ENABLING VIRTUAL CARE FOR A PROVIDER – THE INFOSYS WAY
The silver lining of the pandemic's persistent presence since it started in 2019 has been the shot in the arm it inadvertently gave to virtual modes of care delivery like telehealth and telemedicine. There has been a steep rise in the demand for at-home diagnostics and care, and growing interest in the application as well as acceptance of mobile health, remote patient monitoring devices, IoT devices for collection of health data and utilizing them for prevention and therapy.

However, the concepts of virtual healthcare are not new. An 1879 article in the Lancet described the use of the telephone to reduce avoidable outpatient visits. In 1925, a cover story of Science and Invention magazine talked about a doctor diagnosing his patient via the radio, and also ideated a device that would allow examining patients remotely over video. Remote monitoring was also involved in the Mercury space program when the National Aeronautics and Space Administration (NASA) began performing physiologic monitoring from afar.

Despite the availability and constant developments in technological innovations, the healthcare and life sciences ecosystem lagged in adopting it uniformly before the outbreak of COVID-19. The unanticipated demand caused by the pandemic led to its unstructured and haphazard embracement. The sprints to provide virtual care services have happened without fully addressing or even anticipating the needs of Healthcare professionals (HCPs) and at times compromised patient experience. Physician burnout, limitations of telehealth for outpatient consultations at hospitals, scalability, competency issues among providers (with Medicine traditionally being taught for in-person, bedside examination, and evaluation), interoperability, and sequestration of patient data are just some of the issues faced by hospitals and HCPs. And some of the patient pain points include inadequate consultation time, decreasing 'human' touch, breaks in the continuity of care, accessibility in remote areas, and quality of care.

With an aim to help Providers be ‘digital ready’ and ensure focus on the technologies and processes best suited for them and the population they service, Infosys has built a framework amalgamating the various contemporary medical technologies, processes, and procedures to address the provider and patient pain points with virtual care.

Fig 1: An overview - The iVCTOR framework
The iVCTOR (Infosys Virtual Care, Treatment, Observation, Rehabilitation) framework brings together telemedicine/telehealth with other enablers of virtual care such as remote patient monitoring (RPM) devices, wearables and sensors, mobile health and point of care testing with services such as home healthcare, portable diagnostics and therapeutics, this empowers a provider during the journey towards building an all-encompassing, scalable virtual care service and/or platform.

With patient experience at its core, the iVCTOR framework helps put forth recommendations by examining four key aspects for providers:

**Services that can be virtually enabled**

We begin by reviewing the workflows across the various modes of healthcare delivery and the administrative processes that support the same – outpatient, inpatient, critical care, emergency care, inpatient surgery and day care surgery, and identifying the processes that may be automated and virtually enabled – from collecting patient history, scheduling to follow up, post-procedural care, etc.

For example, outpatient services, registration of patient, any prior authorization, appointment scheduling, the actual consultation using RPM devices and wearables for checking vitals may all be facilitated without the patient leaving his/her/their home.

**Departments that can be virtually enabled**

Virtual care is more germane for certain specialties, and for others just select processes would be amenable for virtual enablement. The framework looks through the physiological and disease conditions which define a specialty, and the related processes physicians follow as part of diagnoses and treatment of patients with these conditions to determine which ones are amenable for virtual enablement. For example, medical specialties such as Cardiology, Neurology and Gastroenterology are more pliable for virtual care enablement across the modes of healthcare delivery (such as outpatient, inpatient, etc.) than surgical specialties such as Cardiothoracic surgery, Neurosurgery or Surgical Gastroenterology. And yet, the outpatient services for surgical specialties along with post-procedural rehabilitative monitoring can be virtually enabled.

**Policies and SOPs impacted**

Similar to the way medicine is taught, most regulations and legislations have been ratified with physically present patients and doctors during healthcare delivery. The iVCTOR framework reviews the policies and SOPs across modes of healthcare deliveries and departments – clinical, supportive and administrative – and provides recommendations for additions and modifications to policies and SOPs for ensuring compliance with regulations and patient safety through every stage.

**Technologies that can be utilized**

Fig 2: Four key considerations to provide recommendations
Technologies that can be utilized

It makes prudent business sense to utilize the technologies and applications that are part of the existing IT Portfolio before looking to invest in one of the multiple solutions that have surfaced in the market for enabling virtual care. The framework includes the following:

**Consultation**
- Two-way Video Conferencing
- Two-way messaging – chat, multimedia and documents
- POCT
- Remote Patient Monitoring Devices
- Wearables
- Portable Medical Equipment (Home Health)
- Transcription

**Diagnostics**
- POCT
- Portable Medical Equipment (Home Health)
- eReporting
- LIS Integration technologies
- RIS/PACS Integration technologies
- Artificial and Augmented intelligence

**Therapeutics**
- Two-way messaging – chat, multimedia and documents
- Two-way Video Conferencing
- Remote Patient Monitoring Devices
- ePrescription
- Artificial and Augmented intelligence

**Monitoring**
- Remote Patient Monitoring Devices
- Wearables
- Artificial and Augmented intelligence

**Procedures**
- Portable Medical Equipment (Home Health)
- Two-way Video Conferencing
- Wearables
- Robotic Surgery
- AR/VR devices

**Interoperability**
- EMR/HIS Integration technologies
- Mobile Health - Patient & Provider facing
- Clinical Decision Support System
- Internet of Things
- Data Lake

Fig 3: Applicable technologies - clinical processes
### Fig 4: Applicable technologies – administrative processes

<table>
<thead>
<tr>
<th>Registration</th>
<th>Scheduling</th>
<th>Insurance verification</th>
<th>Billing &amp; Payment</th>
<th>Physician / Healthcare worker Roster</th>
<th>Bed Availability</th>
<th>Discharge / Patient Transfer</th>
</tr>
</thead>
</table>

- Mobile Health - Patient & Provider facing
- Integration technologies with EMR/HIS
- Artificial Intelligence
- Robotic Process Automation
- Interoperability
- Data Lake
Patient experience design

As with every healthcare IT service provided by Infosys, the iVCTOR framework at its core has the principles of patient experience design which underscores every assessment and ensuing recommendation. iVCTOR’s triaging logic, utilizing data provided by patient, wearable devices and remote patient monitoring devices, helps identify patients that are best suited for seeking virtual care, versus those whose health condition needs an in-person assessment. The framework bridges any gaps created due to an HCP and a patient not sharing the same physical space. It enhances patient experience with optimal use of the time an HCP spends with a patient, ensuring adequate information is available for HCPs to make the best possible diagnostic and therapeutic decisions. Eventually, safeguarding the continuity of care, improving patient safety and building confidence among patients and their families about the quality of care that is being delivered.

The pandemic may have caused an unprecedented demand, but the acceptance of virtual care among patients, families and providers has been unprecedented too. Virtual care is here to stay! With continuing medical research and market analysis pointing towards the untapped value in virtual care, providers find a need to invest in building virtual care capabilities. The iVCTOR framework - built on principles of human-centric design, with extensive research of existing and emerging technologies, existing Virtual Care Frameworks (such as the AMA telehealth information playbook, the PAHO framework for telehealth), provider and patient pain-points - aims to help providers achieve their goals smartly, efficiently, and sustainably.

Here is a look at a Cardiology patient’s outpatient virtual consultation journey:

65-year-old Randall Moxley, known patient with Ischemic Heart disease, experiences palpitations

Mobile App: Assessment
Randall connects to his Hospital application and updates his symptom tracker.

AI Based Triage
His mobile app, connected to wearables, reviews symptoms and ECG - suggests virtual consultation with Cardiologist

Tele-Consultation
Dr. Rogers can view Randall’s vitals in real time and suggests investigations: 2D ECHO, Holter monitor, cardiac markers

Mobile App: Scheduling
Randall schedules an appointment with his Cardiologist, Dr. Rogers, for a virtual consultation

Portable Diagnostics
Diagnostics are notified and tests are performed at home, and reports shared with Dr. Rogers.

Medication Delivery
After a follow up, Dr. Rogers prescribes Beta blockers for managing PVCs, the prescription is shared with the pharmacy and medications delivered to Randall at his home.

Randall is now asymptomatic and very pleased with his hospital’s services in his time of need

Fig 5: The virtual outpatient journey
And here is the journey of an inpatient when the treating physician is virtually enabled:

Antoinette Danvers, ADT Executive, has received a patient from Dr. Tara Hunter’s OPD for admission into the Inpatient ward.

*ADT applications*
Antoinette admits Mrs. Rao reviewing her registration and insurance details and checking availability into an Inpatient room on the 2nd floor.

*EMR applications*
Senior Nurse Claire receives Mrs. Rao, orders investigations per Dr. Hunter’s prescription and informs Dr. Brown, the hospitalist in-charge of the 2nd floor. Dr. Hunter is notified of the admission.

*Teleconsultation*
Dr. Brown sets up a video-consultation from Mrs. Rao’s room with Dr. Hunter with Nurse Claire documenting any new orders.

*Voice-to-Text Clinical Notes*
Dr. Brown reviews Dr. Hunter’s assessment made by Dr. Hunter in the EMR where her voiced clinical notes have been documented.

*Remote Patient Monitoring*
Dr. Hunter can view Mrs. Rao’s current vitals on her dashboard and adjusts Mrs. Rao’s medications.

*Interacting Systems*
Nurse Claire updates Mrs. Rao’s drug chart and Inpatient Pharmacy is notified of the updated medications.

Dr. Hunter was able to safely admit, monitor and treat her patient remotely without a break in continuity of care.
Author
Dr. D. Prajwal Kumar
Senior Consultant, Healthcare DCG

iVCTOR Framework by Provider Center of Excellence

Contributors:
Seema Pandey, Dr. D. Prajwal Kumar, Aishwarya Athanikar, Akshita Rout, Bhakti Dua, Keerthi Unnikrishnan, Soham Gorade, Dr. Swapnali Takke

Other Contributors:
Bhavika Chetri, Dr. Jaritha Sequira, Dr. Vishwa Deshmukh, Urmi Singh, Vaishali Tambe

For more information, contact askus@infosys.com