

Indian Dermatologists Wield Technology to Combat COVID-19!

The novel coronavirus pandemic (COVID-19) that originated in Wuhan, China, has crippled not just individuals but entire economies, businesses, markets and sectors including healthcare. At a time, when the reach of traditional media and face-to-face interaction has been limited due to social distancing measures, social media platforms are serving as tools of education by creating awareness and disseminate credible information. Video conferencing solutions have now become the lifeblood of healthcare and educational institutions, enabling webinars, meetings and conferences to take pace in the virtual universe, while heeding to the WHO guidelines. Teledermatology has experienced a reincarnation of sorts pushing millions of people, doctors and patients alike to jump into the telecare bandwagon. With the current struggle to ensure avoidance of contact with people, teledermatology has become the need of the hour with most dermatologists wanting to consult, treat and effectively serve their patients who otherwise would continue to suffer due to their skin problems. Needless to say, the youth are at the forefront of this affair by their innate adeptness towards social media, webcasting and telemedicine. The portals of Artificial Intelligence (AI), namely Internet of Things (IoT), Big Data and machine learning promise to redefine the way the data are collected, processed, analyzed and reproduced from various echelons. The subsequent sections of the article elaborate on the role of various aspects of technology during COVID-19.

Social Media Platform for Educating General Population and Creating Awareness

By virtue of social media, the digital connectivity among individuals has

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remarkably improved. Most people have their presence on social media handles like WhatsApp, Facebook, Instagram, YouTube, Twitter, LinkedIn, Google Plus, various Blogs and Websites. With the use of social media platform during COVID-19, dissemination of information has become easy. Circulation of text, audio clips and video clips from the experts, healthcare agencies and regulatory bodies through digital media have helped create public awareness and educate general population.^[1] The Yuva cell committee^[2] of the Indian Association of Dermatologists, Venereologists and Leprologists (IADVL) has been actively involved in creating educational posters and videos on social media platforms such as Facebook and Instagram. Running various awareness campaigns through social media platform brings insight to the problem and helps to confront scrupulously. Experts in the field need to come forward and share their knowledge; else misinformation from spurious sources will prevail and do more harm. Active social media presence may also help a dermatologist gain professional clout, and more importantly help to learn latest developments and activities in dermatology around the globe.^[3]

Digital Platforms for CMEs, Webinars, Conferences and Meetings

Digital health education has received substantial traction over the past few years, which is more relevant now than ever. In view of the ongoing COVID-19 pandemic, social distancing and lockdown has made meetings and continuing medical education using digital platforms essential and invaluable. Technological advancement has made it possible to transmit high-quality audio and high-definition video by virtue of webinars and webcasting, thereby

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opening many gateways for digital health. Numerous national and international key opinion leaders have joined hands to dissipate their expertise globally. An equal number of reputed dermatology associations have also shifted their conference modules to an online platform to facilitate this.^[3,4] The role of web conferencing is certainly not limited to continuing medical education and administrative meetings have also been conducted for various organizations and fraternities. Digital platforms are cost-effective and serve as an efficient means of customized communication for instructors and viewers alike. These enable viewers to access high-quality content at the ease of their time, place and pace. At the same time, it is possible to enhance the outreach and impact of the sessions for the speakers and trainers through various digital video conferencing application and software. Furthermore, digital platforms also help in keeping healthcare professionals updated on the latest guidelines and protocols in these dire times. Mobile technology adds to this substantially by bringing the content directly into the users' palms. Screen mirroring, screen casting and screen sharing are easier ways to utilize the mobile and computer technology in education and professional connectivity.^[5] Younger dermatologists have taken to these platforms with gusto. Among the few, concerns related to digital education are an increased time for recording, data privacy, and lack of face-to-face meetings. Overall, digital education in dermatology is a ripe territory in terms of innovations. Considering its versatility, flexibility and scalability,^[6] this could be a befitting answer to fulfill the future needs of education efficiently.

Teledermatology

Most hospitals and clinics have reduced or stopped face-to-face patient consultations to contain the spread of COVID-19. Diagnosis of diseases, patient management and important decisions like continuing/discontinuing glucocorticoids, immunosuppressants and biological agents have suffered a lot; and this unfortunate trend is likely to continue in the upcoming months. Management of patients who require immunosuppressives, and close monitoring, is practically not possible, using teledermatology. This is one of the major demerits when we think of this technology. With constant consultation requests, many dermatologists have now shifted to teledermatology commonly called online consultation in order to continue patient care and management. Telemedicine/teledermatology is defined as the use of electronic information and communication technologies to provide healthcare support when physical distance separates patients from healthcare professionals with expertise in the field.^[7] Teledermatology can be delivered as real-time video consultations (RT-TD) or as asynchronous store-and-forward (SAF) service. Most

dermatologists were unfamiliar with the concepts of teledermatology before COVID-19 outbreak, majorly because the medico-legal aspects of this technology are poorly defined in our country. The interim approval by various health authorities to use telemedicine in clinical practice (during COVID-19) has invoked the interest of many dermatologists.^[8] Healthcare professionals poorly equipped with teledermatology are using WhatsApp messenger as a teledermatology tool and various unified payments interface (UPI) for collection of consultation fees.^[9]

Dermatology, being an inherent visual specialty, will definitely have certain advantages over other specialties because we can diagnose conditions based on clinical photographs, by obviating the requirement of face-to-face consultation. It is worth mentioning that entities like acne, melasma, hair loss etc., can be handled to a certain extent on tele-consultation. However certain diseases like immunobullous disorders, drug reactions and auto-immune collagen vascular diseases, it is not possible to arrive at a diagnosis, unless a proper clinical examination is performed. Managing such situations will be difficult. Moreover, we should remember that there is bound to be some variations in diagnostic accuracy and inter-observer concordance, between face-to-face consultation and teledermatology.^[10] The dermatosurgical procedures are better avoided during COVID-19 and telemedicine here as well can be used to cancel and schedule the procedures.

Postgraduate teaching and examination, both will have to be revamped, on account of the present scenario. It is a fact that online lectures accompanied by case presentations, seminars and journal clubs is the best form of method of teaching. But we need to mould ourselves a different methodology like seminars through online platforms, virtual case presentation and discussion. Conduction of examination is becoming tough and we can only hope for a tangible solution in the near future. However, keeping in mind, the current global scenario, teledermatology is undoubtedly the best possible consultation platform, which can be offered to most of our patients, but not all.

Internet of Things, Artificial Intelligence, Big Data and Deep Learning

The revolution in digital technologies in the past decade has changed our perspective towards the management of various clinical disorders. IoT helps interconnect various computing devices (instruments, machines, computers etc.), establishes a network of communication within and beyond healthcare setup and enables real-time data collection.^[11] This data can be utilized by AI to predict disease trends,

disease associations, risk stratification and outcomes. This is realized through Machine Learning (ML) and Deep Learning (DL). DL is a subset of ML and incorporates computational models and algorithms that imitate the architecture of the biological neural networks in the brain (artificial neural networks [ANNs]).^[12] The patterns within the data are deciphered using the DL (processed by the hidden layers of ANN).^[13,14] Through IoT, hospitals, health agencies and governments across the globe are sharing the data about COVID-19. The real-time update on several cases, deaths and recoveries are examples of utilization of IoT.^[14] In addition, IoT helps in identifying the high-risk areas in the world, country or state. With the help of the big data and various global databases, COVID-19 associated forecasting in China and beyond was made possible.^[15] Healthcare agencies of various countries are using the internet to disseminate real-time information about COVID-19. A patient's travel history and contact tracing can be easily done through big data. Many countries are exploring the possibilities of smartphone tracking.^[16,17] In smartphone tracking, any smartphone that has come in close range of an infected person's phone will be identified and the owner of that phone would be screened for the possibility of COVID-19.

The data analytics, predictive models, AI and DL has improved our understanding of the COVID-19 and SARS-CoV-2. When the world was struggling to know about this novel mysterious virus, these predictive models and algorithms helped us understand the single-stranded RNA genetic material of SARS-CoV-2. The mobile-based coronavirus diagnostic tools/apps can assess the possibility of having a disease in a person based on a set of questions. The AI-based infrared systems can detect the change in body temperature and is useful for screening large populations at hotels, hospitals, shopping malls and airports.^[17] Infrared light is emitted from the human body in the form of heat.^[17] The infrared sensors in the camera detect the amount of heat being emitted by its color. AI then generates a color palette that represents the scale in temperature by utilizing computer algorithms.^[17] The online 'chat-bots' can provide answers to COVID-19-related queries, educate people and thus, help decrease load on the physicians. The AI- and DL-based diagnostic algorithms are easing out the screening process of patients at the peripheral health centers in many countries. Utilizing the triage-based AI systems, risk stratification into mild, moderate and severe cases can be done and the more deserving patients can be provided with intensive care immediately. Lastly, drug and vaccine discovery with the help of AI would really help mitigate COVID-19-related morbidity and mortality.

Limitations of Using Technology During COVID-19

It is true that we were not prepared to face a pandemic of such a scale and so was technology. COVID-19 has also

highlighted the limitations of our current technological advancements. The increased traffic on cyberspace is a major limitation of the current confinement. This causes a decrease in the peak spectral efficiency.^[18] The problem is more where bandwidth is narrow. The optimal use of technology is compromised in such a situation. Another big concern arising from the use of technology is the degree of privacy and security of data. Recently, there were reports that Zoom, a commonly used webinar and online meeting platform, had significant encryption issues. There were concerns that information recorded from the interfaces of users was being misused.^[19] Technical intricacies aside, tele dermatology may have its safety issues. Third-party platforms may have direct access to patient data. This translates to potential to influence consumer behavior through this gathered information. Additionally, it may render the consumer doctor susceptible to medico-legal implications. The diagnostic potential of AI based applications is still unclear. The training of AI based models requires sufficient data to optimize the prediction of outcomes. At present, with insufficient data to train, more and more streamlining of data is required to optimize AI-based diagnosis. Although the task of creating foolproof technology for dermatologists is challenging, its myriad and diverse applications give it a clear leverage.

Future Considerations

The use of drones to keep a check on people violating lockdown protocols, use of 3-D printing in developing personal protective equipment (PPE) and use of robots to deliver food, distribute drugs to patients and spraying disinfectants at high-risk areas, marks a beginning of a new era of disease control. Many healthcare policies are expected to change in the coming months and technology seems to be playing a big role. It is high time that dermatologists learn about digital technology and its utility in healthcare. The utilization of technology in the current pandemic and its success will probably determine the trust and acceptance of general populations and health authorities in the future. With increased acceptance, we might see the implementation of these technological advancements in other diseases as well.

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Conflicts of interest

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