



AI, ML, NOP

UNDERSTANDING THE ALPHABET SOUP OF ARTIFICIAL INTELLIGENCE

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MNACEP Emergency Medicine Summit
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DISCLOSURES

NONE

Artificial Intelligence is here

AI is set to boom into a \$90 billion industry by 2025 as ChatGPT generates investment frenzy, UBS Wealth Management CIO says



Artificial intelligence could save healthcare industry \$360B a year

Dive Brief:

- Artificial intelligence could save the U.S. up to \$360 billion annually if adopted more widely in healthcare, according to a new report from McKinsey and Harvard researchers.



No longer science fiction, AI and robotics are transforming healthcare

AI is getting increasingly sophisticated at doing what humans do, but more efficiently, more quickly and at a lower cost. The potential for both AI and robotics in healthcare is vast. Just like in our every-day lives, AI



'That is exactly how we treated the patient': ChatGPT update's medical expertise surprises physicians

A ChatGPT update released March 14 has been stunning physicians with its ability to deliver sound medical advice, *The New York Times* reported.



The AI Arms Race Is Changing Everything

To create is human. For the past 500,000 years we've been unique in our ability to make art, cuisine, medicine, societies: to envision and craft something new where there was nothing before.

Now we have company. While you're reading this sentence, artificial intelligence (AI) programs are painting cosmic portraits, responding to emails, preparing tax returns, and recording metal songs. They're writing pitch decks, debugging code, sketching architectural blueprints, and providing health



60% of Americans Would Be Uncomfortable With Provider Relying on AI in Their Own Health Care

Yet many see promise for artificial intelligence to help issues of bias in medical care



JPMorgan Joins Other Companies in Banning ChatGPT

JPMorgan joins Amazon, Verizon and Accenture in banning staff from using the chatbot. Financial services giant JPMorgan Chase has reportedly banned its staff from using ChatGPT. CNN cited sources saying that the decision, which applies to global staff, was due to compliance concerns over using third-party software.



Objectives

1

Understand the fundamentals of artificial intelligence

2

Describe the implementation difficulties in health care

3

Identify use cases for artificial intelligence in emergency medicine

1

Understand the fundamentals
of artificial intelligence

Artificial Intelligence



If drug A and drug B are prescribed to a patient, drug A is known to increase the effects of drug B → trigger an alert for potential overdose risk

Rules based logic: if/then rules



If drug A and drug B are prescribed to a patient, drug A is known to increase the effects of drug B → trigger an alert for potential overdose risk

Artificial Intelligence



Rule-based logic: if-then rules

If drug A and drug B are prescribed to a patient, then drug A will increase the effect of drug B \rightarrow watch for potential overdose risk

Not AI

Artificial Intelligence

PERC Rule for Pulmonary Embolism

Rules out PE if no criteria are present and pre-test probability is $\leq 15\%$.

When to Use ▾	Pearls/Pitfalls ▾	Why Use ▾
Age ≥ 50	No 0	Yes +1
HR ≥ 100	No 0	Yes +1
O ₂ sat on room air $< 95\%$	No 0	Yes +1
Unilateral leg swelling	No 0	Yes +1
Hemoptysis	No 0	Yes +1
Recent surgery or trauma Surgery or trauma ≤ 4 weeks ago requiring treatment with general anesthesia	No 0	Yes +1
Prior PE or DVT	No 0	Yes +1
Hormone use Oral contraceptives, hormone replacement or estrogenic hormones use in males or female patients	No 0	Yes +1

Clinical Decision Support Rule

PERC Rule for Pulmonary Embolism

Rules out PE if no criteria are present and pre-test probability is $\leq 15\%$.

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Artificial Intelligence

Clinical Support Rule

PERC Rule for Pulmonary Embolism

Rule: Present and pre-test probability

Pearls/Pitfalls Use

	No 0	Yes +1
	No 0	Yes +1
O ₂ sat	No 0	Yes +1
Unilateral leg	No 0	Yes +1
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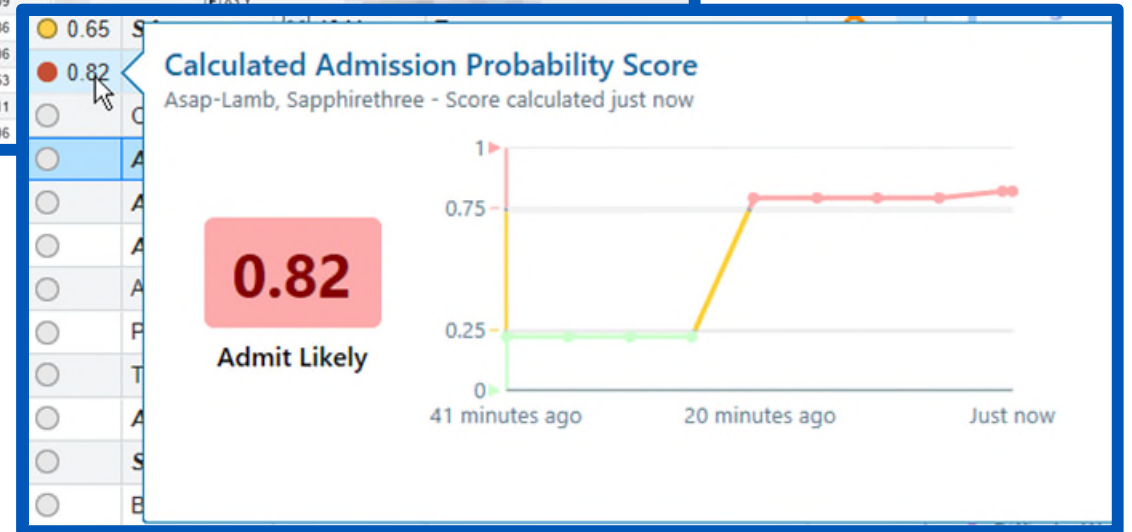


Not AI

Artificial Intelligence

Likelihood to Admit Prediction Score

Bed	RTLS Loc	Alerts	AI Admit Score	Patient	Sex/Age	Complaint
C01-P		! F			F 63 Y	
C02-P					M 70 Y	
C03-P			0.52		M 53 Y	
C04-P		!! SIS	0.06		F 34 Y	
C05-P		! F	0.1		M 78 Y	
C06-P			0.04		F 79 Y	
C07-P			0.09		F 31 Y	
C09-P			0.05		M 38 Y	
C11-P			0.04		M 49 Y	
C12-P		! FIBH	0.09		F 83 Y	
C13-P		! F	0.36			
C14-P			0.06			
C15-P			0.53			
C16-P			0.11			
C17-P		!! SIF	0.06			

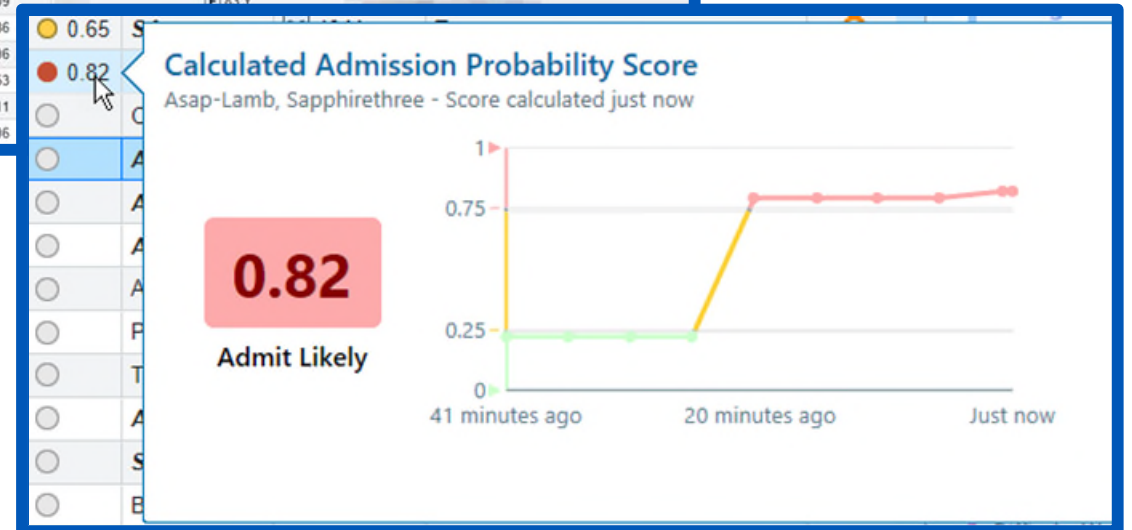


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Artificial Intelligence

Likelihood to Admit Prediction Score → Predictive Analytics

Bed	RTLS Loc	Alerts	AI Admit Score	Patient	Sex/Age	Complaint
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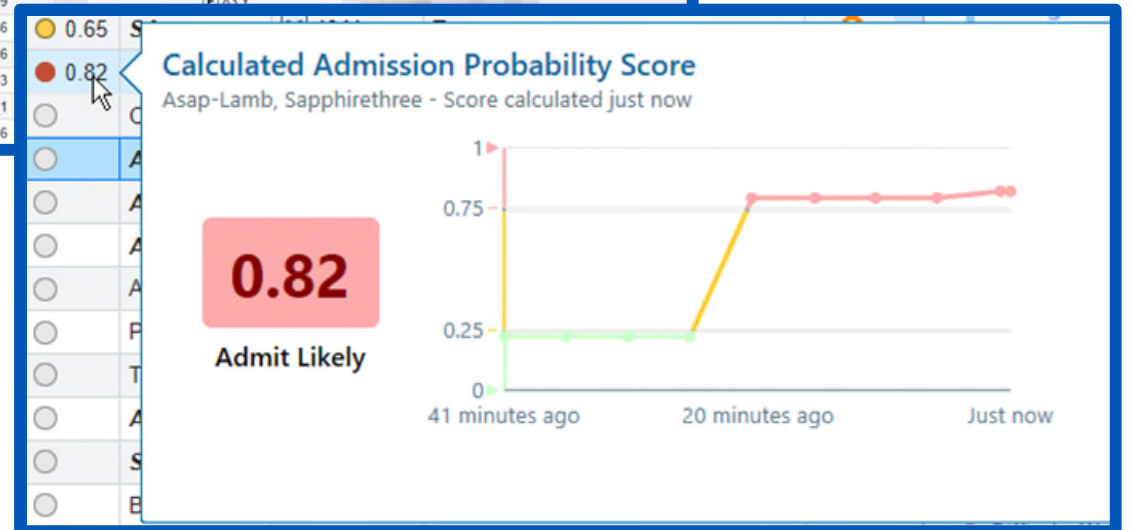
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Artificial Intelligence

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C16-P			0.11			
C17-P		!! SIF	0.06			

AI!!



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Artificial Intelligence

Sepsis Risk Score

The screenshot displays a patient's medical record on the left and a 'Sepsis Risk Score' alert on the right. The patient's name is 'Ihave Sepsis', and the alert is titled 'OurPractice Advisory - Sepsis, Ihave'. The alert is marked as 'Critical (1)' and 'SEPSIS ALERT'. It states: 'This patient has met the criteria for possible sepsis based on SIRS criteria and one or more of: white blood cell result, lactate result, or blood cultures ordered.' A table below lists the criteria and patient values:

Sepsis Criteria:	Patient Values:
Temp < 36C (96.8F)	Temperature: (!) 38.9 °C
=>38.3C (101F) oral	
=>39C (102.2F) core	
SBP <= 90	Blood Pressure: (!) 80/70
RR > 24	
HR > 100	Heart Rate: 102
MAP <= 65	
WBC >=12K or <=4K	
Lactate > 2	
Blood Cultures Ordered	Yes

Below the table, it says 'Indicate in acknowledgement below if patient is:' with options for 'Potentially septic OR' and 'Pause this BPA for 1 hour if additional clinical information is needed'. A 'Sepsis Vitals' table shows data for 01/08/25 1328 to 01/08/25 1528:

Date/Time	Temp	BP	Resp	Pulse	Heart Rate	MAP	MAP (Manual)	Temp src	User
01/08/25 1526	38.9 °C !	80/70 !	--	--	102	--	73 mmHg	Oral	SDP

The interface also shows 'Blood Cultures Ordered' and 'White blood cells' with a timeline. At the bottom, it says 'The following actions have been applied: Scheduled: A follow-up advisory has been scheduled' and 'Acknowledge Reason' with buttons for 'Follow-up in 1 hour', 'Sepsis possible', and 'Patient not septic'. 'Accept' and 'Cancel' buttons are at the bottom right.

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Artificial Intelligence

Sepsis Risk Score

SEPSIS ALERT

This patient has met the criteria for possible sepsis based on SIRS criteria and one or more of: white blood cell result, lactate result, or blood cultures ordered.

Sepsis Criteria:	Patient Values:
Temp < 36C (96.8F)	Temperature: 38.9
=>38.3C (101F) oral	
=>39C (102.2F) core	
SBP <= 90	Systolic Blood Pressure: 80
RR > 24	Respiratory Rate: 20
HR > 100	Heart Rate: 102
MAP <= 65	Mean Arterial Pressure: 73
WBC >=12K or <=4K	White Blood Cell Count: 12.5
Lactate > 2	Lactate: 2.5
Blood Cultures Ordered	Yes

Indicate in acknowledgement below if patient is:

- Potentially septic OR
- Pause this BPA for 1 hour if additional clinical information is needed

Sepsis Vitals from 01/08/25 1328 to 01/08/25 1528

Date/Time	Temp	BP	Resp	Pulse	Heart Rate	MAP	MAP (Manual)	Temp src	User
01/08/25 1526	38.9 °C !	80/70 !	--	--	102	--	73 mmHg	Oral	SDP

Blood Cultures Ordered

White blood cells

The following actions have been applied:

- Scheduled: A follow-up advisory has been scheduled

Acknowledge Reason

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Artificial Intelligence

Note Summarization

1

Notes This Visit Summarize Notes Sign Visit

Generate Summary From Notes

Notes that can be summarized ▾

2 Focus On ?

Topic to focus the summary on

3 Generate Summary Leave Feedback

4

Notes Summary

AI Pioneering

Generated at: 06/25/2024 11:06 AM. Date range: 03/15/2023 to 06/01/2024.

Jonathan Smith, age 45 years old:

On March 15, 2023, Jonathan presented with increasing shortness of breath and intermittent chest pain, with a notable family history of early myocardial infarction. The plan included ordering tests, recommending a stress test and cardiology referral, and encouraging home blood pressure monitoring and lifestyle modifications [1]. On April 12, 2023, he reported intermittent blurry vision, and a dilated fundus exam showed no diabetic retinopathy. He was prescribed eyeglasses and advised to monitor his vision [2]. On May 3, 2023, his cardiology evaluation showed no ischemic heart disease, and his ophthalmology assessment indicated no diabetic retinopathy [3]. On August 10, 2023, he presented with worsening right knee pain, likely early osteoarthritis, and was advised on R.I.C.E. regimen, physical therapy, and potential corticosteroid injection [4]. On September 15, 2023, his ophthalmology follow-up showed stable mild refractive error and no diabetic retinopathy [5]. On October 12, 2023, he reported improvement in knee pain and stable chronic conditions during a routine follow-up [6]. On January 15, 2024, he presented with epigastric discomfort and intermittent nausea, and the plan included a trial of PPI, an abdominal ultrasound, and dietary adjustments [7].

References

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Artificial Intelligence

Note Summarization → Generative AI

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Artificial Intelligence

Note Summarization → Generative AI

The screenshot displays the 'Summarize Notes' interface in Epic MyChart. It includes a navigation bar with 'Notes', 'This Visit', 'Summarize Notes', and 'Sign Visit'. A large 'AI!!' watermark is overlaid on the interface. The interface is annotated with four numbered steps: 1. 'Summarize Notes' button; 2. 'Focus On' dropdown menu; 3. 'Generate Summary' button; 4. The resulting 'Notes Summary' card. The summary card shows the patient's name, age, and a detailed medical history with numbered references.

1 Summarize Notes

2 Focus On

3 Generate Summary

4 Notes Summary

AI!!

Notes Summary

Generated at: 06/25/2024 11:06 AM. Date range: 03/15/2023 to 06/01/2024.

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Artificial intelligence

Artificial Intelligence

Teaches computers to think more like use, understanding and solving problems, informing decisions, and even communicating with us

Intelligent Automation

Combines AI with automation tools to complete computer tasks traditionally performed by humans (e.g., data entry, processing documents)

2

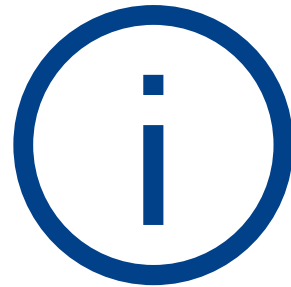
Describe the implementation difficulties with AI in health care

Implementation Difficulties

**Technical
challenges**



**Ethical
considerations**



**Governance &
guidance**



Cost



3

Identify use cases for artificial intelligence in emergency medicine

Emergency Medicine use cases for AI

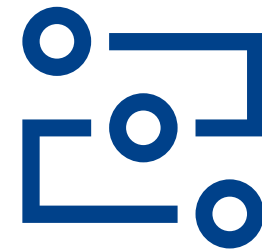
Clinical workflows



Predictive Analytics



Operational efficiency



Emergency Medicine use cases for AI



Imaging review (radiology, ECG, etc.)



Patient flow optimization



Real-time monitoring/alerts for deteriorating patients

Clinical workflows

Emergency Medicine use cases for AI

Predictive Analytics



Sepsis prediction






Risk scores



Predictive modeling for patient outcomes

Emergency Medicine use cases for AI

Operational Efficiency

-  AI based speech recognition for note generation
-  Chart summarization
-  Data entry

QUESTIONS + ANSWERS