

# **SUMMER TRAINING REPORT**

**Part 1- Report on Digital Health: An emerging healthcare model for Hospitals of India amidst COVID-19**

**Part 2- Report on online course “eHealth: More than just an electronic record”**

**By**

**Dr. Roshni Patel**

**Under the guidance of**

**Dr. Sheenu Jain**

**MBA Hospital and Health Management**

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## **ABBREVIATIONS**

|            |                                                         |
|------------|---------------------------------------------------------|
| AI         | Artificial Intelligence                                 |
| CAGR       | Compound Annual Growth Rate                             |
| COVID-19   | Coronavirus disease-2019                                |
| eHealth    | Electronic Health                                       |
| EHR        | Electronic Health Record                                |
| IRDAI      | Insurance Regulatory and Development Authority of India |
| ICT        | Information and communication technologies              |
| MARS       | Mobile app rating scale                                 |
| M-health   | Mobile health                                           |
| MOOC       | Massive Open Online Course                              |
| OPD        | Outpatient Department                                   |
| PPE        | Personal Protective Equipment                           |
| SARS-Cov-2 | Acute Respiratory Syndrome-coronavirus 2                |
| WHO        | World Health Organization                               |

## **PART-1**

### **Digital Health: An emerging healthcare model for Hospitals of India amidst COVID-19**

#### **1. Introduction**

Coronavirus disease (COVID-19), which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first identified in December 2019 in Wuhan, China, and has since spread globally, thereby declared as global pandemic on March 11, 2020 by World Health Organization. COVID-19 has infected tens of thousands of people in India as well. To mitigate the dangers associated with the disease, India had declared lockdown on 24th March 2020 which keeps going till 31st May 2020. Social Distancing being executed as a key system in the push to slow the spread of the infection. Several Industries have been influenced colossally with healthcare industry being no exception. Hospitals faced a major turmoil as they were directly affected by the disease. For instance, massive drop in OPD footfall, elective surgeries and medical tourism. Medical and paramedical staff working as frontline workers are in 24\*7 contact with coronavirus positive patients. This is indeed a turbulent time and to keep up with the new way of things, hospitals are forced to go through a major digital transformation like never before.

Digitalisation in healthcare was trying to acquire its position since a long time now with the augmentation of internet and blooming usage of mobiles in India, and now with coronavirus crisis digital health has become the need of the hour and its significance is even more expected to grow like never before. To combat the situation with keeping safety as the primary measurement, there has been a digital transformation in the healthcare industry. Government policies, one of the major barriers that was hampering virtual healthcare to make its position in the healthcare sector, has now been eased due to the current crisis. For instance, as per the new guidelines, telemedicine services can be provided by a registered medical practitioner of the country along with providing prescription of medication if required. From using artificial intelligence for easy and rapid screening of COVID-19 patients, to using interactive chatbot services to generate awareness amongst people and using wearables to provide COVID-19 related information, digital health has clearly marked its significance in times like COVID-19 pandemic. Digital health seems to have clearly disrupted healthcare by changing the way care delivery models

provide outcomes, harnessing data to drive decisions and automating processes so that they keep up with the pace of business.

### **1.1 Research Question:**

What is the impact of digital health on hospitals of India amidst the COVID-19 pandemic?

### **1.2 Aim:**

The study aims to assess the benefits of incorporating digital health model for hospitals of India amidst COVID-19.

### **1.3 Objectives:**

- To study the impact of digital health as a model for hospitals of India during COVID-19 crisis.
- To study about digital health and to examine the challenges faced by the hospitals due to COVID-19 and how digital health can help them to amend amidst the ongoing pandemic.
- To give a brief with illustrations about various digital platforms that have been implemented in the hospitals of India as a potential measure against the pandemic.
- To state some recommendations and future of digital health in India post COVID-19 situation.

## **2. Literature Review**

COVID-19 pandemic is believed to be the most catastrophic event of our times. Most of the sectors have been badly affected due to this making healthcare sector no exception. The impact of this pandemic is even worse for hospitals and the numerous challenges that is faced by them calls for an innovative and technologically advanced solutions[1]. There's a surge in adoption of digital technology and its usage is soaring in India, which makes it easy for healthcare industry to adopt digital transformation[2]. Although the technology in healthcare sector is gradually taking its position, but now with such crisis it seems to take bigger strides especially for hospitals across the country. Steps taken by government such as liberating regulations on telemedicine practice in India, opened an opportunity to brace the technology. From spreading health awareness via local language website to reaching out to patients via telemedicine and using AI to help combat the pandemic, digital health is bringing a paradigm shift in the healthcare sector[3]. Hospitals are facing a number of challenges such as staff shortage, fear of infection, reduction in OPD footfall and elective surgeries, and halt in medical tourism. Such challenges has highly affected the reviews of

hospitals[4]. Hence, digital solutions such as telemedicine, m-health, EHR, wearable devices, robots, and big data is the need of the hour[5]. Hospitals, as a defence to the current pandemic have adopted these digital solutions. Few examples of such hospitals are Fortis, Apollo, Max healthcare, Medanta, Nanavati, BLK, Cloudnine, etc.[6,7]. The pandemic has given a great opening to digital health. Consumers are positively looking at the wide canvas of wearable gadgets, health apps, AI, robotic carriers, telemedicine, and to electronic health records. Government is actively adopting and promoting digital health with initiatives such as AarogyaSetu app, telemedicine practice guidelines, National eHealth Authority, and e-Sangeevani. Hence, it is safe to say that it has opened a window for hospitals of India to embrace digital health solutions. Innovation and technology can be proved as a great investment in the post-COVID world[8].

### **3. METHODOLOGY**

In this study to analyse the impact of digital health on hospitals of India amidst the pandemic, semi-systematic literature review approach was used as the method to make theoretical and practical contribution in the mentioned area.

The aim of semi-systematic review approach (Narrative approach) is to identify all the empirical evidences that fits the criteria to answer our research question. The data for this study was obtained from the secondary source database which includes all the systematic secondary data and articles available on role digital health is playing for hospitals of India amidst the pandemic.

#### **3.1 Study design-** Descriptive semi-systematic literature review design.

It is a semi-systematic review process, as a systematic review process was followed wherever possible, but due to limited data available, certain alignments were made in terms of depth of search and screening process.

#### **3.2 Structure of the study-**

##### **Identification**

- articles identified using E-database
- pubmed, google scholar etc

##### **Screening**

- articles screened by title and abstract

##### **Eligibility**

- articles and reports assessed for eligibility

##### **Reports and articles included in the research (n=23)**

### **3.3 Key terms used in the study-**

- Digital health
- COVID-19
- Virtual healthcare
- Tele-health
- Hospitals
- Healthcare Industry
- India

### **3.4 Inclusion and exclusion criteria-**

- All the research articles and reports which include data pertaining to digital health and its key role for hospitals during COVID-19 crisis. Articles highlighting digital health during the current pandemic were included.
- Reports and articles which emphasis on the challenges faced by the hospitals of India during COVID-19 were also included.
- Reports and data without any reliable source were excluded from the study.

## **4. Limitations**

1. As COVID-19 crisis is relatively new and as the study is to see the impact of digital health on hospitals of India amid the pandemic, the number of articles for the exact study were limited.
2. As the pandemic is ongoing, the exact impact of digital health on hospitals of India cannot be known, hence assumptions were made based on previous studies, current news and articles on the related topic.

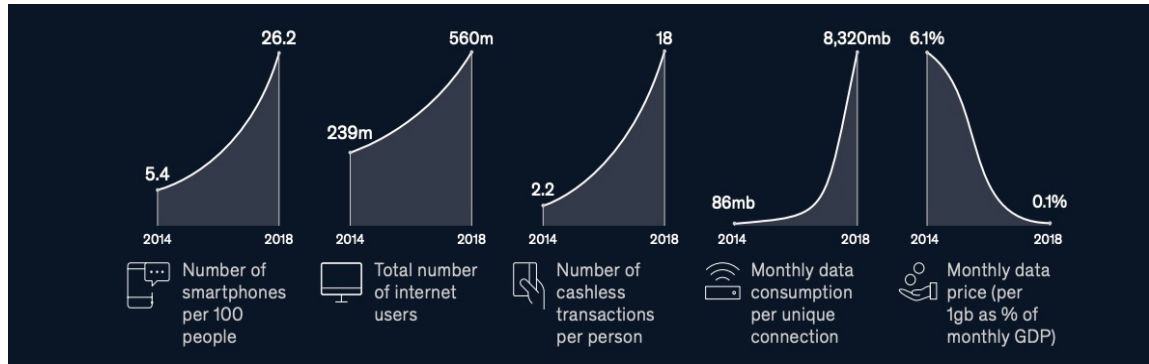
## **5. Data analysis**

### **5.1 Digital Health**

The World Health Organisation defines digital health as “a broad umbrella term encompassing eHealth, as well as emerging areas, such as the use of advanced computing sciences in big data, genomics and artificial intelligence”. Therefore, the expression Digital Health may be said to include the tools and services that use information and communication technologies (ICT) for purposes connected to health.

India is one of the largest and fastest-growing markets for digital consumers, with 560 million internet subscribers in 2018, second only to China.

### Digital usage of the population of India



Source: McKinsey Global Institute analysis

**Figure 1.** Digital usage by the population of India

The above image clearly depicts that how digital usage is soaring in India. With this increasing trend in digitization it can be said that digital health has a clear potential to gain adoption in the healthcare sector.

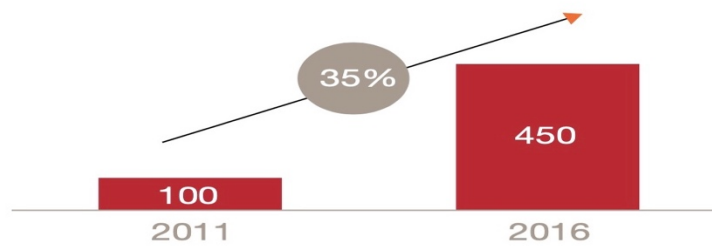
Although India has reached WHO recommendation of 1:1000 doctor-patient ratio, it is still incommensurate. Most of the doctors work in urban areas, while rural areas have limited access to doctors and no access to specialist at all. The current crisis demands more from the healthcare sector. Digital health can thereby decrease the burden on the already limited healthcare workforce and infrastructure, and can help fill the void if executed well.

Some prominent example of digital health is- Telemedicine, Robots, Self-monitoring healthcare devices, EHR, Big Data, and m-Health.

#### Telemedicine

It is a subset of telehealth that refers solely to the provision of healthcare services and education over a distance, through the use of telecommunications technology. Telemedicine technology is frequently used for follow-up visits, management of chronic conditions, medication management, specialist consultation and a host of clinical services that can be provided remotely via secure video and audio connections. The figure below shows the India telemedicine market for the year 2011 and 2016.

### India Telemedicine Market (Million USD)



Source: PwC Analysis

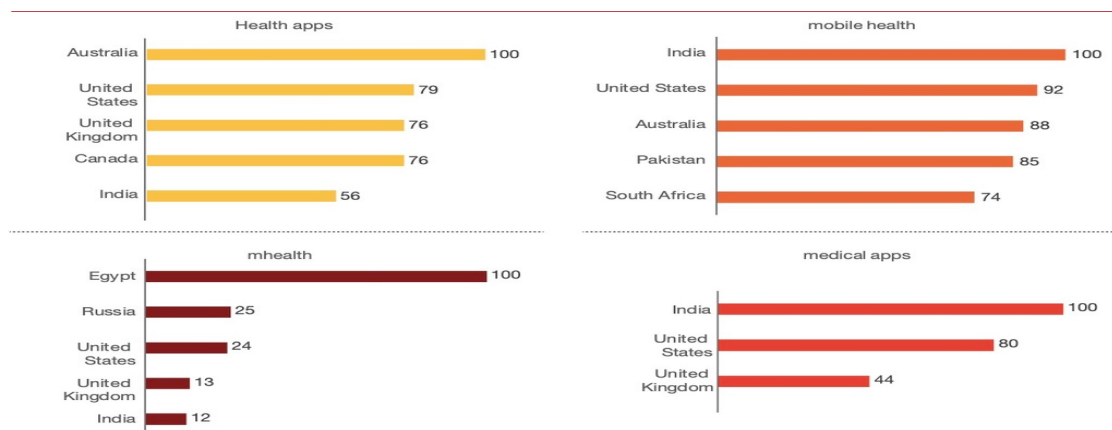
**Figure 2.** Increasing trend in Indian telemedicine market

With the ease in government regulations and with the Insurance Regulatory and Development Authority of India (IRDAI) asking insurers to include telemedicine in medical insurance wherever medical consultation is allowed in the terms and conditions of medical insurance policies, telemedicine has surged under COVID-19.

#### M-health

Mobile health -a provision of Digital Health services on a mobile platform. It is one of the largest sectors within digital healthcare in India. According to one of the PwC reports, M-health's estimated market size in 2015 was 2,083 crore INR which is likely to rise to 5,184 crore INR by 2020. Mobile health-apps are a major segment within M-health, especially the one which connects patients to doctors and enable remote consultation.

#### India ranks among the top 5 for mHealth-related searches



Source: PwC Analysis (google trends June 2017)

**Figure 3.** google trends showing India's rank in the search for mHealth related apps

As per the data gathered from google trends, India ranks among the top five countries in searching the terms such as M-health, mobile health, health apps, and medical apps. It clearly depicts that Indian population is clearly interested in M-health.

### Electronic Health Record (EHR)

EHR is a systematised collection of patient's health record in a digital format which is secured for later use as well. As it is centrally stored, it can be accessed at any time, irrespective of where and when the data was collected. With EHR, doctors can have access to patient's health record even if he/she is treating the patient for the first time. It can hence help reduce the repetition of tests thereby helping the patients and healthcare facilities to manage costs. Patient's medical history is highly secured in such digital versions.

### Self-monitoring healthcare devices

The devices which empowers people to monitor their health status with a dual purpose at a fitness or an activity level for self-tracking and at a clinical level furnishing more information to clinicians with a potential for prior diagnostic and guidance of treatment. Such devices can help one to track weight, diet, exercise, sleep patterns and postures. They are widely used to measure vital signs such as blood pressure, heart rate etc. The raw data which is collected can help the person to self-monitor by detecting the health symptoms and alert him/her in case of any potential issue.

### Robots in healthcare

Robots in healthcare are used for multiple purpose to reduce the burden of medical personnel from routine tasks. Robotic medical assistants monitor the vital signs of the patient and alert the nurses if any human presence is required. There are robots assisting in surgery which allows doctors to perform surgery with minimal incision, thereby performing the surgical procedures more efficiently. According to a report by GlobalData, the UK based firm, adoption of robots to treat and handle COVID-19 patients is expected to grow in India due to shortage of medical personnel, personal protective equipment (PPE), and to save the already limited medical staff from getting the infection.

### Big Data in Healthcare

The simple explanation of big data is processing of the raw data collected from various Digital Health services such as EHR. EHR generates a massive amount of raw data. Along with that approximately 25 billion devices are expected to be connected through the Internet of Things (IoT), and the data which is generated by these devices needs to be processed by big data processing, which can be later put to use by various companies.

## 5.2 Challenges faced by Hospitals amid COVID-19 pandemic

Hospitals across India is facing numerous challenges amid the ongoing pandemic. Healthcare workforce, which is already limited, are the frontline workers during this crucial time and hence it is the most demanding time for hospitals.

**The following are few of the challenges which are faced by hospitals-**

### Staff shortage

Due to the COVID-19 situation, most of the hospitals have asked their staff to work in shifts of not more than 6-8 hours and then self-isolating themselves due to which availability of manpower has reduced. Approximately 25% loss in manpower hours due to reduced shifts.

Transportation facilities were hampered during lockdown which also contributed to staff shortage as many of them use transportation services and were unable to reach to their workplace. Already India has limited healthcare workforce and with such crisis, the situation is even more challenging.

### Fear of Infection

Fear of infection amongst both patients and staff working in hospitals. Patients fear to go to hospitals for treatment as most of the hospitals are treating coronavirus positive patients. The quick spread of coronavirus infection brings certain amount of tension amongst the staff fearing to get infection as they are constantly treating COVID-19 patients. Hence, it's important to constantly keep assuring the staff and motivating them.

### Reduction in OPD footfall

Sharp reduction in patient occupancy as well as outpatient footfall. Bed Occupancy in hospitals have reduced to almost 25% due to lockdown. The new admissions daily has dropped by 90%.

### Drop in elective surgery

There has been a significant drop in elective surgeries in hospitals across the country due to lockdown. Hence, leading patients to face a lengthy wait for their health issues to be resolved and hospitals to wait for the revenues.

### Medical tourism

Due to travel restrictions, medical tourism has come to a grinding halt. In 2015, India's rank as the most popular destination for medical tourism was 3<sup>rd</sup>. According to Ministry of Tourism figures, medical tourism was expected to grow by 200% by 2020, hitting nine billion dollar. Private hospitals have been highly affected due to halt in medical tourism as

there was a good number of international patients coming to India for treatment before the pandemic and now due to the uncertainty of revival of the situation, private hospitals are facing a major revenue loss.

#### Effect on Revenue

As hospitals are relied upon to be in full availability to the pandemic because of which they are bringing about the overheads and fixed expenses as normal and with a drop in revenue is impacting not only profit and loss of the hospitals but cash flows as well. The above challenges, such as drop in OPD footfall and elective surgeries as well as halt in medical tourism are highly contributing to the revenue loss of the hospitals across the nation.

### 5.3 How Digital Health can help the hospitals to mend amidst the pandemic

Situation such as COVID-19 pandemic calls for urgent measures and the one industry which is at high alert is healthcare industry. With limited medical personnel it is difficult for hospitals of India to handle such situation where everyday thousands of people are getting the infection. Hence digital solutions is the need of the hour as it can lessen the burden on the already limited healthcare workforce with the biggest advantage of saving them from the infection and also by performing the task more efficiently.

A massive acceleration has been noted in the use of **Telemedicine** amidst COVID-19, and it will likely to be in place for at least the next 12-18 months, until an appropriate solution to coronavirus situation is available. WHO mentioned telemedicine as one of the essential services under “strengthening the health systems response to COVID-19” policy. As estimation of 60-80% implementation of telemedicine in India by the year 2025 was made by McKinsey Global Institute Analysis. However, this was estimated in 2019 and now with COVID-19 pandemic the growth of telemedicine shall accelerate even more. In India, registered medical practitioners are entitled to practice telemedicine and can prescribe medications online under the new guidelines stated by Government on March 25, 2020. Hence patient would be able to consult a doctor without stepping out of house, this will reduce the risk of infectious transmission of COVID-19 for both staff as well as patients. Approximately 7% of revenue in a hospital is generated by pure OPD services and hence tele-consultation has the potential to generate revenue for the hospitals across India.

Incorporating patients’ lifelong medical history into an **Electronic Health Record** system can eventually help doctors to make more accurate diagnosis and thereby lower the risk of medical errors. Paperless accounting of patients’ medical history can help reduce the spread

of infection amongst staff. Remote clinicians can access the health records in real time by exchanging it through secure portals.

**Big Data** in many ways can help in flattening the infection curve thereby saving the healthcare workforce from the infection. It can help in predicting community as well as individual risk of infection. Big Data can help in predicting patient treatment outcome using Machine Learning. Such software makes accurate treatment recommendations whether to hospitalise the patient or to move the patient to Intensive unit. Therefore can help hospitals because of limited ICU facilities available and staff shortage. It can help in scanning people entering the hospital premises with the help of face scan and AI technology, which determines who has fever and who doesn't, can help the staff as well as other patients from getting the infection.

**Wearable Devices** such as wearable biosensors can be used to monitor and manage the stress among healthcare workers, as the pandemic has put the frontline healthcare workers at mental health risk as they spends many hours to tackle the situation. It can also monitor COVID-19 patient in the hospital to detect early patient deterioration, thereby limiting exposure to staff, preserve PPE and improve patient safety.

**M-health** solution has been implemented by government by launching AarogyaSetu App. It enables Bluetooth based contact tracing of patients, mapping of likely hotspots as well as spreading of relevant information about COVID-19. Such solutions can help hospitals to identify a coronavirus positive patients and take the necessary steps to avoid the spread of infection.

Use of **Robotic Technology** in hospitals during such crisis can be of great help. For instance, handling COVID-19 patients with the help of Robots can reduce the spread of infection from patient to staff. Adoption of Robots to treat COVID-19 patients is expected to grow in India due to shortage of PPE. Embracing cobots which allows humans and robots to work safely together. It can assure minimal contact between healthcare personnel and patients. Though it is expensive, it's still expected to find increasing use in countries such as India due to less number of professional available for more than 1.3 Billion population. The ongoing crisis has made the world realise the importance of many of the emerging technology such as 3D printing, drones, and robots.

#### **5.4 Few examples of implementation of Digital Health in Hospitals of India**

Digital Health has been around for a long time but it never gained a significant part as mainstream healthcare delivery in India. However, the pandemic has changed this scenario

for hospitals completely as they are now emphasizing on its clinical, operational and financial value.

According to Practo, India's leading digital health care provider, online consultation has increased by 500% between 1st march to 31st may, 2020. With a surge in healthcare providers providing tele-consultation services amidst the pandemic, Practo recorded approximately 80% first-time telemedicine users, along with 67% drop in in-person visits and about 44% of the users were from non-metro cities.

As a coordinated response strategy to COVID-19, **Apollo** has launched a self-risk assessment scan, 24\*7 doctor helpline as well as online consultation with Apollo certified doctors. This app is known as “**Apollo 24|7**”. It allows patients to search for a doctor by specialty, name or by the symptoms he/she is suffering. There has been a ~20% growth on an average in the number of online consultations. Its AI-enabled coronavirus risk assessment, powered by AI, scans an individual’s risk of contracting coronavirus by using a set of 8 simple questions. Once the analysis is done, it evaluates the results as low, medium and high, and accordingly advice the person to consult a physician, start home isolation and precautions, etc. More than 12 million people have assessed their risk via Apollo 24|7 app. Behold.ai collaborates with Apollo for rapid COVID-19 diagnosis using **AI-based chest X-ray technology**. It helps in instant triaging of the coronavirus patients which will boost India’s efforts in fighting against the pandemic by ensuring swift diagnosis and proper allocation of the resources.

In a bid to protect healthcare workers and intensify screening process, **Fortis Hospital** has launched **Mitra robot** for COVID-19 screening. It scans every individual entering the hospital. If an individual has a high temperature or confirms to the robot about symptoms such as cough and cold, the robot will print the pass that will state screening result as fail. Based on this screening result, the person will be guided to the next robot which will connect the individual to the flu clinic that will allow the doctor to further diagnose the individual without any physical contact, the hospital said. Its consultation via tele-consultation is around 12-15% per day.

Max Healthcare and Cloudnine have shown interest in adoption of Robots.

Robot Named “**Nightingale-19**”, is deployed to provide food and medicines among patients at the district coronavirus centre in Ancharakandi in Kannur district where a large number of cases have been reported.

Medicity has been offering telemedicine to domestic and international patients for the past five years through its **Medanta e-clinic app** and telemedicine portal.

**Motherhood Hospitals**, a maternity and childcare facility, is getting 200 consultations through video calls, and 30-40 pharmacy orders a day.

Women and child health care is traditionally viewed as an 'in-person' consult area. But today, at hospitals such as **Nova IVF Fertility**, most of the consultations happen remotely, especially the preliminary consultation for new patients or the follow-ups for existing ones.

The **Cloudnine Group of Hospitals**, which caters to maternity, childcare and fertility care, has announced the launch of its tele-consultation service with doctors. This service has been made available to several units of Cloudnine across Gurgaon, Noida, Chandigarh, Mumbai, Pune, Bengaluru and Chennai. The app name **“It’s our Baby”**, is a committed app built in the wake of the ongoing pandemic, currently has one lakh users.

Tele-consultation services have been implemented in other hospitals such as **Max Healthcare, BLK Hospital, Nanavati Hospital, Artemis Hospital, and NH Hospital**, etc.

### **5.5 Limitations of adoption of Digital health**

- Data privacy and security
- Patient privacy
- Expensive
- Complex process
- Not a stand-alone solution

## **6. Future of digital health and recommendations**

Digital health is definitely going to be a sunshine industry for hospitals of India. With its benefits such as accuracy, efficiency, instant healthcare delivery, precision medicine and quality of treatment, undoubtedly it has become the need of the hour. Digital transformation has the potential to cut down the costs for hospitals. COVID-19 is working as a catalyst in the blooming of digital health platforms. It can securely be said that in the approach towards the future, comprehensive technology and data-driven upgrade of present-day digital apparatuses is in the contribution, permitting patients to have more noteworthy command over their health and medical outcomes.

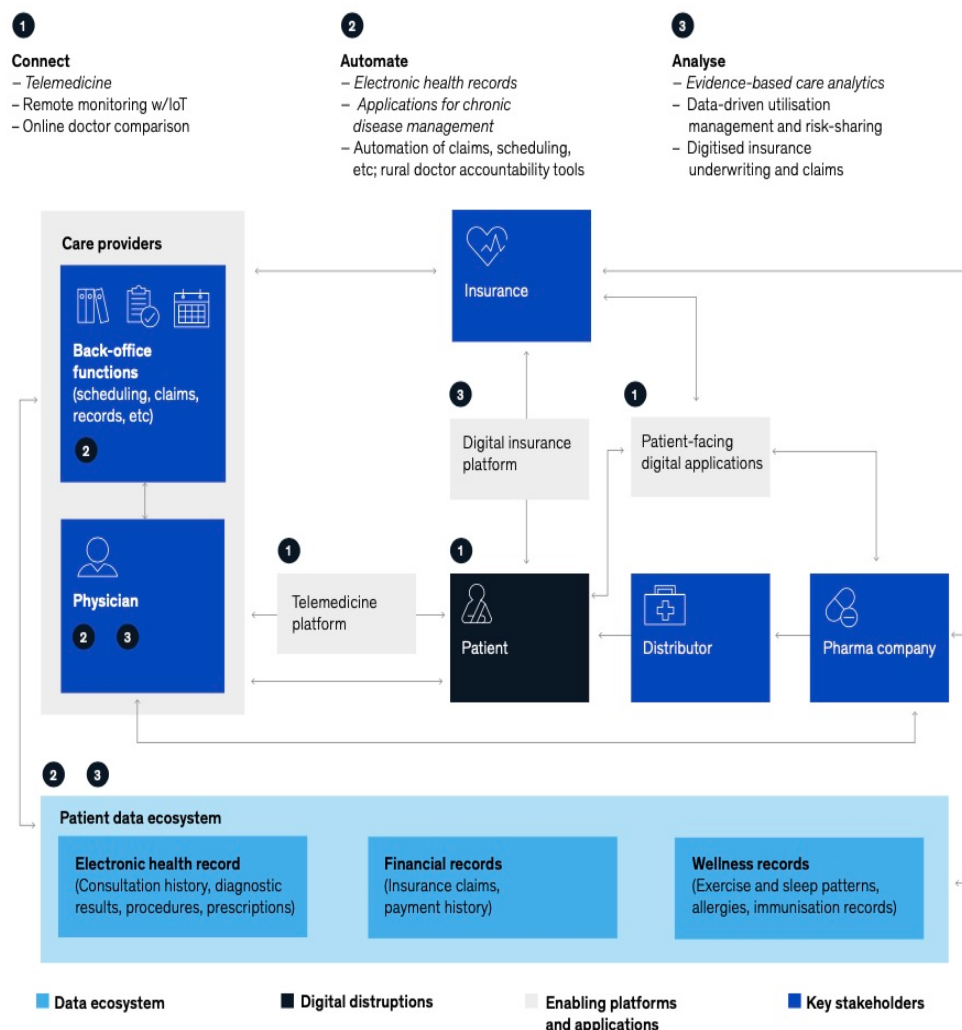
According to a report given by India Health, the following are some digital health stats for India-

- Digital solutions in healthcare is anticipated to drive the industry at a CAGR of 23% by 2020.

- Telemedicine in India is estimated to rise at a CAGR of 20% during 2016-2020, making US\$ 32 billion by 2020.
- The execution of telemedicine technology could save India US\$ 4-5 billion every year.
- The applications of AI in healthcare in India will be worth US\$ 6 billion (INR ~431.97 bn) by 2021.

The above stats were made before the pandemic hit our nation when there was a slow encompassment of healthcare digitisation in India due to lack of government regulations and also due to people's perception towards healthcare. As a result of which there was comparatively less pressure on hospitals to go digital. However, COVID-19 has changed everything. Government have suddenly eased healthcare regulations. The industry received the much-needed push to go digital and embraced new challenges using technology.

### Healthcare in the future: digital technologies enabling patient centered care



Source: McKinsey Global Institute analysis

**Figure 4.** Image depicting future of healthcare industry in India if digital applications were widely adopted.

Coronavirus has changed the dynamics of the existing healthcare delivery system. People are getting cautious like never before. There is no way for healthcare industry to address the situation in an ‘old-fashioned’ response and definitely a new model is the key. Digital health model can help hospitals to mitigate the ongoing crisis. In order to sustain the crisis, hospitals must imbibe digital health platforms in their regime. Not only would it help the already limited healthcare workforce to safely carry their work but also the crashing revenue faced by the hospitals.

## **7. Conclusion**

Deficit in the number of trained healthcare workforce in a situation like COVID-19, calls for an immediate action plan for healthcare sector. Digital health definitely has the potential to reduce the healthcare burden in our country. Its execution is the main key and the window to act is now. The pandemic has clearly established the relevance of digital health, thereby creating an opening to modernize the healthcare system.

COVID-19, in a way acted like an opportunity to blow away all the barriers such as regulatory barriers that had made implementation of digital health difficult in a country like India. What hospitals need to do now is to work on the implementation strategy of digital health technology to make it more efficient.

India’s healthcare industry is estimated to reach \$193.83 Billion in 2020 from \$233.14 Billion in 2019, according to Frost and Sullivan’s recent analysis. This downgrade is mainly due to the pandemic as strict lockdown was implied in the country resulting in less than 25% of bed occupancy with decreased patient footfall in hospitals of India. Working with the traditional healthcare models in the current crisis is clearly insufficient, especially for a country with more than 1.3 billion population. Our hospitals need new healthcare models, a more efficient and a cutting-edge one, like digital health model to control such crisis. It’s high time that hospitals should stop considering digital health as a separate entity but instead an integral part on the overall system.

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## **PART II**

### **REPORT ON ONLINE COURSE**

#### **1. Course name**

**e-Health: more than just an electronic health record.** (By The University of Sydney)

#### **2. Platform used**

**Coursera**

#### **3. Course duration**

15 Hours (5 modules, 5 weeks)

#### **4. Course description**

The MOOC, "eHealth: More than just an electronic record", is multidisciplinary in nature, and aims to equip the global audience of health clinicians, students, managers, administrators, and researchers to reflect on the overall impact of eHealth on the integration of care. It explores the breadth of technology application, current and emerging trends, and showcases both local and international eHealth practice and research.

The entire eHealth Course consists of 5 modules and takes about 5 weeks to complete.

#### **5. Objectives of the course**

- The fundamentals of eHealth and where it is heading
- What kind of health data we are currently collecting and how it will transform healthcare in the future
- How new technologies are helping health consumers participate in their own healthcare
- How eHealth can improve the coordination and efficiency of healthcare and what the barriers might be.
- Length: Self-paced 5 weeks course Study time commitment: 3 hours per week Assessable components: Assignment 1 in Module 2 (40%) and Assignment 2 in Module 5 (60%).

#### **6. Course content**

**Module 1 - What is eHealth?**

Key question: What are the fundamentals of eHealth and where is it heading? To complete this introductory module you will need to view the video lectures for each lesson and complete the four listed ungraded learning activities. It is also recommended that you sample the module reference and further resource list to consolidate your learning.

**Module 2 - Health in our Hands**

How are new technologies helping consumers participate in healthcare? To complete this module you will need to view the video lectures for each lesson and complete the two listed ungraded learning activities. You are also required to complete the graded Peer Review Assignment 1 (40%) for submission as per the assignment instructions. It is also recommended that you sample the module reference and further resource list to consolidate your learning.

### **Module 3 - Data and the Quantified Self**

What kind of health data do we collect now and how will it transform healthcare in the future?

### **Module 4 - Interacting with Health Professionals using New Technologies**

How can eHealth improve the coordination and efficiency of healthcare and what are the barriers?

### **Module 5 - eHealth in Professional Practice**

How can eHealth principles and technologies be applied in my own professional practice?

## **7. Learning methodology used in the course**

- Video lectures
- Reading material
- Quizzes
- Applicative Assignments

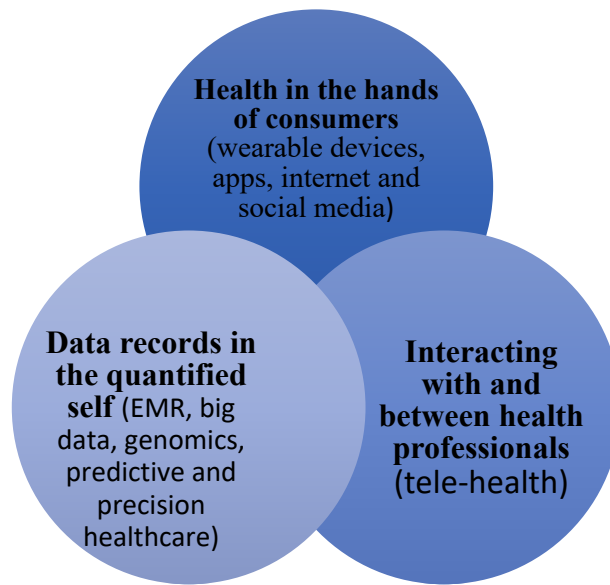
## **8. Key learnings from the course**

The course in general instils learning about how digital technology, especially apps, data and communication technology, is being used to support health and healthcare management and how it's being deployed to improve healthcare delivery and quality. It also gives an insight about the framework to rate apps more objectively. For instance, how to use MARS Analysis to rate health apps.

### **Key learnings from module 1-**

- Compare definitions of eHealth from both health consumers and professionals.
- Visualise an eHealth model which illustrates how key eHealth domains intersect to impact on health care.

### 3 overlapping domains of E-health model



**Figure 5.** Venn diagram showing the overlapping eHealth domains.

- Gain an insight into the fundamental principles of eHealth.
- Rate your own awareness of eHealth in current practice.
- Appreciate the current and future challenges of eHealth for both health consumers and health practitioners.

#### Module 2 and Module 3-

- Understand the potential of mobile technology to support the shift from healthcare to health.
- Describe examples of wellness and healthcare mobile apps currently in use.
- Consider strategies for including mobile health apps in your professional practice.
- Be aware of issues around the design and evidence for effective health apps.

#### Module 4-

- Describe a range of innovative eHealth interactions between consumers and healthcare professional.
- Evaluate the advantages of technology-based eHealth services in improving access and communication in healthcare.
- Appreciate the differences between online and face to face health service interactions.
- Consider new models of healthcare supported by tele-health, social media and personalised apps.

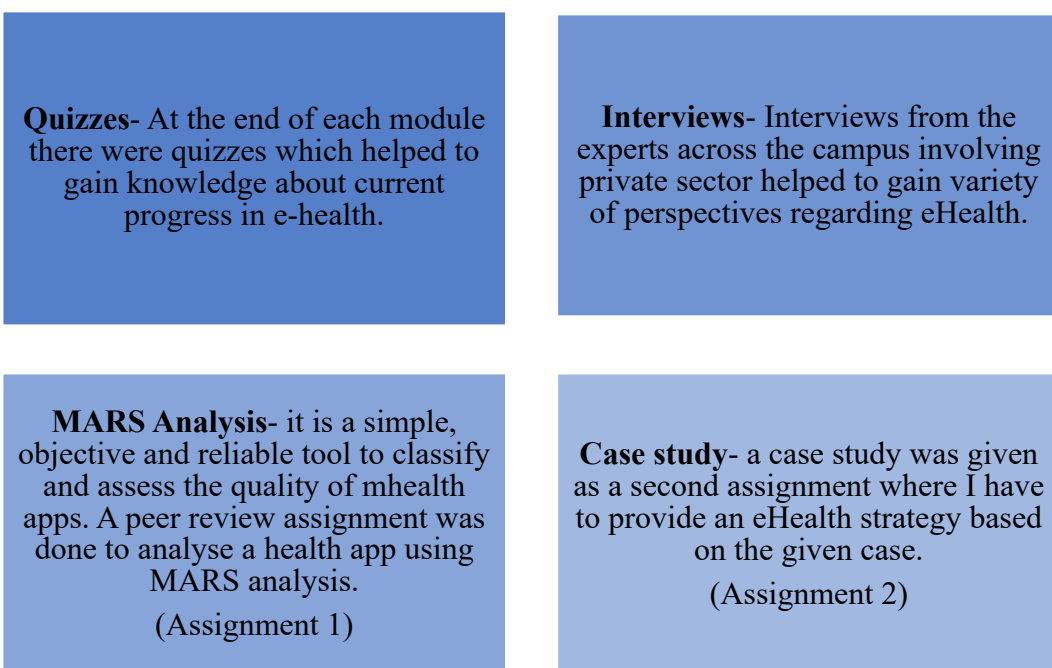
- Appreciate how eHealth can be used to support professional development.

#### Module 5-

Reviewed a variety of case-based examples of eHealth in professional practice.

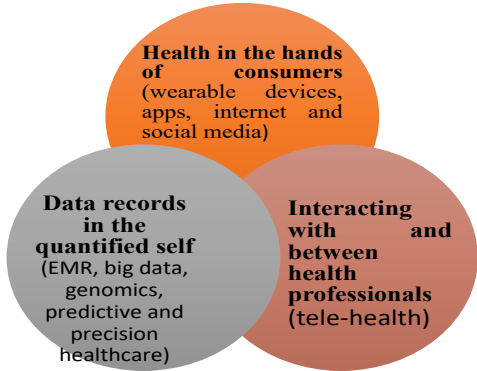
- Provided an evidenced based rationale for adopting an eHealth strategy suitable for your own professional practice.
- Described how you would anticipate this strategy improving healthcare services for both yourself and healthcare consumers.
- Used eHealth principles from previous modules to review and comment constructively on those eHealth strategies suggested by other course participants.

The course in general gave a broader perspective to look upon as far as eHealth is concerned. The following list mentions the approach the course took to instil the knowledge of eHealth and how it had helped me to look at the course in a more comprehensive manner.



**Figure 6.** Approaches used to imply knowledge based on learning.

**Assignment done to formulate a case study based on learnings from the course and to suggest eHealth strategy-**

|                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Background</b>                                                                             | <p><b>Peter (38 years)</b><br/>Lives with wife and two children, 2 &amp; 4 years old. Peter was diagnosed with leukemia two years ago and is now struggling with his treatment and trying to maintain his daily life. Peter is used to working with computers and would like to be able to use both his computer and his smart phone to access his care information and communicate with his care providers. He has had high blood pressure for a long time and been medicated for it since he was 25. After changing physician, Peter tried to cut down on the medication, but has now been warned of the possibility of stroke.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Healthcare needs</b>                                                                       | <p>Peter would like:</p> <ul style="list-style-type: none"> <li>• A reminder services for check-ups and treatment.</li> <li>• To be able to track his own blood count and blood pressure and record how his lifestyle affects it.</li> <li>• Rehabilitation support, exercises etc.</li> <li>• Electronic communication with healthcare services – ask questions online without waiting on the phone.</li> <li>• Participate in support from other young leukemia sufferers.</li> <li>• Access to his own eMR and the ability to input and share his own health data.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Healthcare issue</b>                                                                       | <p>Peter finds that he is not as actively involved and in control of his healthcare as he would like to be. He is frustrated that he's not getting enough rehabilitation and is searching for alternatives.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Your suggested eHealth strategy</b><br><i>(see questions in Step3 of case study guide)</i> | <p>All the 3 e health domains should be a part of Peter's strategy to actively get involved in controlling his healthcare as he would like to be.<br/>The 3 domains are overlapping and hence it means that for the best results it's important to use combine aspect of all the 3 domains.</p>  <p>There are multiple health apps which helps to give a reminder for routine check-ups and treatment. There are devices which can help the Peter to track his own blood count and blood pressure record at the comfort of his home. This is basically the first domain of eHealth i.e., Health in the hands of consumers.</p> <p>With the help of electronic medical record system (EMR) he would have the ability to input and share his own health data. This would be the second domain i.e., Data records in the quantified self.<br/>Telemedicine, a subset of tele-health would help him to interact with his doctor in real time and could be accessed from wherever on earth he would be. It would help Peter to gain answers online without waiting for anything. This is the 3<sup>rd</sup> domain of eHealth i.e., Interacting with and between health professionals.</p> |

**Figure 7.** Image of the assignment to formulate a case study based on learnings from the course.