

Transformation of the patient journey in a virtual healthcare setup in the new normal

February 2021





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Message from PwC

The COVID-19 pandemic has galvanised the healthcare vision worldwide and compelled countries to look at their healthcare service delivery from a fresh perspective. In India, although the concept of digital healthcare has been under discussion for several years, it was never fully adopted as the traditional physical modes were much in vogue. However, the pandemic and the subsequent lockdown required people to adopt virtual services, even in healthcare. The large-scale adoption of virtual services proved that during a crisis, patients need not avail healthcare services only in clinics/hospital premises. Virtual care has provided a platform to deliver the same quality of care to patients remotely and within the comfort of their homes. Therefore, the Government and various healthcare providers are currently exploring the possibilities of providing virtual healthcare services on a larger scale.

In this paper, we have briefly touched upon the various initiatives taken by the Government of India and private healthcare providers in developing the virtual healthcare space while exploring global virtual healthcare trends and the leading practices that can be drawn from them.

This paper showcases examples of virtual healthcare in areas of electronic health records (EHRs), online appointment booking, online prescription and digital medication history, and online learning materials for wellness. It also explores how healthcare providers can deliver accessible patient-centric services in the post-pandemic world and empower the population to lead a healthy life. We have reviewed and forecasted various technology interventions that can help patients proactively gain more control over their health and wellness by leveraging new virtual platforms, and modelled a technology architecture to effectively implement the envisioned digitisation opportunities. Finally, we have presented our recommendations on the way forward and how PwC can support the Government and healthcare providers in their transformation journey.



Abhijit Majumdar

Partner, Technology Consulting
PwC India

01

Introduction

COVID-19 and disruption in the patient life cycle

2020 was a highly unpredictable year as the COVID-19 pandemic disrupted economies and healthcare systems worldwide. The global focus on healthcare throughout the year was paramount, accompanied by a series of lockdowns, quarantine measures and the race to develop effective vaccines. At the same time, the pandemic created a shift in healthcare models across the typical patient life cycle. Healthcare providers and patients, in addition to all the players across the ecosystem, reacted in response to the disruption to existing models and highlighted the need to reimagine new possibilities. This shift in healthcare models is expected to have a lasting overall impact. This paper aims to explore the implications of the pandemic for the new normal and the role of technology in accelerating the adoption of changed healthcare models.

Changes for patients and healthcare providers

Concerns related to personal health and social distancing were among the first noticeable changes that started to directly impact the method of providing healthcare services during the pandemic. Patients preferred not to come to hospitals and clinics, unless absolutely necessary. They were apprehensive of physical visits to hospitals/clinics for fear of getting infected. Consultations for patients with chronic diseases in tier 2 and 3 cities were impacted due to the lockdown as many of them relocated to their hometowns.

From the perspective of healthcare providers, the workload of hospital staff increased significantly in response to the pandemic and adhering to social distancing norms made it more difficult for them to perform their duties. The changing patient preferences, along with the high demand for COVID-19 testing and increased workload of hospital staff, made it difficult for healthcare providers to provide quality care through only traditional means. Moreover, the need to minimise the exchange of paperwork and hospital visits by patients for minor updates – such as report collection – highlighted the shift in the healthcare paradigm.



We have seen an 11 times increase in telemedicine consultations between March and August 2020.

Rajiv Sikka, Head, IT/TeS, Medanta



Drivers of change



Fear of infection among patients



Need to quarantine hospital areas with high COVID-19 risk



Availability of care during COVID-19 quarantine



Change of patient location



Geographical accessibility of specialty healthcare services



Gap between high demand and ability of doctors to address healthcare needs at the current speed of care



Social distancing among healthcare staff



Minimising exchange of objects (paperwork) and the need for patients to visit hospitals



Long waiting queues for consultations



Repeated visits for collecting reports or results from pathological labs

All the above-mentioned factors pointed towards the need for a change in the approach of healthcare providers towards patients. While the pandemic called for reactions from the healthcare providers, it was evident that a sustainable healthcare model would be driven by preventive care rather than reactive care.



Government initiatives towards strengthening virtual healthcare

As telemedicine became vital during the pandemic, the Union Ministry of Health and Family Welfare (MoHFW), Government of India (GoI), issued the Telemedicine Practice Guidelines on 25 March 2020.¹ These guidelines are prepared in collaboration with NITI Aayog and the Board of Governors (BoG), Medical Council of India (MCI). They enable healthcare practitioners and workers to use telemedicine as a part of normal practice, and assist them in providing effective and safe medical care.

The guidelines include information on the available technology platforms and tools, and how these may be integrated for healthcare delivery.

It includes frameworks for practicing telemedicine in various scenarios including patients, registered medical practitioners, caregivers, health workers and emergency situations.

The GoI also launched the National Digital Health Mission (NDHM) on 15 August 2020 to support the integration of digital health infrastructure in the country. This will be accomplished by designing a centralised mechanism to identify every user in the National Health Stack through an identifier. It was launched during the pandemic, aiming to help patients transition to virtual healthcare

and provide a digitised network to the Government as it begins vaccinating citizens.

The NDHM envisions to create a national digital health ecosystem that supports universal health coverage in an efficient, accessible, inclusive, affordable, timely and safe manner, providing a wide range of data, information and infrastructure services and duly leveraging open, interoperable, standards-based digital systems, thereby ensuring the security, confidentiality and privacy of health-related personal information.²

The NDHM will ensure that health records of patients are available digitally and contain information on medical data, prescriptions, diagnostic reports and discharge summaries. This is accomplished by leveraging the building blocks of NDHM such as health ID, NDHM health records, health facility registry etc. It also provides a framework called the 'NDHM Sandbox' for healthcare technology companies to integrate new products and technologies with the existing building blocks, enabling innovation. The NDHM Sandbox provides these companies a controlled environment in compliance with NDHM standards to test their products and services, minimising risks and obtaining judgements from customers and markets.³ This environment is provided to healthcare service providers, public health programmes, software providers, healthcare aggregators and technology companies to test their technologies and products as per their standards.⁴

1 <https://www.mohfw.gov.in/pdf/Telemedicine.pdf>

2 https://nha.gov.in/assets/uploads/NDHM_Strategy_Overview.pdf

3 https://nha.gov.in/assets/uploads/Sandbox_Guidelines_v6.pdf

4 <https://economictimes.indiatimes.com/industry/healthcare/biotech/healthcare/accelerating-digital-health-innovation/articleshow/79415027.cms?from=mdr>

02

The evolving patient life cycle

Despite the lack of preparedness for the pandemic, many healthcare providers responded very promptly by bringing together homegrown virtual care solutions to address critical requirements. As the pandemic intensified, hospitals witnessed an increased usage of virtual care platforms along the entire care continuum owing to the rising need for safe care delivery. The pandemic has

compelled healthcare providers worldwide to relook at traditional care delivery models and shift many parts of care delivery to virtual platforms which do not require in-person visits. These virtual platforms have helped doctors, medical practitioners and staff to enhance capacity and focus their time on patients rather than documentation efforts.

Changes introduced by COVID-19 in the patient life cycle

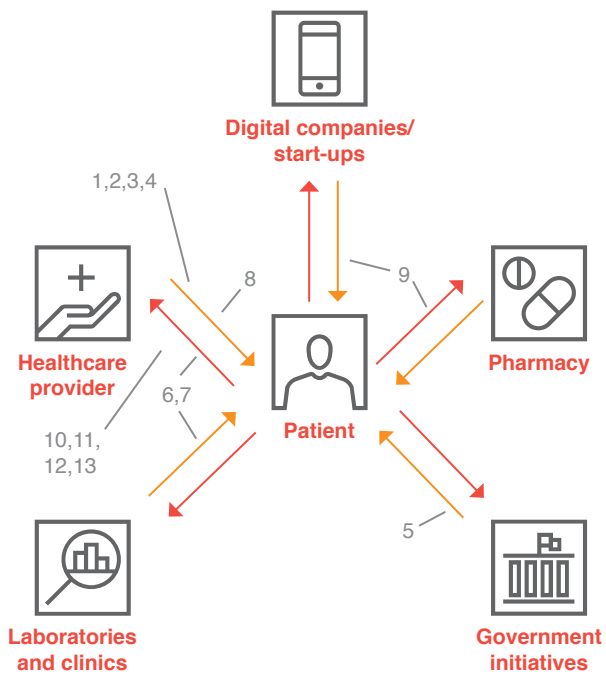
	Pre COVID-19	During COVID-19	Post COVID-19
Step 1	Notice symptoms	Notice symptoms	Notice symptoms
Step 2	Visit a hospital	Book a virtual appointment or visit a hospital for closer check-up	Book a virtual appointment or physical appointment from a hospital's mobile app
Step 3	Fill forms	Fill online forms	Autofill online details from a patient's profile
Step 4	Share documents for medical history and current medication	Share medical history and documentation scans via portal/ applications	Authorise temporary digital access to the doctor to view the patient's medical history
Step 5	Share details of empanelment/ eligibility for Government schemes	Share details of empanelment/ eligibility for Government schemes	Sync with the Government database for details of empanelment/eligibility of schemes
Step 6	Get laboratory tests done at a clinic or hospital	Get samples collected from home and undergo machine-based tests at the clinic/hospital	Get samples collected from home and conduct machine-based tests at the clinic/hospital
Step 7	Collect laboratory results physically and share with the doctor	Get and share digital copies of the laboratory results and scans with the doctor	Get and share a digital copy of the laboratory results and scans with the doctor
Step 8	Get diagnosis and prescription in follow-up visit	Get diagnosis and prescription in virtual consultation	Get diagnosis and prescription in virtual consultation
Step 9	Buy medicines at the hospital or from the local pharmacy	Buy medicines physically or separately via delivery start-ups	Order the medicines directly via delivery start-ups through the hospital's app
Step 10	Receive treatment	Receive treatment	Receive treatment
Step 11	Pay the bill while checking out from the hospital	Pay the bill at the hospital (online) or during checkout	Pay the bill at the hospital (online) or during checkout
Step 12	Continue with follow-up check-ups at the hospital	Share readings from homecare devices with the doctor	Perform self-care and share readings from home and wearable devices on the hospital's app
Step 13	Get physiotherapy and follow-up care at the hospital	Get physiotherapy and follow-up care via healthcare staff at home	Get physiotherapy and follow-up care via healthcare staff at home

Source: PwC analysis

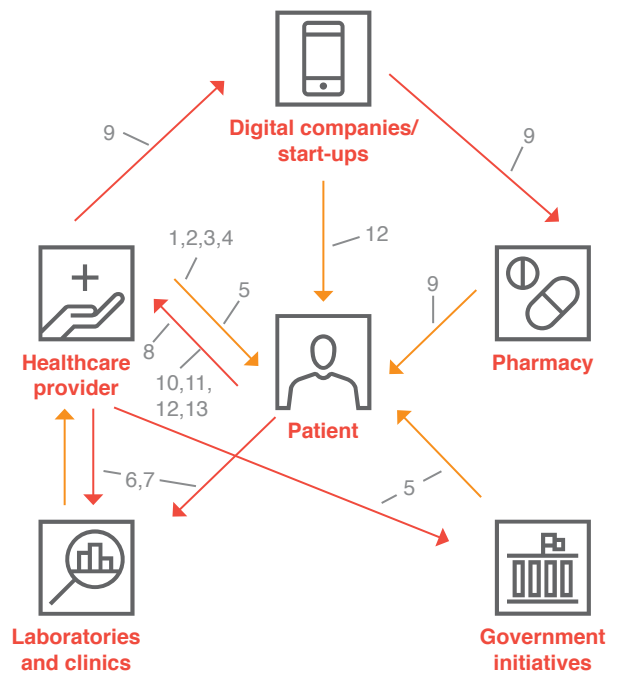


Current vs envisioned healthcare models

Current healthcare model



Envisioned healthcare model



Legend → Input → Output 1 Step number in the patient life cycle

Source: PwC analysis

Changes in the healthcare paradigm

The old healthcare paradigm

Reactive | Disconnected | Cyclical | Stressful



The new healthcare paradigm

Preventive | Connected | Continuous | Transparent



Source: PwC analysis

Technologies existed before the pandemic as well, but there was always a choice not to utilise them.

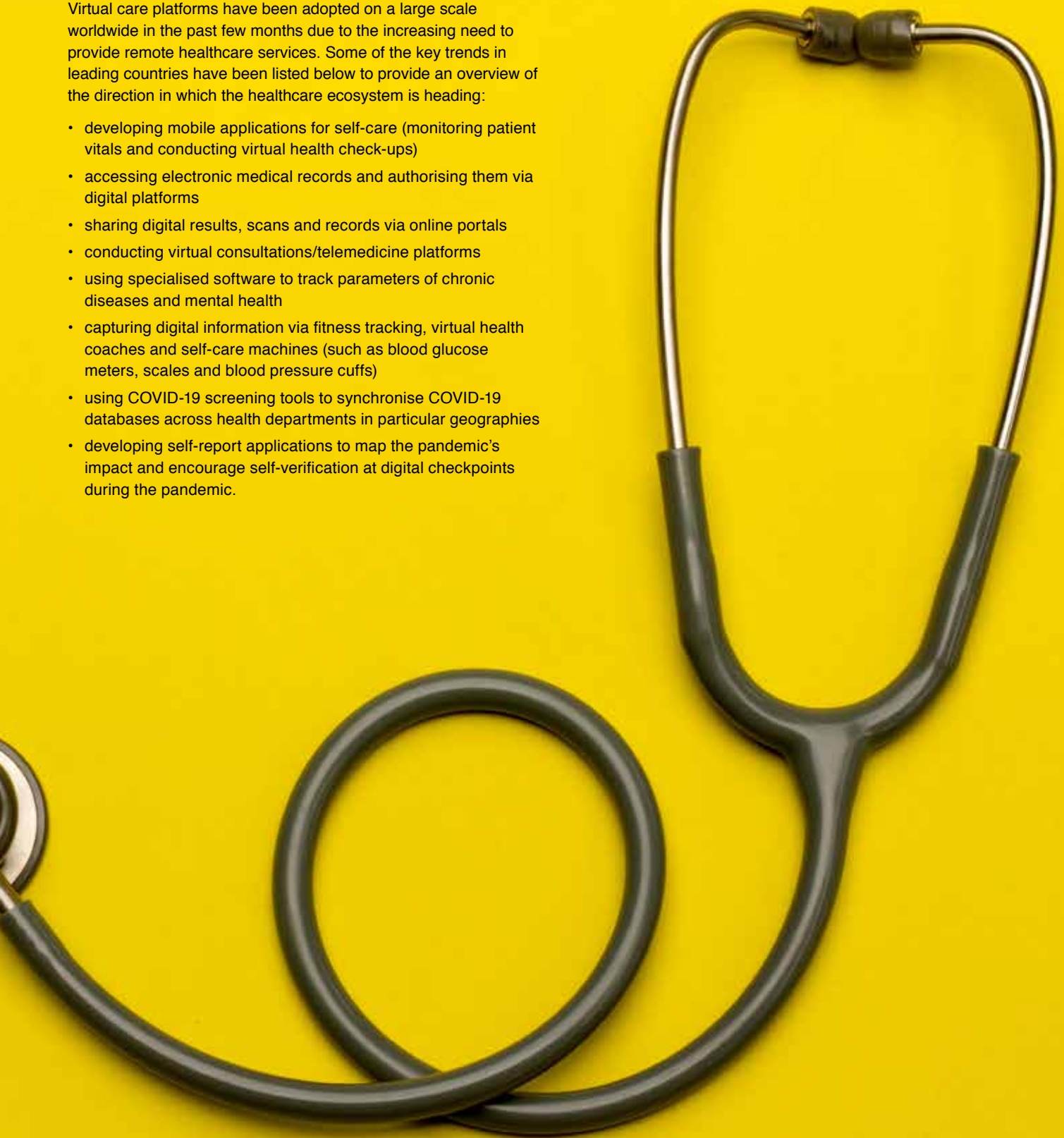
During COVID-19, there was a requirement to monitor vitals/patient status via devices (real-time or manual upload), so most hospitals started using the solutions that were available at the moment.

**Girish Koppar, General Manager, IT,
Wockhardt Hospitals**

Access to virtual care is no longer restricted to healthcare providers. Large multinational companies have started to set up their own virtual care platforms for the benefit of their employees. These programmes and collaborations between employee welfare initiatives and the healthcare ecosystem will help to bridge the gap in healthcare accessibility.

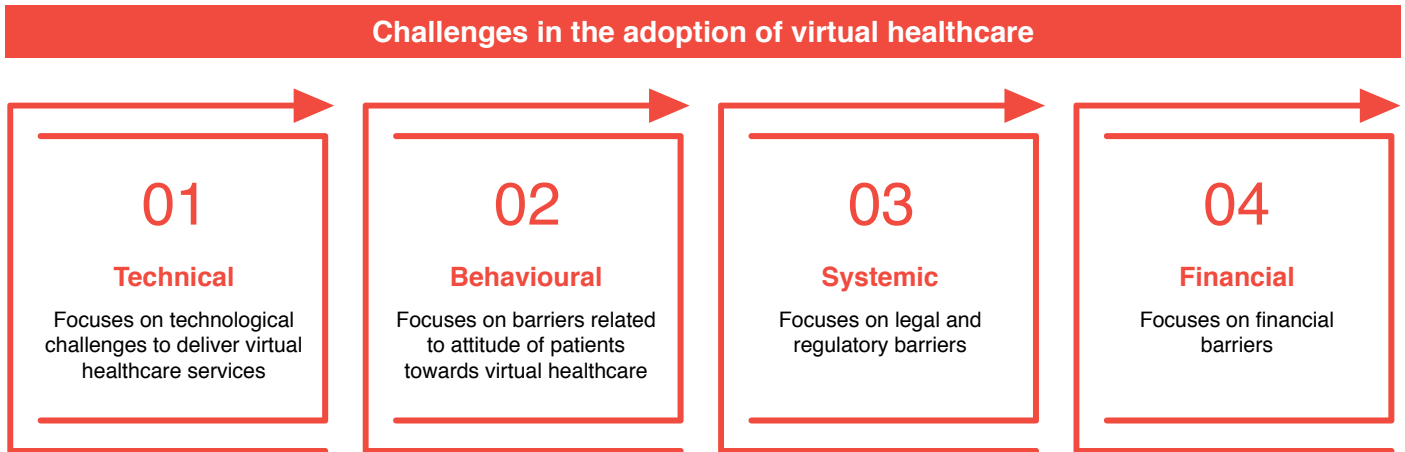
Virtual care platforms have been adopted on a large scale worldwide in the past few months due to the increasing need to provide remote healthcare services. Some of the key trends in leading countries have been listed below to provide an overview of the direction in which the healthcare ecosystem is heading:

- developing mobile applications for self-care (monitoring patient vitals and conducting virtual health check-ups)
- accessing electronic medical records and authorising them via digital platforms
- sharing digital results, scans and records via online portals
- conducting virtual consultations/telemedicine platforms
- using specialised software to track parameters of chronic diseases and mental health
- capturing digital information via fitness tracking, virtual health coaches and self-care machines (such as blood glucose meters, scales and blood pressure cuffs)
- using COVID-19 screening tools to synchronise COVID-19 databases across health departments in particular geographies
- developing self-report applications to map the pandemic's impact and encourage self-verification at digital checkpoints during the pandemic.



03

Potential challenges in the adoption of virtual healthcare



Source: PwC analysis

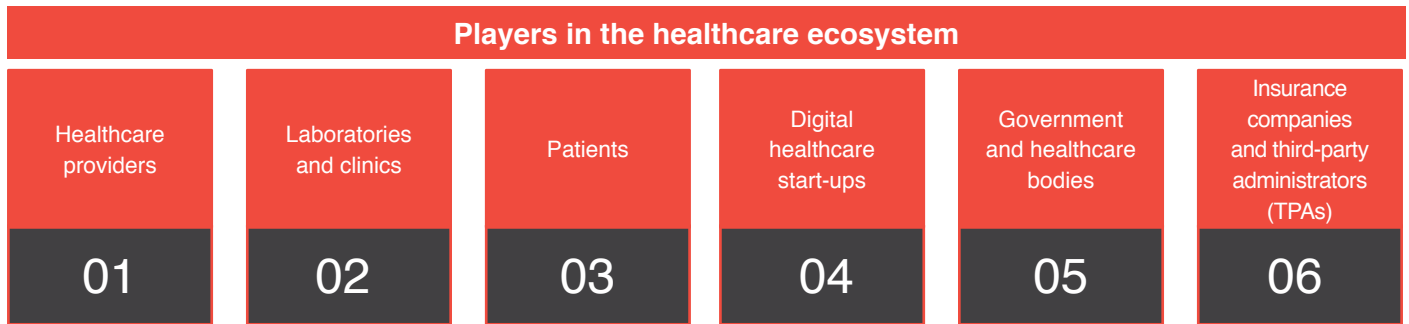
#	Area	Barrier
1	Technical	<p>Hospital/doctor challenges:</p> <ul style="list-style-type: none"> • Multiple platforms for doctors and patients to access patient records and information, due to lack of integration between platforms • Low interoperability among systems • Lack of work from home (WFH) setup for clinical staff • Traditionally, data security and privacy concerns are one of the primary reasons for slow adoption of virtual healthcare services. As a result of the COVID-19 pandemic, new threats have emerged. Hackers are also targeting enterprise mobile devices with phishing attempts. <p>Patient challenges:</p> <ul style="list-style-type: none"> • Lack of trust in virtual health due to the possibility of medical errors • Technical problems and network bandwidth issues • Lack of virtual assistance and provisions for remote meetings
2	Behavioural	<ul style="list-style-type: none"> • Reliance on healthcare systems to treat diseases instead of preventing them • Individual preference for availing treatment from healthcare professionals virtually • Lack of a simplified integrated workflow and interactive user experience • Low patient awareness and trust in virtual care quality offerings • Low literacy related to technology and digital health services within the community, especially among the elderly population
3	Systemic	<ul style="list-style-type: none"> • Lack of enforceable Government, legal and regulatory mandates • Lack of uniform reimbursement regulations in terms of medical insurance • Inability to adopt virtual methods for consultation necessarily requiring physical examination
4	Financial	<ul style="list-style-type: none"> • No financial motivation for patients to avail virtual healthcare services • Initial setup cost for virtual healthcare services estimated to be in the medium/high range



04

Envisioned scenario (interactions within the ecosystem)

The figure below shows the key players in the healthcare ecosystem.

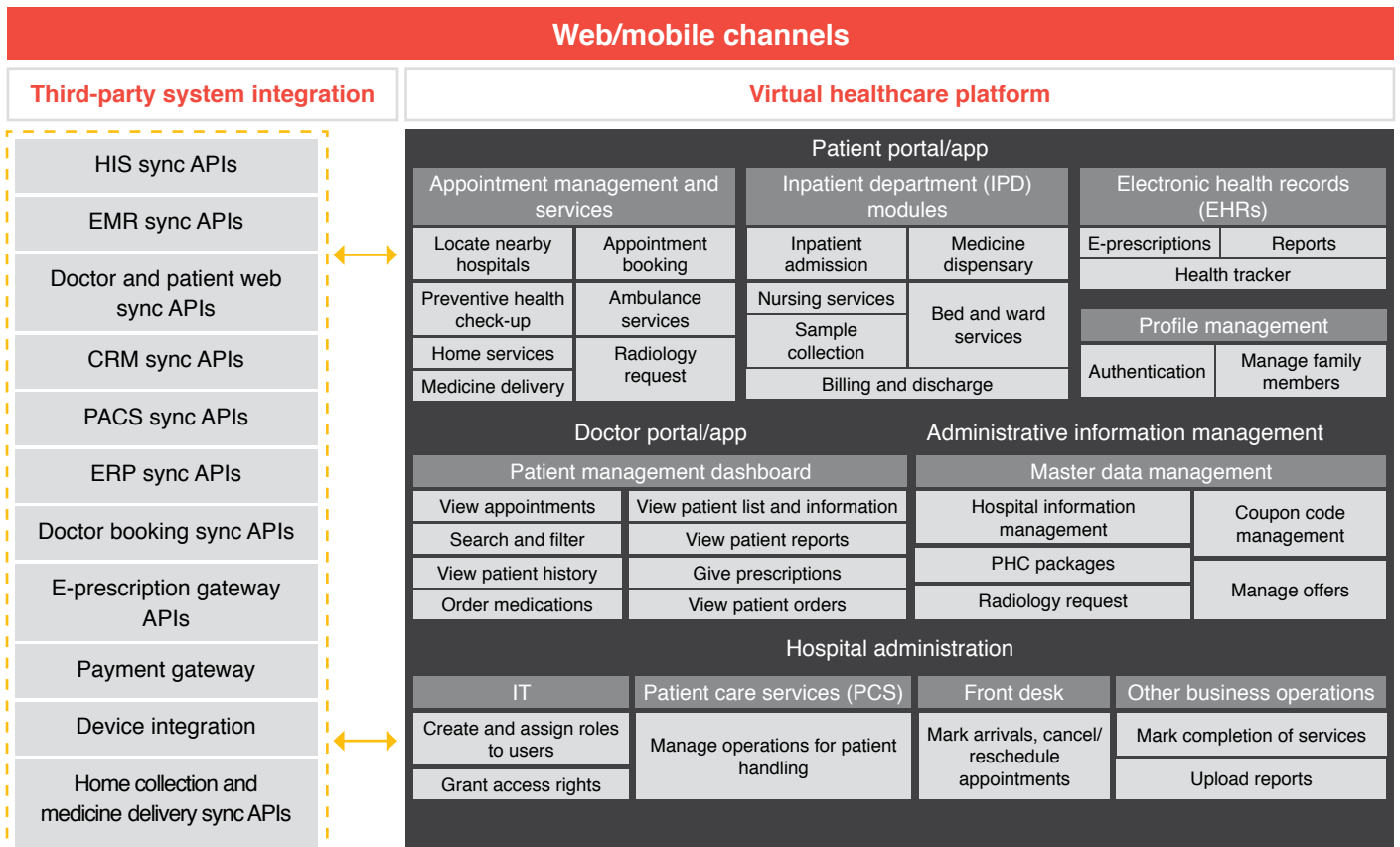


Source: PwC analysis

In the following sections, we have highlighted our point of view on the future of healthcare providers and patients.

An omnichannel platform for healthcare providers

There are four key building blocks for any virtual healthcare services platform – patient portal/application, doctor portal/application, administrative information management and hospital administration.



Source: PwC analysis

The platform offers access to a wide range of healthcare services, including inpatient module, automated medicine delivery and instant access to health records. It provides a seamless experience to the patient on the patient portal/app and gives real-time patient health data (dashboard) access to doctors on the doctor/nurse

app. The platform will help in monitoring post-operative patients during their recovery phase or for regular treatment of chronic disease patients. Integration with third-party healthcare technology software products/gadgets makes this platform a one-stop-shop for all healthcare needs

Envisioned patient journey in a virtual care ecosystem

The following diagram highlights the experience of a patient opting to avail virtual healthcare services from a healthcare provider.



Meet Vineeta

Vineeta is a 31-year-old woman living in Mumbai with her husband and two kids. Vineeta balances her career with her personal life, which sometimes becomes quite stressful. Lately, she has been feeling depressed. She is unable to concentrate on her work and feels disinterested in her personal as well as professional life.



Patient activation

Vineeta discussed her situation with her husband. They jointly decided that Vineeta should seek advice from a professional. While Vineeta does not know where to start, she is confident that she will be able to change her behaviour and learn more about her current health state by discussing her situation with a professional. She is determined to become more aware and understand why she feels the way she does.

Enablers:

Patient portal

Applicable user groups:

General patients	Chronic disease patient
Patient families	Follow-up patients



Appointment management

Vineeta logs in to her patient portal where she has a 360-degree view of her medical profile, access to EMR, electronic services and reliable health information. She then decides to book a telemedicine appointment via the portal. She searches for available doctors and selects a suitable date and time for consultation. She completes the payment electronically. She successfully completes the booking and receives a booking confirmation on her email as well as via a message on her phone.

Enablers:

Patient portal Telemedicine

Appointment management

Applicable user groups:

Chronic disease patient	Healthy patient
Platform providers	Administrative units



Pre virtual consultation

Before her scheduled appointment, she receives an email consisting of the teleconsultation guidelines. She is then requested to provide her consent to the terms of the virtual consultation. She is reassured about data privacy which makes her feel a lot more comfortable. She is also asked a few questions about her symptoms to speed up the virtual consultation.

Enablers:

Mobile app	Connectivity
Cyber security	Telemedicine

Applicable user groups:

General patients	Administrative units
Clinicians	



Post virtual consultation

Following her virtual visit, Vineeta is redirected to a feedback page where she rates her psychiatrist's performance and provides positive and negative feedback.

At the same time, Vineeta is asked if she would like to book a follow-up visit within a week to report on her situation. She confirms her next appointment.

Enablers:

Telemedicine	Connectivity
Patient portal integration	

Applicable user groups:

General patients	Administrative units
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During the virtual consultation

Throughout the appointment, the psychiatrist, a female as per Vineeta's choice, evaluates Vineeta's health state. The psychiatrist is also able to review Vineeta's medical history and check if Vineeta is taking any medication with side effects that may be resulting in her current state of health.

Enablers:

Mobile app	Connectivity
Cyber security	Telemedicine

Applicable user groups:

General patients	Clinicians
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Dispensing and follow-up

Following her first meeting, Vineeta goes and purchases the medicines she was prescribed.

Throughout the week, she feels much better and is slowly but surely returning to her previous health state. At her follow-up virtual consultation, she reassures the psychiatrist that she is doing much better and thanks her for the quality of care.

Enablers:

Third-party platform	Telemedicine
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Applicable user groups:

Follow-up patients	Pharmacists
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E-prescription

After the consultation is complete, the psychiatrist electronically prescribes medication for better sleep and reduced anxiety via the e-prescription platform. Vineeta is able to view the e-prescription after logging in to her patient portal.

Enablers:

E-prescription	Patient portal integration
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Applicable user groups:

General patients	Pharmacists
------------------	-------------



Normalisation

By using the telemedicine platform, Vineeta was able to address the issues with her health and return to a healthy and productive life. She becomes an advocate of telemedicine and recommends it to her friends and family. She is very thankful for having an effective platform that increases health accessibility and convenience while not sacrificing quality.

Design principles for a future-ready virtual care platform

In order to ensure a seamless experience for patients who avail virtual healthcare services, healthcare providers need to ensure that their future-ready virtual healthcare platforms adhere to the following design principles.

Omnichannel platform for healthcare providers



Scalable for future business growth



Multiple system integration regardless of source and technology



High-performance application and integration



Full functional availability despite low network coverage



Multi-device accessibility for on-the-go usage



Robust database framework for analytics, ad-hoc reporting and personalisation



Low infrastructure and maintenance costs

Source: PwC analysis



05

Way forward

Gol

The Gol needs to focus on leveraging the trend towards digitisation to further the vision of providing quality remote healthcare to all citizens. The NDHM is an appreciated initiative, and presents the Gol with the opportunity to reduce duplication of efforts (such as laboratory testing). This can be achieved by bringing the different ecosystem players together. The Gol should also focus on bringing independent healthcare committees together to develop a common agenda and work towards finalising a timeline to achieve the vision of a virtual national health ecosystem. Enabling technology platforms with integrations standard will be the key to achieving this vision.

The Gol should also closely monitor threats related to data breaches and cyber security in addition to standardising guidelines related to the same, keeping in mind existing and future possibilities of integration and collaboration with different ecosystem players.

Healthcare providers

Healthcare providers should use the learnings from the pandemic and continue with the momentum of digital shift to further leverage technology. A single platform that provides patients with an omnichannel experience can support the customer-centric mindset needed to make the adoption of digital healthcare an achievable reality. Providers should prioritise delivering relevant technology-powered patient experiences. The success of such initiatives will be dependent on the awareness levels and marketing efforts. All technology advancements utilised by hospitals should be clearly connected to their cost-saving and revenue-earning goals to ensure that such initiatives get sufficient internal backing to be viable.

Understanding the behaviour and preferences of customers in this changing environment should be the priority for healthcare providers before moving forward with any initiative. This process could also include taking an outside-in view for gaining deeper insights into the leading practices within the industry. Healthcare providers should also focus on adapting to the changing needs and managing data responsibly, and follow the standards set by other data-centric industries by recruiting for roles such as chief information security officer.

Digital start-ups

To achieve the vision of a connected healthcare model, digital start-ups should continue to build their platforms with scalability and collaborate with hospital apps and other ecosystem players. Digital services such as medicine delivery, insurance and online tools for digitising hospital services in particular, can fill in the gaps in the process of digitising the patient life cycle. Digital start-ups and companies should also anticipate possible regulatory challenges and focus on aligning themselves with emerging business models involving increased touchpoints and data while maintaining trust.

There is a huge opportunity for healthcare service providers to improve their business model of teleconsultations in India by structuring programmes that provide an omnichannel and seamless experience to their patients, are optimally priced and reach out to customers located beyond conventional brick-and-mortar catchments.

**Veneeth Purushotaman, Group
CIO, Aster DM Healthcare**

IT vendors

Healthcare providers should ensure that the services provided are resilient and reliable by deploying remote healthcare solutions as cloud-native solutions based on a microservice architecture.

Considerations for platform deployment

Accessibility

The target user group will need to access the platform **anytime from anywhere** in a particular region, using various channels (desktop, mobile etc.) over the internet.

Hosting the solution on cloud will ensure that the system is **available 24x7x365 with an uptime of 99.99%**.

Flexibility

The platform will have multiple components that will be deployed in a **phased manner**. A microservice architecture ensures that each component can be treated as a **microservice and each microservice can be built using different technologies**, without affecting the communication among microservices.

Scalability

Since, the entire population of a particular region/country is the target user group for the platform, it is crucial to ensure that the solution is scalable. **Automatic scale-up and scale-down** options in cloud will ensure that the platform is able to handle the workload effectively without any impact on system performance.

Resilience

The platform must be **fault tolerant**. Due to the isolated nature of microservices, even if one microservice fails, the others can **run independently**. This implies that the platform **should not have a single point of failure**.

Moreover, the failure of a microservice can be handled efficiently and effectively.

Faster deployments

The platform will require faster deployments, be it new service deployment or bug fixes in the existing services.

DevOps methodology adopted along with cloud deployment will ensure **faster, automated and secured deployment and reduced downtime**.

Integration capability

The platform will require near real-time integration with multiple external systems situated at different locations across a region/country. Compared to a monolithic architecture, a **microservice architecture makes such integration simpler and easier to manage** as it can directly communicate with different architectural layers.

Source: PwC analysis

About The Bengal Chamber of Commerce and Industry (BCC&I)

The Bengal Chamber of Commerce and Industry (<https://bengalchamber.com/>), is one of the oldest institutions of its kind tracing its origins to 1833. The Chamber has played a pioneering role as a helmsman, steering the evolution of Commerce and Industry in India. The Chamber reviewed and commented upon some of the most critical legislations in the country. The Bengal Chamber was involved in the conceptualization of the airport in Kolkata and the Howrah Bridge and had lobbied for creation of overland trade routes with China through Tibet. The Bengal Chamber has helped in the formation of a slew of educational and cultural institutions – Indian Institute of Management Calcutta, Indian Institute of Social Welfare and Business Management (IISWBM), Nazrul Manch and the Academy of Fine Arts apart from bringing to Kolkata the son-et-lumiere at the Victoria Memorial.

Today, The Chamber is deeply involved in areas like Healthcare, Information Technology, Education, Energy and Environment, Finance and Banking, Corporate Governance, MSME Development, Manufacturing, Infrastructure, Tourism - to name a few and has now assumed a multi-faceted role.

The Chamber has a vibrant IT Committee comprising of the leading developers, consultants, corporates, academia. Start Ups have also been included. The focus has always been to communicate and create a bridge between the technology users and the developers on how the synergy may be enhanced with disruptive innovations. The Bengal Chamber's annual signature event Business IT Conclave (BITC) creates a platform for the stakeholders of technology including the providers, users, academia, incubators and startups to network, interact, brainstorm and share best practices on the emerging technologies and their applications.

There is always a constant focus of connecting the stakeholders with larger markets through dedicated B2B and B2G Meetings in partnerships in Embassies and Consulates in India, bilateral Chambers of Commerce and other similar organizations.

The Chamber has set up Webel-BCC&I Tech Incubation Centre to encourage entrepreneurship and facilitate deserving potential entrepreneurs a platform to initiate Start Ups which would be a contribution to the Start Up Movement of the State. The incubates are provided mentorship by the Mentor Group and Chamber's experts on the domain knowledge and ancillary areas of business like Taxation, Legal and IPR and others. The viable businesses are connected with financiers and collaborators.

The Bengal Chamber's Health Committee has been playing an important role in addressing the critical aspects in the field of healthcare in the State and has been catalytic in bringing about significant corporate consciousness in healthcare management. It has organized Health Expos, Panel Discussions, Lectures on Health issues by leading and iconic personalities in Health from the fraternities of doctors, entrepreneurs and policymakers. The Chamber's National Health Debate also deserves special mention, which were addressed by national and international personalities. The Committee also organizes a quiz on health & lifestyle to create awareness on healthy living. The Committee's activities also include B2B Meet with the IT companies to discuss latest offerings relevant to the healthcare sector, Medico Legal Workshop involving doctors, lawyers and hospital administrators to learn and share the experiences on medico legal issues & guidelines, Blood Donation Camp, Seminar on Deceased Organ Donation as a gesture of our responsibility to our Society. The Committee also celebrates Doctor's Day in a unique way by organizing Panel Discussion, Quiz with the Doctors of our Society. The Committee also engages in Policy Advocacy.

With the outbreak of the pandemic, the Health Committee of The Chamber, as a proactive measure, has shared useful information on history, symptoms, treatment and prevention of COVID-19 with all the members and stakeholders of The Chamber.

The Health Committee of The Chamber has also taken the initiative to connect MSMEs, manufacturing the items which are essential to combat the current pandemic, with the healthcare service providers. The Committee has also facilitated the members in donation of Masks and Sanitizers

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About PwC

At PwC, our purpose is to build trust in society and solve important problems. We're a network of firms in 155 countries with over 284,000 people who are committed to delivering quality in assurance, advisory and tax services. PwC refers to the PwC network and/or one or more of its member firms, each of which is a separate legal entity. Please see www.pwc.com/structure for further details.

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