

Artificial Intelligence in Healthcare Industries

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Meaning

Artificial intelligence (AI) has transformed industries around the world, and has the potential to radically alter the field of healthcare. Imagine being able to analyse data on patient visits to the clinic, medications prescribed, lab tests, and procedures performed, as well as data outside the health system -- such as social media, purchases made using credit cards, census records, Internet search activity logs that contain valuable health information, and you'll get a sense of how AI could transform patient care and diagnoses.

AI in healthcare refers to the use of machine learning, natural language processing, deep learning and other AI technologies to enhance the experiences of both healthcare professionals and patients. The data-processing and predictive capabilities of AI enable health professionals to better manage their resources and take a more proactive approach to various aspects of healthcare.

With these technologies, doctors can then make quicker and more accurate diagnoses, health administrators can locate electronic health records faster and patients can receive more timely and personalized treatments.

Importance of Artificial Intelligence in Health Care

- It Enables predictive, personalized, and preventive care
- It Reduces human error and improves efficiency
- It Enhances patient experience and access to care
- It Strengthens data-driven decision-making
- It Supports real-time monitoring and remote consultation

Key Areas for Healthcare Digital Transformation Implementation

Below are a few critical areas where healthcare organizations should prioritize their digital health implementation roadmap.

Remote Patient Monitoring (RPM)

IoT-enabled wearables and sensors continuously capture vital signs and patient metrics. RPM platforms deliver real-time alerts to care teams, enabling early intervention and reducing hospital readmissions.

Electronic Health Records (EHR)

Modern EHR systems centralize patient data, ensuring accuracy, interoperability, and secure sharing across care settings. This fosters coordinated treatment plans and minimizes medical errors.

Clinical Decision Support Systems (CDSS)

AI-driven CDSS analyzes patient history, lab results, and clinical guidelines to recommend evidence-based diagnostics and treatment options, boosting clinician confidence and care quality.

Mobile Health Applications (mHealth)

Patient-facing apps empower individuals to track wellness metrics, receive medication reminders, and engage in teletherapy or digital coaching, improving adherence and self-management.

AI & Machine Learning for Diagnostics

Deep-learning algorithms with AI assistance for radiologists and pathologists by detecting anomalies in medical images, predicting disease progression, and personalizing treatment protocols.

Advanced Health Reports

Advanced analytics dashboards aggregate clinical, financial, and operational data, turning raw information into actionable insights that drive continuous process improvement.

Digital Pharmacy Management

Automated inventory tracking, e-prescribing, and dose-verification systems reduce dispensing errors and support medication-adherence programs.

Blockchain for Health records

Immutable, distributed-ledger technology secures medical records, streamlines consent management, and ensures compliance with stringent privacy regulations.

In-Hospital Digital Patient Monitoring

Bedside monitors, smart beds, and wearable telemetry feed continuous vital-sign data to centralized nurse stations, improving response times and patient safety.

Online Appointment Scheduling

Automated scheduling portals streamline booking workflows, send automated reminders, and dynamically adjust for provider availability, significantly reducing no-show rates.

Technological innovations are rapidly digitizing healthcare as digital transformation becomes increasingly embedded in the healthcare ecosystem. But here are the key trends shaping the Future of healthcare industry.

Diagnostics and imaging:

Artificial intelligence algorithms can analyse medical images to detect diseases like cancer and precursors for other conditions, often faster and more accurately than human analyses.

Challenges/Shortcomings in Traditional HealthCare Sector

1. **Low Doctor-Patient Ratio:** Disparity between the number of doctors available and the population needing medical attention is a significant challenge.
2. **Absence of Medical Records:** The lack of centralized medical records or integrated databases makes it difficult for healthcare providers to access patients' complete medical history, leading to inefficiencies in diagnosis and treatment.
3. **Urban-Rural Divide:** 65% rural population, but 80% doctors in urban areas, leading to limited access to immediate care.
4. **Limited Access to Immediate Care:** Many patients, especially those in remote or underserved areas, are deprived of immediate care due to geographical barriers, further widening the gap in healthcare accessibility.
5. **High Healthcare Costs:** Affordability remains a significant barrier to accessing quality healthcare services.
6. **Lack of**

Telemedicine and Remote Care: Limited availability of telemedicine services and remote healthcare options restricts access for individuals in remote or underserved areas.

Opportunities of Digitization in Healthcare

1. Automation The global AI market reached a value of \$119.78 billion in 2022 and is expected to expand at a CAGR of 38% from 2022 to 2030. Automation helps healthcare with the following: ● It enhances the quality of their care and reduces the time of their stay at the hospital. ● It enhances the safety of the patient. ● It expands efficiency. ● It improves access to care. ● It engages the patients.

On demand Healthcare Solutions

It reduces the paperwork.

It offers people immediate access to medical care. It gets rid of various hassles.

It provides effective patient interactions

Telemedicine and Virtual Visits Telehealth and telemedicine market is expected to hit US\$ 912 Billion by 2033, growing at a compound annual rate of 24% from 2023 – 2033, according to Future Market Insights. Telemedicine and virtual visits can help you with the following: Comfort and convenience. It can control infectious illnesses. It offers a better assessment. It supports the management of chronic conditions and primary care.

Patient Portals Using patient portals, you can get test results, ask questions, or update patient profiles and insurance companies. You can benefit from a patient portal in the following ways: It provides rapid growth. Implementing a patient portal increases office efficiency. It streamlines the workflow. It supports telemedicine facilitation, which enables patients to consult with you via message or video calls. Patient engagement is improved.

Benefits of Digital Transformation in Healthcare

1. It Offers an Optimized Workflow helps in cutting down on paperwork.
2. It Offers Better Interaction with Clients Through chats and videocalls
3. It Helps in Creating a Secure Database of EHR (Electronic Health Record)
4. It Offers Advanced Communications Accurate patient diagnosis, quicker data transmission, and other internal communication are all made possible for organizations because of enhanced communications.

Digital Transformation Benefits for Patients

- It provides personalized medical care services.
- It provides simple access to individual health records.
- It provides easy appointment scheduling.
- It offers excellent communication with Doctors online

Benefits of smart hospitals –

For Providers/hospitals

-- Improving operational efficiency----

Control over systems and processes Hospital asset management Cost optimization
Reducing manpower Improving EBITDA and profitability For Patients’

-- Improvement in quality of treatment----

Better patient experience Patient safety (less chances of medication error, wrong surgery/wrong treatment) Electronic health records/ availability of records for future references
Lower infection rate, better prognosis

AI and Robotics Benefits of AI in smart hospitals AI & Data Analytics-Accumulated clinical data can be used for prevention, early diagnosis, early treatment, minimising complications and better outcomes. Data is retrieved from Clinical notes, lab reports, radiological images etc. AI Chatbots- For management of chronic lifestyle diseases including mental disorders. Wearables with AI- Wrist watches/patches/monitors for detecting cardiac arrhythmias/abnormal heartbeats.

Robotics Robotic exoskeletons- are wearable electromechanical devices to enhance the physical performance of patients suffering from ortho/neuro/gait/locomotor problems. These are also used especially during COVID for routine tasks such as lab sample/ medicine and food delivery, or room cleaning. Allows the surgeons/doctors to perform many types of complex surgeries with more precision, minimal invasion and better control than conventional services. Benefits - Fewer complications, such as surgical site infection, Less pain and blood loss, Shorter hospital stay and quicker recovery and Smaller, less noticeable scare.

Telemedicine

- 70% of Indian population is residing in rural areas and 70% of hospital infra and medical manpower is confined to Tier 1 cities. Telemedicine is a great tool for providing primary healthcare services to remotest rural areas.

- Patients can communicate with physicians from their homes or E-clinics for most of their basic medical needs. Telemedicine can reduce hospital visits of patients and therefore reducing the risk of hospital acquired infections.
- Telemedicine can help in improving doctor's operation efficiency for medical management in outdoor department.
- \$5.5 bn telemedicine market by 2025, growing at a CAGR of 31%
- Telemedicine adoption during COVID - 19 : 80% North India, 50% - South/Western region and more than 30% -Eastern India
- 30 million tele consultations through Health Ministry's e-Sanjeev ani telemedicine as of March 2022.

Examples of AI in Healthcare

It is a privilege to give some examples.

AI in Medical Diagnosis

Every year, roughly 400,000 hospitalized patients suffer preventable harm, with 100,000 deaths. In light of that, the promise of improving the diagnostic process is one of AI's most exciting healthcare applications. Incomplete medical histories and large caseloads can lead to deadly human errors. Immune to those variables, AI can predict and diagnose disease at a faster rate than most medical professionals.

AI in Drug Discovery

The drug development industry is bogged down by skyrocketing development costs and research that takes thousands of human hours. Putting each drug through clinical trials costs an estimated average of \$1.3 billion, and only 10 percent of those drugs are successfully brought to market. Due to breakthroughs in technology, AI is speeding up this process by helping design drugs, predicting any side effects, identifying ideal candidates for clinical trials and potentially reducing costs by up to 50 percent.

AI in Patient Experience

AI can be used to support digital communications, offering schedule reminders, tailored health tips and suggested next steps to patients. The ability of AI to aid in health diagnoses also improves the speed and accuracy of patient visits, leading to faster and more personalized care. And efficiently providing a seamless patient experience allows hospitals, clinics and physicians to treat more patients on a daily basis.

AI in Healthcare Data Management

Highly valuable information can sometimes get lost among the forest of trillions of data points. Additionally, the inability to connect important data points slows the development of new drugs, preventative medicine and proper diagnosis. Because of its ability to handle massive volumes of data, AI breaks down data silos and connects in minutes information that used to take years to process. This can reduce the time and costs of healthcare administrative processes, contributing to more efficient daily operations and patient experiences.

AI in Robotic Surgery

Hospitals use AI and robots to help with everything from minimally invasive procedures to open heart surgery. Surgeons can control a robot's mechanical arms while seated at a computer console as the robot gives the doctor a three-dimensional, magnified view of the surgical site. The surgeon then leads other team members who work closely with the robot through the entire operation. Robot-assisted surgeries have led to fewer surgery-related complications, less pain and a quicker recovery time. According to the Cleveland Clinic, this type of surgical intervention has greatly advanced over the years, with a 94 to 100 percent success rate.

Conclusion

While AI is already being used across the healthcare industry, its use is still in an early, specialized stage. According to researchers, current AI systems are considered narrow AI (NAI) — tools designed to perform specific tasks, such as processing numerical data or analysing images, rather than exhibiting broad, human-like intelligence. Researchers are exploring the potential of artificial general intelligence (AGI), which could eventually expand AI capabilities in the healthcare industry, though this remains largely theoretical.

In the near term, AI is already being used to improve the efficiency and accuracy of healthcare operations. Hospitals and medical facilities are using the technology to manage administrative tasks, answer calls, interpret radiology images, assist in diagnoses and much more. These applications can reduce human error, speed up routine processes and free up human clinicians to focus on the more complex aspects of patient care.

Looking further ahead, the invention of AGI could shake up the healthcare industry, providing greater personalized care. For instance, an AGI-powered diagnostic tool

may be capable of synthesizing a patient's entire medical history and symptoms to detect early signs of a disease and recommend treatment, identifying signs that may have otherwise been overlooked in traditional evaluations. Meanwhile, on the pharmaceutical side, AGI could accelerate the drug discovery process and tailor treatments to individual patients based on their unique genetic and medical profiles.

However, integrating AI into the healthcare space comes with some significant challenges and drawbacks that will only persist if we don't do anything about them. Chief among them is data privacy and security, as AI tools require access to large volumes of sensitive patient information. As a result, healthcare organizations have become prime targets for cyberattacks. To mitigate these risks, AI developers are implementing data anonymization techniques, strict encryption standards and compliance measures aligned with HIPAA regulations.

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