

Artificial intelligence and teledermatology: An overview

Wajeeha Nusrat, Shehla Shaukat, Zunaira Arshad

Department of Dermatology Unit-I, KEMU/ Mayo Hospital, Lahore.

The pandemic of COVID-19 has proved to be the actual driving force for teledermatology (TD) incorporated with medical health and Artificial intelligence (AI). The meaning of Teledermatology is the practice of using telecommunications technology in order to provide dermatological care distantly.¹ In patient-facilitated teledermatology, the patient on their first interaction with the dermatologist can share his/ her clinical pictures followed by teledermatology consultations. This method of consultation is suitable to long standing dermatological diseases such as eczema, vitiligo, psoriasis etc that require repeated follow ups resulting in significant time and cost.² Historically, teledermatology has been divided into two fields: the real-time (RT) TD that utilizes video channels for interaction between the doctor and the patient and the store-and forward (SaF) TD where a patient contacts a dermatologist through asynchronous software tools like email, text messages etc resulting in reduced wait time for meeting, allowing team members to communicate according to their own schedules.

Stakeholders in teledermatology includes patients (main stakeholders), medical professionals (next essential stakeholders) whose knowledge and research lay the

foundation for building telemedicine infrastructure, developers who build solutions to medical problems and lastly policy makers who make laws to guide implementation of TD.

It has been proven that the store-and-forward telemedicine triaging is most appropriate in Dermatology. With the lesser cost of computer power and readily available deep convolutional neural networks, utilizing the digital images, machine learning has been able to build artificial intelligence (AI) models. The AI models are able to interpret the digital pictures taken with a smartphone camera and return an authentic dermatology output within seconds. The speed with which the AI dermatology is being developed, there is a strong prediction that it will soon overshadow the store-and-forward teledermatology.³

Artificial intelligence is the capability of a machine to copy intelligent human mind and behavior. In medicine, there are two branches of AI: the virtual branch which includes medical imaging, electronic health records and the physicians prescriptions and the physical branch that uses robots to help the patient or the doctor.⁴

In medicine, the application of artificial intelligence includes machine learning (that allows a system to automatically learn from experience) natural language processing (that enables content extraction) machine comprehension, question answering and text generation, visual applications (that allows image recognition) speech and robotics.⁵

Address for correspondence

Dr. Wajeeha Nusrat
Senior Registrar
Department of Dermatology,
KEMU/ Mayo Hospital, Lahore.
Email: drwajeeha.nusrat27@gmail.com

AI-Powered diagnostic tools used in Dermatology include: DermAI, TeledermAI, Melanoma AI, Google Health, Aysa and Visual Dx. There are a number of benefits of AI in TD like computer-based analysis of image, diagnostic aid, faster data processing, reduced wait times for appointments, improved access to care for rural and underserved populations, reduced burden in healthcare facilities, increased patient care and contentment, cost savings, triaging patients with potential skin cancer,⁶ integration with medical health for self-management and distant diagnosis,⁷ quality control of images through suitable tools and providing education and support to patients.⁸

Pakistan can benefit greatly from AI and we have great potential. During Covid-19, AI technology worked by various contact tracing apps_ that send automated texts to people who were within a two-metre radius of a Covid positive patient. Similarly, students at Ghulam Ishaq Khan Institute and Detect Now created an AI algorithm to screen for Covid-19 by sensing a patient's dry cough through voice recognition. Internet of Things (IoT) devices are an advancing technology in Pakistan. IoT means the physical objects like sensors, appliances and hardwares connect and exchange information with other devices and networks over the internet.⁹ Limitations of AI includes availability and quality of data, need of skilled professionals and ethical concerns regarding AI adoption.¹⁰

Future projects of AI includes Google Glass Enterprise Edition 2, Augmented reality (AR), and Microsoft HoloLens (widely accepted in surgery). Further work and development of precise research designs are needed to evaluate the efficacy and cost-effectiveness of wearable AI devices in the future. AI has the potential to revolutionize TD by improving the accuracy of diagnosis, reducing wait times, and improving access to care. However, the various challenges

need to be addressed before AI can be widely adopted in TD.

References

1. Kaliyadan F, Ramsey ML. Teledermatology. [Updated 2022 Oct 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK459382>.
2. Kanthraj GR. Patient-assisted teledermatology practice: What is it? When, where, and how it is applied?. *Indian J Dermatol Venereol Leprol.* 2015;**81**:136-43.
3. Börve A. From Teledermatology to Dermatology Artificial Intelligence: Will Teledermatology Exist in the Next 2 Years? *Iproc* 2022;**8(1)**: e36907. <https://iproc.org/2022/1/e36907> DOI: 10.2196/36907.
4. Giansanti D. Advancing Dermatological Care: A Comprehensive Narrative Review of Tele-Dermatology and mHealth for Bridging Gaps and Expanding Opportunities beyond the COVID-19 Pandemic. *Healthcare.* 2023; 11(13):1911. <https://doi.org/10.3390/healthcare11131911>
5. Pai VV, Pai RB. Artificial intelligence in dermatology and healthcare: An overview. *Indian J Dermatol Venereol Leprol.* 2021;**87**:457-67.
6. Majidian M, Tejani I, Jarmain T, Kellett L, Moy R. Artificial Intelligence in the Evaluation of Telemedicine Dermatology Patients. *J Drugs Dermatol.* 2022;**21(2)**:191-4. doi: 10.36849/jdd.6277. PMID: 35133107.
7. Karmel Abu Baker, Elizabeth Roberts, Karen Harman, Dan Mullarkey, Dilraj Kalsi, BT06 Using artificial intelligence to triage skin cancer referrals: outcomes from a pilot study. *Br J Dermatol.* 2023; **188(4)**:ljad113.372. <https://doi.org/10.1093/bjd/ljad113.372>
8. Jain A, et al. Race- and Ethnicity-Stratified Analysis of an Artificial Intelligence-Based Tool for Skin Condition Diagnosis by Primary Care Physicians and Nurse Practitioners. *Iproc.* 2022;**8(1)**:e36885. URL: <https://www.iproc.org/2022/1/e36885> DOI: 10.2196/36885.
9. Umer L, Khan MH, Ayaz Y. Transforming Healthcare with Artificial Intelligence in Pakistan: A Comprehensive Overview. *Pak*

Armed Forces Med J. 2023;**73(4)**:955-63.
DOI:
<https://doi.org/10.51253/pafmj.v73i4.10852>.
10. Aung, Yuri & Wong, David & Ting, Daniel.
The promise of artificial intelligence: A

review of the opportunities and challenges
of artificial intelligence in healthcare. *Br
Med Bull.* 2021;**139**.10.1093/bmb/ldab016.