Trinity Washington University Symposium on Artificial Intelligence

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Learning Outcomes

By the end of this presentation, you would be able to:

• Appreciate artificial intelligence (AI) as the 4th IR.

• Show the potential benefits and abuses of AI in healthcare.

• Explain the need for AI ethics for healthcare.

• Recognize the practical solutions for adherence for AI ethics in health.

Defining Artificial intelligence

- "Artificial Intelligence (AI) refers to the ability of algorithms encoded in technology to learn from data so that they can perform automated tasks without every step in the process having to be programmed explicitly by a human." (WHO, 2021).

AI - 4th Industrial Revolution

- AI driven by big data - fueling the 4th industrial revolution.

- Together, big data and AI are generating a new type of AI called data intelligence.

Cautious optimism – Stephen Hawking

- *"Our future is a race between the growing power of technology and the wisdom with which we use it"*- Stephen Hawking

- Professor Stephen Hawking advised AI advocates to use caution, stating: **"Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks."**

The Power of AI in Health and Medicine

➡ Geoffrey Hinton, possibly the Godfather of AI, noted that AI is already delivering huge benefits in health care. AI is at present analogous with radiologists at understanding medical images, and AI is already designing drugs.

➡ AI can accelerate drug development and drug discovery vis-à-vis truncating the process and make it less expensive and more effective (Fleming, 2018).

➡ AI was employed to identify probable treatments for the Ebola virus disease (Atomwise, 2015).

The Power of AI in Health and Medicine

- In LMIC, AI may be employed to upgrade detection of tuberculosis through interpreting staining images (Xiong et al., 2018), or for scanning X-rays for indications of tuberculosis, COVID-19 or 27 other conditions (Mandavilli, 2020).

- AI has been employed to 'now-cast' (measure the current state) of the COVID-19 pandemic (Cho, 2020).

The Power of AI in Health and Medicine

➡ Telemedicine has helped with the shift from hospital to home-based care, facilitated by AI technologies (video-observed therapy for tuberculosis and virtual assistants for patient care).

➡ AI could be employed to predict illness or some major health events prior to their occurrence, e.g., to measure the relative risk of disease, so as to prevent lifestyle diseases as cardiovascular disease (Fan et al., 2020) and diabetes (Yan et al., 2019).

Recent Cases of Unethical Use of AI in Healthcare

- IBM's Watson supercomputer issued treatment recommendations using only a handful of hypothetical cancer cases, so offering unsafe and inaccurate medical advice, thereby posing a health and safety threat to patients (Ross and Swetlitz, 2018).

- The UK Information Commissioner's Office (ICO) indicated that data from 1.6 million patients was delivered to Google's DeepMind without appropriately informing patients or obtaining their consent (Powles and Hodson, 2017).

- Black patients spend an average of $1100–1800 less per year than White patients for a particular level of disease burden. The AI algorithm generated racial disparities via seeing Black patients' healthcare needs as lower, when they require as much coordinated healthcare as white patients. (Obermeyer et al. 2019).

Inadequate Humanistic Approach

- Thus far, there is no ample international guidance on use of AI for health in keeping with ethical norms and human rights standards, that is, utilizing a humanistic approach.

AI Benefits Rely on a Humanistic Approach

- However, for AI to have a beneficial impact on public health and medicine, ethical considerations and human rights must take center stage in the design, development, deployment, and assessment of AI technologies for health.

- For AI to be used effectively for health, prevailing biases in healthcare services and systems based on race, ethnicity, age, and gender, that are encoded in data used to train algorithms, must be incapacitated. **So using high-quality, comprehensive datasets is critical.**

All Actors are Involved

- For starters, how should we address unethical uses in healthcare?

- In developing, designing, deploying, and monitoring of AI in healthcare, not only healthcare practitioners should be responsible, but all actors involved in the supply chain of AI algorithms.

Practical Solutions for Adherence to Ethical AI in Healthcare

Proposed 'Ethics' frameworks:

- SHIFT: Sustainable AI, Human-centric AI, Inclusive AI, Fair AI, Transparent AI – 5 core themes (See next slide).

- Reviewing 253 articles over 20 years (2000-2020) generated this SHIFT framework (Siala and Wang, 2022).

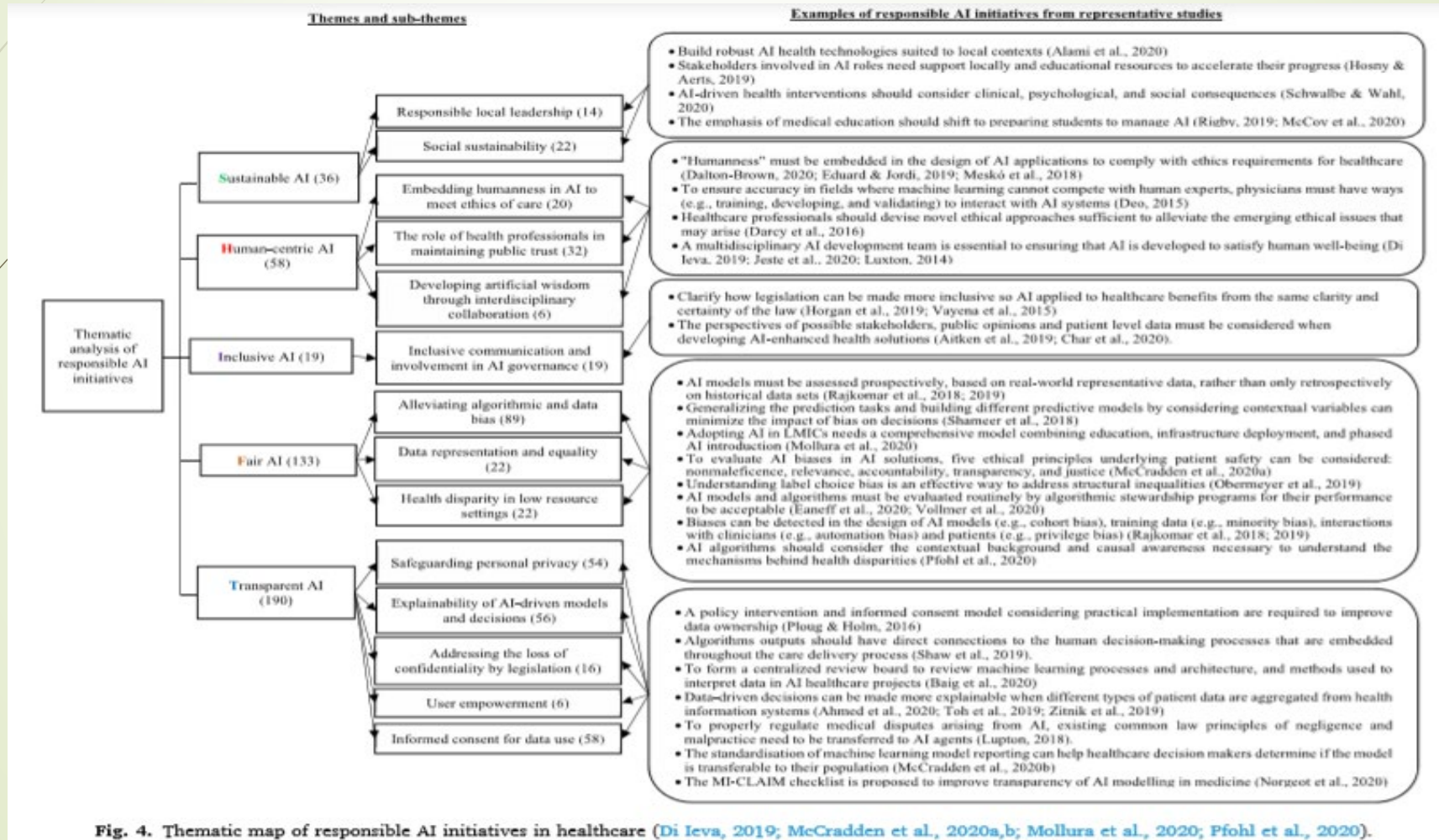# Practical Solutions for Adherence to Ethical AI in Healthcare

Fig. 4. Thematic map of responsible AI initiatives in healthcare (Di Ieva, 2019; McCradden et al., 2020a,b; Mollura et al., 2020; Pfohl et al., 2020).

Practical Solutions for Adherence to Ethical AI in Healthcare

- Early 2020, the European Commission commissioned the High-Level Expert Group (HLEG) on AI to develop guidelines for developing, deploying, and use Trustworthy AI, viz:

  - Respect for human autonomy

  - Prevention of harm

  - Fairness and explicability

  The HLEG even suggested possible ways of assessing AI on the following criteria:

  Human agency and oversight; technical robustness and safety; privacy data governance; transparency; diversity, non-discrimination and fairness; environmental and societal well-being; and accountability.

Evidence on Trustworthy AI

- Extracting evidence on whether there is movement on achieving Trustworthy AI ((Karimian et al., 2022), based on 2166 articles between 2010 and 2020) showed that fairness, preservation of human autonomy, explicability and patient privacy often appeared in the literature.

- Prevention of harm was least studied.

- Evidence on the application of the criteria (previous slide) to assess the Trustworthy AI was largely missing in the literature.

Practical Solutions for Adherence to Ethical AI in Healthcare

- The WHO Expert Group (2021) offered the following AI ethical guidelines: (1) Protect autonomy; (2) Promote human well-being, human safety, and the public interest; (3) Ensure transparency, explainability, and intelligibility; (4) Foster responsibility and accountability; (5) Ensure inclusiveness and equity; (6) Promote AI that is responsive and sustainable.

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