



Enhancing India's Health Care during COVID Era: Role of Artificial Intelligence and Algorithms

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Abstract Computerization of health care is the only model to sustain safe health care in this COVID era particularly in overpopulated nations with limited health care providers/systems like India. Accordingly incorporation of computer-based algorithms and artificial intelligence seems very robust and practical models to assist the physician. The advantages of Computerized algorithms to facilitate better screening, diagnosis or follow-up and use of Artificial Intelligence (AI) to aid in medical diagnosis are discussed.

Keywords Computer algorithms · Artificial intelligence · COVID-19

Challenges in Outpatient Health Care System in COVID Era

The increasing threat of COVID-19 spread in heavily populated countries of the third world having limited resources is likely to exist for many more months. The associated deteriorating economy is likely to make the situation much worse with overcrowding. With poor doctor-patient ratio, a constant patient-pressure as is usual in India is further likely rapidly worsen corona-control. The recent reports of violence against doctors [1], nationwide strike by doctors [2] and subsequent demand of

implementing a law to curb this violence against doctors [3] clearly indicate the pathetic situation arising out of multiple factors including patient-pressure. Hence the need of this hour is to screen out all the patients and select those that need emergency care as well as shortlist those who need inpatient management. This is to be preferably done with minimal physical interaction. The incorporation of computer-based algorithms and artificial intelligence seems a very robust and practical model to assist the physician through online portal.

Computerized Algorithms Facilitate Better Screening, Diagnosis, Follow-up and Documentation

The incorporation of the questionnaire based algorithms have a very important role in short listing differential diagnoses. With encouraging results obtained during a study at the departments of Pulmonary medicine and Otolaryngology using ABA (algorithm based assessment) [4], it is feasible to extend this concept to every specialty of medicine. The likely advantages of ABA are many: (1) The ABA is likely to record a comprehensive registry of complaints, then siphon out the irrelevant information/complaints while presenting the primary concern/relevant symptomatology to the treating physician; thereby making effective use of the allotted limited time; (2) It may be standardized or customized as per the situation/disease/specialty and then adopted widely to maintain a minimum standard of assessment; (3) The patients can be encouraged to fill in the questionnaires at home through online portal and accordingly may be referred to specialty clinic depending upon the focus of specific ailment; (4) Online ABA at home may screen and unexpectedly reveal some

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occult set of problems; (5) ABA may even assist the educated-non-medical persons residing in remote areas (absence of physician) to understand the gravity of ailment and thereby facilitate urgent consultation if needed; (7) it may be an asset for the patients to follow up their post-treatment recovery as well; (8) the social distancing will be maintained up to a certain extent at least further contributing to the corona control.

Artificial Intelligence (AI) to Aid in Medical Diagnosis

Although in infancy, AI holds a tremendous scope to assist and guide the physician in diagnosing a specific problem. For example AI in assessment of the pictorial images of a clinical finding may help in diagnosis with significant degree of probability or if not so then at least narrow-down the differentials. Although some applications of AI have been initiated for retinal diseases, pathology images, radiological imaging as well as in cardiology, but future scope is tremendous. AI may be advantageous for a countries like India in several ways: (1) The suggestibility of a diagnosis through AI would help a junior/less experienced doctor to think accordingly; (2) In rural settings where the concerned specialist is not available AI may assist in referral. Since the majority of health care providers in rural India are still non-qualified quacks and faith leaders, AI assistance may augment basic health care; (3) Many domestic applications of AI based diagnoses may be suitable for patients where it

can be integrated with ABA; (4) AI may further help the health care providers of alternative medicine (Homeopathy, Ayurveda, Siddha, Unani systems) to have a better idea of the problem in terms of modern (Allopathic) medicine; (5) A learning role for trainees cannot be overemphasized.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Ghosh K (2018) Violence against doctors: a wake-up call. *Indian J Med Res* 148(2):130–133
2. Shepherd A (2019) Doctors in India strike after attacks. *BMJ* 365:14268
3. Sachan D (2019) Indian doctors' leaders demand national law to reduce violence in hospitals. *BMJ* 365:14303
4. Katyayan A, Yadav V, Mishra P, Mishra A, Saxena M et al (2019) Computer algorithms in assessment of obstructive sleep apnoea syndrome and its application in estimating prevalence of sleep related disorders in population. *Indian J Otolaryngol Head Neck Surg*. <https://doi.org/10.1007/s12070-019-01607-z>

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