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

- **Andrew Gettinger, MD, Moderator**
  - Chief Clinical Officer, The Office of the National Coordinator for Health IT

- **Danielle Whicher, PhD, MHS**
  - Health Researcher, Mathematica

- **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
Artificial Intelligence in Health IT -- The Good, The Bad, The Ugly

A Joint Clinician Panel with the American Medical Association

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/
Health Care AI 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 AI 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
No ordinary trends....

<table>
<thead>
<tr>
<th>National specialty shortages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic mismatches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aging of Baby Boom living longer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing demand on safety net</td>
</tr>
<tr>
<td>Growing demand for caregivers and physicians</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dropping birth rates in US and globally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer funding safety net</td>
</tr>
<tr>
<td>Shrinking ratio of physicians to patients</td>
</tr>
<tr>
<td>Shrinking number of caregivers</td>
</tr>
</tbody>
</table>

- 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 AI

• 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, AI 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.
AI 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

- AI is designed to enhance human intelligence and the patient-physician relationship rather than replace it
- Keeping with best practices in user-centered design
- AI 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.
AI 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
- Business/Administrative Operations
- Quality Assurance
- Compliance and Program Integrity
- Population Health
- Risk Stratification
- Clinical Decision Support
- Patient Decision Support
- Diagnostic| Therapeutic

What is the level of risk based on application?

What is the level of risk based on the method/system?

AI – All Algorithms
- Data Based / Machine Learning
- Locked or Continuous Learning?
- Deep learning

Autonomous, Assistive, Hybrid
AMA Resources

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

Andrew Gettinger, MD
Andrew.Gettinger@hhs.gov
@ag1

Phone: 202-690-7151

Health IT Feedback Form: https://www.healthit.gov/form/healthit-feedback-form

Twitter: @onc_healthIT

LinkedIn: Search “Office of the National Coordinator for Health Information Technology”

Subscribe to our weekly eblast at healthit.gov for the latest updates!
Artificial Intelligence in Health IT – The Good, The Bad, The Ugly (Part 2)

A Joint Clinician Panel with the American Medical Association
Should the AI space be regulated?

IBM Proposes Artificial Intelligence Rules to Ease Bias Concerns

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

Google CEO: 'Artificial intelligence needs to be regulated'

BY EMILY BIRNBAUM - 01/21/20 12:43 PM EST
Artificial Intelligence in Health IT – The Good, The Bad, The Ugly (Part 2)

• Andrew Gettinger, MD, Moderator
  • Chief Clinical Officer, The Office of the National Coordinator for Health IT

• Jesse M. Ehrenfeld, MD, MPH
  • Chair, Board of Trustees, American Medical Association

• A. Zach Hettinger, MD, MS, FACEP, FAMIA
  • Director of Cognitive Informatics, MedStar National Center for Human Factors in Healthcare

• Sonoo Thadaney Israni, MBA
  • Executive Director, Stanford Presence Center, School of Medicine, Stanford University
Artificial Intelligence in Health IT -- The Good, The Bad, The Ugly (Part 2)

Jesse M. Ehrenfeld, M.D., M.P.H., FAMIA, FASA
@DoctorJesseMD
Chair, Board of Trustees
American Medical Association
No ordinary trends….

<table>
<thead>
<tr>
<th>National specialty shortages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic mismatches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aging of Baby Boom living longer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing demand on safety net</td>
</tr>
<tr>
<td>Growing demand for caregivers and physicians</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dropping birth rates in US and globally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer funding safety net</td>
</tr>
<tr>
<td>Shrinking ratio of physicians to patients</td>
</tr>
<tr>
<td>Shrinking number of caregivers</td>
</tr>
</tbody>
</table>

- Physician burn-out
- Overwhelmed with data
- Overall technology without emphasis on user-centered design
AMA policy on AI

• 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 AI

• 2018 AMA House of Delegates adopts policy on Health Care Augmented Intelligence (AI)
  • AI’s role in enhancing patient care, improving population health, reducing overall costs, increasing value and the support of professional satisfaction for physicians.
  • 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, AI 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.
AI 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
AI 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
- AI-enabled products that will likely not be FDA-regulated (e.g., administrative-type functions) or otherwise exempt from FDA regulation
Additionally, AI 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 AI 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 AI-enabled products.
Data integrity, bias and privacy

• Health care AI 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.
AMA Resources

- Additional AI resources available from AMA: https://www.ama-assn.org/amaone/augmented-intelligence-ai
AI in Healthcare: Hope, Hype, Promise, Peril

Sonoo Thadaney Israni
Executive Director, Presence (a Stanford Medicine Center), Stanford University
Special NAM Publication

Andrew Auerbach, MD, University of California San Francisco
Andy Beam, Harvard University
Paul Bleicher, MD, PhD, OptumLabs
Wendy Chapman, PhD, University of Utah
Jonathan Chen, Stanford University
Hossein Estiri, PhD, Harvard Medical School
James Fackler, MD, John Hopkins School of Medicine
Steve Fihn, MD, MPH, FACP, University of Washington
Guilherme Del Fiol, MD, PhD, University of Utah
Anna Goldenberg, PhD, University of Toronto
Seth Hain, MS, Epic
Jaimee Heffner, Fred Hutchinson Cancer Research Center
Edmund Jackson, PhD, Hospital Corporation of America
Jeffrey Klann, PhD, MEng, Harvard Medical School
Rita Kukafka, DrPH, MA, Columbia University
Hongfang Liu, PhD, FACMI, Mayo Clinic
Michael Matheny, MD, MS, MPH, Vanderbilt University *
Doug McNair, MD, PhD, Cerner
Eneida Mendonca, MD, PhD, University of Wisconsin Madison
Joni Pierce, MBA, J Pierce & Associates
Nicholson Price, University of Michigan
Joachim Roski, PhD, MPH, Booz Allen Hamilton
Suchi Saria, Johns Hopkins University
Nigam Shah, MBBS, PhD, Stanford University
Sonoo Thadaney, MBA, Stanford University *
Ranak Trivedi, Stanford University
Jenna Wiens, University of 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.”
“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
THE DATA SCIENCE HIERARCHY OF NEEDS

LEARN/OPTIMIZE

AGGREGATE/LABEL

EXPLORE/TRANSFORM

MOVE/STORE

COLLECT

Source: Monica Rogati’s Medium post “The AI Hierarchy of Needs”
AI needs population representative data or GIGO

AI-triggered
Healthcare Inequity
“AI Could Reinvent Medicine—Or Become a Patient's Nightmare

The Mayo Clinic will store health data in Google's cloud and use its AI expertise to unearth insights. But Google has made mistakes before...”
HIPAA and Protecting Health Information in the 21st Century

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

Author Affiliations | Article Information
“Digital HeLa?”

*Research Ethics for De-identified Big Data* (work in progress)
Appropriate AI in health CARE

Techno-chauvinism

We Can. Should we?
Appropriate AI in health CARE

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

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

with MADELEINE CLARE ELISH, Data & Society
Framework for implementing AI via lens of human rights values

What do we value?  How are we each responsible?

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

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

We can, but should we?

Who knows, who decides, who decides who decides?

— Shoshana Zuboff
The Age of Surveillance Capitalism

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

“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
“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
This is personal
Thank you!

Sonoo Thadaney Israni, MBA
Executive Director, Stanford University Presence Center (Stanford Medicine)
Contact ONC

Andrew Gettinger, MD
Andrew.Gettinger@hhs.gov
@ag1

Phone: 202-690-7151
Health IT Feedback Form: https://www.healthit.gov/form/healthit-feedback-form
Twitter: @onc_healthIT
LinkedIn: Search “Office of the National Coordinator for Health Information Technology”

Subscribe to our weekly eblast at healthit.gov for the latest updates!