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Artificial Intelligence In Healthcare: An Introduction

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Conflict of Interest Disclosure

- I certify that, to the best of my knowledge, no affiliation or relationship of a financial nature with a commercial interest organization has significantly affected my views on the subject which is being presented.

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Learner Outcomes/Objectives

- Objective #1: *Define "Artificial Intelligence" and describe how it is being used in healthcare.*
- Objective #2: *Identify and explain use of computer-assisted diagnosis, remote monitoring, computerized voice recognition technology and AI-assisted medical decision.*
- Objective #3: *Predict how the use of AI in healthcare will impact medical professional liability claims, discovery and litigation.*

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My Information

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The Next Step in EMR Evolution

- EMR systems have ≥ 15 years of patient data
- Pre ChatGPT, $67.4 billion in projected spending by 2027 ($6.9 billion in 2021)
  - Artificial Intelligence in Healthcare Market by Offering (Hardware, Software, Services), Technology (Machine Learning, NLP, Context-aware Computing, Computer Vision), Application, End User and Geography - Global Forecast to 2027
- Next up–Human level decision making
  - **Result:** Netflix/Amazon/Facebook experience

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The Next Step in EMR Evolution

- Moore's Law and AI
  - Number of computer transistors doubles about every two years
  - Computers continue to get faster, smaller, cheaper and now, adds AI
  - Doubling effect–as devices get smaller and more powerful, AI gets bigger as it becomes more complex
- STAT Health Tech posts updates daily

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Overview of AI Use in Health Care

- Patient Monitoring
  - Use of smart devices, watches and home assistants
- Administrative
  - Voice recognition technology for dictation to the EMR
  - Automated appointments; reminders; test results
- Computer Aided Diagnosis (CAD)
  - Computerized interpretation of imaging studies and pathology specimens
- Clinical Decision Support (CDS)
  - The chart is now a "tool" and not merely used to document
  - The chart can be considered a new participant in physician/patient relationship

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AI-Enhanced Smart Devices Usage

- Predicting/Reporting
  - Falls; acute medical emergencies; diagnosis; tracking infectious diseases.
- Monitoring
  - Listening devices; cameras; bluetooth medical devices (EKGs, Glucose, Pulse Oximetry); wearables.
- Virtual hospitals
  - Nurses and doctors talk with and monitor patients by looking at screens with graphs of data from the patients
  - No beds, all patients monitored remotely
  - AI surveillance algorithms pick up warnings and alert the clinicians

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Proliferation of Smart Devices

- Unique considerations
  - Internet connectivity
    - Ability to pay for online services (cellular/wifi)
    - Reliability of internet connectivity (speed, etc.)
  - Battery life
  - Duty to preserve the devices for litigation
  - Unique partnerships developing—*Geisinger and Best Buy's Geek Squad?!*

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AI and Medical Dictation

- **Pro:** Siri/Alexa dictation frees physician to focus on patient
- **Con:** 95% accuracy still not good enough
  - Loud background
  - Microphone use
  - Language accents
  - Use of medical/text abbreviations

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AI-Assisted Communications /Scheduling

- **Pro:** Automation assists with continuity of care
- **Con:**
  - Will patients be less likely to reach out to their physicians?
  - Who is monitoring the automated messages?
  - How to verify messages have been reviewed by patient?
  - Elderly patients and inability to have online relationship
    - Cost/familiarity with online communications/lack of smartphone
  - Reminder fatigue

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Health Care Risks With CAD

- Early success with imaging and pathology
  - Improved accuracy
  - Reduced human workload
  - In some instances, AI is better than humans
- AI fooled by image tampering attacks
  - UPMC submitted false mammography images and fooled AI 69% of time; humans 71%
    - https://www.upmc.com/media/news/121421-wu-ai-safety

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ChatGPT—Natural Language Predictor

- At core, it predicts next words to use in responding to an inquiry
- Made public—investors included Microsoft, Musk and the usual suspects
- Chatbot use has skyrocketed
- ChatGPT technology now being integrated in other platforms
- Caution: ChatGPT can make things up and lie
- What is healthcare providers' information and what is AI's contribution?

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Computer Decision Support (CDS)

- Two AI components: EMR data and algorithms
  - Algorithms + EMR = Recommendations
  - Problem: AI does not explain rationale for decision
  - Referred to as the ***"black box"***
    - Makes complex decisions *without* explaining rationale
    - Complicated as variables are added to the algorithm

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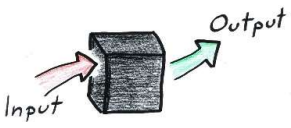
The Black Box



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Giving Pause to CDS

- STAT Health and the Massachusetts Institute of Technology conclude AI could do more harm than good
  - *Subtle shifts in data fed into popular health care algorithms can cause their accuracy to plummet over time.*
  - The signs of dysfunction are often faint, making it difficult to root out faulty information before it bleeds into decision-making.
    - Stat and MIT rooted out the weaknesses in well being care algorithms. Here's how we did it. www.statnews.com/2022/02/28/data-drift-machine-learning, February 28, 2022

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Implications of CDS

- **Pros**
  - Computerized "second opinions" can reduce medical errors
  - Better care, shorter hospitalizations, less claims
- **Cons**
  - Documentation – how will AI appear in chart?
  - Black Box – how to explain recommendations?
  - Retrospective analysis required to gauge care
  - However, CDS is not immune from bias and error
  - Little FDA oversight in CDS adoption

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Role of Bias and Reliance on Clinical Care

- Training
  - Will the next generation be as honed as their predecessors if AI-dependent?
- Pre-Care Knowledge of AI Recommendation Creates Bias
  - Initial positive finding by AI can increase number of false positives
  - Initial negative finding may provide false assurance that things are normal
  - May need multiple reviews to be certain of diagnosis and/or recommendations

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Anticipated Claim Issues

- Health care providers will remain primarily accountable
  - New defense- "Reliance on AI recommendation was reasonable under the circumstances"
- Over/under reliance on AI
- Increased likelihood of class actions
- Law is slow to technology-No legal cases at present
- How will jurors perceive AI in healthcare?

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