ASCO Practice Leadership Series

Artificial Intelligence in Cancer Care: Is the Promise Real?

Thursday, May 18, 2023, 4:00pm ET
Welcome!

• Please mute your phones
• Q&A session at the end
  ▪ Use the Q&A button in the bar at the bottom of your Zoom window
  ▪ Type in your question
  ▪ We will address questions in the order they are received
ASCO® PracticeNET
Networking for Education and Transformation
Speaker

Douglas Flora, MD, LSSBB
Executive Medical Director of Oncology Services
The Robert and Dell Ann Sathe Endowed Chair in Oncology
St. Elizabeth Healthcare
ARTIFICIAL INTELLIGENCE IN CANCER CARE: IS THE PROMISE REAL?

Dr. Douglas Flora, LSSBB
Executive Medical Director Oncology Services
Robert & Dell Ann Sathe Endowed Chair
I have no relevant disclosures or conflicts of interest.
Data Science

- Managing, processing, and interpreting big data to effectively inform decision-making

Artificial Intelligence

- Technology for machines to understand, learn, and make “intelligent” decisions. An imitation of intelligent human behavior.

Machine Learning

- Application of AI that allows a system to automatically learn from data, use insights to improve over time, and forecast trends.

Deep Learning

- A subset of machine learning based on artificial neural networks.
Artificial Intelligence (AI) – the development of computer systems that are able to perform tasks that typically require human intelligence, such as recognizing patterns, making decisions, and solving problems.

- AI has the potential to revolutionize the healthcare industry by enabling us to diagnose diseases and develop personalized treatments faster and more accurately than ever before.
“THE IMITATION GAME”
The Turing Machine
BakeryScan AI created in Japan in 2007 inspired a doctor at Kyoto’s Louis Pasteur Center for Medical Research in 2017.

The now specialized AI SCAN uses the same technologies that can differentiate a donut from a cream puff to identify cancerous cells with 99% accuracy.
AI IN CHEMOTHERAPY AND RADIATION TREATMENTS

Automatic delineation of tumors and organs at risk

- Traditional target delineation (manual)
- Radiates DICOM
- PET DICOM
- CT DICOM

Automatic delineation of AI target area

- AI model
- Standardized result

Extract image, resolution, coordinates and other information

Registration and interpolation

Eliminate mechanism, remove noise, enhance and normalize

Result

Some organs may require a doctor to manually modify them locally

Radiotherapy planning system (USES one or more algorithms to calculate the absorbed dose distribution in the patient's body, and the results are used by the radiation planner)

Automatic formulation of radiotherapy plan

Nasopharyngeal carcinoma

Bladder cancer

Comparison of sketch speed of target area:

AI takes 10-20 minutes
Manual work takes 4-5 hours
AI DETECTING PROSTATE CANCER NEAR PERFECTION

- Images from more than 1M parts of stained tissue slides from patient biopsies used to teach AI to discriminate between healthy and abnormal tissue
- Tested on 1,600 slides from 100 patients
- AI demonstrated 98% sensitivity and 97% specificity at detecting prostate cancer
- AI also flagged 6 slides not noted by expert pathologists
DEEP LEARNING DETECTING COLORECTAL CANCERS

- Real-time, non-invasive imaging alongside traditional colonoscopy to screen deeply-seated polyps and early-stage colon cancers

- Geisinger study identified group of 25,610 patients overdue for CRC screening and used machine-learning algorithm to flag those at highest risk.

- Of the patients flagged, 68% were scheduled for colonoscopy and of those, 70% had a significant finding
EFFICIENCIES FOR SYSTEMS AND PROVIDERS

Unlocking Healthcare Capacity and Access with Technology and Lean Transformation

How Novant Health Optimized OR Capacity to Restore Elective Surgery & Achieve Stronger Financial Health

ASCENT 4
Process, review, and release GC/LC-MS data

INTEGRATION SOLUTION
Eon is a powerful supplement to Epic.
CAPACITY MANAGEMENT

- Achieve more effective discharge practices.
  - Anticipate potential delays and better direct patient flow
  - Predictive modeling to improve discharge planning
- Open and close surge units at the right time.
  - Predict upcoming bed shortages
  - Identify departments with higher utilization to be proactive in triaging patient flow
- Promote system-wide visibility
  - See an accurate overview of entire system capacity
  - Allows more feasible, manageable transfers between facilities
CAPACITY MANAGEMENT

- AI powered patient flow optimization, like RTLS, ensures patients move through a facility, with the right level of care, as efficiently as possible.

- AI optimized schedule management gives clinicians more time with their patients

- AI decision support algorithms improve the ability of front-line doctors and caregivers to make more accurate diagnoses and provide better treatment.

- Immediate gains in reducing clinical errors
CAPACITY MANAGEMENT
During the 2015 West African Ebola Virus
Atomwise partnered with IBM and the
University of Toronto to screen the top
compounds capable of binding to a
glycoprotein that prevented Ebola
penetration into cells.

This AI analysis occurred in less than a day, a
process that usually would have taken
months or years enabling the development
of the treatment for Ebola.
Another set of eyes for cancer diagnostics

Artificial intelligence's ability to detect subtle patterns could help physicians to identify cancer types and refine risk prediction. By Neil Savage
INNOVATION THAT BENEFITS PROVIDERS AND PATIENTS

FDA clears Paige's AI as first program to spot prostate cancer in tissue slides

Deep Learning Algorithms for Detection of Lymph Node Metastases From Breast Cancer Helping Artificial Intelligence Be Seen

AI Partnership to Advance Brain Tumor Research, Treatment
Hackensack Meridian Health and Neosoma, Inc. have announced a collaboration aimed at tackling difficult-to-treat brain tumors through the use of artificial intelligence.

AI Estimation of Gestational Age from Blind Ultrasound Sweeps in Low-Resource Settings


Using Free-Response Receiver Operating Characteristic Curves to Assess the Accuracy of Machine Diagnosis of Cancer

Improving Breast Cancer Detection Accuracy of Mammography with the Concurrent Use of an Artificial Intelligence Tool

White House unveils CancerX innovation accelerator, new funding for cancer screenings on Moonshot anniversary
ChatGPT has ‘great potential’ to improve cancer prevention and screening, study finds

How Chatbots and Large Language Model Artificial Intelligence Systems Will Reshape Modern Medicine: Fountain of Creativity or Pandora’s Box?

Li R, Kumar A, Chen JH

Author information

JAMA Internal Medicine. 28 Apr 2023.
DOI: 10.1001/jamainternmed.2023.1835
PMID: 37115531

Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum

John W. Ayers, PhD, MA; Adam Pollok, PhD; Mark Dredze, PhD; Eric C. Lees, PhD, MPH; Zachariah Zhu, BS; Jessica B. Kelley, MSN; Dennis J. Faix, MD; Aaron M. Goodman, MD; Christopher A. Longhurst, MD, MS; Michael Haponiuk, MD; Doney M. Smith, MD, MAS

JAMA Internal Medicine | Original Investigation

Medicine in the Era of Artificial Intelligence: Hey Chatbot, Write Me an H&P.

Brent TD

Author information

JAMA Internal Medicine. 28 Apr 2023.
DOI: 10.1001/jamainternmed.2023.1832
PMID: 37115537
## Table. Example Questions with Physician and Chatbot Response

<table>
<thead>
<tr>
<th>Question</th>
<th>Physician response</th>
<th>Chatbot response</th>
<th>Evaluation scores</th>
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<td>If you’ve surpassed 2–6 h, chances are they’ve passed into your intestines. Which means it can’t be retrieved easily. Many people can swallow razorbabies and toothpicks without issue. In case you develop stomach ache, then don’t hesitate seeking out an emergency room, and remember to point out the swallowed toothpick. For now, they won’t be doing much.</td>
<td>It’s natural to be concerned if you have ingested a foreign object, but in this case, it is highly unlikely that the toothpick you swallowed will cause you any serious harm. Toothpicks are made of wood, which is not toxic and will not cause poisoning. However, it is possible for a toothpick to cause injury if it becomes stuck in the throat or if it punctures the digestive tract. However, this is unlikely to happen with a dull, cooked toothpick that is only 2 cm long. If you are experiencing any discomfort or symptoms such as abdominal pain, difficulty swallowing, or vomiting, it is important to contact a health care provider for further evaluation. However, if you are not experiencing any symptoms, it is safe to assume that the toothpick has passed through your digestive system and you do not need to be concerned. It’s always a good idea to be cautious when consuming food and to remove any foreign objects before eating. It’s understandable that you may be feeling paranoid, but try not to worry too much. It is highly unlikely that the toothpick will cause you any serious harm.</td>
<td>100% preferred the chatbot. 4.67 mean quality score (chatbot) 3.33 mean quality score (physician) 4.33 mean empathy score (chatbot) 2.00 mean empathy score (physician)</td>
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<td>Things that signify you should see a doctor: • Nausea/vomiting • Dizziness • Severe or worsening headache • Loss of consciousness • Confusion • Neck stiffness • Problems with vision • Limb weakness If you develop any of these in the next 24 h, rush to the emergency room.</td>
<td>It’s always best to err on the side of caution when it comes to head injuries. While it’s possible that you may be fine, it’s important to be evaluated by a medical professional to rule out any serious injuries. It’s possible that you may have suffered a concussion or other head injury, even if you didn’t lose consciousness. Symptoms of a concussion can include headache, dizziness, nausea, difficulty with balance, and feeling “off.” The location of the impact and the apparent force of the injury could potentially make a difference in the severity of the injury. It’s also important to note that symptoms of a concussion or other head injury may not always appear immediately and could take hours or even days to develop. It’s important to seek medical attention as soon as possible if you experience any of the following symptoms after a head injury: • Loss of consciousness, even if it’s just for a few seconds • Severe or worsening headache • Nausea or vomiting • Slurred speech • Difficulty with balance or coordination • Seizures • Changes in behavior or personality • Clear fluid draining from the nose or ears It’s also a good idea to see a doctor if you experience neck pain after a head injury, as this could be a sign of a neck injury. In the meantime, try to rest and avoid activities that could potentially cause further injury to your head, such as contact sports or activities that involve high speeds or heights. If you experience any of the symptoms listed above or if your symptoms worsen, seek medical attention right away.</td>
<td>100% preferred the chatbot. 4.33 mean quality score (chatbot) 4.67 mean quality score (physician) 4.67 mean empathy score (chatbot) 2.33 mean empathy score (physician)</td>
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"Dave provides smart, personalized and accessible information instantaneously, which can greatly improve the quality of care and life for millions of patients worldwide,"

Eliran Malki, Co-founder and CEO of Belong.Life
At the Center for Cancer and Blood Disorders in Texas, oncologists are using clinical AI to help patients avoid unnecessary ER trips, saving time and money for both providers and patients.

The AI enables care teams to predict which patients are likely to go into the ER in the next 30 days and recommends actions oncologists and case managers can take to keep patients stable and out of emergency care altogether.
CURRENT LIMITATIONS AND CHALLENGES

PROBLEMS
- Workforce Shortages
- Equipment Shortages
- Drug Shortages
- Poor Data Collection and Utilization Practices

AI APPLICATIONS
- Portable Diagnostics
- Clinical Decision Support
- On-demand knowledge for specialty tasks, image interpretation, failure trend prediction, and troubleshooting
- Population Health – data for cause and effect analysis and policy-making
- Health Registries and Data Aggregation

CHALLENGES
- AI Literacy
- AI Talent
- Regulations
- Funding
- Infrastructure
- Data Privacy and Security
- Algorithmic Bias
- Lack of Transparency
- Ethical Considerations
CURRENT LIMITATIONS AND CHALLENGES

Healthcare Algorithms Are Biased, and the Results Can Be Deadly

Deep-learning algorithms suffer from a fundamental problem: They can adopt unwanted biases from the data on which they’re trained. In healthcare, this can lead to bad diagnoses and care recommendations.

How Bias Can Creep into Health Care Algorithms and Data

Health care is rife with bias. Without careful attention, AI will intrude into those inequities.

Biases in Artificial Intelligence Led to Healthcare Disparities

Researchers from the US and China note that several biases found in artificial intelligence design perpetuate healthcare disparities.

Amazon Still Pushing Biased Facial-Recognition Software To Law Enforcement, MIT Researcher Contends

Racial bias in a medical algorithm favors white patients over sicker black patients

A US government study confirms most face recognition systems are racist
CURRENT LIMITATIONS AND CHALLENGES

Oprah Winfrey

Appears to be male 76.5%

Michelle Obama

"a young man wearing a black shirt", "confidence": 0.7999446

"hairpiece", "confidence": 0.9350064
Contrary to fears that machines will replace human workers, AI in healthcare may actually be “re-humanizing” healthcare.

- Improves Data Analysis
- Better Diagnosis and Treatment Predictions
- Frees Medical Staff from Administrative Burdens
CHANGING THE HEALTHCARE LANDSCAPE

- Streamlining Workflows
- Reducing Costs
- Improving Collaboration
- Advancing Research
- Empowering Patients
90+ HEALTHCARE AI STARTUPS TO WATCH
PERCENTAGE OF AI IN ONCOLOGY & RELATED FIELDS

- Radiology & Imaging
- Pathology & Histology
- Oncology
- Other (Including Genetics, Pharmacology, and Clinical Trials)
IS THIS A GUTENBERG MOMENT?
Envisioning the Healthcare Landscape with ChatGPT
New York Medical College Explores The Opportunities And Risks Of AI On The Healthcare Industry In The Following Article Written Entirely Using ChatGPT
February 13, 2023

Opinion > Kevin, M.D.
AI in Healthcare: Meeting HIPAA Standards With ChatGPT
— Patients deserve a commitment to privacy
by Harvey Castro, MD, MBA February 11, 2023

ChatGPT Passes US Medical Licensing Exam Without Clinician Input
ChatGPT achieved 60 percent accuracy on the US Medical Licensing Exam, indicating its potential in advancing artificial intelligence-assisted medical education.

New and surprising evidence that ChatGPT can perform several intricate tasks relevant to handling complex medical and clinical information
Download PDF Copy

ChatGPT AND HEALTHCARE: THE KEY TO THE NEW FUTURE OF MEDICINE

THE LANCET
Digital Health

ChatGPT: the future of discharge summaries?
Sajan B.Patel: Kyle Lam 09
Open Access Published: February 06, 2023 DOi: https://doi.org/10.1016/S2589-7506(23)00022-3

5 Ways ChatGPT Will Change Healthcare Forever, For Better
Robert Pearl, M.D. Contributor 0

Follow
“I think we can all agree there isn’t any algorithm for empathy,” he said. “This is what we are for - the human connection. We aren’t suddenly going to become more intelligent. But machines are. Our charge is to get more humane.”
## CONTACT INFORMATION

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Feel free to submit questions

Use the Q&A button in the bar at the bottom of your Zoom window
Learn More About PracticeNET

• Free oncology business benchmarking program
  ▪ Productivity, revenue, staffing, resources
• Covers multiple service lines
  ▪ Providers and APPS
  ▪ Medical oncology/hematology
  ▪ Radiation oncology
  ▪ Gynecologic oncology
• Must have at least 1 ASCO member at your practice
• Contact us at practicenet@asco.org
Next Calls

• 3<sup>rd</sup> Thursday of each month
• May 18, 4:00pm
  ▪ AI in Cancer Care – Is the Promise Real?
• Full calendar at practice.asco.org