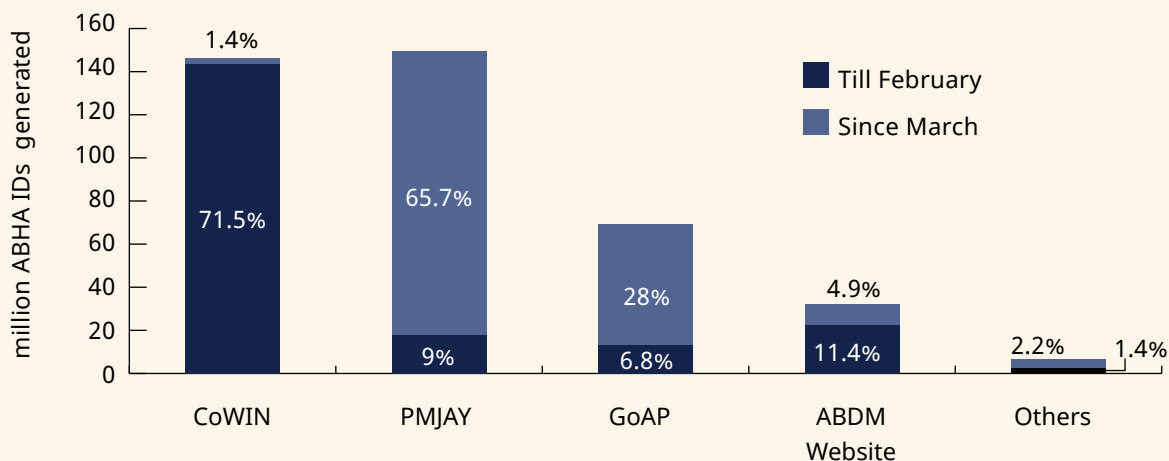
On the ABDM dashboard, Andhra Pradesh (AP) stands out with over 11% of Health IDs created and over half the registered health facilities and health care providers. Moreover, 90% of the health IDs have been created by the state government, the only state to do so on scale, thus far. While CoWIN is still responsible for almost 60% of the ABHA IDs, its recent contribution has dropped to small amounts. Almost two-thirds of the recent enrolment (65.7%) has come from PM-JAY and 28% from the Government of AP, while the share of CoWIN (1.4%, down from 71.5%) and the ABHA website (4.9%, down from 11.4%) has reduced. This is a welcome change because it is linking the insurance program to digital health and shows the potential of state initiatives to increase the reach of digital health – in AP, ABHA IDs rose more than 80% in a month and has enrolled close to half its population.

In AP, this has been possible because the government has been actively enrolling households and individuals through its network of NHM personnel, who visit each household. During this enrolment process, the Community Based Assessment Checklist (http://namayush.gov.in/sites/default/files/doc/ Community_based_assessment_checklist_(CBAC)_form.pdf) used to detect non communicable diseases is used to generate an initial electronic health record for each person with an ABHA ID. This enables the individual to appreciate the purpose of the ABHA ID and makes it more likely that it will be used in the future, e.g. in consultations at PHCs, or in digital e-Sanjeevani consultations, where the doctors are able to access the health record of the individual after suitable permissions. The introduction of doorstep delivery of medicines after e-Sanjeevani consultations may also help to shift individuals from unqualified doctors to formal qualified doctors, to the extent it increases ease of access, which would be a significant contribution for digital health.

Along with ABHA IDs, the Government of AP is registering its health facilities and its medical professionals who work in health facilities, especially within the primary care system. The introduction of EHR and digital health in tertiary care is more complex and is to be taken up later.

restructuring with much more inter-departmental collaboration. Integrating information technology (IT) also means that maintenance issues are understood and handled. Even with requisite training, routine technical and logistical issues such as server downtime, power cuts, generator/invertor failures, or internet shutdowns are all potential issues. Offline data entries are potential solutions, but these could be affected by issues as simple as forgetting to back up storage on data collection devices, or to charge them. This is not only a technological transformation, but a change in the entire governance structure and decision-making processes of an organisation (Rosalia, Wahba, & Milevska-Kostova, 2021). Discussions with institutions who have implemented EHR indicate substantial efforts in training and induction with high degree of involvement from top management. **A key issue here is the training of independent service providers. It is possible that an ecosystem might develop quickly, but certification of such 'trainers' would need to be in place.**

This is very important since the accuracy of data, especially in scenarios where real-time data is collected (NDA, 2020) is critical in healthcare. Data quality could be affected by several factors such as patient misreporting, poor implementation of health software, or even errors in data entry as a result of mishaps in data storage and transfer (Iron Mountain, 2022). In a country like India, with so many diverse states and regions, governing data collection, storage, and transfer to the last detail is a huge operational challenge – as was observed in efforts by China to implement standardised record keeping terminologies at a regional level (Agrawal & Prabakaran, 2020).

A modular approach to digital health in general and EHR introduction in particular is perhaps inevitable, given the constraints on readiness of both healthcare facilities and users

Financial Issues with Implementation

The financial issue relates to the cost of implementing EHR. Over the long run, even if digital health is less expensive (Ekman, 2017) short-term costs could be a significant consideration, especially for smaller facilities. In principle, one-time costs could be subsidised/ financed and it is possible that EHR systems would be provided on a SaaS (Software as a Service) basis, enabling hospitals to recover costs on a fee per service basis for patients. Challenges in execution could also lead to significant cost, e.g., the dismantling of the UK's National Programme for IT (NPfiT) led to significant financial losses for taxpayers (see annexure and Syal, 2013).
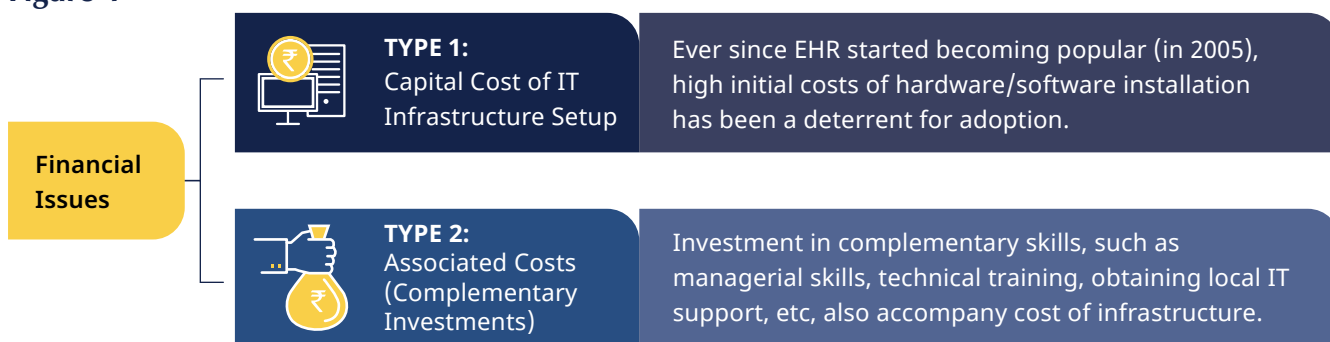
Way Forward

The implementation of EHR brings out several issues of readiness, including a basic directory of healthcare institutions. Effective rollout of EHR would need to address these challenges.

As a part of developing this report, several consultations were held with experts from the government, academia, private sector hospitals, and social impact organisations who work with electronic medical records. The following recommendations emerged as vital in order to create an enabling environment for implementing EHR successfully in India. These recommendations have been categorised under the same heads as the issues identified above:

Legal / Regulatory Framework

a)   Commonality in standards and templates for EHR (at least for some basic details) so that data can be shared universally, which needs to be balanced

Figure 4

| Financial Issues | TYPE 1: Capital Cost of IT Infrastructure Setup | Ever since EHR started becoming popular (in 2005), high initial costs of hardware/software installation has been a deterrent for adoption. |
| | TYPE 2: Associated Costs (Complementary Investments) | Investment in complementary skills, such as managerial skills, technical training, obtaining local IT support, etc, also accompany cost of infrastructure. |

(The Commonwealth Fund , 2005), (Bronsoler, Doyle Jr., & Reenen, 2021)

with the need for states/private sector hospitals to retain autonomy in designing the software and the kind of data or information they wish to collect, as well as the sequence of adoption. The adoption of FHIR standards is one step but it needs to be supplemented with a broader awareness exercise (discussed more fully below)

b) A basic datum for common minimum standards is an updated and verified Health Facility Registry. While the NMC and INCR are working on an integrated registry of health professionals, there is no systematic database of health facilities, as mandated under state specific Clinical Establishments Acts. Developing this on an urgent basis would be a first step. The government can lead by example by registering all public facilities, e.g., PHCs, CHCs, and district hospitals as part of this registry.

While different states have varying requirements for registration of clinical establishments, a minimal commonality in these requirements, facilitated by the National Council of Clinical Establishments, could help aggregation into a national database, building on the learnings from the VAHAN Registry experience.

The ABDM Objective / ABHA ID

a) More extensive Information, Education, and Communication (IEC) outreach is required at various levels on how to register and obtain an ABHA ID – among users, hospitals (who could potentially link existing patient IDs to ABHA IDs for single point access), and software developers responsible for implementing EHR across various settings in the country – in order to expand access.

To facilitate enrolment along with IEC endeavours, ANMs and ASHA workers could be deployed and a rudimentary basic EHR can be generated during this process (see Box 3). This would be preferable to using outsourced consultants, both from the point of view of increasing engagement of healthcare workers with potential beneficiaries as well as reducing the risk of breach in data privacy. The EHR generated during this enrolment process should be used at the PHC level, and in outpatient clinics at hospitals.

There are successful examples of this already, and in addition, many states have positive experiences on deploying ASHA workers/ANMs to improve outcomes in reproductive and child health.

b) If ABHA IDs are linked with Aadhaar numbers (which is one workaround for the problem of changing mobile numbers) there could be additional concerns about privacy, though most hospitals treat their data with utmost confidentiality. Indeed, the reluctance can be from health service providers, who, though there is the use of consent artifacts, may need to be reassured about the security of data, since they feel that linkages could increase the risk of unauthorised access to personal data of patients.

However, there is hope that with a sufficiently mature technology and more watertight regulations (drawing from the finance / banking sector's learnings during the transition to digital transactions), this could be addressed to the satisfaction of all concerned.

Stakeholder Readiness for Adoption

Health Service Providers

a) Hospitals with already advanced protocols and processes (e.g. National Accreditation Board for Hospitals & Healthcare Providers) as well as a robust IT system found it easier to adapt to EHR. Training provided to doctors and other staff helped greatly during the transition, as well as spelling out clearly on what kind of information needs to be included in EHR beforehand and putting in place a user-friendly interface. Therefore, an exercise that involves an assessment of existing capacity to integrate EHR (both in terms of IT and otherwise) could be useful to understand how much time it could take hospitals/service providers to make the EHR shift. At this stage, since only a few hospitals have adopted EHR, it is also possible and easier to facilitate knowledge/experience sharing sessions between doctors from different hospitals through which they can see each other's user interfaces and learn from them.

b) The EHR shift is easier and more cost effective for outpatient consultations than for inpatients, since the latter involves a lot more intricacies and increased potential of errors in treatment. Therefore, promoting a shift towards adoption of EHR in OPD as a first step could be greatly beneficial and drive faster adoption.

The initial cost of implementation is a very small hiccup compared to the benefits of EHR adoption, at least for private hospitals – one sure benefit being the space saved for storage of files. However,

for mid-sized hospitals there may be a need to use software-as a-service models (SaaS) to make it a cost-effective option for them.

Health Service Users (Patients)

a) As highlighted above, data privacy is a key concern for patients to adopt EHR – but this is only with respect to the ABHA ID and not a huge issue for patients with EHR in private hospitals. On the question of whether EHR does provide access to healthcare in remote areas – it definitely does, and also underlines the potential for tele-health consultations. Putting in place a structure for EHR and tele-health for less complex consultations in primary care settings could be of great use to expand access and make consultations more affordable for rural and urban areas alike.

b) A critical issue with ABHA IDs and EHR in remote areas with low literacy is patient consent on sharing a part of, or their entire medical records. Many patients in in these areas may not be aware of how their data is used. The current system for consent in the ABHA case is the presence of a centralised consent manager who oversees consent matters; however, making the consent form available in the vernacular and creating awareness on the concept of consent during IEC efforts could help.

c) Mandating an ABHA ID for PM-JAY insurance reimbursement might put off private hospitals from providing the benefits to below-poverty-line populations that currently exist, due to data privacy concerns of linking hospital patient IDs with the ABHA IDs (and because the coverage of PM-JAY is much higher than other government insurance schemes). However, this mandate could be piloted with a smaller population that has government insurance access (such as those under the Central Government Health Scheme) to understand how this affects adoption/reimbursement.

d) A public health perspective could be used to drive adoption by combining indicators on social determinants of health along with EHR.

While individual EHR could improve treatment outcomes and drive efficiency, integration of social determinants into the database could help identify collective disease burden in a particular geography over a period of time and inform public health interventions (e.g., in an area prone to diseases such as dengue or malaria, infrastructure could be ramped up to ensure no stagnant water is present in the locality, awareness on preventing the diseases among households could be increased, etc.).

Conclusion

The experience of tele-consultations during CoVID has raised awareness of digital health among people. However, the growth of digital health systems – especially, accessible electronic health records for a large segment of the population which has the potential to improve health outcomes – requires both basic infrastructure and enrolment, and changes in mind-set and practices among health care professionals and in health care facilities.

There are also concerns about whether this is the best use of a limited health budget. While this is not addressed in this brief, it is an issue that needs more justification and attention, especially if common resources are deployed for competing purposes.

A robust start appears to have been made with the growth of ABHA IDs. The NHA has also published a number of consultation papers on EHR, and registration of health facilities and service providers. The growing integration with the insurance programme, AB-PMJAY and the digital register initiatives of NMC and INC are also encouraging developments. Most importantly, the experience of Andhra Pradesh, using existing systems creatively, shows the possibility of both increasing enrolments rapidly as well as enabling people to understand how to make the best use of this facility, and the potential to reduce the use of unqualified medical service providers. There will be many challenges as the programme is expanded, but it appears feasible to overcome them.

Appendix: Lessons and Learnings from International Experience

Table 1: Lessons (from the UK's dismantling of NPfIT 2002 and other global experiences)

EHR Ecosystem	° No representation of end users in system design, leading to poor public accountability Over-dependence on technology, jeopardising the value of technical knowledge.
Legal / Regulatory Framework	° Failure of a one-size fits all approach, which also rendered measurement of benefits and progress difficult. ° Centralised management of software and supplier selection led to poor management due to attrition of government health officials, and poor local/regional context.
Readiness for adoption (Healthcare Providers)	° Poor uptake of centralized system, with institutions resorting to using homegrown systems. ° In multi-site organisations (with branches), organisational culture differences led to resistance to change and low morale. ° Introduction of EHR led to disruption of workflows (and changes in power structures), and loss of productivity and revenue.
Readiness for adoption (Healthcare Users)	° Lack of in-depth analysis of user requirements
Technical and Logistical Issues	° Vendors did not play a supportive role when physicians faced technical issues during use. Increased possibility of medical errors due to a number of factors, including internet fluctuations, freezing/crashing of systems, difficulty in navigating an online portal, or simply nervousness of staff to type in front of others.
Financial Issues	° Local IT infrastructure spending was not covered in the central budget, leading to confusion. Third party payers benefitted more than healthcare providers.

SOURCES: (Syal, 2013), (Centre for Public Impact , 2017), (Henrico Dolfing , 2019), (Hendy, Reeves , Hutchings , & Masseria , 2005), (Luz, Mussi, Dutra, Chaves, & Gestao, 2021), (Menachemi & Collum, 2011), (Clarke , et al., 2016)

Table 2: Learnings (mainly from Australia, and the UK's revised approach in 2020)

EHR Ecosystem	° Promoting stakeholder inclusiveness by adopting a principle-based approach that balances both system efficiency and stakeholder (patient) participation. Setting up working research groups for innovation on EHR. ° Development of a knowledge and skills framework for the entire ecosystem by involving all stakeholders, so that change management is possible ° Introducing a unique health ID system at a national level ° Middle-out approach, with elements from top-down and bottom-up approaches. Ensuring a strong governance structure that understands national and regional contexts.
Legal / Regulatory Framework	° Introducing data quality standards and a set of nationally assured set of indicators for monitoring implementation of EHR (to ensure accountability). Removing policy barriers for innovation
Readiness for adoption (Healthcare Providers)	° Fair and real-time access to information for healthcare providers (ensuring interoperability and centralisation). ° Involving frontline staff in system design innovation
Readiness for adoption (Healthcare Users)	° Educated users could be torn between asymmetric information and expert knowledge, and enabling them to make the right healthcare choices through equitable and single point access for all services is necessary. ° Identifying a SPOC (single point of contact) for guiding the public on consent-based use, acting as an ombudsman for grievances, ensuring transparent access to audits for them, involving users in system design innovation. ° Adopting an opt-out approach is more effective, wherein all users are registered and opt out if unwilling.
Technical and Logistical Issues	° Linkages between general practitioner clinic and hospital data can ensure safe sharing of data and improve health outcomes. Linking such outcomes with an incentive-based reward system for healthcare providers could be useful. Putting in place a panel of suppliers to provide support on structural hiccups. Adoption of an evolutionary approach that is adaptable to change
Financial Issues	° Gradual implementation and signing of contracts with clear definition of scope. ° Channelling technology funds into innovations. ° Encouraging local IT contracts and autonomy for GPs (General Practitioners) to select local suppliers could reduce the burden on taxpayers to a great extent (of course, with adherence to national standards and guidelines). ° Optimal budget allocation for health IT systems from the government's end, consistent flow of funds with accountability.

Sources: (Andargoli, 2021), (National Information Board, HM Government , 2020)

References

Agrawal, R., & Prabakaran , S. (2020). Big data in digital healthcare: lessons learnt and recommendations for general practice. *Nature: Heredity (Review Articles)*.

Andargoli, A. E. (2021). e-Health in Australia: A synthesis of thirty years of e-Health initiatives. *Telematics and Informatics*.

Bala, S. (2021, May 17). India's Covid crisis exposes deep-rooted problems in public health after years of neglect. CNBC.

Barik, D., & Thorat, A. (2015). Issues of Unequal Access to Public Health in India. *Frontiers in Public Health*.

Bronsoler, A., Doyle Jr., J., & Reenen, J. V. (2021). The Impact of Healthcare IT on Clinical Quality, Productivity, and Workers. *National Bureau of Economic Research Working Paper Series*.

Centre for Public Impact . (2017, April 3). The Electronic Health Records System In the UK. *Case Study* . Centre for Public Impact: A BCG Foundation .

Clarke , A., Adamson , J., Watt, I., Sheard , L., Cairns , P., & Wright , J. (2016). The impact of electronic records on patient safety: a qualitative study. *BMC Medical Informatics and Decision-Making*.

Das J (2011) The Quality of Medical Care in Low-Income Countries: From Providers to Markets. PLoS Med 8(4): e1000432. https://doi.org/10.1371/journal.pmed.1000432

Ekman, B. (2017). Cost Analysis of Digital Healthcare Model in Sweden. *PharmacoEconomics*.

Filkins, Barbara L., Ju Young Kim, Bruce Roberts, Winston Armstrong, Mark A. Miller, Michael L. Hultner, Anthony P. Castillo, Jean-Christophe Ducom, Eric J. Topol, and Steven R. Steinhubl. "Privacy and security in the era of digital health: what should translational researchers know and do about it?." *American journal of translational research 8*, no. 3 (2016): 1560

Grimm, C. A. (2020). *Hospital Experiences Responding to the COVID-19 Pandemic: Results of the National Pulse Survey (March 23-27, 2020)*. US Department of Health and Human Services (Office of the Inspector General).

Hendy, J., Reeves , B. C., Hutchings , A., & Masseria , C. (2005). Challenges to implementing the national programme for information technology (NPfIT): a qualitative study. *The British Medical Journal*.

Henrico Dolfing . (2019, January 20). The £10 Billion IT Disaster at the NHS. *Case Study 1*. Henrico Dolfing .

Huddart, S., Singh, M., Jha, N., Benedetti, A., & Pai, M. (2021). Case fatality and recurrent tuberculosis among patients managed in the private sector: A cohort study in Patna, India. *Plos one, 16*(3), e0249225.

Iron Mountain. (2022). Healthcare Data Quality and Integrity: Risk and Rewards for Medical Providers. *General Articles*. Iron Mountain.

Krishnan, K., Bailey, R., & Jain, G. (2021). Data Protection in Public Healthcare: An Assessment of Three Government Schemes in India.

Lin, F., Xie, D. (2020). Research on Named Entity Recognition of Traditional Chinese Medicine Electronic Medical Records. In: Huang, Z., Siuly, S., Wang, H., Zhou, R., Zhang, Y. (eds) *Health Information Science*. HIS 2020. Lecture Notes in Computer Science(), vol 12435. Springer, Cham. https://doi.org/10.1007/978-3-030-61951-0_6

Luthra, S. (2016, June 13). Doctors are overloaded with electronic alerts, and that's bad for patients. The *Washington Post (Health & Science)*.

Luz R, Mussi CC, Dutra A, Chaves LC. Implementation of large-scale health information systems. *Revista de Gestão.* 2021 May 20.

Mabiyan, R. (2020, January 6). India bullish on AI in healthcare without electronic health records. *ETHealthWorld.com*.

MCI, NITI AYOG. (2020, March 25). *Telemedicine*. Retrieved from MoHFW: https://www.mohfw.gov.in/pdf/Telemedicine.pdf

Menachemi, N., & Collum, T. H. (2011). Benefits and drawbacks of electronic health record systems . *Dove Medical Press: Risk Management and Healthcare Policy*.

MoHFW. (2016, December 30). Notification of Electronic Health Record Standards (2016). *Circular - Ministry of Health and Family Welfare*. New Delhi, New Delhi, India : Government of India.

MoHFW. (2019). *National Digital Health Blueprint*. Government of India.

Narayanan, K., & Bakshi, A. (2021). *History and Future of Digital Health*. iSpirit; itihaasa Research and Digital.

National Information Board, HM Government . (2020). *Personalised Health and Care 2020: Using Data and Technology to Transform Outcomes for Patients and Citizens.* Government of the United Kingdom.

NDA. (2020). *Digital Health in India: Legal, Regulatory and Tax Overview*. Nishith Desai Associates.

NHA. (2021). *Consultation Paper on Unified Health Interface*. MoHFW, Government of India.

NITI Aayog. (2018). *National Health Stack*. New Delhi: NITI Aayog.

Pandya , A., & Lodha , P. (2021). Social Connectedness, Excessive Screen Time During COVID-19 and Mental Health: A Review of Current Evidence. *Frontiers in Human Dynamics*.

Raghavan, P. (2020, September 14). Draft NDHM policy: Experts warn of 'structural problems', lack of clarity on patient control over data. *New Indian Express*.

Rosalia, R. A., Wahba, K., & Milevska-Kostova , N. (2021). How digital transformation can help achieve value-based healthcare: Balkans as a case in point. *The Lancet Regional Health - Europe*.

Sinha, S., Majumdar, S., & Mukherjee, A. (2021). Implementing Electronic Health Records in India: Status, Issues & Way Forward. *Bio Medical Journal of Scientific and Technical Research*.

Swaniti Initiative. (2016, February). *Health Records System in India*. http://www.swaniti.com/wp-content/uploads/2016/02/Health-records-system-in-India.pdf

Syal, R. (2013, September 18). Abandoned NHS IT system has cost £10bn so far. *The Guardian*.

The Commonwealth Fund. (2005, September 14). I*mproving Healthcare Quality: Cost Is Biggest Barrier to Electronic Medical Records Implementation, Study Finds*. Retrieved from The Commonwealth Fund: https://www.commonwealthfund.org/publications/newsletter-article/cost-biggestbarrier-electronic-medical-records-implementation

UPD. (2021). *What are the risks around patient data?* Retrieved from Understanding Patient Data : https://understandingpatientdata.org.uk/weighing-up-risks

Vaidya, A. (2021, August 11). Widespread use of health IT can cause burnout but also help curb it. *MedCity News*.

Vivek, ND (2020, December 20). Health digitisation raises privacy concerns. *The Business Line.*

Wadhwa, M. (2020). Electronic Health Records in India . *CSD Working Paper Series: Towards a New Indian Model of Information and Communications Technology-Led Growth and Development*.

Zhang, H., Ni, W., Li, J., Jiang, Y., Liu, K., & Ma, Z. (2019). On standardization of basic datasets of electronic medical records in traditional Chinese medicine. *Computer Methods and Programs in Biomedicine*, 174, 65-70.

CENTRE FOR
POLICY
RESEARCH

British
High Commission
New Delhi

ABOUT THE PROJECT

India's continued economic growth and progress is integral to the bilateral relationship it shares with the United Kingdom, especially as the two explore deeper economic cooperation in finance and trade. The India-UK 2030 roadmap reaffirms this and outlines critical reform areas that will not only provide better opportunities for people in both countries, but also strengthen their partnership. In this context, the Centre for Policy Research, with support from the British High Commission, New Delhi, has produced four policy briefs on timely issues of mutual interest to both countries. These policy briefs help leverage mutual experience and suggest actions to chart more sustainable growth trajectories.