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Comment on Chapters 1–4 Laura C. Rosella

Building Blocks for AI in Health Care

Advances in AI are increasing rapidly across many sectors; however, the impact in health care has been more limited in comparison. It has become clear that health care's complexity, system actors, data context, and regulatory requirements necessitate a different approach. This comment will discuss themes relating to health decision making, data challenges, and the potential for regulatory innovation raised by the contributing authors to this volume.

Across the invited papers, the complexity of the health care environment and, more specifically, the motivations, actors, and built-in incentives were articulated. Together these factors drive the unique context in which health care operates and point to advances needed for the next phase of health AI. In health care, where decisions have significant implications for patient care, there is an understandable reluctance to rely on AI, despite several examples highlighted across the papers that show improved accuracy and economic benefits. Health care decisions vary widely across clinical tasks and inherently involve trust at multiple levels. There is obvious trust needed between the patient and health care provider; however, there is an equally important level of trust required by clinicians and the measured or observed information about their patients that is the basis of their clinical decisions. In health care, there has been an increasing trend toward transparency and explicit reasoning over the past four decades, particularly following the evidence-based medicine movement (Scott, Cook, and Coiera 2021). For AI to translate from a well-developed idea to day-to-day impact, designing for this decision-making context is needed. (Bottou 2014) The future of AI in health care will require intentional and specific design that allows for transparency, trust, and justification of decisions. To inform this evolution, there is a need for real-world testing with rigorous evaluations within health care environments. These evaluations will inform how to optimize AI that overcomes the identified barriers related to decision making.

Increasing trust in AI can be enhanced by providing information alongside AI to support reasoning, but equally important is to ensure trusted systems are in place for oversight and monitoring. One of the main concerns about the uptake of AI in health care is the potential harm due to systematic prediction errors, especially for those that already face discrimination in society (Obermeyer et al. 2019). Ultimately, in order to instill confidence

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for use in health care environments, there is a need to ensure transparency, reproducibility, and rigor in the validation of models that underpin AI (Rosella 2022). To ensure this oversight takes place independently, systematically, and appropriately for AI, it needs to be backed by the regulatory innovations called for in Stern's analysis.

The implementation of electronic medical records (EMRs) in health care has resulted in numerous challenges and unintended consequences, including provider burnout (Li et al. 2022). Those who work in health care frequently argue that EMRs were not set up to succeed in the realities of health care and should serve as an important lesson to those developing AI technologies. To avoid a similar fate, there should be an initial phase of intense study of the health care setting, for example, through ethnographic approaches. By contrast, most AI developed for health care start with the data generated from health care and build the technology from there. One needed change would be to instead start with the people and environments before the data and algorithms. By designing for the health care context first, there is an increased likelihood of adoption and opportunities to build trust and accountability, thereby forming the basis for change and improvement.

All papers in this volume reflect on the challenges with health data quality and the barriers to data access. Increased granularity of health data, more comprehensive data elements, and open data access are essential to build, validate, and update AI models, but the challenge of health data access proves to be one of health care's most thorny problems. Several new data platform models are now emerging, aiming to balance the ethical and confidential use of personal health information with the need for transparency, reproducibility, and diversity of data required for robust AI. Obermeyer presents a proposed data platform solution representing a welcome shift in the health data ecosystem. Ongoing work linking multiple data streams, including capturing people's sociodemographic and environmental characteristics, will be needed to improve AI performance and mitigate against potential biases.

The papers in this volume point to the building blocks needed for AI to have a meaningful impact in health care. The first is acknowledging and designing AI to support the reasoning and transparency needed for health care decisions. Second is the need for an intentional and more detailed understanding of the complex health care environment, behaviors, and motivations within in order to design AI solutions that work with and not against these realities. Third, efforts must be made to enrich the data used to develop AI, and there is a continued need to ensure this data is made available in a responsible way that allows for improved AI performance, fairness, and reproducibility. Finally, there is a clear need for innovative models of regulation and continuous oversight of AI used in health care that measures performance over time and the impact on patient outcomes.

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