

TRANSFORMING HOSPITAL OPERATIONS: IMPACT OF DISRUPTIVE TECHNOLOGIES ON PATIENT RECORD MANAGEMENT AND ACCELERATING HOSPITAL CARE

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ABSTRACT

Improved patient care, easier access to healthcare, and lower healthcare expenses are all possible outcomes of disruptive technology that hospitals may use to better maintain patient records. Technologies that are causing a paradigm shift in healthcare include: Bracelets with embedded sensors—These wristbands have the potential to store sensitive patient data, including names, dates of birth, blood types, and allergies. Along with monitoring patients, they may also follow caregivers as they attend to their needs. Tags that use radio frequency identification (RFID) technology are commonly attached to lanyards and wristbands worn by healthcare workers. In addition to accessing medical information, they let doctors monitor their patients' whereabouts and condition in real time. Among the many potential applications of artificial intelligence (AI) in the medical field are: As a second opinion on diagnoses, AI can evaluate massive volumes of picture data for image reading. Analytics: Preparing for medical crises is made easier with analytics tools powered by AI. Providers of chatbot services: These digital assistants can field questions from patients via social media and websites. You may also use them to analyse data and keep track of patient health information. The term "patient portal" refers to a set of protected web applications that facilitate two-way communication between patients and their healthcare providers. Two forms of artificial reality systems augmented and virtual, utilizing augmented and virtual reality technology, patients may better understand their health data and keep tabs on their condition. The research was conducted in hospitals in Bangalore location in India and total of 225 samples are collected from the age group of 18 years to 60 years of age. The variables are disruptive technology, patience health reports, patience user friendly, patience health monitoring and dependent variables patience satisfaction.

INTRODUCTION

New opportunities for enhancing patient safety have arisen because of technology developments in the previous several decades. Clinical workflows might become more standardized and efficient with the use of technology to digitize healthcare operations, which could lead to a decrease in costs and mistakes in all healthcare settings [1]. The load on doctors can rise, too, if technology treatments aren't well-designed or executed. Clinicians who are already overworked may not respond to alerts because they are too tired to pay attention [2].

Computer programs that use AI and ML- The field of artificial intelligence (AI) and machine learning has been seeing explosive growth in healthcare technology in the past several years. As physicians input fresh data, algorithms powered by AI and ML can

sift through mountains of data, both historical and real-time, to make predictions about outcomes and treatment recommendations [3]. The adoption of AI remains sluggish, despite the widespread interest in the potential benefits of the technology. The inconsistent system quality is one of the obstacles to implementation. For instance, it was discovered not long ago that a widely used model for sepsis diagnosis had extremely low sensitivity. Performance can be affected by algorithm drift when fresh data is assimilated; this is especially true during and after major disruptions such as the COVID-19 pandemic [4]. Additionally, these algorithms may be "black box" algorithms, meaning they cannot be modified by the system due to vendor restrictions on accessing the code. Clinicians may be sceptical about AI treatments due to their inconsistent quality and lack of

transparency. An essay published in 2022 attempted to address these issues by outlining the business case for AI deployment in health systems and providing best practices [5]. Instead of viewing AI to a goal, best practices involve utilizing it to tackle a pressing issue inside the healthcare system. Furthermore, it is crucial to test the AI with the patients and data from the health system to show how well it works in that environment, verify that the AI can provide a return on investment, and make sure it's easy to apply. An additional white paper detailed an ergonomics and human-factors framework for AI development, with the goal of bettering its integration into healthcare workflows, systems, and teams. standards for artificial intelligence have been issued by both the federal government and international organizations. The National Artificial Intelligence Initiative's standards aim to increase trustworthiness, while the World Health Organization's rules ensure ethical governance [6].

Medical technology, which includes both low- and high-risk medical devices, includes everything from tongue depressors and surgical gloves to medical thermometers, insulin pumps, pacemakers, and in vitro diagnostics. Every day, patients all over the Asia Pacific region rely on these technologies to diagnose, treat, and improve their health. Healthcare providers can identify and treat patients more quickly and accurately with the use of medical gadgets, which ultimately improve patients' quality of life by allowing them to overcome illness. There is a good chance that people are constantly exposed to medical devices without even realizing it. This is because there are numerous regulatory bodies around the world that control the usage and classification of these devices, making it difficult to establish a universal definition of what constitutes a medical device [7].

Mobile Applications design for patients to interact with Doctors in India:

List of apps used for booking appointments with doctors in India are Doctor on Demand, Lybrate, Teladoc Health- teleheal, HealthPix EMR, DocPluse, PlushCare, Practo, MFiner, Zocdoc, MDLive, healthTap- Online Doctors, Doctolib, Amwell, Talkspace, Core Doctor Appointment, Sminq, MyChart, MyHealth are apps used by Indian. Most of the apps are effective usage in the metro cities in India and Patient use to book the appointment of the doctor and the app also help to store the patient health records. Through the app patient can Appointment scheduling, cancellation, and booking, Online consultation, payment, and medications, Alerts, reminders, and alerts, Facility for video calls and Emergency assistance [8].

Technology and humans' together for better healthcare

AI- The healthcare industry is about to undergo a complete and utter transformation due to the advent of artificial intelligence (AI). By analysing patient data, AI systems may predict which patients will benefit most from a treatment, create new medications more rapidly than human doctors, and distinguish between benign and malignant tissues. Atomise finds treatments in a database of molecule structures by using supercomputers. A virtual search for current, safe drugs that may be reengineered to treat the Ebola virus was devised by the startup, which began in 2015. The company's AI algorithm projected two medications that may lessen Ebola's infectiousness, and those predictions came true. DeerMind, an AI built by Google, has more recently begun to analyze breast cancer. On pre-cleared datasets, the novel system outperformed human radiologists in identifying breast cancer by a margin of 11.5%. There are a plethora of startups utilizing AI to revolutionize healthcare, and these two are only two of them. These businesses are living proof of the potential future of artificial intelligence (AI) in healthcare, with their work transforming medical imaging, developing novel medications, and mining medical information [3].

Virtual worlds- Both patients and doctors are finding that virtual reality (VR) improves their quality of life. Imagine being a patient in a hospital and seeing a future when you may go home or even to Spain, or even witness surgeries as if you were the surgeon! Virtual reality (VR) has several potential applications, including the education of young surgeons and the practice of actual surgical procedures by experienced doctors. Software developers such as Immersive Touch and Osso VR have shown encouraging results thus far. Surgeons who received virtual reality training outperformed their peers who had more conventional training by

a margin of 230%, according to recent research. Improvements in pain treatment are just one area where patients are reaping the benefits of technological progress. Women are being given virtual reality headsets to help them relax during labour by allowing them to imagine a peaceful scene. Patients suffering from neurological, post-operative, cardiac, gastrointestinal, and other types of pain have reported less discomfort when exposed to virtual reality stimuli. Anxiety, discomfort, and satisfaction with healthcare were all positively impacted by surgery, according to 2019 pilot research [9].

Virtual Reality- When compared to virtual reality (VR), augmented reality (AR) ensures that users maintain contact with reality while simultaneously delivering information to their eyes as quickly as possible. These unique characteristics, experienced by both patients and healthcare practitioners, are propelling augmented reality to the forefront of healthcare's future. As a result, current surgeons may be able to hone their skills, and medical students may be better prepared for real-life procedures. Students learn about the human body with the help of the Holonomy app for the Microsoft HoloLens. As an alternative to studying on real people, medical students now have access to computer models of the human body that are both realistic and comprehensive [10]. Another exciting startup, Magic Leap, is working on a mixed reality headset that's a little bit different. When it comes to brain health, Magic Leap has partnered with XRHealth to build the therapeutic platform SyncThink, and a German tech startup called Brainlab will be bringing its innovation to healthcare. Although no commercial goods have been introduced to the market just yet, these collaborations will certainly be seen throughout the healthcare industry in the next years [11].

Sensors, wearables, and health trackers- Wearables, health trackers, and sensors are becoming more important tools for patients and individuals to take charge of their health, which is directly related to the future of healthcare and medicine [12]. These are first-rate tools that improve our health literacy and empower us to make healthier choices on an individual basis. The Fitbit Ionic keeps tabs on your sleep and exercise, the Polar H10 may help you hone your fitness program, and the Muse headband can guide you through guided meditation. Countless health monitors and applications are available nowadays. You may choose a gadget to suit your needs, whether you're trying to improve your weight management, cognitive abilities, stress levels, or just want to feel healthier and more energized. The patients themselves become the focal focus of care with these technological marvels. Patients may monitor their health from the comfort of their own home and remotely communicate the findings to their doctor. The gadgets provide people more agency over their health and decision-making [13].

Triage device for medics- It is the holy grail of every medical practitioner to own a singular, unparalleled tool. It needs to be capable of analysing and diagnosing any illness. These types of gadgets are already a reality because to the exponential rise of healthcare IT. A small device that can assess vital signs including heart rate, temperature, blood pressure, electrocardiogram (ECG), and oxygen saturation is the palm-sized Viatom CheckMe Pro. Competitors are also in the process of creating devices with comparable features to the MedWand, which includes a camera for telemedicine and all the measuring capabilities. The BioSticker, developed by Bio IntelliSense, is another option; it is FDA-approved and, despite its little size, can monitor a wide range of vital signs, including respiration rate, skin temperature, cardiovascular health, sleep quality, gait, and more. Even if these items aren't quite ready for the sci-fi tricorder just yet, we'll be there in no time. Mobile devices equipped with powerful microscopes will soon be able to swab skin lesions for analysis and examine the resulting photographs. It may be able to detect certain proteins and antibodies or detect DNA anomalies with the use of sensors. For example, an electronic nose, an ultrasonic probe, or anything else that might be connected to a smartphone to make it more useful [14].

Transforming the pharmaceutical industry- Developing new pharmaceuticals takes a long time and costs a lot of money. Still, innovative approaches utilizing tools like AI are enhancing the pharmaceutical research and development process. The pharmaceutical industry will be significantly impacted in the next

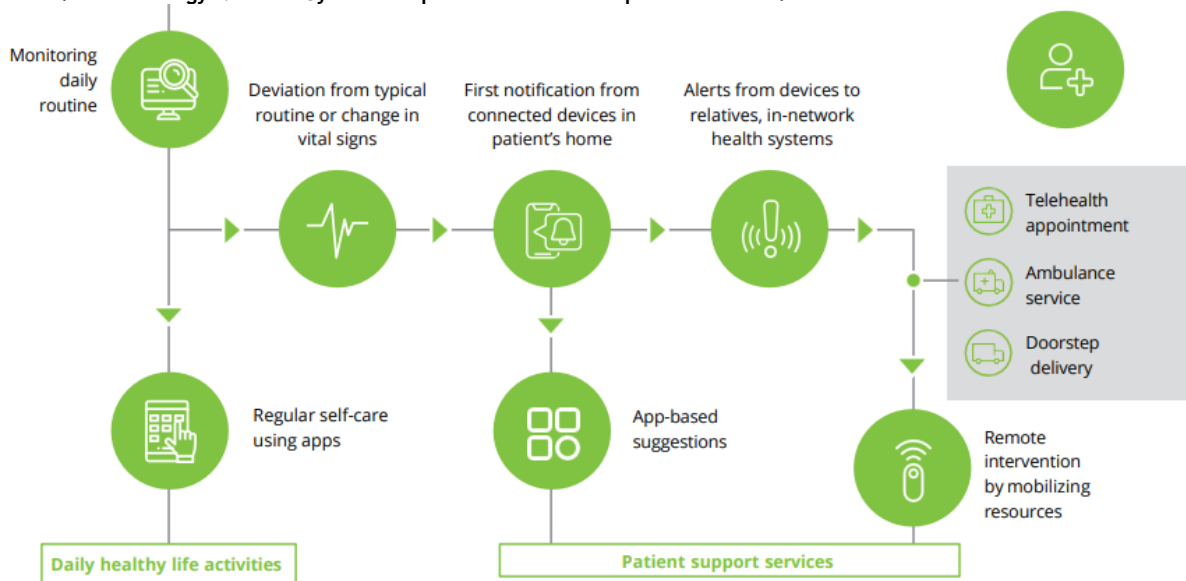
years by these innovative methods and technology. Artificial intelligence is enabling businesses like Turbine, Recursion Pharmaceuticals, and Deep Genomics to rapidly and cheaply develop novel therapeutic solutions and medication candidates. In silico drug trials are another emerging technique in medicine. Regulatory review and development of healthcare items, technologies, and therapies make use of these customized computer simulations. Since our present biology and technological knowledge precludes the use of simulated clinical trials, this business is already using its organs-on-a-chip development to tear down boundaries. The Virtual Physiological Human (VPH) Institute has built virtual models using its technology, HumMod, and is utilizing them to investigate cardiovascular illness and osteoporosis [6].

The Emergence of Nanotechnology- Nanoparticles and nanodevices may soon be used as precision medication delivery systems, miniature surgeons, or instruments for cancer therapy. In 2014, a group of researchers from Germany's Max Planck Institute created tiny microbots in the shape of scallops that could literally swim through tissues and fluids. A patient-friendly and non-invasive method is being employed for colon inspections with smart tablets like PillCam. In late 2018, scientists at MIT created a pill-like electronic device that can be operated remotely. It can either release medications when instructed to do so by a smartphone or convey analytical results. With the introduction of smart patches, nanotechnology is quickly rising to the forefront of consumer electronics. At CES 2020, the French firm Grapheal displayed their smart patch. Wounds may be continuously monitored, and the graphene core of the device can speed up the healing process [15]. Nanotechnology in healthcare will manifest in many more tangible forms as technology advances. One day, remote-controlled capsules may potentially make nano-surgery a reality, and the next PillCam could even be able to collect biopsy samples.

Mechatronics- One of the most fascinating and rapidly expanding areas of medicine is robotics. Surgical robots, pharmabotics, and disinfection robots are just a few examples of the many types of robots that are now under development. The year 2019 was a banner one for exoskeletons. A tetraplegic man learned to control an exoskeleton with just his brain signals after the first exoskeleton-assisted surgery. From helping the elderly to assisting those with spinal cord injuries, these robots have a wide range of potential uses. Using robots as companions can also aid with loneliness; they are also utilized in healthcare to address mental health concerns and chronically unwell youngsters. Jibo, Pepper, Paro, and Buddy are some of the robots that now exist. Some of them include built-in microphones, cameras, and touch sensors that their owners may use to command them [16].

Additive manufacturing- The advent of 3D printing has opened a whole new universe of possibilities in the medical field. The availability of printing for blood arteries, prosthetic limbs, bio tissues, and medicines has increased the number of items on the list, and this trend is certain to continue. The Rensselaer Polytechnic Institute in Troy, New York, developed a 3D-printing technique in November 2019 that allows for the creation of live skin and blood arteries. Skin transplant recipients and burn sufferers really benefited from this breakthrough. Non-governmental organizations (NGOs) are utilizing 3D printing to provide prostheses for refugees in areas affected by violence. One example is Refugee Open Ware, which helps people in need. These evolving technologies are also helping the pharmaceutical sector. Since 2015, 3D-printed pharmaceuticals have been available to the public, having been authorized by the FDA. Scientists are now working on "polypills" that can be 3D printed. To help patients stay on track with their treatment regimen, they will feature many layers of medication [17].

1. Technology Network System to operation or monitor patient records:



Source: Deloitte Report

According to the Deloitte technology report, the network system starts with the monitoring the daily routine activities of the patient recorded in the mobile applications through regular self-care using the apps then can monitor the deviation from typical routine or change in vital signs then first notification from the connected devices in patient's home then app based suggestions will record using the patient support services then can alerts from device to relatives and in-network health system then helps to telehealth appointments, ambulance service and doorstep delivery through the remote intervention by mobilizing resources.

2. Research Objectives:

- The goal of this study is to examine how innovative technologies like Blockchain, Internet of Things (IoT),

and Artificial Intelligence (AI) affect the way hospitals keep track of patients' medical records.

- The goal of this study is to assess how new technology may improve healthcare delivery, decision-making, and patient treatment times via opening access to information in real-time.
- 3. Scope of the Study:**
- The study delves into the ways in which AI, Blockchain, and the IoT can revolutionize healthcare by integrating them into hospital systems. This integration could lead to better patient record tracking, easier data accessibility, and overall operational efficiency.
- Implications for Medical Treatment and Patient results:** The goal is to assess the ways in which the availability

of up-to-date patient records in real-time enhances clinical decision-making, shortens treatment times, and boosts patient care and results.

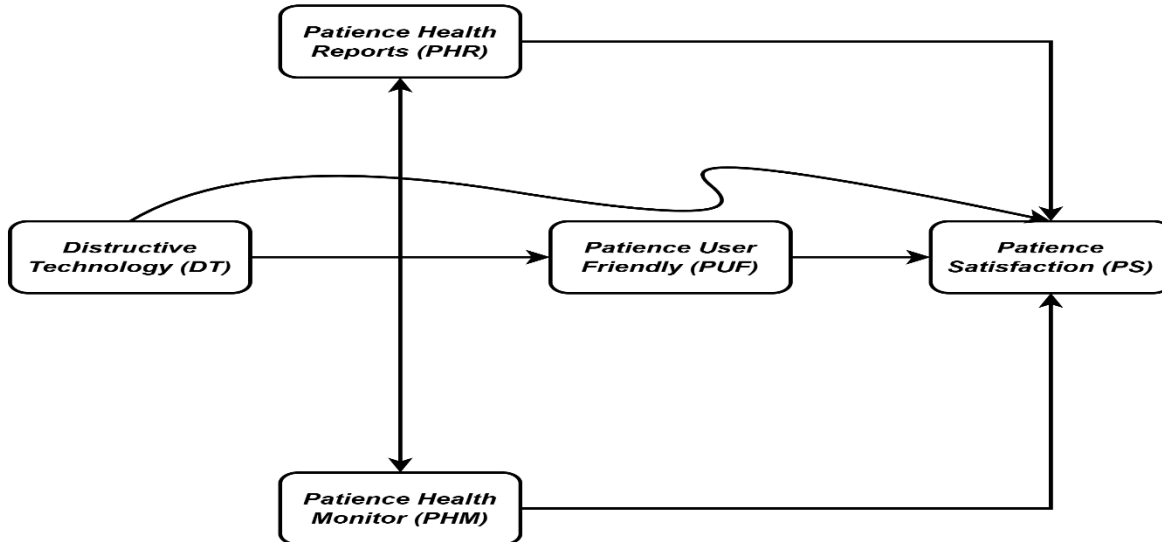
- Cost, data privacy, and infrastructure preparedness are some of the obstacles that the report lists as potential obstacles to deploying disruptive technologies. On the other hand, the study identifies potential chances for future developments and scalability in healthcare systems.

4. Research Methodology:

In this investigation, we will be using quantitative methods. To gain a better understanding of the uptake and effect of disruptive technologies, doctors, nurses, and hospital administrators will be

5. Data Analysis:

The research framework:



The variables are independent variable (IV) is Destructive Technology (DT), Mediating variables are Patience Health Monitor (PHM), Patience User Friendly (PUF), Patience Health Report (PHR) and dependent variable is Patience Satisfaction (PS) are used to test relationship between them. The testing of the variable using SMARTPLS: The total 22 number of questions are frame with five

variables i.e., independent variable (destructive technology), Mediating variable are Patience health reports, patience user friendly, patience health monitor and dependent variable was patience satisfaction. The reliability between all the variables is 0.89 i.e., above 0.70 and the reliability variable was significant and acceptable to test the relationship between the variables.

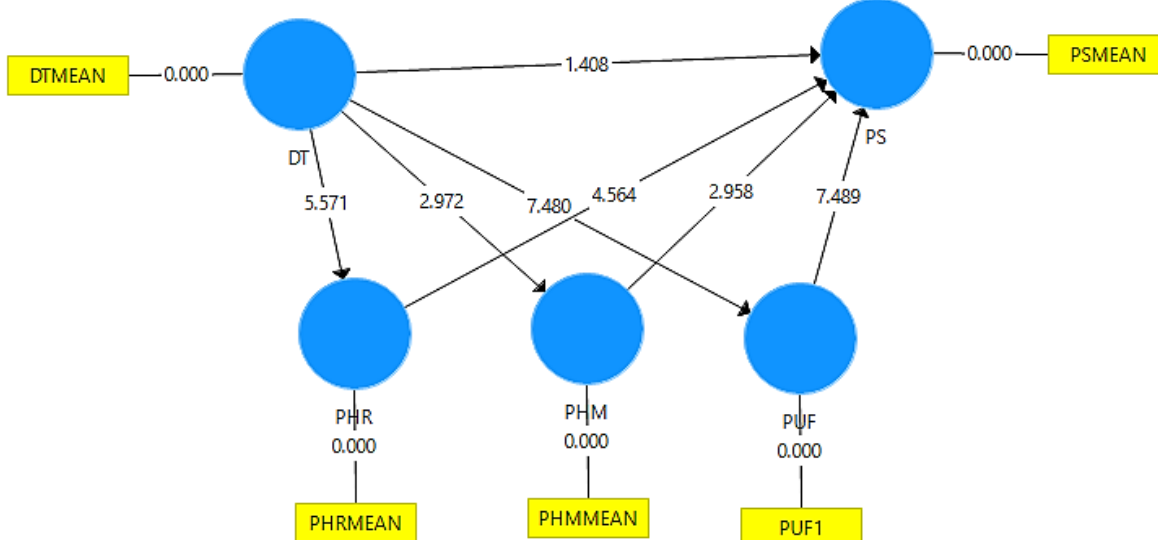


Table 1: Testing of the relationship between the Destructive technology with other variables:

Relationship	Original Sample (O)	Mean (M)	Standard Deviation	T- value	P Values	Result
DT -> PHM	0.217	0.212	0.073	2.972	0.003	Significant
DT -> PHR	0.283	0.286	0.051	5.571	0.000	Significant
DT -> PS	0.093	0.099	0.066	1.408	0.160	Not Significant

DT -> PUF	0.396	0.396	0.053	7.480	0.000	Significant
PHM -> PS	0.123	0.122	0.041	2.958	0.003	Significant
PHR -> PS	0.192	0.189	0.042	4.564	0.000	Significant
PUF -> PS	0.463	0.457	0.062	7.489	0.000	Significant

CONCLUSION

Hospital patient record monitoring systems have been transformed by the incorporation of disruptive technologies like Blockchain, Artificial Intelligence (AI), and the Internet of Things (IoT), leading to more efficient and quicker medical care. Healthcare has long struggled with issues including inaccurate patient data, delays due to manual record-keeping, and limited access to critical information; these technologies aim to solve these problems. AI allows healthcare facilities to instantly sift through mountains of patient data, spot trends, and aid doctors in making data-driven choices. Blockchain technology makes guarantee that patient records are secure, transparent, and immutable, which means that there will be fewer data breaches and more compliance with privacy standards. In a similar vein, the Internet of Things (IoT) allows for seamless data exchange between devices and systems, which improves continuity of care, and real-time patient monitoring. Reduced wait times, optimized treatment plans, and better patient outcomes are all possible thanks to healthcare providers' expedited access to accurate patient information. Improved operational efficiency, less paperwork, and simplified processes all help hospitals so that doctors and nurses can devote more time to caring for patients. But there are still obstacles, such as the high expense of implementation, the requirement for specialized hardware and software, and worries about the safety and privacy of sensitive information. The long-term advantages of embracing disruptive technology surpass the difficulties, notwithstanding these obstacles. To sum up, hospitals can revamp patient record monitoring, cut down on treatment delays, and provide high-quality care thanks to disruptive technologies, which provide a revolutionary potential for healthcare systems. A more effective healthcare system that prioritizes patients can be achieved if hospitals consider these innovations while also tackling current problems. Innovative healthcare, better clinical results, and a resilient healthcare ecosystem will be possible via the deliberate integration of various technologies.

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