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AI and machine learning

Recent advances in neuroscience and genetics are providing a new view of brain function in health and disease.[1] As discussed in Drs. Hripsime Kalanderian and Henry Nasrallah's article "Artificial intelligence in psychiatry" (Evidence-Based Reviews, Current Psychiatry. August 2019, p. 33-38), machine learning technologies are capable of analyzing vast amounts of personal and biologic data for diagnosing and treating mental disorders.

In a 2016 article, Dr. Arshya Vahabzadeh[2] wrote, "In the near term, humans will continue to make the majority of psychiatric diagnoses and provide treatment." He predicted that data science—specifically machine learning—will help revolutionize how we diagnose, treat, and monitor depression. He foresees a future where AI machines or learning machines will more accurately diagnose and treat depression.

These predictions remind us of the promises made with the introduction of psychoactive drugs to the practice of psychiatry. In the 1970s, the increased emphasis on neurotransmitters led to new biologic models of mental illness and the expansion of the *Diagnostic and Statistical Manual of Mental Disorders*. The increased use of psychoactive medications relegated the practice of psychotherapy to other mental health professionals. Psychiatry became a "drug-intensive" specialty, and psychiatrists saw themselves as psychopharmacologists.[3] During this time, psychiatry became progressively dominated by the pharmaceutical industry. The deregulation of the markets and the for-profit ideology of the pharmaceutical industry resulted in an economically and mutually beneficial alliance between pharmaceutical companies, academic faculty, and individual psychiatrists.

Using the same for-profit ideology and ethics of the pharmaceutical industry, technology-based corporations are making massive investments in the application of these technologies in neuroscience research and clinical practice. The "promise" that AI will diagnose and treat depression more accurately than clinicians will again radically change the psychiatrist's role. Most of a psychiatrist's clinical work eventually will be replicated by machine learning and technicians. The human-to-human encounter that is at core of the profession will be replaced by the machine-to-human encounter.[4]

From the social economic perspective, the American health care system is designed to increase profit and maximize the earnings of the industries.[5] Unless social policy changes, expensive new technologies will increase the cost and limit accessibility to health care, benefiting the few at the expense of the majority of people. These technologies will produce a robust return on investment, but the wealth they create will benefit fewer and fewer people.

Several writers have called attention to the social, economic, and ethical consequences of these advances and recommended that the academics and technologists who support AI and machine learning in medicine must "receive sufficient training in ethics" and gain exposure to social and economic issues.[6] Darcy et al[7] warns of the risks of introducing these advanced technologies in medicine: "As machine learning enters the state-of-the-art clinical practice, medicine thus has the immense obligation to ensure that this technology is harnessed for societal and individual good, fulfilling the ethical basis of the profession.… Ethical design thinking is essential at every stage of development and application of machine learning in advancing health. Toward this aim, physicians with integrity and sophistication should partner closely with computer and data scientists to reimagine clinical medicine and to anticipate its ethical implications. It is important to systematically validate data from mobile health and consumer-facing technologies, particularly for cases in which dynamic intervention is provided."

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