


Informatics and Big Data: “PRO”

William Hersh
Professor and Chair
Department of Medical Informatics & Clinical epidemiology
Oregon Health & Science University

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Despite the problems related to data and algorithms, there is much potential value to

- Clinical decision support
- Health care quality
- Public health surveillance
- Patient engagement
- Clinical research
- Use of machine learning and artificial intelligence



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Clinical decision support

- Old news but still unsolved – medical errors, patient safety, and more
- Came to fore with IOM “errors” report
 - Institute of Medicine (US) Committee on Quality of Health Care in America, 2000. *To Err is Human: Building a Safer Health System*. National Academies Press (US)
- Safety has improved but problems persist and solutions not taken up
 - Making Healthcare Safer III, 2020. AHRQ. <http://www.ahrq.gov/research/findings/making-healthcare-safer/mhs3/>

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Health care quality

- Old news but still unsolved – quality not as good as it could be
 - McGlynn et al., 2003. The Quality of Health Care Delivered to Adults in the United States. *New England Journal of Medicine* 348, 2635–2645
 - Ganguli et al., 2021. Low-Value Care at the Actionable Level of Individual Health Systems. *JAMA Intern Med* 181, 1490–1500
- Can improve quality of care by leveraging data for learning health system
 - Bastarache et al., 2021. Developing real-world evidence from real-world data: Transforming raw data into analytical datasets. *Learning Health Systems*, e10293

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Public health surveillance

- Old news but still unsolved – we blew the last pandemic; will we handle the next one?
 - Gottlieb, S., 2021. *Uncontrolled Spread: Why COVID-19 Crushed Us and How We Can Defeat the Next Pandemic*. Harper
- Opportunities for doing better, including with data, for the next one(s)
 - DeSalvo et al., 2021. Medicine's Role in Reimagining Public Health: Reuniting Panacea and Hygeia. *JAMA Health Forum* 2, e214051
 - National Academy of Medicine, 2022. *Emerging Stronger from COVID-19: Priorities for Health System Transformation*

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Patient/consumer engagement

- Patients/consumers want access to data, knowledge, and health system engagement
 - Reed et al., 2019. Patients with complex chronic conditions: Health care use and clinical events associated with access to a patient portal. *PLoS One* 14, e0217636
 - Boston et al., 2021. *Integrating Patient-Generated Digital Health Data into Electronic Health Records in Ambulatory Care Settings*. AHRQ Digital Healthcare Research. <https://digital.ahrq.gov/ahrq-funded-projects/integrating-patient-generated-digital-health-data-electronic-health-records>
 - *Most Americans Want to Share and Access More Digital Health Data*, 2021. Pew Charitable Trusts. <https://pew.org/3B9DJXg>
 - Ross, C., 2022. Call it data liberation day: Patients can now access all their health records digitally. *STAT*. <https://www.statnews.com/2022/10/06/health-data-information-blocking-records/>

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Clinical research

- Growing amounts of data from EHR, patients, and other sources – complementing but not replacing randomized controlled trials (RCTs)
 - Sauer et al., 2022. Leveraging electronic health records for data science: common pitfalls and how to avoid them. *Lancet Digit Health* S2589-7500(22)00154-6
- Biobanks offer full range of multimodal data, from EHR to omics to personally generated data, e.g.,
 - <https://www.ukbiobank.ac.uk/>
 - <https://allofus.nih.gov/>

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Use of machine learning and artificial intelligence

- Algorithms can see and diagnose as well as clinicians
 - Topol, E., 2022. The amazing power of “machine eyes.” Ground Truths. <https://erictopol.substack.com/p/the-amazing-power-of-machine-eyes>
- Other breakthroughs promise advances
 - AlphaFold
 - Jumper et al., 2021. Highly accurate protein structure prediction with AlphaFold. *Nature* 596, 583–589
 - Voice recognition – major contribution to solving documentation burden problem

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Thank you!

William Hersh, M.D.
Professor and Chair
Department of Medical Informatics & Clinical
Epidemiology
Oregon Health & Science University
Portland, OR, USA
Email: hersh@ohsu.edu
Web: www.billhersh.info
Blog: <https://informaticsprofessor.blogspot.com/>
Twitter: @williamhersh

