CHEAT SHEET

for Entire health care ecosystem

AI in health care

———

Understanding AI and its applications across health care

Published March 2022• 10-min read

Key takeaways

- AI is an umbrella term that covers a range of different technologies, each with different types of capabilities and levels of complexity

- AI can enhance a wide range of objectives in health care by improving the cost, speed, accuracy, and consistency of various processes

- AI in health care is not intended to replace human workers and will not always be perfect. Rather, having good data and appropriate human input can bring better results than humans working alone

What is it?

Artificial Intelligence (AI) is not a single technology, but rather a field of technology able to perform tasks that normally require human intelligence by using algorithms, heuristics, pattern matching, and other techniques within the realm of computer science. AI has been an area of significant interest for the health care industry for several years, and many health systems, payers, and life science organizations have (or plan to) incorporate AI and automation into their business strategy.

AI capabilities can be broken down into Narrow AI and General AI. Virtually every AI solution today uses Narrow AI. Narrow AI algorithms solve a tightly defined task, such as finding pneumonia in an x-ray, or powering a patient portal chatbot, but have limited utility outside the task for which they were designed. General AI is a more adaptable intelligence that can understand context, quickly adapt to new situations, and apply knowledge to a wide variety of domains—but such AI may be technically impossible to achieve.

Below are a few AI-related terms that are useful to distinguish:

- **Advanced Analytics:** a broad category including AI, predictive analytics, and prescriptive analytics to augment processes and predict future events

- **Machine Learning (ML):** a range of techniques including strategies like time-series analysis, which allow computers to learn to perform tasks without being explicitly programmed. Uses advanced statistical techniques to identify patterns in data and then make predictions from those patterns with a degree of certainty

- **Natural language processing (NLP):** techniques which allow computers to understand human language and communicate back with similar language

- **Robotic Process Automation (RPA):** the use of automated robots to handle repetitive tasks, generally not highly "intelligent"

Source: Becaert, "Time Series Analysis in Machine Learning," Element AI; Advisory Board interviews and analysis.

What is it?

Not all AI functions have the same degree of intelligence. This statement equation can explain how to determine the extent of a system's intelligence:

The **less** the
$\begin{bmatrix} \textit{Statistician} \\ \textit{Researcher} \\ \textit{Analyst} \end{bmatrix}$
has to **determine** the
$\begin{bmatrix} \textit{Order of processing} \\ \textit{Data to apply/focus on} \\ \textit{Steps to improve the model} \end{bmatrix}$
the more the system can be **described as intelligent**

Looking specifically at intelligent functions, it can be helpful to understand types of technologies based on what they *do*—their abilities and use cases. Below is an example of several types of AI applications, categorized by their functions[1].

Areas of function		Type of AI
Can it "see"?	*Can it identify what it sees?*	**Computer vision**
Can it "hear"?	*Does it respond in a useful, sensible way?*	**Speech recognition, NLP**
Can it "read"?	*Is it reading what you type?*	**NLP**
Can it "move"?	*By itself without help?*	**Smart robot**
Can it "reason"?	*Is it looking for patterns in data?*	**ML**
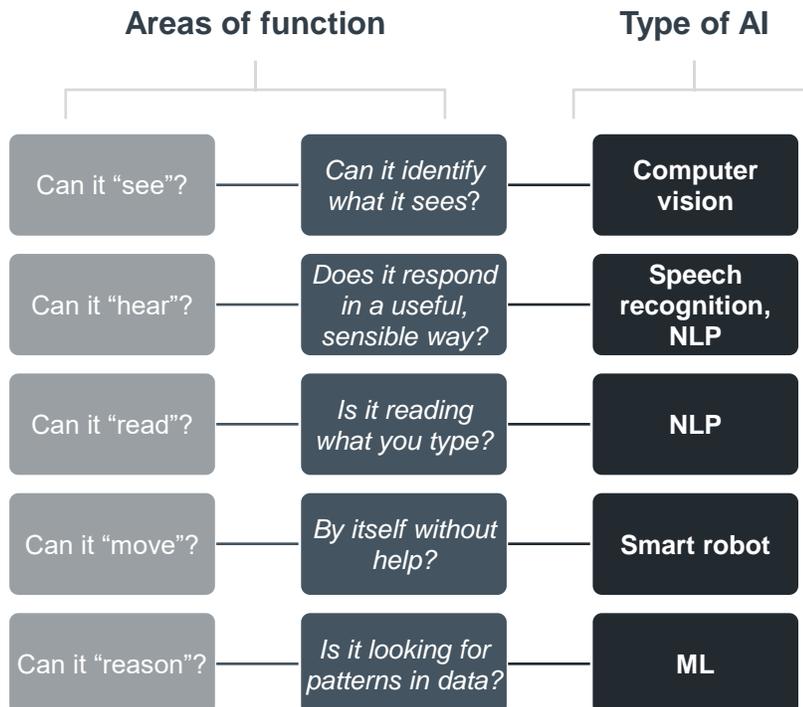
Source: "The Artificial Intelligence Ecosystem," Advisory Board; Hao K, "What is AI? We drew you a flowchart to work it out," MIT Technology Review, November 2018; Kovalenko O, "12 real-world applications of machine learning in healthcare," SPD Group, February 2020;

1. Adapted from Karen Hao's piece in MIT Technology Review.

Why does it matter?

When supplemented with human intelligence and action, the use of AI systems in health care can provide advantages in three key areas:

1. **Improves speed, capacity, consistency, and accuracy:** Computers don't forget what they have learned, don't get tired, and can recognize shifts or patterns in data more quickly and comprehensively than most humans (once they are trained appropriately). Automation and AI can run thousands of tasks at once – something impossible for humans alone to achieve.

2. **Addresses the increased amount of data:** Health care experts (no matter how experienced) can only take in, comprehend, and act on so much data at one time, and in health care the breadth and depth of data are growing exponentially. AI can help process the rapidly expanding amount of structured and unstructured data from sensors, medical devices, mobile apps, and EHRs to make data more actionable.

3. **Enhances the abilities and efforts of human workers:** AI can help free human experts from repetitive or tedious tasks, continuously monitor complex situations, discover patterns and anomalies, and ensure that tasks do not fall through the cracks. AI can be a trusted and capable assistant, augmenting human capabilities across the value chain.

With these key benefits in mind, AI can take on a wide range of potential use cases within health care, including research, education and training, clinical decision making, patient engagement, and business operations. Simpler forms of automation such as RPA can handle a variety of rote processes, while more advanced Machine Learning and other "intelligent" functions can greatly improve processes for a variety of both clinical and administrative areas.

---

1. CDI: Clinical Documentation Improvement

Source: Advisory Board interviews and analysis.

How does it work?

AI in health care can encompass a wide variety of products, ranging from robotic process automation (RPA) scripts that assist with financial processing, to NLP that helps physicians record visit notes, to computer vision programs that can improve the accuracy of imaging results.

The level of complexity can range from relatively simple to extremely complicated. However, AI programs are generally designed to fit into existing workflows with the aim of augmentation, not disruption. AI is generally more widespread and established in administrative processes such as revenue cycle management, while AI for clinical purposes such as diagnosis is relatively narrower in potential use cases for now. Below are simple illustrations of how AI can work in different potential settings.

Example 1: How AI can fit in to a clinical workflow

| Physician records visit chart | → | NLP reads, analyzes chart | → | ML assesses chart and predicts diagnosis | → | Physician reviews, makes final diagnosis |
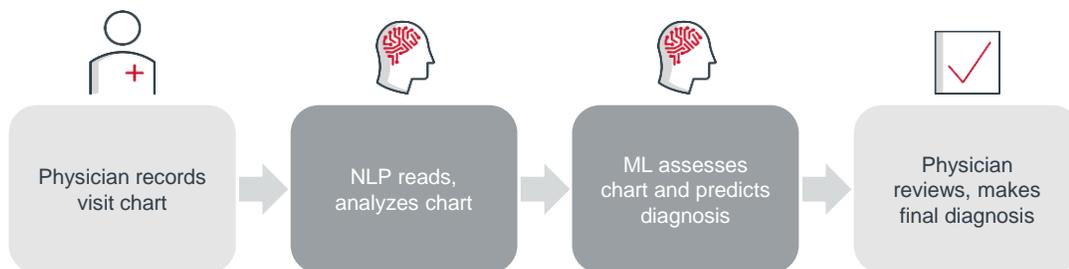
Example 2: How AI can fit in to a revenue cycle workflow

| Physician records visit chart | → | AI/RPA surfaces records most likely to have documentation opportunities for CDI[1] | → | CDI clarifies discrepancies with physicians | → | Final code submitted for billing |
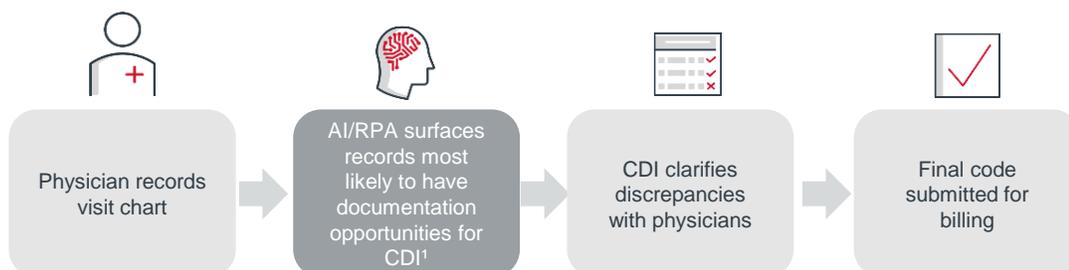
1. Clinical Documentation Improvement

Source: Advisory Board interviews and analysis.

How does it work?

Despite myriad benefits, there is still very serious skepticism about applying AI in health care. In general, there are three primary sources of skepticism that can slow adoption in health care settings:

First is the **uncertainty around how AI programs produce their outputs**, also known as the commonly-cited "black box problem". With most AI tools, there is virtually no way to tell *how* a result is produced. However, developers are creating several "white box" or explainable AI (XAI) models designed to improve transparency around how AI programs work internally.

Another concern is **whether AI will replace or "take over" people's roles**. In general, AI solutions are not intended to replace workers wholesale, but rather to support and augment administrative and decision-making processes to reduce extra burden, improve accuracy, and allow workers to practice at top-of-license. AI still works best when paired with human oversight, as systems may not perform predictably when faced with parameters outside of their normal range of experience.

Finally, there are questions around **the accuracy and bias of AI outputs**. Much like human workers, AI will not produce perfect results every time, because good AI is only possible with good data inputs. Especially for AI that uses population-level inputs, data that is biased or skewed can lead to inaccurate results and worsened heath disparities. AI will succeed when its data inputs are accurate, unbiased, and representative. When AI works alongside human decision-makers and is maintained properly, it can significantly improve speed, cost, capacity, and outcomes for a wide range of processes in health care.

Source: Advisory Board interviews and analysis.

Conversations you should be having

01 Are there problems in our organization that AI can be useful in solving or mitigating? Which problems are best suited to an AI solution, and which ones aren't?

02 What attitude do staff in our organization have about AI and automation? Where is there skepticism, and what's driving it? What is our communication plan to promote greater acceptance of AI and automation?

03 How will our organization ensure that the quality of data inputs are accurate, unbiased, and representative, to ensure that our use of AI does not exacerbate existing inequities?

04 How will our organization continue to improve and maintain AI over time? What plans do we need to put in place, and who will be accountable for doing so?

In order to make the best use of AI in your organization, it's important to start with a specific problem or goal you want to solve, rather than with a specific AI you want to implement. Review organizational performance data and speak with top-performing staff about what's keeping them from making the best use of their time to pinpoint the right opportunities.

Source: Advisory Board interviews and analysis.

Related content

Advisory Board resources

External resources

OUR TAKE
How AI and automation can help clinicians practice at top-of-license

Read now

What is AI? We drew you a flowchart to work it out

WEBINAR

The 2021 playbook: The promises (and perils) of digital health and artificial intelligence

Watch now

RESEARCH

The artificial intelligence ecosystem

Read now

RESEARCH
The rise of Machine Learning

Read now

SPONSORED BY

iodine

Iodine is an enterprise AI company that is championing a radical rethink of how to create value for healthcare professionals, leaders, and their organizations: automating complex clinical tasks, generating insights and empowering intelligent care. Iodine's powerful predictive engine complements the skills and judgment of healthcare professionals by interpreting raw clinical data to generate real-time, highly focused, predictive insights that clinicians and hospital administrators can leverage to dramatically augment the management of care delivery – facilitating critical decisions, scaling clinical workforces through automation, and improving the financial position of health systems. For more information, please visit iodinesoftware.com.

This report is sponsored by Iodine Software, an Advisory Board member organization. Representatives of Iodine Software helped select the topics and issues addressed. Advisory Board experts wrote the report, maintained final editorial approval, and conducted the underlying research independently and objectively. Advisory Board does not endorse any company, organization, product or brand mentioned herein.

To learn more, view our editorial guidelines.

Project director

Eunice Jeong

ejeong@advisory.com

Research team

Eunice Jeong

Katie Schmalkuche

Program leadership

John League

LEGAL CAVEAT

Advisory Board

655 New York Avenue NW, Washington DC 20001
202-266-5600 | **advisory.com**