The Ultimate Guide

Artificial Intelligence in Healthcare

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Introduction

Artificial intelligence (AI) plays a role in many industries, from banking and cyber-security to product design and healthcare. Its uses are infinite and artificial intelligence will continue to advance through new technology and innovation.

The benefits of leveraging technology in healthcare have the power to impact both your facility and patients. Some implementations include diagnostic capabilities and predicting disease, customized treatment plans, enhanced electronic health records and more.

This guide has everything you need to know about artificial intelligence in healthcare. If you're looking for industry insights, barriers to AI adoption, or ways artificial intelligence will improve healthcare, you'll love this guide.

Chapter 1

Healthcare Artificial Intelligence Industry Insights

Artificial Intelligence involves utilizing a computer to perform and automate a particular task typically performed by humans. With that automation comes a marketplace for AI tools, automation, and big data solutions.

The market for healthcare artificial intelligence tools is expected to surpass $34 billion by 2025, driven by the desire to automate key tasks and provide deeper insights, according to a new report released by Tractica.

Tractica is a market intelligence firm that focuses on human interaction with technology. Their forecast is based on an "in-depth assessment of major companies as well as startup-level activity in the healthcare AI space."

Health IT Analytics agrees,

> The global market will rise to the challenge of synthesizing massive volumes of big data through machine learning techniques, including deep learning, semantic computing, and neural networks, according to the report.

According to Accenture analysis, when combined, "key clinical health AI applications can potentially create $150 billion in annual savings for the US healthcare economy by 2026."

Top 10

AI Applications

Application	Value
Robot-Assisted Surgery**	**$40B**
Virtual Nursing Assistants	**$20B**
Administrative Workflow Assistance	**$18B**
Fraud Detection	**$17B**
Dosage Error Reduction	**$16B**
Connected Machines	**$14B**
Clinical Trial Participant Identifier	**$13B**
Preliminary Diagnosis	**$5B**
Automated Image Diagnosis	**$3B**
Cybersecurity	**$2B**
Total	**~$150B**

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They analyzed 10 AI applications with the greatest near-term impact and assigned each of them a value. The value given is based on the estimated potential annual benefits for each application by 2026.

Robot-assisted surgery is number one, with the highest value potential. Not only is it cheaper, but it can also increase a patient's overall treatment with less hospital time.

The applications for AI are endless and can deliver high-quality and cost-effective care.

Now for the opposition...

Chapter 2

Barriers to Artificial Intelligence Implementation

There are pros and cons to everything, and AI is no different.

Or should we call these cons, fear?

Despite all the benefits (which we will discuss next), the fear surrounding more intelligent solutions can often be a controversial topic.

Today, there are still barriers to the widespread adoption of AI, and not just in the healthcare industry. As a whole, there are challenges that need to be addressed and overcome before moving forward and implementing AI.

R&D Magazine, which provides research and development news for more than 50 years, points out four key obstacles:

1. Integration of data is complex, which can result in missing and disparate data
2. Challenges such as trust, legal and liability issues
3. Time and energy limitations to consider and the need for better hardware designs
4. Talent shortage - specific skills and knowledge needed to succeed with AI

Let's take a granular look at the healthcare industry.

What are the general fears of AI in healthcare?

Fear of job replacement

Concern that computers will replace physicians and staff

Less human interaction and affectionate care

Data privacy

Data usage could be interpreted as an infringement of a patient's right to privacy

Understanding and learning a new technology in the workplace

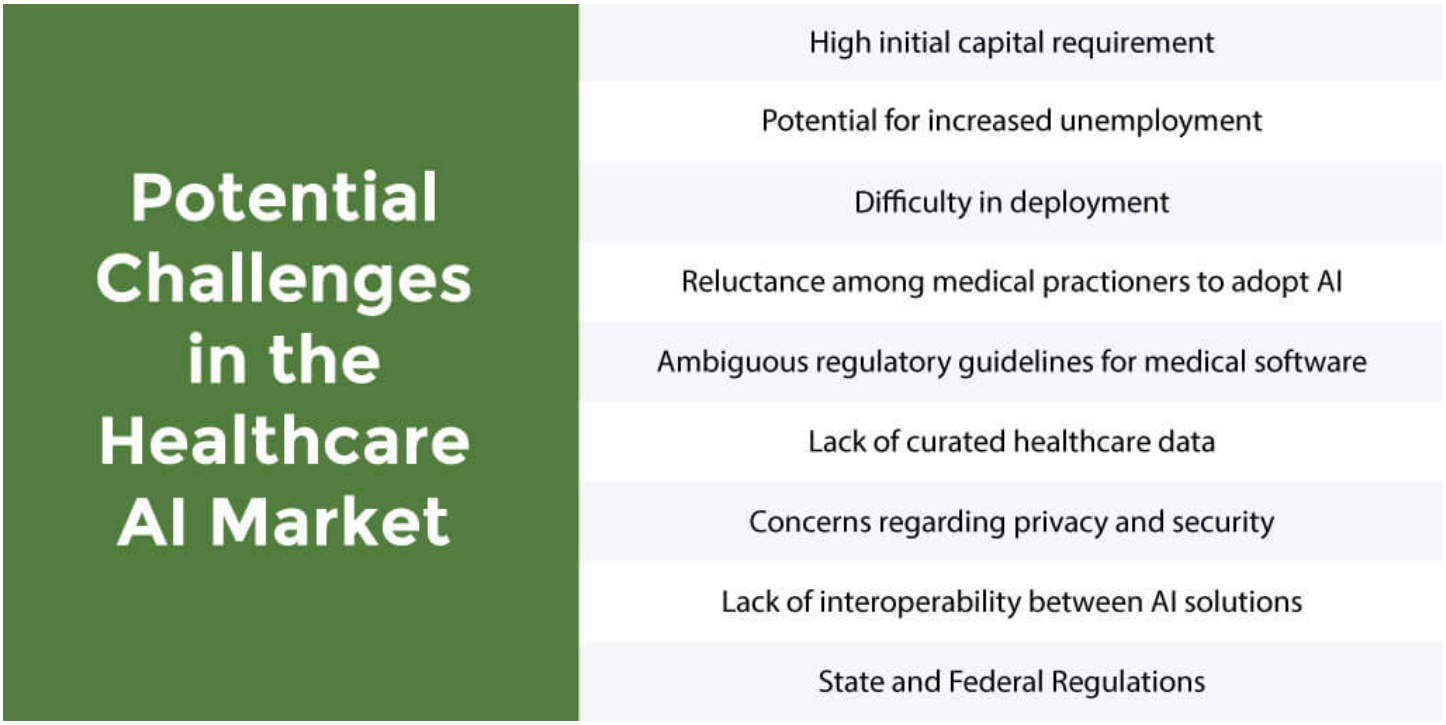
Development costs

Cybersecurity threats or vulnerabilities

Potential Challenges in the Healthcare AI Market [Chart]

The healthcare industry faces an uphill battle for full AI integration. TM Capital Corp. prepared an in-depth industry spotlight highlighting their thoughts on the below nine potential challenges.

Based on information gathered from Global Market Insights, "Healthcare AI Market Size, Competitive Market Share & Forecast, 2024" (2017) and Markets and Markets, "Artificial Intelligence in Healthcare Market" (2017).



According to the study, a major concern is State and Federal regulators, "they are a key hurdle facing AI."

The healthcare leadership team at TM Capital adds,

"Certificates of Need, risk-based capital requirements, and burdensome reporting can create major barriers to new entrants and innovations."

Even with its challenges, the question remains...

Do the benefits outweigh the potential challenges and fears?

Chapter 3

Advantages of Artificial Intelligence in Healthcare for an Improved Future

The healthcare AI market is projected to grow at a 39.4% CAGR to more than $10 billion in worldwide revenue by 2024. And with good reason...

Artificial intelligence offers a number of advantages when exploring the healthcare landscape. It promises innovation in the healthcare system for a better future.

Let's go back and address a few of those fears from earlier:

Computers will replace doctors.

> *Not necessarily - they will complement them. AI technology can assist doctors in making better data-driven decisions.*

There can be a positive impact on the reduction in mortality rates. AI can help improve the efficiency of disease diagnosis, management, and treatment.

> *Accessibility of info can be positive and is not always an infringement of privacy*

Keith Kirkpatrick, a principal analyst at Tractica who focuses on emerging interface technologies, adds,

> "AI applications are designed to address specific, real-world use cases that make the diagnosis, monitoring, and treatment of patients more efficient, accurate, and available to populations around the world."

Based on a study by Frost & Sullivan, the market for AI has the potential to improve healthcare outcomes by 30 to 40 percent while simultaneously cutting treatment costs in half by:

- Integrating information such as medical records with operating metrics can help assist physicians
- Reducing unnecessary hospital visits by alerting staff only when patient care is needed
- Creating time-saving administrative duties such as voice-to-text transcription

The benefits, including better patient care, reduced costs and leveraging the many opportunities offered by the integration of AI, significantly outweigh the fears and challenges.

Below we highlight a quick side-by-side comparison of the pros and cons of AI in healthcare.

How Artificial Intelligence Plays a Role in Healthcare [Pros vs. Cons]

Pros	Cons
Better data-driven decisions	Concerns regarding privacy & security
Increased disease diagnosis efficiency	Lack of curated healthcare data
Treatment time cut in half	High initial capital investment
Integration of information	Lack of interoperability
Reduce unnecessary hospital visits	Reluctance from staff to embrace AI
Create time-saving administrative duties	Potential for increased unemployment

The debate over artificial intelligence in healthcare will always be present. Overall, the main goal is to develop AI safely and with purpose for patients, physicians, and developers.

Chapter 4

Artificial Intelligence Study: How AI Technology Can Improve Human Lives

Location: Shanghai Changzheng Hospital, China

Problem: Highest lung cancer rates in the world

Solution: Use AI and deep learning to diagnose cancer by pairing a computerized tomography (CT) scan with AI

Infervision, a technology company that uses deep learning and AI, combined deep learning with medical data to recognize symptoms in medical images.

The AI technology learns from past imaging reports such as X-Ray, CT, MRI, etc. to assemble automatic diagnostic recommendations. The Infervision intelligent screening system "immediately pushes a warning to the doctor when it detects a medical image with subnormal symptoms."

Eliot Siegel, chairman of the Radiological Society of North America (RSNA) Medical Imagine Resource Committee commented,

> "The application of AI will lead to a real digital shift in traditional medical imaging, requiring AI and people to work together to meet the challenges of the medical industry. In the process of lung nodule screening, Infervision is providing preemptive solutions that allow doctors to meet patients' needs in a short period of time."

Advantages of AI technology:

- Ability to identify early detection of high-risk diseases
- Possibility to save on medical expenses
- Can lower the cost of chronic disease management
- Provides efficient medical treatment

This is just one study demonstrating AI's ability to read medical images that saves time and accuracy for a radiologist.

Chapter 5

The Future of Artificial Intelligence in Healthcare [2019 and Beyond]

As the healthcare industry adopts more of the latest technology, the International Data Corporation (IDC), a global market intelligence in healthcare, made a few predictions of the impact of AI and automation:

1. "By 2020, adoption rates of IoT-enabled asset tracking and inventory management systems in hospitals will have doubled worldwide, improving patient safety, staff satisfaction, and operational efficiency."

Integration of data will aid healthcare facilities in gaining new insights to benefit both the patient and provider.

2. "By 2020, one hospital in four with 200+ beds will have deployed robotics to handle time-consuming tasks, reduce labor, and prevent errors to enhance the sustainability of its business operations and improve patient safety."

3. "By 2020, 20% of healthcare organizations will have moved beyond pilot projects and will be using blockchain for operations management and patient identity."

4. "By 2021, 20% of healthcare organizations will have achieved 15–20% productivity gains through the adoption of cognitive/AI technology."

source: IDC

Looking further into the future - 20 years from now...

Tony Hebden, Ph.D. vice president at Health Economics and Outcomes Research (HEOR) and Steve Elmore, Ph.D. vice president at Target Enabling Science and Technology, share their thoughts on how AI will impact healthcare in the future.

The Future of Artificial Intelligence in Healthcare

AbbVie. "The Future of Artificial Intelligence in Healthcare." Online video clip. YouTube. YouTube, Oct. 26, 2018. Web. Nov. 9, 2018.

Here's an excerpt from their discussion:

Steve: "Tony, where do you see AI in healthcare in the future, say 20 years from now?"

Tony: "The ability of AI to enable physicians. Rather than replace physicians, it would help in diagnoses and then aid in what would be the most effective treatment for individuals. More personalized medicine."

Steve: “I would agree. The integration of additional types of data, we track our steps, etc. - in the future, we’ll be able to track our blood sugar, our lipid levels, etc... [and get] real-time feedback.”

Tony: “The idea that we will be able to identify patients before they get sick, to treat a patient before they become a patient.”

Steve: “Synergies between human intelligence and artificial intelligence, a doctor will have far more powerful tools to do his job.”

Conclusion

The potential of artificial intelligence is difficult to ignore. The number of successful case studies and examples will continue to grow as we look toward the future, for the integration of AI in healthcare.

Artificial intelligence promises to make sense of complex medical data, gain insights and better recognize patterns in behavior. AI is a “decision engine” that can exponentially increase the effectiveness and efficiencies of healthcare organizations.

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