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INNOVATIONS IN THE INDIAN HEALTHCARE INDUSTRY TO BRAVE THE VUCA TIMES

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ABSTRACT

Volatility, Uncertainty, Complexity, Ambiguity—in a VUCA world the moment of surprise is everywhere, making things extremely unpredictable and planning and strategizing far more challenging. The healthcare industry is witnessing seismic shifts as medicine becomes more personalised, health data becomes valuable, and data sharing becomes essential, demanding the healthcare sector to re-strategise.

This research aims to understand the various innovations and change-management techniques based on technology that have been adopted by healthcare industries in today's VUCA world while exploring the innovations needed to drive the Indian healthcare sector in the years to come. Thus, it examines and highlight the implications of the rising emphasis being placed on innovations in the healthcare industry - helping the sector to re-strategise and face the changes in today's VUCA world with greater clarity. This paper is also designed to call attention to and discuss contemporary perspectives taken by top healthcare organisations in India before and during the COVID-19 pandemic.

This research is based on secondary data, including intensive analysis of research papers, media articles and grey literature reports, along with examining the recent innovations undertaken by the top healthcare companies and hospitals in India. The findings suggest that moving away from a supply-driven healthcare system toward a patient-centred system is necessary, and therefore organisations in India have to embrace innovation, agility, and adaptability in unison to brave the VUCA times.

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KEYWORDS

Innovation, VUCA World, Technology, Indian Healthcare industry.

INTRODUCTION

To thrive in a Volatility, Uncertainty, Complexity, Ambiguity (VUCA) healthcare world (can be used to characterise this kind of environment that the world is facing today. [1]), a growth mindset is needed consisting of new regulations, new products, new paradigms and new technology. The feeling of certainty, stability, and familiarity that individuals and industries were accustomed to, has been replaced with a state of upheaval.

Since the healthcare industry is also operating in a VUCA environment, it is also increasingly facing challenges in its daily operations. These challenges include an abysmal healthcare delivery, depleting margins, lack of access to high-quality healthcare, difficulties in managing processes, growing healthcare costs, lack of accountability and the human power crisis. All these challenges act as a driving force in the healthcare sector, forcing it to re-strategise. [2]

The healthcare sector is presently adopting new strategies centred on technology-enabled treatment to increase patient experience, raise quality, and lower costs. This is enabled by leveraging Augmented Reality (AR), which uses digital visual components, music, or other sensory cues, to create an improved representation of the actual world transmitted through technology. While Virtual Reality (VR) involves the use of computer technology to create a virtual environment that can be explored in 360 degrees and may resemble or be entirely unrelated to the actual world. Artificial Intelligence (AI) uses systems or robots that mimic human intellect to carry out tasks. The integration of such technologies in the healthcare industry has led doctors and nurses to feel like they are in a room with an actual patient. [3]

Other than AI, various innovative technologies are also being utilised in Machine Learning. Coupling image processing with Machine Learning (ML) is an application of AI allowing systems to learn from past performances and make inferences about future performances without explicit programming. ML aims to create computer systems that can independently access and utilise data to acquire knowledge. Implementing ML will help drive the shift towards superior metrics and smoother processes beneficial in visual-heavy fields like dermatology, pathology, ophthalmology, and radiology. [4]

Due to the COVID-19 pandemic, home-based care for convenience and flexibility was implemented to cope with the rise in on-demand virtual urgent care and remote patient monitoring, that act as an alternative to lower acuity emergency department visits and after-hours consultations [5].

Apparently, the Innovation Matrix, which is a visualisation model that depicts different aspects of innovation to help develop a new product or service, is being adopted in the Indian healthcare industry. The innovation matrix needs to function in continuity, considering the existing business processes and updating them from time to time. [6]

Indeed, the healthcare industry has come up with changes to improve its systems and processes to serve patients better. In the following section, we will discuss some notable innovations adopted by the Indian healthcare industry both - pre and during COVID-19 to suit the evolving customer needs.

HEALTHCARE INNOVATIONS IN INDIA

The Indian healthcare industry comprises hospitals, pathology laboratories, the medical devices industry, telemedicine and medical tourism. India's healthcare industry has been growing at an average annual growth rate of 22% since 2016. [7] It is expected to reach $US372 billion in 2022, making healthcare one of the largest sectors of the Indian economy. It is the VUCA environment that helps focus on the characteristics of the transition period and the "new normal". [8] The onset of the COVID-19 pandemic and the ever-evolving and uncertain world has led to profound structural and sustained innovations. Although the adoption of home healthcare solutions in India is at a relatively nascent stage, it has tremendous potential for growth. The technology life cycle is motivated by the premise that evolutionary technological changes underlie the development of many new industries. Due to advancements in technology like artificial intelligence, robotics, and blockchain, healthcare companies get a competitive advantage in today's VUCA world. [9]

To study innovations in the Indian healthcare sector, the researchers analysed news articles, research papers and case studies on innovations in the Indian healthcare sector. However, there wasn't adequate literature regarding an exhaustive list of innovations adopted by different Indian healthcare companies. Hence this study is a compilation of the most notable innovations adopted. This study is confined to the top 10 Indian healthcare companies as they have been pioneers in adopting new technology while having the most notable innovative changes in recent times, along with heavily investing in their research and development teams. The Indian healthcare organisations under focus in the study are Apollo Hospitals, Fortis Hospitals, Dr Lal Path Labs, Narayana Hrudayalaya Ltd, Government Medical College in Kalamassery, Asian heart hospitals, Wockhardt, Aster DM Healthcare, Sahyadri Hospitals and Reliance Foundation hospitals. Healthcare is no longer focused on here and now but on the here, now and everywhere. Key aspects include:

1. Advancements in Robotics and 3D printing- At Apollo Speciality Hospital in Chennai, the most advanced CyberKnife Robotic Radio Surgery System was installed. [10] It's the world's first and only robotic radiosurgery device, designed to treat tumours with sub-millimetre precision anywhere in the body. Aster DM has brought breakthroughs, and advancements in healthcare, from Hospital Information Systems reshaping the way healthcare, is given to the Da Vinci Robotic Surgical System, allowing minimally invasive surgery with 3D vision. Aster DM has also taken centre stage in the healthcare industry to develop innovative solutions to the COVID-19 dilemma. [11] The DaVinci Si Surgical System with Simulator at Asian Heart Hospital is Mumbai's first Robotic Surgery option. With the newest technology and patient treatment and care advances, Asian Heart Hospitals is unquestionably leading the way in India's healthcare with the latest technologies and innovations in patient treatment and care. The DaVinci Si Surgical System with Simulator, which has been operating in Asian hospitals for months, is the world's most sophisticated Robotic Surgery tool. It is the first of its kind in Mumbai, Western India, and Asia-Pacific. [12] Facing an increased patient load and a simultaneous need to distance from patients physically, The Government Medical College in Kalamassery, Ernakulum turned to robots for assistance. Asimov's three-wheeled robot named 'KarmiBot' was deployed to sanitise premises using its ultraviolet radiation. It is used in hospitals' isolation wards to carry food and medicines for Covid patients. [13] Apollo Hospitals have also developed the world's first hospital-based 3D printing facility. 3D printing helps in saving and improving lives in unthinkable ways. 3D-printing labs manufacture customised, safer, and higher-performing products at a considerably lower cost. 3D printing helps clinicians better understand their patients and improve their comfort level with patients by providing 3D products designed specifically for their anatomy. [14] Program for Appropriate Technology in Health (PATH) is working closely with the Indian government to support all the above digitization efforts to develop feasible, long-term, patient-centric initiatives. [15]

2. Telehealth and COVID-19 support innovations - To deal with increased patient volumes, Apollo TeleHealth established Tele-Ophthalmology centres in 115 Community Health Centres around the state to provide state-of-the-art eye screening services. Apollo TeleHealth also supports India's Pan African e-Network Project and offers millions of patients worldwide the virtual consult service 'Ask Apollo'. [16] Aster DM Healthcare has also opened a COVID-19 Support Centre that is open 24 hours a day, seven days a week, for people throughout India. Aster DM made it easier for individuals to register and book appointments with healthcare experts on their website using social media and digital channels. Aster DM began investing in technologies like telemedicine, virtual healthcare consultations, digital symptom checks, and chatbots educated with advanced modelling. To complete the patient experience, it also evolved its telemedicine system with easy-to-use sensors at the patient end, an AI-based clinical decision support system, voice-to-text prescriptions, and a follow-up PHR service with diagnostics and medicines. Thus, AI is a big deal at Aster DM, from self-help/triage solutions to medical-grade symptom checkers and chatbots. [17] When the Covid outbreak happened in India, Fortis Healthcare was among the first hospital chains to introduce telemedicine services across 23 centres. Virtual connect and e-consultation helped clinicians stay in touch with patients and solve their problems effectively. [18] According to Vision 2020, PATH in India is exploring new methods to use technological and digital advances in India's primary healthcare facilities, both in urban and rural areas. This entails expanding the usage of telemedicine, creating cutting-edge techniques that can improve the quality of healthcare services, ease the workload of healthcare personnel, and ensure a more patient-centric approach helping patients receive accessible and quality care.

3. Internet Of Things, Analytics and Integrated Hospital Information Systems infrastructure -Wockhardt Hospitals created and implemented the Internet of things (IoT), which is easily connected with their primary Hospital Information System application. Due to this, Wockhardt could retain existing patients while engaging new patients through its Teleconsultation and Home Care application platforms. [19] Wockhardt hospitals' digitization leapfrogged to the point where most patient interactions with doctors and payments were handled online, enhancing convenience and assisting the hospitals in generating much-needed revenue during difficult times. [20] Dr Lal Path Labs created an e-MRF (Electronic Material Requisition Form) that instantly sends orders to the ERP and begins the packing and shipping process. Dr Lal Path Labs use the

Laboratory Information Management System (LIMS) to supplement its operations. It keeps track of specimens and workflows, aggregates data, and ensures that lab activities adhere to different standards and allows for real-time updates. The manual system lacked this intelligence for validating data, resulting in a lengthy procedure which is now done away with. [21] The NH-Atma software at Narayana Hrudayalaya will be the cornerstone for developing their digital infrastructure. NH-Atma is cloud-based, completely scalable, and compatible with the hospital's existing infrastructure. It will be able to spot issue areas before they become severe occurrences due to the advancements in AI and predictive analytics. [22] Narayana Hrudayalaya has also replicated the manual extracting data to the Structured query language (SQL), Server and Power BI. The Power BI dashboard helps provide real-time data of more than 3,000 doctors across 30 comparable parameters. One of their ongoing projects includes using AI to decipher X-Rays to point out any irregularities. These implementations have brought about efficiencies, cost savings, and better patient care. [23] Furthermore, their own data analytics software, NH-Medha, has shown to be an effective tool in assisting hospital managers in reducing expenses and physicians in making better clinical decisions. They created e-ICU cards to manage better an ICU patient's condition, which has significantly influenced care management for their ICU patients. Their tech-enabled e-ICU has resulted in better clinical results, shorter patient stays, and lower drug usage. [24] KareXpert is a Jio-backed SaaS-based digital healthcare platform that helps enhance patient care, save operational expenses, and boost income. [25] The KareXpert platform, a comprehensive suite of AI-enabled, cloud-native solutions for hospitals with mobile/web apps for all stakeholders and patients, has been chosen by Reliance Foundation hospitals. Advanced Health Management Information System (HIMS), Electronic Medical Record (EMR), pharmacy, linked ambulance, e-claim & insurance, inventory & SCM, queue management, Management Information System (MIS) reporting, Business Intelligence, and hospital branded mobile apps are among its integrated applications and vast solutions. [26] KareXpert aims for increased ease of access and sharing of information across providers, payers, and patients with its AI-ready healthcare data-house. [27] Sustainable integration of the health system continues to be the key goal of the healthcare driven non-governmental organization-PATH's efforts to incorporate technology into healthcare, which contribute to the development of a system that is firmly focused on the patient's needs.

4. Mobile applications, chatbots and accessible critical care services - The Relax Mommy programme at Sahyadri Hospital provides enrolled patients with the option of 4-5 home visits. Under this innovative programme, a certified expert nurse visits the patient's house with a point-of-care pregnancy solution. On the other hand, the expecting mother will receive a personalised app developed in collaboration with CareNX Innovations, an Indian Institute of Technology (IIT) Bombay startup. With real-time communication of test data to clinicians for fast decision-making, the portable diagnostic kit with this app will conduct 'doorstep' screening tests, identify difficulties early in pregnancy, and treat high-risk pregnancies. The Relax Mommy programme offers healthcare practitioners a one-of-a-kind chance to give pregnant women care, support, and information. This would not only allow for more quality time between doctors and patients, but it will also allow for a greater focus on high-risk management and general well-being. Sahyadri hospitals aim to provide specialised in-home, family-centred care in the future. [28] Dr Lal Path Labs gave their 800 on-the-ground phlebotomists a mobile app that was connected entirely with their customer-facing app and allowed patients to schedule home testing appointments. They established a chatbot on their website to make it easier for patients to acquire information about their results. The bot answered all report-related questions. This has allowed them to handle a large number of calls while still ensuring seamless operations. The eACCESS programme was developed by Apollo Hospitals to make critical care specialists available 24 hours a day, seven days a week to deliver high-quality treatment to ICU patients. Clinicians can connect to and monitor several ICUs from a central location using cutting-edge hardware and software. Hospitals with trouble managing ICU patients will benefit from this effort. [29] In 2022, with the help of the Ayushman Bharat Digital Mission (launched by the Prime Minister of India in 2021, to connect the digital health solutions of hospitals across the country). This is helping healthcare companies lay the groundwork for the nation's digital health ecosystem, helping the country move rapidly towards a more patient-centric healthcare system.

FINDINGS AND ANALYSIS

The healthcare sector in India is ever evolving. AI, AR, VR, ML, big data and robotics have paved the way for many innovations in the industry, with it being used for patient diagnosis, treatment and medical research. The interview with Mr. Madhur Verma- former CEO of Sahyadri hospitals Ltd. highlighted that, in order to cope with the increasing pressures posed by the COVID-19 pandemic, every hospital became very good at bed management, ensuring maximum bed utilisation and reducing the overall turnaround time of beds from 3-5 hours to less than an hour. Technology also played a significant role, with all hospitals adapting different innovations and technology to serve patients better. Patients switched to digital online payments rather than paying by cash, thus improving the overall efficiency of the payment systems. Furthermore, telehealth and telemedicine play a considerable role today. [30] Healthcare organisations quickly transformed their systems to launch teleconsultation services and offer doctor consultations via WhatsApp and video call.

The COVID-19 pandemic has accelerated the growth of telehealth, along with self-service and remote monitoring tools used by patients and healthcare professionals, to improve healthcare access, outcomes, and affordability. Telehealth and remote monitoring helped provide patients with round-the-clock medical services. Furthermore, mobile apps and chatbots helped healthcare organisations establish an excellent virtual connection with patients during the COVID-19 pandemic.

One common observation in all the successful healthcare organizations reported in this study was that they were change-seeking and disruptive- each adopting new technologies and innovations while leveraging change management effectively, as it is the need of the hour. Hospital information systems were redesigned into a completely electronic mode, making them more accessible and affordable. Advancements in 3D printing and robotics helped surgeons pre-planning operations, allowing for minimally invasive surgeries. A shift was observed from a supply-driven healthcare system toward a patient-centred system. New opportunities for healthcare players in the future will include developing tools to promote emergency medical care and the improvement of health infrastructure with technology-based optimization. [30]

While these new opportunities stand at the forefront of healthcare, it is necessary to dive deeper into the innovation matrix, pre-empting changes of the future while keeping in mind the need of the hour. This will allow for the effective vetting of ideas leading to educated decisions about how to proceed. This matrix assessment will help businesses look at innovations through the consumer lens and imbibe a continuous circularity into existing business processes. Thus, continuous innovations and change management techniques based on technology proactively minimize vulnerabilities and increase opportunities to take advantage of the ever-evolving VUCA world. Moreover, in the long run, sustaining and incorporating innovations will prevent healthcare organisations from going back to their base state of being-post a crisis and prepare the Indian healthcare industry to be agile and versatile to deal with all the sudden changes that come its way.

CONCLUSION

Indeed, the discussions around technology and innovations are highly relevant to understanding how the healthcare sector prioritises and redesigns its fundamental business practices in the VUCA world. The relationship between innovation and uncertain times in the Indian healthcare industry is theoretically and empirically robust. The best way for the Indian healthcare industry to cope with VUCA is to comprehend and embrace the change. Therefore, new challenges necessitate new and distinct technologies tailored to consumers' needs. Vision 2020 of the Indian healthcare industry along with the Ayushman Bharat Digital Mission that helps build the foundation required to enable the nation's integrated digital health system by focusing on the growing role of technology and innovations, help drive towards a patient-centred system.

Technology must be leveraged to transform VUCA issues into opportunities to play a transformative role in innovations. At the same time, healthcare expenditures must be increased, new healthcare management practices must be devised, and data security must be prioritised in the healthcare sector. This research has also helped highlight the path to be taken by the healthcare sector, which involves initially coming up with robust plans and mandates to deal with uncertainty, followed by leveraging technological advancements and integrating project partners into the system. Finally, organizations need

strong data-driven monitoring approaches to implement technologies and innovations smoothly.

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