Technology-driven Healthcare Post-COVID-19

Next Normal, New Frontiers, and New Horizons

Healthcare
PURPOSE-DRIVEN, RESILIENT & ADAPTABLE

with Business 4.0™;

EMBRACE RISK

MASS PERSONALIZE

CLOUD

INTELLIGENT

LEVERAGE ECOSYSTEMS

CREATE EXPONENTIAL VALUE

AUTOMATED

AGILE
Abstract

The COVID-19 pandemic is testing the limits of the global healthcare industry, stretching across multiple functions from supply chain to care delivery. In addition to amplifying the existing shortcomings, it has also thrown in a new set of challenges. Interestingly, these disruptions have inadvertently set in motion the next-gen transformations in healthcare. We are witnessing an accelerated adoption of virtual care models, home delivery of medicines, and smart testing among many other initiatives. This paper examines the next phase in normal in healthcare, which demands business and technology innovation, rapid transformation, and community-wide adoption at a scale never seen before.
Healthcare Post-COVID-19: Drawing the map to the unknown

The pandemic has brought to the surface a number of critical challenges. Some of these include huge demand for intensive care, disruptions to supply chain, increased need for chronic care, restricted pharmacy and lab visits, a surge in demand for behavioral health services, prioritization of distribution of limited resources, and cancellation of elective procedures, ophthalmology, dental, and clinical therapy sessions.

However, with time and growing acceptance, setting the precedent for the changed environment has opened newfound avenues for healthcare delivery. There are two frameworks – (ICARE)²™ and SCoHTM – that various stakeholders across the healthcare continuum can deploy. While the (ICARE)²™ framework is designed to solve important problems such as fit-for-purpose care for different segments of the population, (SCoH)TM looks at the ways societal elements and governance will get a makeover. The two frameworks will propel healthcare systems, policies, and governance to becoming pandemic proof while serving the community.

1. The (ICARE)²™ Framework – The Next Normal

While we are nowhere close to getting past the current crisis, when we do, it is imperative for traditional payers, pharmacies, and care delivery systems to have collaboration, co-operation, and co-opetition. Driving the delivery of seamless anytime-anywhere-healthcare to large segments of the population will top the agenda. The (ICARE)²™ framework (Innovation, Intelligence, Collaborative Competition, Accelerated adoption, Rapid research, Extra-ordinary Engineering) outlines an approach of exponentially collaborative co-opetition between traditional and digital care delivery models, and digital supply chains.

The (ICARE)²™ framework revolves around:

1. Accelerated research, design, and testing of vaccine models and drugs.
2. Large-scale production to handle pandemics backed by security and privacy.
3. Use of innovative technologies to deliver appropriate regimens at the points of care.

Across all these stages, digital methods aided by data science, robotics, AI, drones, and neo-engineering methods can bring in the capabilities needed to deliver large-scale medical care. For instance, a 3D-printed Personal Protective Equipment (PPE) can theoretically be fabricated anywhere without relying on inter-continental commerce chains. For chronic patients, IoT measurements, guided by analytics, AI, and robotics can enable timely intervention, reducing the risk of complications and readmissions.
New Vistas across the Care Continuum

- Patients requiring intervention / specialist care in hospital settings
- Rapid access to clinical records leveraging Cloud, QR and Augmented reality
- Genetic data for personalized medicine

- Patients needing closer examination
- Only specific tests after the prior digital consult - faster/specific check

- Expansion into rural communities through No touch examination
- Video-consult by Primary care physician
- IOT based basic measurements - pulse, blood pressure, Glucose monitoring readings / Physician mailed tests for certain conditions (A1C, lipid)
- Depression screening Contextualized through AI
- Remote access to EHR on Cloud
- Mixed reality for deeper diagnosis for select patients
- Predict disease progression leveraging AI

- Wearable with Multi-parameter sensors connected to cloud
- Remote monitoring of vital signs using real time data on Cloud
- Physician / Nurse practitioner guided care
- PHR integration

Figure 1 Digital Care Continuum Framework
No-Touch Physicals
Enabled by the Internet of Things (IoT), secure ways to measure and relay vitals such as temperature, blood pressure, pulse rate, blood oxygen level, etc. can be explored. Additionally, auto-uploading of this recorded data to the cloud can reduce errors. At-home lab tests such as blood glucose strips and HbA1C test kits can make remote physical examinations feasible.

Smart Medication, Remote Therapy, and Virtual Behavioral Care
Smart medicine cabinets with voice reminders and automatic refill-requesting capabilities can eliminate multiple pharmacy visits. Additionally, employing video-monitored therapies and gaming consoles for remote therapies bridges the gap between patients and providers.

Senior Care and Disabled Population
Robotic-assistive devices in bathrooms and robotic CPRs may also be feasible. Additionally, seniors can be supported by one-touch grocery and prescription services through secure voice/touch-friendly applications, integrated within their refrigerators.

Digital Emergency Care
Allowing emergency care to begin right at home and in the ambulance guided by IoT, telemedicine, and robotic intervention can transform the existing emergency care model. This can further enhance the effectiveness of emergency care and increase ER throughput.

Supply Chain
In the post-COVID-19 world, supply chains can get a positive revenue boost by digitalization. While manufacturing disruptions can be solved by 3D printing, drones can be used for logistics.

Revenue Resilience
To regain revenue resilience, providers can offer guided secure video sessions and no-touch digital care. Similarly, payers can leverage reimbursement models that incentivize care providers who adopt digital tools.

Collaborative Competition in Healthcare
Telemedicine and prescription delivery during COVID-19 can inspire healthcare systems to collaborate and succeed. Co-opetition and innovative models such as no-touch health and drone-based delivery will only enhance the overall value, revenue, and outreach of healthcare organizations.

The proposed Social Connectors of Health (SCoHTM) framework is propped on the Social Determinants of Health (SDoH). It will have a profound impact on all our activities going forward, such as travel, networking conferences, and clubs, to create a secure data fabric.

There is a compelling public health business case to integrate SCoHTM into the interoperable FHIR (Fast Healthcare Interoperability) framework. This will ensure the ability to deploy real-time care delivery at airports, train stations, crowded places, and regions where animals and humans live in close vicinity. Additionally, SCoHTM provides valuable indicators that can predict and prevent epidemics and pandemics from flu to respiratory infections - such as SARS, MERS, and COVID-19 -, communicable diseases such as Ebola, Chicken Pox, and measles, and vector-borne illnesses such as Zika and West-Nile infections.

Strict privacy rules while allowing the exchange of SCoHTM parameters for the purposes of pandemic prediction, is a careful balancing act that can be achieved through technology and governance. To that end, blockchain-based implementation can be a future-proof model. Tamper-proof biometric keys for citizen audits along with digital encryption is also feasible.
Blockchain-Based Secure Pandemic Repository
A blockchain-based pandemic repository implementation of SCoH™ data can ensure trusted exchange and secure access of information for the purposes of epidemic prediction and management. The SCoH™ data over HL7 FHIR APIs can track, monitor, and activate predictive, preventive, and prescriptive pandemic responses to governments and public health systems.

Blockchain Citizen Immunity Vault with APIs
As extensive testing is not possible every time, a national vault that has a repository of immunity detected by vaccinations and antibodies of the population can come in handy. A blockchain-based implementation with API integration to healthcare systems and points of care can be activated.

Digital Healthcare Manufacturing
Digital manufacturing such as 3D printing will increasingly play a key role in the post-COVID-19 world. Local manufacturing can be conducted in libraries, hospitals, and physicians’ offices when the supply is impacted. The essential workers of the future should never have to be dependent on the supply chain and be self-resilient with a 3D-printed PPE fabricated in college workshops.

Security and Privacy
Next-gen digital care should have tamper-proof security and privacy practices. For example, tele-consultations can have tamper-proof biometric login for enhanced security and ease of use. Avenues like intrusions, hacking prevention, and drone control will have to be guarded by privacy regulations and technologies such as blockchain. It is important that privacy never becomes a deterrent to public health.
Conclusion

The post-COVID-19 world will offer a key opportunity for a digital generational leap to the healthcare system. This will drive the move towards adopting a resilient and adaptive anytime-anywhere-connected care models. The digital touchpoints can transform the caregiver-patient interaction to a caregiver-machine-patient digital interaction. The reformed healthcare norms hold the power to expand access to care and shift care to low-cost settings. Care delivery in the transformed business and social environment, guided by these two frameworks can ensure safety and security for all, in the times to come.

References:


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