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Artificial Intelligence 101

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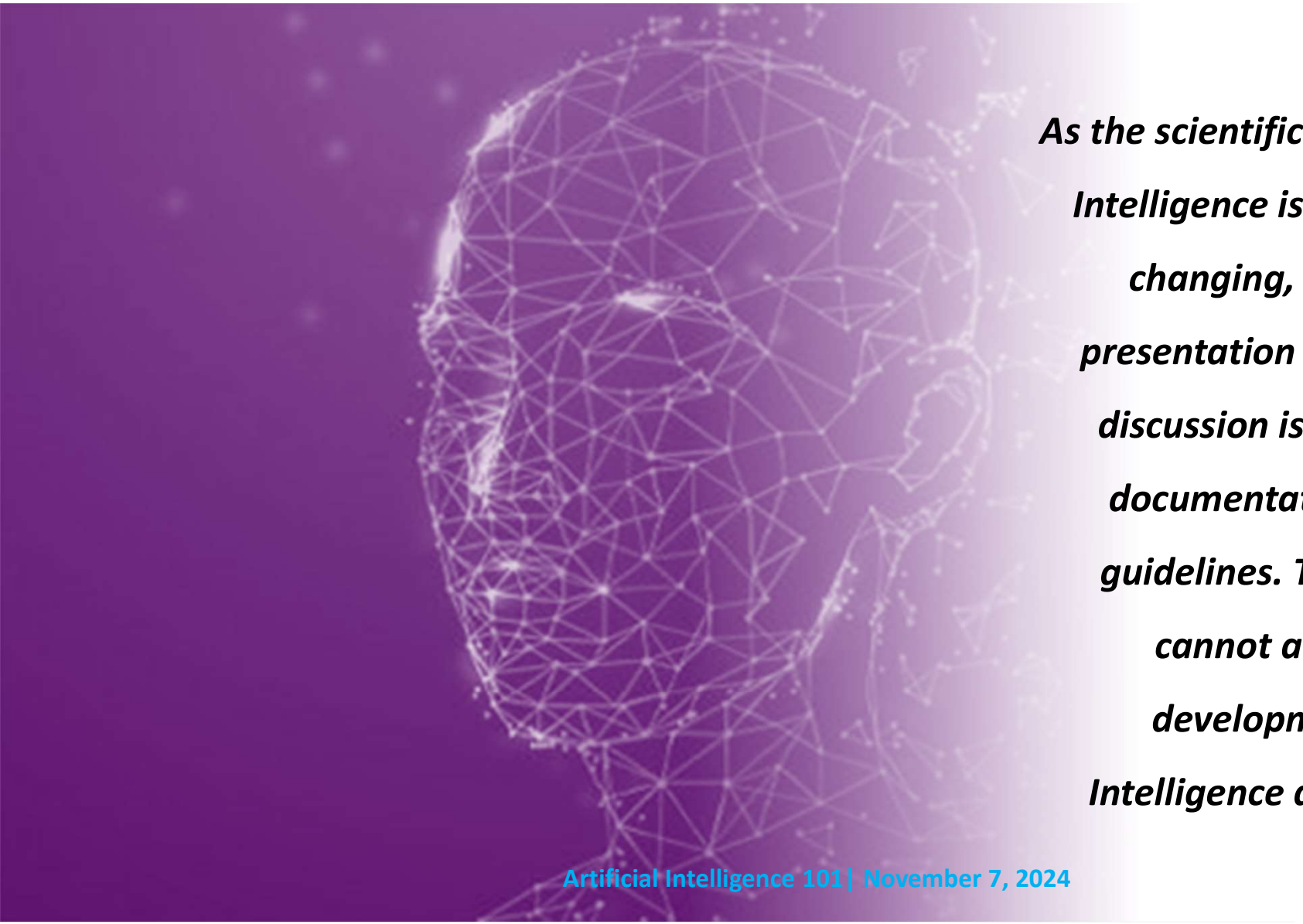

As the scientific field of Artificial Intelligence is vast and rapidly changing, the intent of this presentation and surrounding discussion is to inform future documentation and practice guidelines. This presentation cannot account for future developments in Artificial Intelligence and its oversight.

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What is Artificial Intelligence?

Definitions - What is Artificial Intelligence or AI?

The term “artificial intelligence” means a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. (15 USC § 9401(3))

AI, or artificial intelligence, refers to the simulation of human intelligence in machines designed to think and learn like humans. This includes abilities like understanding natural language, recognizing patterns, solving problems, and making decisions. (ChatGPT)

AI Concepts

AI Model - a component of an information system that uses AI technology and generates outputs based on provided parameters. AI Models apply different algorithms to relevant data inputs.[3]

Algorithms *are procedures, often described in mathematical language or pseudocode.*[4]

Machine Learning (ML) – a subfield of AI where algorithms are used to learn from data to discover patterns to drive further capabilities, such as prediction and decision-making, with limited human interaction.[5]

Deep Learning (DL) –a specialized subset of ML, mimics that of the human brain.[6]

AI Concepts

Generative AI – a class of AI models that emulate the structure and characteristics of input data in order to generate derived synthetic content.

*1-**Generates new content** that is similar but not identical to the input data*

*2-Texts, images, audio, and other **digital** content*[3]

Large Language Models (LLM) – trained on enormous amounts of data to provide foundational capabilities needed to run multiple applications and resolve a multitude of language-related tasks.[7]

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Overview and Applications of AI in Mental Health

Brief Overview of AI in Mental Health

Introduction of AI in Mental Health

- ELIZA (1960s, MIT): Early AI program simulating therapist conversation

Current AI Integration

- Techniques: Machine learning, natural language processing, data analysis
- Data Sources: Electronic Health Records (EHRs), Patient-Generated Health Data (PGHD)

Applications

- Enhancing current treatment and services by streamlining client assessments, personalizing treatment plans, providing real-time support (e.g., chatbots, virtual platforms)
- Using predictive analytics to identify high-risk individuals, implement early intervention and use preventative measures to improve mental health outcomes.

Enhancing Diagnostics - Examples

- **AI for Early Detection**
  - Analyzes an EHR chart (treatment history, clinical notes, etc.) to identify clients at higher risk for conditions such as anxiety and depression, and tailors their treatment plans more effectively.
- **Multisource Data Analysis**
  - Analyzes language in social media posts to detect changes in mood and potential signs of MH issues, such as depression.
  - Incorporates data from MH apps or surveys that client use to report their mood, thoughts, and experiences.
- **Real-Time Risk Assessment**
  - Collects physiological data (e.g., heart rate, sleep patterns, activity level) via wearable devices to assess physical changes that could indicate changes in mental health (e.g., stress, anxiety, depression).
  - Alerts clients and providers to potential changes in mental health (e.g., relapse) based on this data.

Enhancing Treatment Planning- Examples

- **Personalized Treatment Plans**
  - Analyzes client data (treatment histories, assessments, treatment responses) to personalize treatment plans.
- **Real-Time and Dynamic Treatment Adjustments**
  - Uses a real-time data analysis to modify treatment plan. For example, an MH app for bipolar disorder monitors mood, medication, and lifestyle factors, and alerts therapist in real time when mood trends downward and medication adherence is low. Therapist uses this information to make real-time treatment modifications (e.g., complete an outreach to the client, increase therapy frequency, consult the prescriber).
- **Tailored interventions**
  - Analyzes journal entries and mood data to identify specific cognitive patterns (e.g., overgeneralization) and adapt CBT interventions to address those patterns.

Predictive Analytics

Key applications

- **Crisis Prediction**
  - Flags clients (e.g., history of stress-triggered anxiety, suicidal ideation) for additional support, even if currently stable.
- **Treatment Prediction**
  - Predicts client responses to specific therapies based on historical data to select the most effective treatment.
- **Resource Management**
  - Identifies areas needing staff and resources, enhancing support for high-risk clients and addressing staffing shortages.

Data Integration
("PREDICTIVE DATA INTEGRATION")

- **Unified Data View**
  - Combines data from multiple sources for analysis by AI algorithms
- **Common Data Sources**
  - Clinical Information: EHR
  - Behavioral and Lifestyle Data: Patient-Generated Health Data (PGHD) from clients and caregivers, surveys, smartphones, apps and wearables.
- **Additional Data Types**
  - Mood rating scales, sociodemographic data, social determinants of health.

Data Integration Challenges

- **Data Quality**
  - Ensuring the quality and consistency of data from multiple sources can be difficult, as discrepancies can lead to inaccurate analyses.
- **Interoperability**
  - Different types of data can be stored in various formats, making it hard to combine them effectively.
- **Privacy and Security**
  - The absence of strict security regulations (similar to HIPAA) increases vulnerability to unauthorized access, data breaches and cyber threats.

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Improved Documentation; Client Engagement ; Implementing Data Privacy and Security Measures

Improved Documentation

1. Personalized treatment plans
2. Voice Recognition software
3. Chatbots in meetings/sessions
4. Electronic Health Records (EHR) Programming

OpenAI

What do you know about OpenAI?

Examples of OpenAI

- **One model of Open AI is defined as *"an advanced language model developed by OpenAI. It is designed to understand and generate human-like text based on the input it receives. Built on the GPT (Generative Pre-trained Transformer) architecture, it can engage in conversations, answer questions, provide explanations, and assist with various tasks across diverse topics."***
- Paid vs Free:
  - **more comprehensive resources or tools**
  - **more accurate and contextually relevant information regarding mental health issues**
  - **greater customization in documentation formats or tools**
  - **Ongoing updates**

Client Engagement and Support

- **AI is utilized in many ways to assist in client engagement**
  - *Appointment reminders*
  - *Utilized in online therapy platforms*
  - *Chatbot based therapies*
  - *Monitoring mood/wearables*
  - *Gamification*
  - *Guided meditation*
  - *Therapeutic Tools*

Implementing Data Privacy and Security Measures

- "To support the implementation of safety in AI systems, there must be protections preventing both physical and digital endangerment of human life, health, property, and the environment. This is achieved through responsible cybersecurity, development, and deployment practices from system owners as well as clear communication of responsible use and risks." CMS Playbook
- Risk of cyberattacks
- HIPAA compliance

Implementing Data Privacy and Security Measures

- CBH has not yet issued our own policy pertaining to use of AI.
- Thus far, we have cautioned CBH staff not to upload PHI or CBH proprietary information to platforms such as Chat GPT.

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Regulatory / Legal Considerations

Artificial Intelligence Oversight - 2024

Federal

Comprehensive federal legislation or regulations do not yet exist to regulate the development or use of AI

There are laws that might address AI with "limited application"

Federal guidelines and frameworks do exist

National Institute of Standards and Technology (NIST) is currently holding discussion to develop federal standards

Regulatory agencies have started to apply existing law to AI

Artificial Intelligence Oversight

State

45 States / US Territories introduced AI bills in 2024

31 States / US Territories adopted resolutions or enacted legislation about AI issues in 2024

Pennsylvania

- Executive Order 2023-19 – Expanding and Governing the Use of Generative Artificial Intelligence Technologies Within the Commonwealth of Pennsylvania
- Act No. 125 Combating AI Generated Child Porn and Deepfakes
- House Bill 1663 proposed September 2023 to regulate the use of AI in health insurance

Artificial Intelligence Oversight - 2024

AI Companies

Several leading AI companies – OpenAI, Microsoft, Anthropic, Inflection, Amazon, Google, Meta – have voluntarily committed to, "help move toward safe, secure, and transparent development of AI technology."

These companies are focusing on:

- Testing of AI systems before their release
- Sharing information on managing AI risks
- Investing in safeguards
- Developing mechanisms to ensure users know when AI content is generated

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Ethical Considerations & Monitoring of AI

(Oversight & Bias Mitigation)

Ethical Considerations

- **Patient Autonomy**
  - Informed Consent
  - Empowerment
- **Transparency & Explainability**
  - Disclosure & Consent to Use of AI
  - Explanation of How/Why AI is used
- **Data Privacy & Security**
  - HIPAA Compliance & PHI Protection
- **Accountability**
  - Providers retain ultimate responsibility for patient care decisions
  - Reporting Mechanisms
- **Access and Inequality**
- **Impact on Provider-Patient Relationships**
  - Maintain Trust & Human Connection
- **Bias & Fairness**
  - Bias in AI can lead to disparities in outcomes
  - Equality and equity

AI Is Not Immune to Bias

- What is Bias
  - Bias is an effect that deprives a statistical result of representativeness by systematically distorting it
- Types of Bias
  - Systemic bias
  - Computational and statistical biases
  - Human-Cognitive Bias

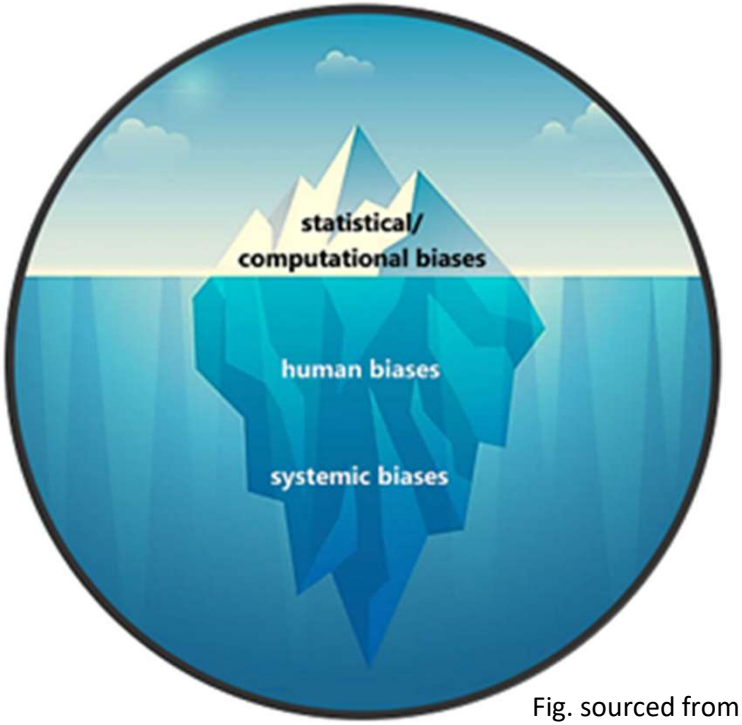

Fig. sourced from NIST

Examples

Diagnostic Disparities

An AI system trained primarily on data from specific demographics may fail to accurately diagnose or assess conditions in individuals from diverse backgrounds. This could lead to misdiagnosis or inadequate treatment recommendations for minority groups.

Treatment Recommendations

If the AI model suggests treatment plans based on historical data that reflect biases in treatment access (e.g., certain therapies being more frequently prescribed to certain demographic groups), it might overlook effective options for underrepresented populations, leading to inequitable care.

Access to Resources

An AI system that recommends resources or support services based on historical usage patterns may inadvertently prioritize services more commonly accessed by certain groups. This could limit access to critical resources for those from different backgrounds or lower socioeconomic statuses.

How Users Can Mitigate Bias

- **Be Mindful of AI Utilized:**
  - Advocating for/ engaging with AI which has diverse datasets, inclusive practices, diverse stakeholders & Transparent design
  - Identifying and communicating potential biases to AI developers to address biases encountered in real-world applications(User Feedback Loops).
- **User Education/ Training**
  - Educate users about the limitations and potential biases of AI systems, fostering critical thinking when interpreting AI outputs.
  - Human in Loop

Oversight & Training

- **Get Informed**
  - Understand how staff is interacting with AI (if you're unsure)
  - Consider how your organization wants to interact with AI
  - Create internal policy & procedures on use of AI, developing feedback loops with developers of AI systems to promote trustworthy AI
- **Train**
  - Educate users about the limitations, risks, potential biases of AI & foster critical thinking when interpreting AI outputs
  - Continue to prioritize quality staff via training efforts (AI should not be used to replace staff skill/expertise)
- **Set Clear Goals**
  - Define clear, ethical objectives for AI usage & the potential impact of the AI applications used.
  - Create measures to assess risk, impact to care, effectiveness, value, user satisfaction etc.

Monitoring of AI

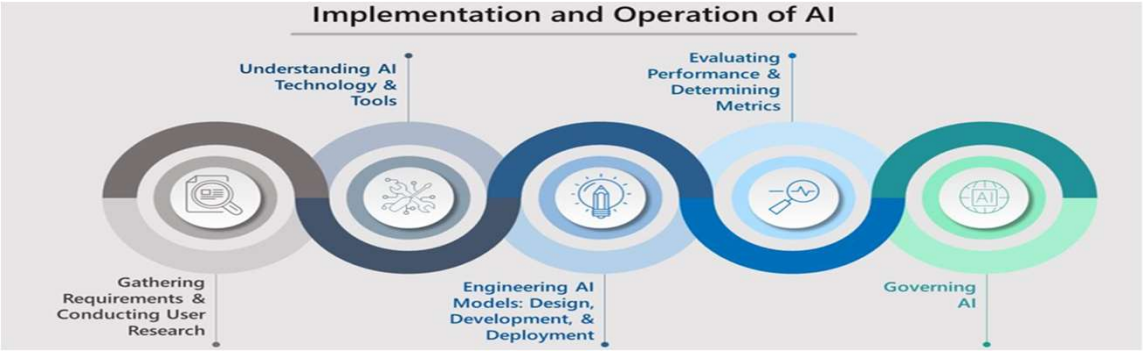

Fig. from CMS Playbook

- **Clear Performance Metrics**
  - Monitoring clinical outcomes
  - User engagement levels
  - Error rates in AI outputs
  - Soliciting feedback from both patients and providers
- **Maintain Human Involvement & Ethical Oversight**
  - Human In Loop, Human interpretation of outputs, ethical decision making

"Ensuring Traceability & auditability of the decision-making processes and factors that make up each AI-based solution."- CMS Playbook

How Can we Prepare for Future Regulations, Now?

- Develop policies and procedures for improving organizational accountability efforts
  - Related to AI usage, system risks & contingency management
- Looking to CMS and NIST for suggestions and risk assessment & AI Governance
  - Keeping up to date with regulations, legislation and applicable research as it develops
- Safeguarding Patient Rights (HIPAA Compliance)
- Maintain Human Involvement & Ethical Oversight
  - Human In Loop, Human interpretation of outputs, ethical decision making
- Utilizing 'Trustworthy' AI
  - Transparency, Explainability, Data Integrity
- Monitoring Impact & Outcomes
  - Alignment with KIPs, Patient Satisfaction

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Roundtable Discussion

CBH Program Integrity staff and FORUM Participants discuss current AI use, risk areas, and future practice guidelines

Roundtable Summary

Issues with AI:

- **AI using data from unauthorized databases**
- **Issues protecting Member information**
- **Issues with offshore storage of data**
- **Documentation not correctly depicting services**
- **Transparency of AI use with Members**
- **Clinical skills eroding as Clinicians rely more on AI**
- **Costs of AI use, AI monitoring, and insurance**
- **Free versions contain higher risk**
- **Amount of time Supervisors take investigating unauthorized AI use**
- **Potential for future legal ramifications**

Roundtable Discussion

Considerations:

- **Transparency of AI use and receiving Member consent**
- **Provider IT Departments may be able to limit unauthorized use of AI by Provider staff**
- **Provider staff suggested CBH receive Provider feedback in guideline development**

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