

Editorial

Artificial intelligence in medicine and healthcare

*Liang-Kung Chen, MD, PhD^{1,2}

¹Aging and Health Research Center, National Yang Ming University, Taipei, Taiwan

²Center for Geriatrics and Gerontology, Taipei Veterans General Hospital, Taipei, Taiwan

2210-8335/Copyright © 2018, Asia Pacific League of Clinical Gerontology & Geriatrics. Published by Full Universe Integrated Marketing Limited.

Maybe someday, the doctors providing you healthcare will no longer be a human being. Behind the screen, artificial intelligence is actively operating to provide diagnosis and treatment recommendations. However, this scenario may or may not arrive in the near future. Automation and artificial intelligence are developed at an incredible pace and are gradually changing the nature of the workplace.¹ A report from McKinsey in 2017 estimated that approximately half of working activities may be replaced by automation and/or artificial intelligence. This phenomenon triggers extensive discussions of how jobs and work opportunities will affect individuals and what societal impacts may be triggered or generated. Among all topics where artificial intelligence is playing an increasingly significant role, medicine and healthcare are specific domains to be extensively investigated and discussed in recent years.²⁻⁴ The exponential growth of medical knowledge and the lack of time and capacity for physicians to handle vast amounts of constantly increasing information substantially highlights the potentials of artificial intelligence in medicine and healthcare. Despite the great benefits of artificial intelligence, various concerns have been raised regarding the “human touch” of medicine and healthcare since both are highly people-focused professions.

Currently, artificial intelligence in medicine and healthcare refers to the application of various automated technologies in the diagnosis, treatment and prediction of outcomes among patients who need different types of health services. Although diagnosis and treatment seem simple on many occasions, they require extensive professional background, knowledge and logical thinking. In brief, diagnosis and treatment processes generally consist of the following steps:

- (1) Collecting patients' data, physical examinations, and laboratory tests;
- (2) Analyzing collected data and results;
- (3) Providing diagnosis based on collected information and matching it with previous information and knowledge;
- (4) Selecting appropriate treatment plans based on the diagnosis;
- (5) Administering the treatment plans for patients;
- (6) Monitoring the treatment responses and re-evaluating the diagnosis and treatments.

Based on the above-mentioned steps, artificial intelligence may do better than doctors in many ways, but increased use of artificial intelligence in medicine and healthcare eventually could raise certain ethical dilemmas and bring about many issues of concern. Most physicians reported that they spent much more time performing data entry and desk work during the office consultation than actually talking to patients. If the introduction of artificial intelligence can effectively save time and effort for physicians and promote more interaction between patients and doctors, automation and artificial intelligence could truly improve doctor-patient relationship and quality of care.

***Correspondence**

Liang-Kung Chen, MD, PhD
Center for Geriatrics and
Gerontology, Taipei Veterans
General Hospital
E-mail:
lkchen2@vghtpe.gov.tw

DOI: 10.24816/jcgg.2018.v9i3.01

Keywords

artificial intelligence
automation
healthcare
medicine

However, can artificial intelligence be sophisticated and “intelligent” enough to cover every dimension of medicine and healthcare? Literally, the answer is no at present time, especially in those with complex care needs.^{5,6} However several possibilities have been proposed that could be beneficial:

- (1) Decision support systems to provide possible diagnoses for doctors when seeing patients;
- (2) Laboratory information systems to continuously track patients’ data for early detection of certain conditions;
- (3) Robotic surgery systems to provide precision surgery with minimal trauma to patients;
- (4) Reducing human error to improve overall quality of care and to reduce potential lawsuits for malpractice and/or negligence.

The potential for artificial intelligence use in medicine and healthcare is likely employed in reducing manual tasks, freeing up a physician’s time, and increasing efficiency of health services. Artificial intelligence could play more active roles in improving medicine and healthcare as traditionally, physicians treated patients based on the knowledge of “the statistical average person” with limited heterogeneity of data. Nowadays, with assistance from artificial intelligence, healthcare professionals are able to provide more personalized health services together with improving medical science by adding more diverse data sources.⁷

Currently, the general consensus in the discussion of using artificial intelligence in medicine and healthcare is that routine tasks and data collection can be taken over by machines, but there will always be strong needs for doctors to act on the irreplaceable human roles. Moreover, professional judgement, creativity, and empathy are human elements that machines cannot do well. Until now, artificial intelligence has demonstrated its excellence in providing diagnosis and treatment recommendations.⁸ However, more inspiring applications are under development by using the computing capacity of artificial intelligence to provide better classifications of diseases and degenerative conditions (e.g. dementia or other neurodegenerative disorders). Using new data variables like multi-omics data, wearable devices, and biorecognition, the previously established prediction models may all be revised and upgraded. Medicine and clinical practice will completely differ from previous times, triggered by the increasing development and use of artificial intelligence.

Despite all the bright sides of automation and artificial intelligence roles in medicine and healthcare, limitations and barriers will always exist.

- (1) Machines are not human, so machines may pose an issue for the law system when there is a lawsuit of any kind;
- (2) Artificial intelligence generates decisions based on currently available knowledge;
- (3) Medicine lacks some concrete differentiation between healthy and unhealthy status, especially when facing degenerative processes.

The importance of automation and artificial intelligence in

medicine and healthcare cannot be denied. Using artificial intelligence’s highly efficient computing capacity, medicine and healthcare practice may be greatly changed and a great variety of health data may truly enter daily practice. However, the “human touch” an essential part of the patient-doctor relationship needs to be continuously strengthened even though the increasing assistance of automation and artificial intelligence may bring various barriers.

REFERENCES

01. Brynjolfsson E, Mitchell T. What can machine learning do? Workforce implications. *Science*. 2017;**358**:1530-4.
02. Wahl B, Cossy-Gantner A, Germann S, Schwalbe NR. Artificial intelligence (AI) and global health: how can AI contribute to health in resource-poor settings? *BMJ Glob Health*. 2018;**3**:e000798.
03. Usvyat L, Dalrymple LS, Maddux FW. Using technology to inform and deliver precise personalized care to patients with end-stage kidney disease. *Semin Nephrol*. 2018;**38**:418-25.
04. Johnson KW, Torres Soto J, Glicksberg BS, Shameer K, Miotto R, Ali M, et al. Artificial intelligence in Cardiology. *J Am Coll Cardiol*. 2018;**71**:2668-79.
05. Tung HH, Chu KH, Lien RY, Hsu CI. The needs of caring people with dementia and their family care-givers. *J Clin Gerontol Geriatr*. 2018;**9**:3-4.
06. Pradhan S, Panda A, Panigrahy SR. Determinants of potentially inappropriate medication in elderly: A hospital based cross sectional study. *J Clin Gerontol Geriatr*. 2017;**8**:93-7.
07. Chen LK. Precision geriatrics: Comprehensiveness and individualization for frailty intervention. *J Clin Gerontol Geriatr*. 2017;**8**:44-6.
08. Chen LK. Pursuing appropriate psychotropic treatment for older people with dementia in long-term care facilities. *J Clin Gerontol Geriatr*. 2018;**9**:1-2.