

Artificial Intelligence in Health IT – The Good, The Bad, The Ugly (Part 1)

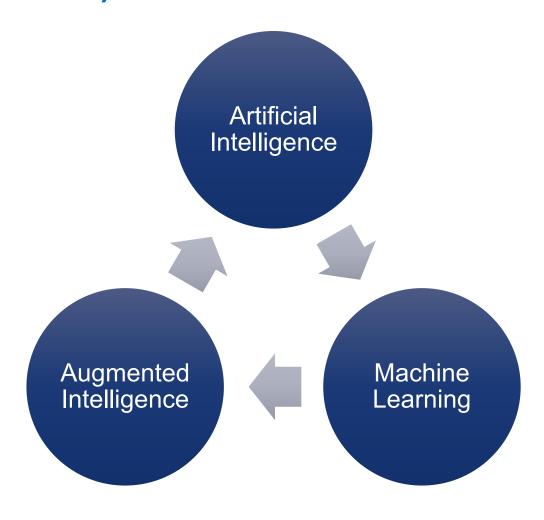
A Joint Clinician Panel with the American Medical Association







Artificial Intelligence in Health IT – The Good, The Bad, The Ugly (Part 1)







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- Andrew Gettinger, MD, Moderator
 - Chief Clinical Officer, The Office of the National Coordinator for Health IT
- Danielle Whicher, PhD, MHS
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- Hassan A. Tetteh, MD, MBA, FACS, FACHE
 - Health Mission Chief for Warfighter Health, Joint Artificial Intelligence Center, Department of Defense
- Jesse M. Ehrenfeld, MD, MPH
 - Chair, Board of Trustees, American Medical Association



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Danielle M. Whicher

Mathematica Policy Research



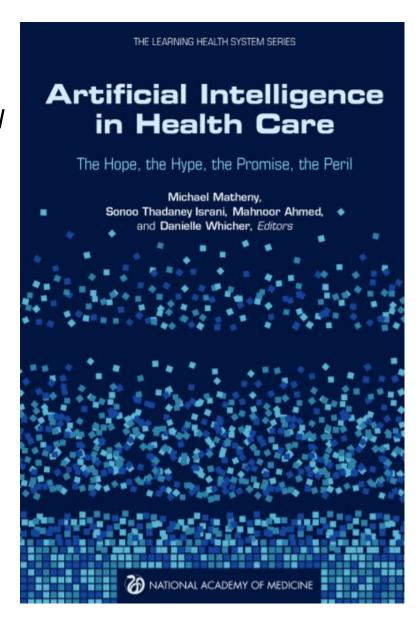




NAM Publication Aims and Audience

- Develop a reference document for model developers, clinical implementers, clinical users, and regulatory and policy makers to:
 - understand the strengths & limitations of AI/ML
 - promote the appropriate use of these methods & technologies in healthcare
 - highlight areas of future work needed to facilitate the broader use of AI/ML in healthcare

https://nam.edu/artificial-intelligence-special-publication/







NAM Publication Conceptual Organization

Chapter 2
Al Overview

Chapter 3

Al Promise & Hope

Chapter 4
Al Peril & Hype

Chapters 5 & 6
Use Case
Utility

Chapter 5 Model Development Chapter 6
Implementation
Maintenance

Chapter 7
Legislation & Regulation

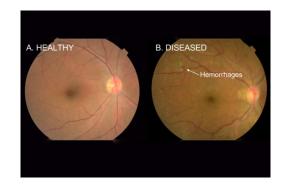


Health Care Al Applications

- Patients and families
 - Self management of chronic diseases
 - Assistance for people with cognitive disabilities

- Clinical care teams
 - Diagnosis and risk assessment
 - Personalize treatment plans
 - Information retrieval and visualization



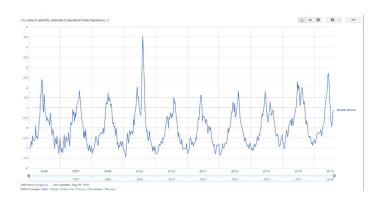


Health Care Al Applications

- Health systems/hospital administration
 - Patient scheduling
 - Identifying fraudulent claims
 - Prior authorization

- Public health
 - Disease surveillance
 - Monitoring air pollution









Key Considerations Moving Forward

- **Health care data**: data access, bias, standardization, reporting of data quality, and patient privacy
- **Transparency:** data transparency versus algorithmic transparency depends on factors such as risk, performance, and user trust and liability
- Level of automation: near term focus on augmented intelligence
- Regulatory environment: environment is evolving; the goal should be balancing innovation with appropriate oversight/protection
- Training and education: for clinical users, AI developers, and other relevant stakeholders
- Deployment environments: system need a robust and mature underlying information technology (IT) governance strategy



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Jesse M. Ehrenfeld, M.D., M.P.H., FAMIA, FASA

@DoctorJesseMD

Chair, Board of Trustees

American Medical Association







No ordinary trends....

National specialty shortages

Geographic mismatches

Aging of Baby Boom living longer

Growing demand on safety net

Growing demand for caregivers and physicians

Dropping birth rates in US and globally

Fewer funding safety net

Shrinking ratio of physicians to patients

Shrinking number of caregivers

Physician burn-out

Overwhelmed with data

Overall technology without emphasis on user-centered design





AMA Policy Development

- Learnings from 2016 survey of 1300 physicians
 - Physicians are optimistic about digital medicine tools.
 - Physicians have the greatest enthusiasm for the clinical benefit and work efficiencies provided by digital tools.
- 2017 AMA Board of Trustees adopts advocacy principles on health care Al
- 2018 AMA House of Delegates adopts policy on Health Care Augmented Intelligence (AI)
 - Rapidly evolving systems should augment and scale the capabilities of physicians, the broader health care team, and patients in **achieving the quadruple aim in health care**.
- Specifically, Al systems should:
 - Enhance the patient experience of care and outcomes;
 - Improve population health;
 - Reduce overall costs for the health care system while increasing value; and
 - Support the professional satisfaction of physicians and the health care team.





Al In General

- Augmented Intelligence (AI) is an alternative conceptualization that focuses on AI's assistive role, emphasizing the fact that its design enhances human intelligence rather than replaces it.
- Machine Learning (ML) is a part of the discipline of artificial intelligence and refers to constructing algorithms that can make accurate predictions about future outcomes. Machine learning can be supervised or unsupervised.
- When thinking about AI, you must ask "what type of AI systems are we discussing?"





Key Attributes for AI in Health Care – AMA policy

- Al is designed to enhance human intelligence and the patient-physician relationship rather than replace it
- Keeping with best practices in user-centered design
- Al systems must be based on risk of harm and benefit accounting for a host of factors
- Is explainable
- Clinically validated
- Conforms to leading standards for reproducibility
- Address bias and avoids introducing or exacerbating health care disparities
- Safeguards patients' and other individuals' privacy interests
- Rapidly evolving systems should augment and scale the capabilities of physicians, the broader health care team, and patients in achieving the quadruple aim in health care.





Al In Health Care - Opportunities

- Office and hospital automation patient scheduling, order entry, chat bots, voice recognition, etc.
- Diagnosis analyze all the known data about the patient and produce insights
- Treatment analyze the diagnosis and all other known data and produce best practice treatments, perhaps even comparing to "patients like me" data
- Additional time for physicians to spend with patients to focus on their health
- Improve patient experience and aid behavioral change and treatment compliance





There is not a single health care AI system, application, or method, but many. Systems may use one or more methods and likely have different risk profiles and benefits:

Research AI – All Algorithms **Business/Administrative Operations** Quality Assurance Data Based / Machine Learning Compliance and Program Integrity Population Health Rules Based Locked or Continuous Learning? Risk Stratification **Clinical Decision Support** Deep learning **Patient Decision Support** Autonomous, Assistive, Hybrid Diagnostic | Therapeutic What is the level of risk based on application? What is the level of risk based on the method/system?



AMA Resources

• Additional AI resources available from AMA: https://www.ama-assn.org/amaone/augmented-intelligence-ai



3 ways medical Al can improve workflow for physicians

The real promise of health care Al is to enhance the work of physicians, not to replace them. Discover three ways Al may improve physicians' workflow.



Don't fall for these 3 myths about AI, machine learning

With the future of health care innovation being shaped by Al and machine learning, it is important to debunk common myths about both subject matters.



Unlocking the potential of digital health care

Evolving technologies could lead to great advances in health care, but it is important ensure that they don't intensify pre-existing disparities.



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Ochsner Health System pursues high tech for high patient impact

Members Moving Medicine: See how Ochsner Health System uses innovative technology to predict patient deterioration.



The Office of the National Coordinator for Health Information Technology

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Should the Al space be regulated?

Precision Regulation for Artificial Intelligence By Ryan Hagemann, IBM Policy Lab co-Director (Musahington, DC) & Jean-Marc Lecterc, IBM Policy Lab co-Director (Blussett)

Among companies building and deploying artificial intelligence, and the consumers making use of this technology, trust is of paramount importance. Companies want the comfort of knowing how their AI systems are making determinations, and that they are in compliance with any relevant regulations, and consumers want to know when the technology is being used and how (or whether) it will impact their lives.

62% of Americans and 70% Europeans

prefer a precision regulation approach for technology, with less than 10% in either region supporting broad regulation of tech. 85% of Europeans and 81% of Americans support consumer data protection in some form, and 70% of Europeans and 60% of Americans support AI regulation.

As outlined in our Principles for Trust and Transparency, IBM has long argued that AI systems need to be transparent and explainable. That's one reason why we supported the OECD AI Principles, and in particular the need to "commit to transparency and responsible disclosure" in the use of AI systems.

Principles are admirable and can help communicate a company's comminents to citizens and consumers, But it's past time to move from principles to policy. Requiring disclosure — as appropriate based on user-case and end-user — should be the default expectation for many companies creating, distributing, or commercializing AI systems. In an earlier Policy Lab essay, we articulated a disclosure requirement for law enforcement user-cases of facial recognition technology. Something similar should be required of AI more generally in order to provide the public with appropriate assurances that they are being

treated fairly and equitably by AI-based determinations in sensitive use-cases.

That is why today we are calling for precision regulation of AI. We support trappeted policies that would increase the responsibilities for companies to develop and penate trustworthy AI. Given the ubegluty of AI – it touches all of us in our daily lives and work – there will be no one-size-first-all rules that an properly accommodate the many unique characteristics of every industry making use of this technology and its impact on individuals. But we can define an appropriate risk-based AI governance policy framework based on three pillars:

- Accountability proportionate to the risk profile of the application and the role of the entity providing, developing, or operating an A system to control and mitigate unintended or harmful outcomes for consumers.
- Transparency in where the technology is deployed, how it is used, and why it provides certain determinations.
- Fairness and security validated by testing for bias before AI is deployed and re-tested as appropriate throughout its use, especially in automated determinations and high-risk applications.

Wisely, the OECD AI Principles suggest a solid accountability bedrock for this framework, arguing that "Iglovernments should promote a policy environment that supports an agile transition from the research and development stage to the deployment and operation stage for trustworthy AI systems." This implicit recognition Bloomberg



Photographer: Luke MacGregor/Bloomberg

IBM Proposes Artificial Intelligence Rules to Ease Bias Concerns

By Ben Brody and Olivia Carville January 21, 2020, 4:00 AM EST

IBM Policy Lab

ibm.com/policy



Google CEO: 'Artificial intelligence needs to be regulated'

BY EMILY BIRNBAUM - 01/21/20 12:43 PM EST



Photographer: Greg Nash



The

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 - Director of Cognitive Informatics, MedStar National Center for Human Factors in Healthcare
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Al In Health Care - Challenges

- Data structure, integrity, privacy and security
- Demonstrate that AI can reduce costs, deliver the quadruple aim, support the patient-physician relationship, and/or alleviate administrative burden
- Implement and integrate AI into clinical practices and patient care
- Susceptibility to training bias
- Questions as to who will benefit and who may lose
- Al-enabled products that will likely not be FDA-regulated (e.g., administrative-type functions) or otherwise exempt from FDA regulation





Additionally, Al opportunities and challenges lead to questions physicians will need to confront:

- What evidence is needed to demonstrate value, utility, and trust? To whom?
- Oversight for AI benefits and risks, and how to communicate these to the public?
- How can patient and clinician expectations be managed, and concerns allayed?
- User/consumer education and training?
- Integration into clinical workflows?
- How will risk be allocated, given the "black box" nature of many AI systems?





Liability

- Innovators/vendors/manufacturers/health systems should not inappropriately shift risk downstream.
- Those best positioned to have knowledge of AI risks are best positioned to minimize harm.
- Protections should be established for the clinically appropriate use and reliance on healthcare AI.
- Where regulatory oversight is limited, black-box, proprietary AI without explainability should be subject to strict liability.



Oversight/regulation

- Healthcare Al presents unique opportunities to advance patient and consumer health; so too will it potentially present new and novel harms to patient and consumer safety.
- Oversight of healthcare AI should be risk based. Categorization of risk should be based on intended use as well as reasonably expected use.
- The AMA supports FDA's efforts to create a new pathway to FDA approval/clearance and recognizes the challenges the agency faces in working through this process. However, any new oversight structure must ultimately ensure patient safety.
- There will be a tremendous amount of technologies coming forward and an incredibly uncertain regulatory oversight structure to ensure safety—this poses challenges for everyone.
- We strongly urge government agencies to collaborate closely on issues of regulation of Alenabled products.





Data integrity, bias and privacy

- Health care Al systems must account for a host of factors, including efficacy, equity and taking steps to address bias
- Will consumers...
 - Know how their data may be used, by whom, and if solutions or services are being derived from their data?
 - Control how their information is accessed, used, and disclosed by entities collecting data?
 - Know whether their health data will be used to develop and/or train machines or algorithms?
 - Be protected from discrimination, stigma, and exploitation occurring during collection of data and deployment of the AI/ML?
- Health data should not be used to discriminate against individuals, including creation of "risk scores" that could hinder patients and their families from receiving health, disability, or life insurance.

The Office of the National Coordinator for Health Information Technology

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Al in Healthcare: Hope, Hype, Promise, Peril

Sonoo Thadaney Israni

Executive Director, Presence (a Stanford Medicine Center), Stanford University















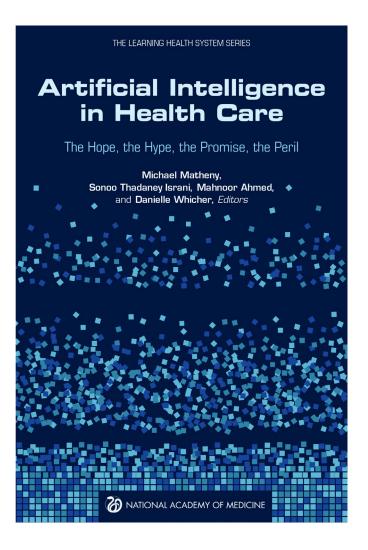


Special NAM Publication

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Michigan











Presence champions the human experience in medicine.

Being present is essential to the well-being of both patients and caregivers, and it is fundamental to establishing trust in all human interactions. Being present is integral to the art and the science of medicine and predicates the quality of medical care.











"Humans were always far better at inventing tools than using them wisely."

uval Nou Harari 21 Lessons for the





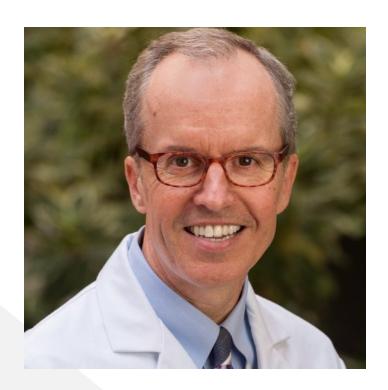


"Will AI ever replace radiologists?

I say the answer is no—but radiologists who use AI will replace radiologists who don't."

Curtis P. Langlotz, MD, PhD

Professor of Radiology and Biomedical Informatics





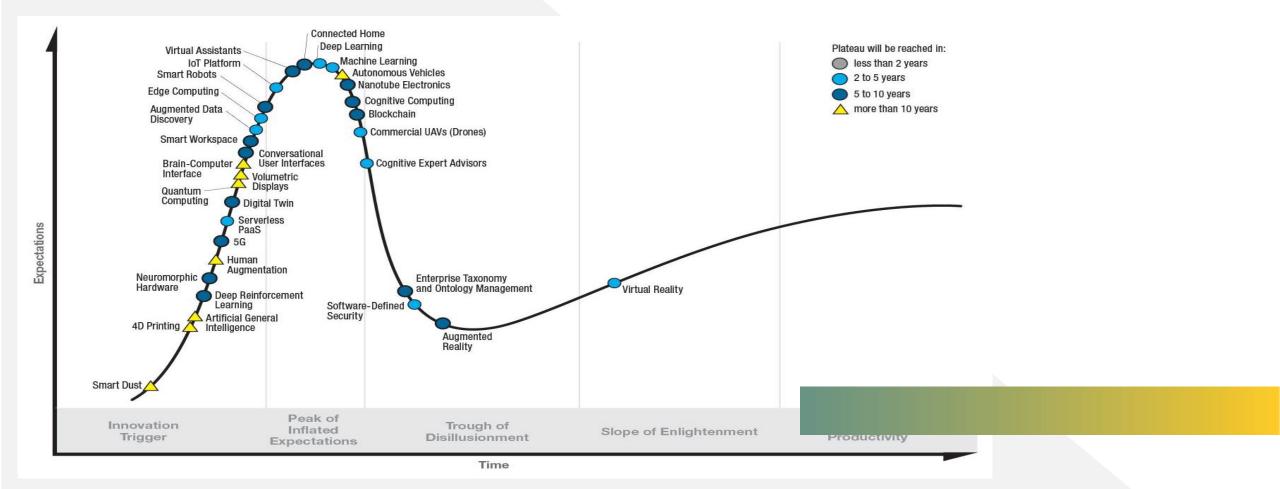






Gartner Hype Cycle

Jonathan H Chen, Steven M Asch, Machine Learning and Prediction in Medicine Beyond the Peak of Inflated Expectations, New England Journal of Medicine (2017)











THE DATA SCIENCE HIERARCHY OF NEEDS

LEARN/OPTIMIZE

AGGREGATE/LABEL

EXPLORE/TRANSFORM

MOVE/STORE

COLLECT

AI, DEEP LEARNING

A/B TESTING, EXPERIMENTATION, SIMPLE ML ALGORITHMS

ANALYTICS, METRICS, SEGMENTS, AGGREGATES, FEATURES, TRAINING DATA

CLEANING, ANOMALY DETECTION, PREP

RELIABLE DATA FLOW, INFRASTRUCTURE, PIPELINES, ETL, STRUCTURED AND UNSTRUCTURED DATA STORAGE

INSTRUMENTATION, LOGGING, SENSORS, EXTERNAL DATA, USER GENERATED CONTENT

Source: Monica Rogati's Medium post "The Al Hierarchy of Needs"



























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"Al Could Reinvent Medicine—Or Become a Patient's Nightmare

The Mayo Clinic will store health data in Google's cloud and use its Al expertise to unearth insights. But Google has made mistakes before..."

A Sunday Times bestseller

THE AGE OF SURVEILLANCE CAPITALISM

THE FIGHT FOR A
HUMAN FUTURE
AT THE NEW
FRONTIER OF POWER

SHOSHANA ZUBOFF











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This Issue

Views 26,223 | Citations 11 | Altmetric 100

Viewpoint

July 17, 2018

HIPAA and Protecting Health Information in the 21st Century

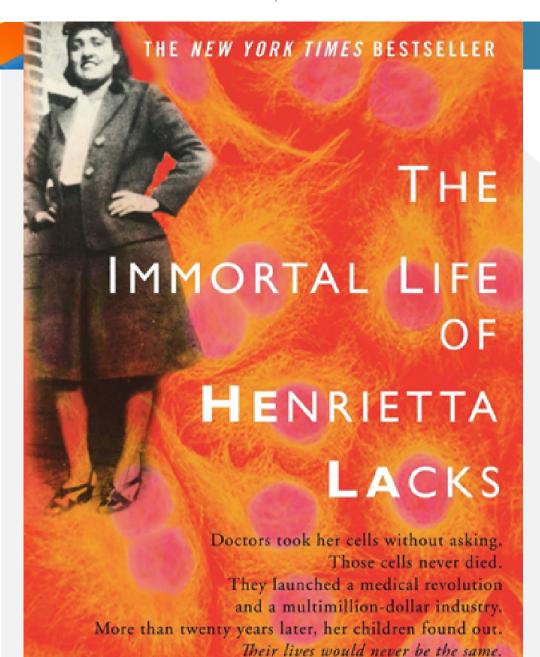
I. Glenn Cohen, JD¹; Michelle M. Mello, JD, PhD²

JAMA. 2018;320(3):231-232. doi:10.1001/jama.2018.5630







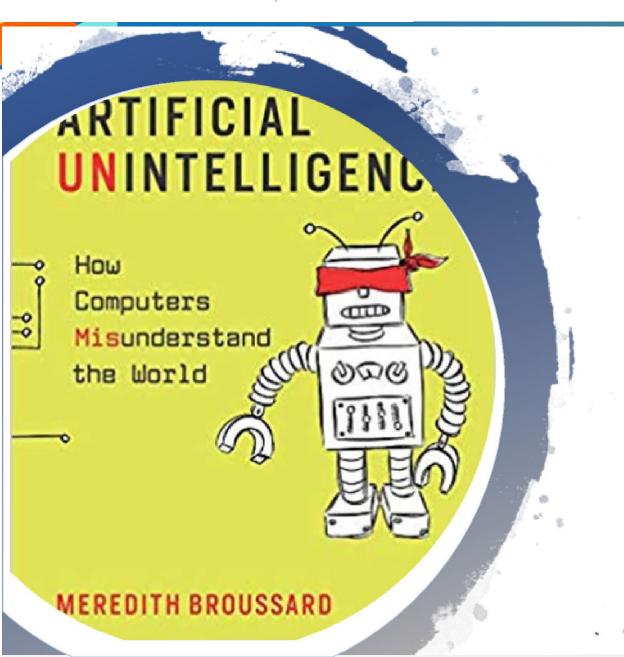


Privacy
Confidentiality
Privilege

"Digital HeLa?"

Research Ethics for De-identified Big Data" (work in progress)





Appropriate AI in health CARE

Techno-chauvinism

We Can. Should we?







Appropriate Al in health CARE

Man told he's going to die by doctor on video-link robot











Unintended consequences







more empowered to demand justice." — NAOMI KLEIN

Unintended consequences

AUTOMATING INEQUALITY

HOW HIGH-TECH TOOLS PROFILE, POLICE, AND PUNISH THE POOR



WEAPONS OF / MATH DESTRUCTION



HOW BIG DATA INCREASES INEQUALITY

AND THREATENS DEMOCRACY

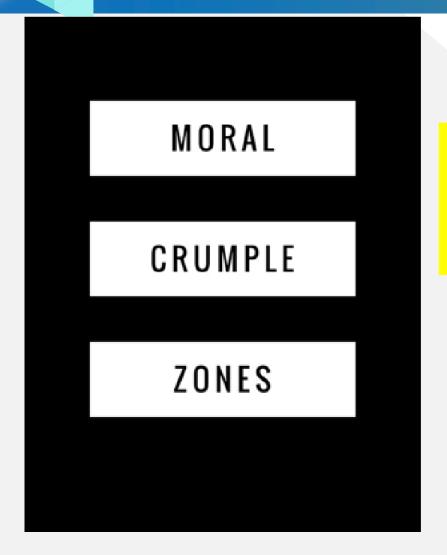
CATHY O'NEIL











Viewpoint October 4, 2019

JAMA Network[™]

Potential Liability for Physicians Using Artificial Intelligence

Unintended consequences

Moral Crumple Zones: Agency & Accountability in Human-Al Interaction

with MADELEINE CLARE ELISH, Data & Society









Framework for implementing Al via lens of human rights values

What do we value?

How are we each responsible?

We can, but should we?

What does
Human Centered mean?
To humans, for humans, by humans?

How do we define progress, quality of life, well-being?

Who knows, who decides, who decides who decides?

Shoshana Zuboff
 The Age of Surveillance Capitalism

Source: Mathaney, M., S. Thadaney, M. Ahmed, and D. Whicher, editors. Forthcoming (2019). Artificial Intelligence and Health Care: The Hope, the Hype, the Promise, and the Perils. Washington, DC: National Academy of Medicine.Reprinted with permission from Judy Estrin. Based on a slide Estrin shared at The Future of Human-Centered AI: Governance Innovation and Protection of Human Rights Conference, Stanford University, April 16, 2019.

nature > news > article

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Preventable



NEWS · 24 OCTOBER 2019 · UPDATE 26 OCTOBER 2019

Millions of black people affected by racial bias in health-care algorithms

Study reveals rampant racism in decision-making software used





Quintuple Aim

"That which is measured, improves."

Karl Pearson
Statistician & founder of mathematical statistics

Source: Mathaney, M., S. Thadaney, M. Ahmed, and D. Whicher, editors. Forthcoming (2019). Artificial Intelligence and Health Care: The Hope, the Hype, the Promise, and the Perils. Washington, DC: National Academy of Medicine.

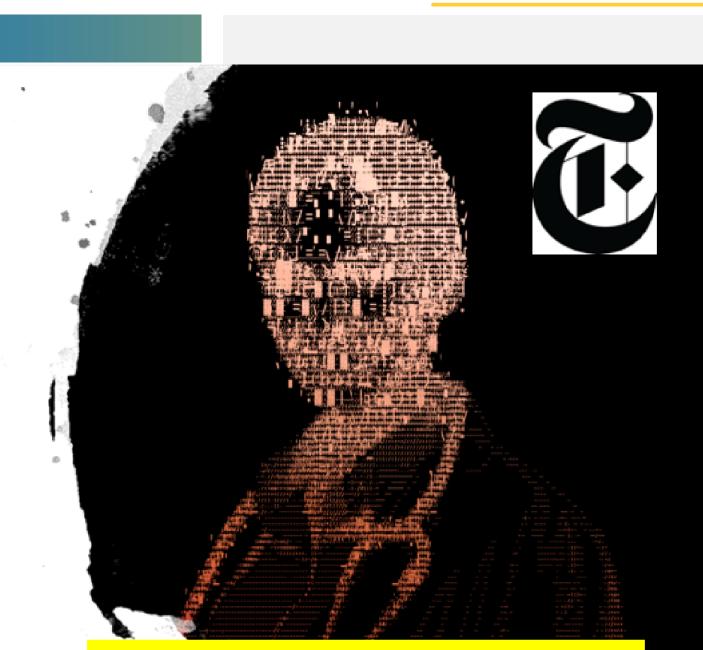


"We need sufficient regulatory scrutiny so

that we don't have debacles like that of Theranos, a company that claimed it could perform comprehensive lab tests from just a few drops of blood.

Technology that is not subject to such scrutiny doesn't deserve our trust, nor should we ever allow it to be deeply integrated into our work."

Abraham Verghese, MD







HOW ARTIFICIAL

INTELLIGENCE

CAN MAKE

HEALTHCARE

HUMAN AGAIN



"If you've ever experienced deep pain, you know how lonely and isolating it is, how no one can really know what you are feeling, the anguish, the sense of utter despair. You can be comforted by a loved one, a friend or relative, and that certainly helps. But it's hard to beat the boost from a doctor or clinician you trust and who can bolster your confidence that it will pass, that he or she will be with you no matter what. That you'll be okay.

That's the human caring we desperately seek when we are sick.

That's what AI can help restore.

We may never have another shot like this.

Let's take it." Eric Topol, MD

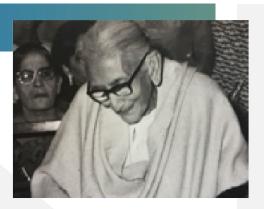
Moving Forward

















This is personal





Thank you!



Sonoo Thadaney Israni, MBA Executive Director, Stanford University Presence Center (Stanford Medicine) Al hype and risks Sonoo Thadaney Israni, MBA
Executive Director, Stanford University
Presence Center (Stanford Medicine)

2020 ONC Annual Meeting

Connecting Policy and Technology: Bringing the EHR to the Patient







The Office of the National Coordinator for Health Information Technology

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