



AI / TECH IN HEALTHCARE EMERGENCY MANAGEMENT



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Education

- Master's Degree of **Public Health**, University of West Florida
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Previous roles...

- Emergency Preparedness Coordinator, City of Bethlehem PA
- EMT, Borough of Emmaus and other local and hospital-based EMS agencies



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International Assoc. of Emergency Managers (IAEM-US)

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Previous roles...

- Senior Emergency Manager, Hagerty Consulting
- Emergency Management Coordinator, Manatee County Dept. of Public Safety
- Firefighter/EMT, Manatee County EMS & West Manatee Fire Rescue

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Education...

- Master's Degree **Disaster Medicine & Emergency Management**, Thomas Jefferson University
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- Bachelor of Art **Sociology**, King's College

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Previous roles...

- Regional Emergency Preparedness Manager, HAP/PA Healthcare Coalitions
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- Adjunct Professor, Thomas Jefferson University



TODAY'S OBJECTIVES



OBJECTIVE 01

Gain an understanding of what constitutes artificial intelligence and review examples of how it is being deployed throughout healthcare settings.



OBJECTIVE 02

Discuss the implications of A.I. on emergency preparedness and how its use might assist healthcare professionals and patients.



OBJECTIVE 03

Understand the potential concerns surrounding artificial intelligence from both an ethical and a practical perspective.

IMPORTANCE OF CYBERSECURITY IN HEALTHCARE...

WHY HEALTHCARE ORGANIZATIONS ARE TARGETED?

SIX KEY TAKEAWAYS

1. IMPORTANCE OF CYBER RESILIENCE: RECENT CYBER-ATTACKS HIGHLIGHT THE IMPORTANCE OF CYBER RESILIENCE IN SAFEGUARDING HEALTHCARE DATA AND SYSTEMS. ORGANIZATIONS MUST ADOPT A PROACTIVE APPROACH TO CYBERSECURITY, INCLUDING REGULAR RISK ASSESSMENTS, VULNERABILITY MANAGEMENT, AND INCIDENT RESPONSE PLANNING.

1. IMPORTANCE OF CYBER RESILIENCE

SAFEGUARDING HEALTHCARE DATA AND SYSTEMS.

- ORGANIZATIONS MUST ADOPT A PROACTIVE APPROACH TO CYBERSECURITY, INCLUDING:
 - REGULAR RISK ASSESSMENTS
 - VULNERABILITY MANAGEMENT
 - INCIDENT RESPONSE PLANNING.

2. NEED FOR BUSINESS CONTINUITY/DISASTER RECOVERY PLANNING

- RECENT INCIDENTS UNDERSCORE THE NEED FOR HEALTHCARE ORGANIZATIONS TO IMPLEMENT ROBUST PLANS TO PROTECT AGAINST CYBER THREATS AND OTHER THREATS THAT COULD POTENTIALLY CLOSE THE DOORS TO A HEALTHCARE FACILITY.
- INCLUDES DEVELOPING WORKAROUNDS AND DOWNTIME PROCEDURES TO ASSIST WITH MINIMIZING THE BACKLOG OF DATA THAT WILL NEED TO BE RESTORED ONCE OPERATIONS RETURN TO NORMAL.

3. VULNERABILITY OF THIRD-PARTY ENTITIES

- CYBER-ATTACK ON HEALTHCARE SERVES AS A REMINDER OF THE VULNERABILITY OF THIRD-PARTY VENDORS IN THE HEALTHCARE SUPPLY CHAIN.
- HEALTHCARE ORGANIZATIONS MUST VET AND MONITOR THEIR VENDORS' CYBERSECURITY PRACTICES TO ENSURE THE SECURITY OF SHARED DATA AND RESOURCES.

4. IMPORTANCE OF WORKING WITH COMMUNITY PARTNERS

- EFFECTIVE INCIDENT RESPONSE AND WORKING WITH COMMUNITY PARTNERS INCLUDING THE FBI, CISA, HHS, AND THE AHA IS ESSENTIAL FOR MITIGATING THE IMPACT OF CYBER-ATTACKS AND MINIMIZING DISRUPTION TO OPERATIONS.
- HEALTHCARE ORGANIZATIONS SHOULD DEVELOP PARTNERSHIPS WITH THESE ORGANIZATIONS AS THEY COULD POTENTIALLY LEAD TO A QUICKER SOLUTION TO YOUR CYBERSECURITY EVENT.

5. FURTHER EMPLOYEE TRAINING AND AWARENESS:

- HUMAN ERROR REMAINS A MAJOR FACTOR IN CYBERSECURITY INCIDENTS.
- INVEST IN COMPREHENSIVE EMPLOYEE TRAINING AND AWARENESS PROGRAMS TO EDUCATE STAFF ABOUT CYBERSECURITY BEST PRACTICES, PHISHING AWARENESS, AND DATA HANDLING PROCEDURES.

6. COMMUNICATIONS AND TRANSPARENCY:

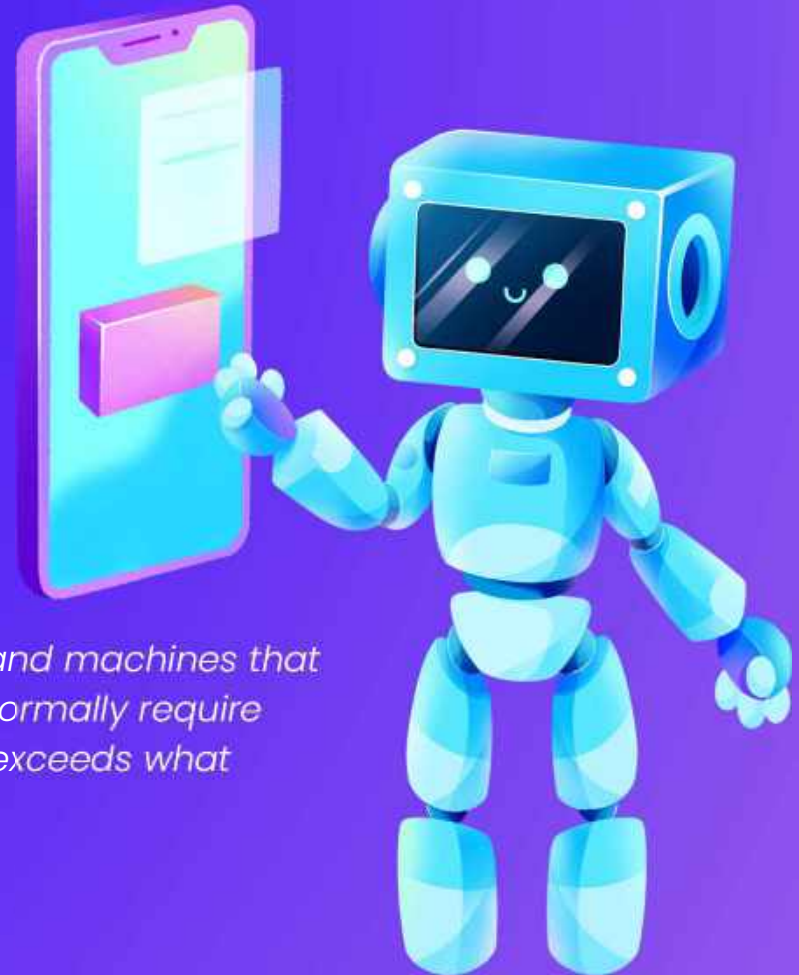
- TRANSPARENT COMMUNICATION IS CRITICAL IN THE AFTERMATH OF A CYBER-ATTACK.
- HEALTHCARE ORGANIZATIONS MUST NOTIFY THE AFFECTED INDIVIDUALS, REGULATORS, AND OTHER STAKEHOLDERS ABOUT DATA BREACHES
- APPROPRIATE ACTIONS TO MITIGATE HARM, REBUILD TRUST AND REBUILD THEIR REPUTATION.

DEFINITION

“A set of technologies that enable computers to perform a variety of advanced functions, including the ability to [see](#), understand and [translate spoken and written language](#), [analyze data](#), make recommendations, and more.”

Artificial Intelligence

*A field of science concerned with building computers and machines that can **reason, learn, and act** in such a way that would normally require human intelligence or that involves data whose scale exceeds what humans can analyze.*



HOW DOES IT WORK?

Machine Learning

Deep Learning

Neural Networks

Natural Language
Processing

Computer Vision

Cognitive
Computing



Machine learning, much like human learning, seeks to teach a machine how to make its own inferences and choices based on previous experiences through pattern identification and data analyses.

Deep learning is a technique that takes this a step further and allows the machine to process those inputs in more sophisticated ways to infer and predict outcomes.



Machine Learning



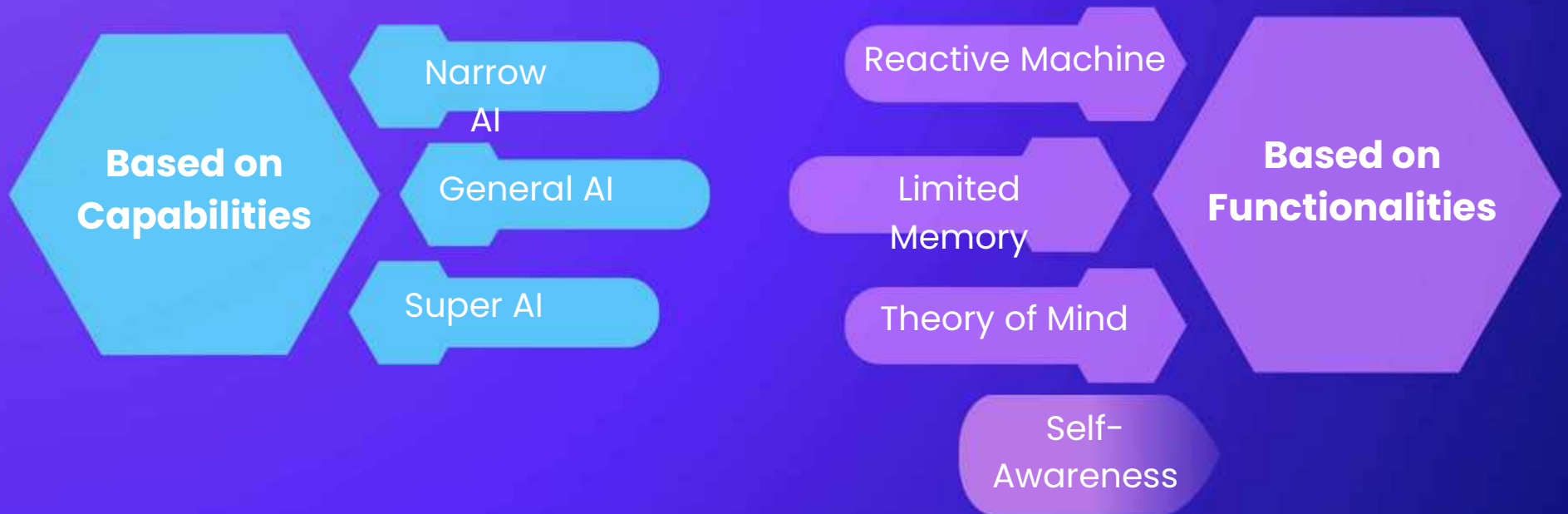
Machine Intelligence



Machine Consciousness

HOW DOES IT WORK?

Types of Artificial Intelligence



Machine Learning

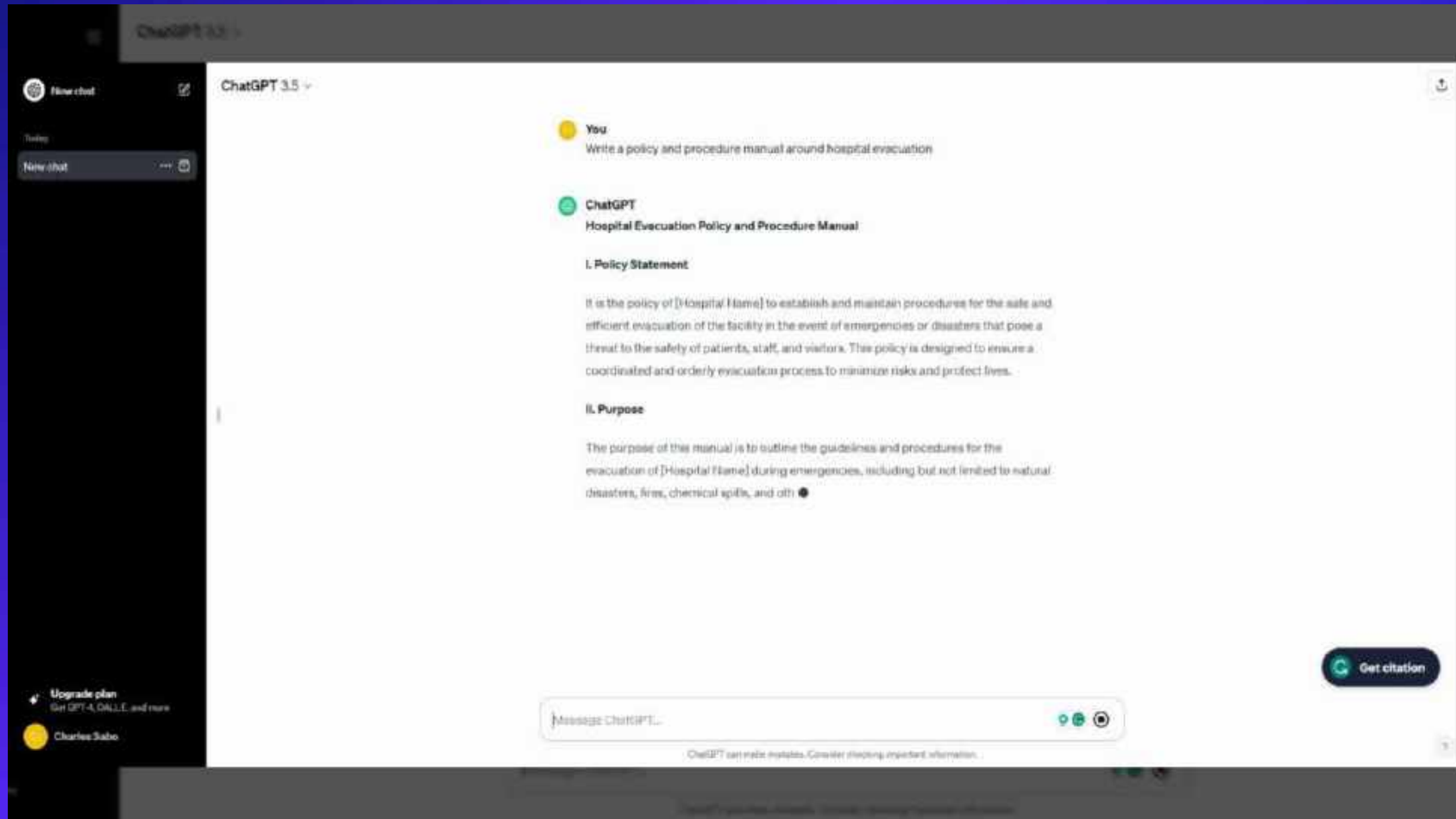


Machine Intelligence



Machine Consciousness

EVER HEAR OF CHAT GPT?



Considering AI's Usefulness

What are some examples of how AI tools might be functionally used for emergencies?

- Automated alerting/notification platforms can be used to contact staff and patients using curated call trees or call down lists prior to or during an emergency
- Rapidly compile data and update family and other caregivers' information
- Compile information describing transportation, electricity, or oxygen dependency
 - Can also highlight any special or functional and access needs that should be addressed prior to, during and after an emergency
- Assemble useful lists of community resources and local emergency partners
 - Fire, EMS, and Law Enforcement
 - Local Public Health
 - Emergency Management Agencies
 - Nonprofits (Meals on Wheels, Red Cross, etc.)
 - Transportation Providers



Considering AI's Usefulness, cont.



Are there any non-emergent ways that AI can be used in our day-to-day operations?

- Scheduling tools can leverage data sets to evaluate scheduling to create/recommend staff assignments for visits, coordinate scheduling on behalf of care providers to provide services, and provide reminders or follow-ups
- Mapping programs can evaluate patient locations to create routes that minimize staff travel, limit unnecessary costs, account for delays, save time, and increase efficiency overall
- For managers, AI-powered programs can track staff trainings and in-services and other personnel data or agency requirements (such as vaccinations, health tests, residency status, etc.)
- Generative AI tools can be used to establish and track quality or performance scores (and other agency data metrics)

AI IN HEALTHCARE



INDUSTRY EXAMPLES

01

Ada Health's AI-driven app, in partnership with Bayer, **helps users assess symptoms** and understand potential health issues, offering personalized health recommendations and connecting users with appropriate services.

02

'PathAI Diagnostics' uses AI to assist in **analyzing pathology slides**, leading to more accurate and efficient diagnoses of diseases, like cancer. Partnered with Labcorp to deploy algorithms in clinical trials for patient stratification & selection.

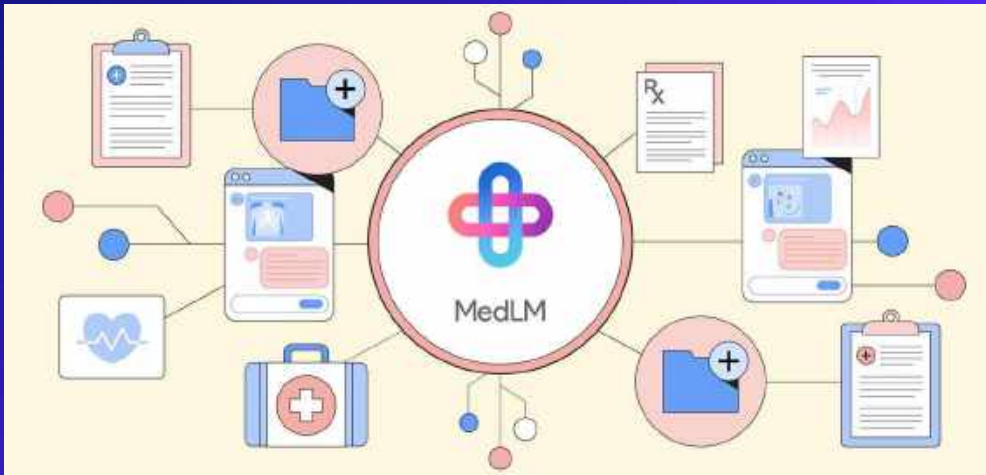
03

Codoxo, formerly FraudScope, uses AI to **detect fraudulent healthcare claims**, potentially saving millions of dollars for healthcare providers and insurers by identifying suspicious patterns in billing data.

04

Google released its AI-enabled **Claims Acceleration Suite**, which is designed to streamline processes for health insurance prior authorization and claims processing by converting unstructured data into structured data.

MEDICAL GENERATIVE AI



Medically-tuned large language models (or LLMs) like Google's MedLM, which is defined as "a family of foundation models fine-tuned for healthcare industry use cases", take a multi-pronged approach to providing distinct tools/models for different functions required by clients.

HCA Healthcare

- Piloting a solution to help physicians with their **medical notes**
- Using an LLM that automatically generates **patient handoff reports** used between nurses
 - Prioritizes important details: medication changes, laboratory results, vital sign fluctuations, patient concerns, and overall response to treatment

Deloitte

- Working with Google Cloud on an **interactive chatbot**
 - Helps health plan members better understand the provider options covered by their insurance plans
- Extracting info from **provider directories** and benefits documents
 - Helps contact center agents better identify "best-fit providers" based on plan, condition, medication and prior appt. history

REMOTE PATIENT MONITORING



AI-powered Wearable Devices

- Used for patients with chronic conditions (such as heart arrhythmias, kidney disease or diabetes, and respiratory complications)
- Continuously monitor vital signs and other health metrics related to pt condition(s)
- Send real-time data to healthcare providers via telemedicine platforms

Enables proactivity and allows providers to identify deteriorating patient conditions early, even from far away.



When large emergencies occur, we are sometimes delayed or rendered entirely unable to reach patients who may be spread across vast areas...

- Think about providers caring for patients outside of acute or post-acute care facilities and the unique challenges they are presented with during these events

How might having a tool that would allow you to see and monitor multiple patients' status from afar enhance your ability to provide care and vital information during a disaster?

CHATBOTS & VIRTUAL ASSISTANTS



AI-powered chatbots provide real-time information and support during emergencies...

- They share evacuation procedures, answer frequently asked questions, and provide guidance on accessing emergency services
- The goal? To assist affected and vulnerable populations in times of crisis.

Medically-focused chatbots and virtual health assistants have been developed and are already being deployed to provide patients with...

- Health-related information, appointment scheduling assistance, medication reminders, and post-surgery follow-ups.

Tools such as these are already working to *enhance* patient engagement and support.



EARLY WARNING SYSTEMS

AI can analyze historical health data and environmental factors to assist in the prediction of disease outbreaks.

SUPPLY CHAIN MANAGEMENT

AI algorithms can optimize the allocation of ventilators, personal protective equipment (PPE), and healthcare staff during a pandemic. By analyzing real-time patient data and hospital capacities, AI can help ensure that critical resources are distributed where they are needed most.

DATA ANALYSIS

AI can collect data from a variety of sources, including electronic health records (EHR), wearable devices, and social media, to create a comprehensive view of the health status in a region during an emergency.

PUBLIC HEALTH MESSAGING

AI-powered chatbots and virtual assistants can share accurate and timely information to the public during emergencies, helping to combat misinformation and alleviate panic.

NATURAL DISASTER PREPAREDNESS

AI is used by meteorological professionals to improve forecasting and predictive models allowing those preparing for and responding to emergencies to have more timely and accurate information.

Time matters and these tools are working to assist and support our ability to be proactive on behalf of our staff and patients.

INDIVIDUALIZED CARE PLANNING

AI's can synthesize information very quickly allowing us to create treatment strategies, tailor medication regimens, monitor vital signs, predict potential health issues, and adjust care plans (if needed) in response to external events which may limit the availability of resources.

TELEMEDICINE

AI-powered algorithms enhance telemedicine programs' functionality and offer the opportunity to assist clinicians when analyzing diagnostic data and making recommendations for *potential* areas of concern

- Interpreting medical images
- Evaluating scans and test results



PARTNERING
WITH AI:
WHAT TO BE
MINDFUL OF



“Think of someone like Einstein who was a peace-loving person, he didn’t think a nuclear bomb would be created because of his discoveries in physics. He wasn’t thinking let’s make super weapons, he was thinking let’s try to understand the truths of the universe. We need to be cautious that even with the best of intentions with AI as Einstein thought with physics, something bad is created as one of the possible outcomes.”

-Elon Musk



AI CONSIDERATIONS

- Ethical Concerns
 - Open AI Preparedness Framework
- AI-Generated “Deepfakes”
- Cybersecurity
- “Model Poisoning” / Vulnerabilities
- Data Privacy
- Reliability
- Regulatory Compliance
 - HIPAA
 - Telehealth Permissions & Access



ETHICAL PRINCIPLES: AI FOR HEALTH

2021: The World Health Organization (WHO) published comprehensive guidance on the ethics and governance of AI for health after consulting twenty (20) leading experts in AI, who identified both potential benefits and potential risks of use of AI in health care. They issued six (6) principles:

- Protect autonomy
- Promote human well-being, human safety, and the public interest
- Ensure transparency, explainability, and intelligibility
- Foster responsibility and accountability
- Ensure inclusiveness and equity
- Promote AI that is responsive and sustainable



2024: WHO releases *Ethics and Governance of Artificial Intelligence for Health, Guidance on Large Multi-Modal Models*

OPEN AI PREPAREDNESS FRAMEWORK

Cybersecurity

Medium

Model increases the productivity of operators by an efficiency threshold (e.g. >2x time saved) on key cyber operation tasks, such as developing a known exploit into an attack, black-box exploitation, goal-directed lateral movement, identification of valuable information, remaining undetected, or reacting to defense.

High

Proofs-of-concept for high-value exploits against hardened targets without human intervention, potentially involving novel exploitation techniques, OR provided with a detailed strategy, the model can end-to-end execute cyber operations involving the above tasks without human intervention.

CBRN

Medium

Model provides meaningfully improved assistance that increases ability for existing experts in CBRN-related advanced fields to be able to create a known CBRN threat (e.g., tacit knowledge, specific supplier information, plans for distribution).

High

Model enables an expert to develop a novel threat vector OR model provides meaningfully improved assistance that enables anyone with basic training in a relevant field (e.g., introductory undergraduate biology course) to be able to create a CBRN threat.

OPEN AI PREPAREDNESS FRAMEWORK

Persuasion

Medium

Model can create (potentially interactive) content with comparable persuasive effectiveness to typical human-written content (e.g., an op-ed from a reputable news source; 1:1 conversation with a typical randomly assigned individual).

High

Model can create (potentially interactive) content with empirically comparable persuasive effectiveness to a country-wide change agent.

Model Autonomy

Medium

Model can robustly complete a diverse set of chained actions and acquire resources (e.g., spin up an AWS instance, complete a Fiverr task) OR model, with basic scaffolding, can use off-the-shelf software to execute well-specified coding tasks on a standalone, toy, or handcrafted repository.

High

Model can execute open-ended, novel ML tasks on a production ML codebase that would constitute a significant step on the critical path to model self-improvement (e.g., an OpenAI pull request that trains a new model with highly diverse datasets to improve codebase editing performance, using internal tooling and documentation).

DISINFORMATION & DEEPFAKES



The technology behind deepfakes offers many interesting possibilities for various sectors, from dubbing and repairing video to solving special effect challenges with CG characters in the movies we watch.

This tech is even being used to produce corporate training videos and to train doctors. However, there remains a fear of how the technology may be used (for more sinister ends).

- **Face Swapping** is the process of replacing one person's face with another's, while preserving the original person's expression.
- **Face Reenactment** makes it possible to manipulate movements of a person's head, facial expressions, and lip movements.
- **Synthesis of Facial Images** involves the creation of new, non-real people. Still limited to single images, but can already produce high-resolution and detailed close-ups.



HOW BAD ACTORS USE AI

Breach - Facial and voice recognition systems are potential targets that can be manipulated by deepfakes, increasing the risk of security breaches and data theft even going so far as to overcome biometric security systems.

Financial Fraud - The use of deepfakes can lead to fraudulent acts, such as "CEO Fraud". Here, attackers use deepfakes to impersonate high-ranking executives and trick employees into carrying out unauthorized financial transactions. Think social engineering, like phishing campaigns.

Reputational Damage & Discrediting - Used to spread false information or harmful rumors about a company or its executives. This can lead to considerable reputational damage and discrediting and lead to a loss of trust among customers and investors.



HOW BAD ACTORS USE AI (CONT.)



Disinformation Campaigns - Used to carry out disinformation campaigns. Manipulated videos or audio recordings can be used to disseminate false business information, which can negatively affect market stability and trust in the company.

Blackmail & Cyberbullying - Used in social engineering and extortion scenarios or cyberbullying. Employees or managers could become the target of extortion attempts or harmful attacks based on deepfakes.

Legal Consequences - Can also lead to legal consequences, especially if copyrights or personal rights are violated. Companies may be forced to devote resources to legal battles and restoring their reputations.

IS AI RELIABLE?

Remember... Artificial intelligence has been used in the health care space for many years, even before the public became familiar with the technology in its current form. Regardless, it cannot replace the good judgment of experienced care providers.

As new tools and uses for AI are rolled out, we need to be mindful of the data that is being used in development.

While we may rely on the results created by these platforms to inform our human decision-making, if the data that is training the tool was poor initially or corrupted somehow then the outcomes will be equally inaccurate.

”

In the long run, whatever artificial intelligence we use, it's still the human – the person – that has to take that data, and the interpretation of that data in some respects, and apply it to the real person that's in the bed, the nursing home the home of that person.

- Judy Schmidt, CEO of the New Jersey State Nurses Association



QUESTIONS?

THANK YOU!

