Digital technological interventions in mental health care

Emerging digital technologies, namely, smartphone, phone applications, social media, and web platforms, have changed the way we interact with one another and with the world around us. These technologies have become an extremely useful tool in the lives of most individuals. In addition, they have had a profound effect on our behavior as well, including various day-to-day activities such as bank services, financial transactions, office work, buying and selling products, communicating with friends and family, as well as taking care of our health and well-being. Evidence is accumulating on how these technologies can easily affect our mood and psychological state in both positive and negative ways. Simultaneously, they also offer opportunities to enhance the availability and reach of mental health care to us. This becomes relevant as few individuals who face mental health challenges may have problems in accessing necessary mental health care but at the same time have access to smartphone.[1]

**DIGITAL DATA COLLECTION**

There are several new methods of data collection using computer science that are morphing ways of our approach toward traditional services related to mental health, be it identifying the illness, monitoring the symptoms, or offering services to those in need. As there is access to so much data online, over social media, through various search engines and newer techniques of analysis of this data, several patterns and trends of human behavior and illness are being identified, which were not as largely visible before. This evolving system, also known as digital epidemiology, is based on uncovering such data, studying it and using it to monitor illness risk and formulate targeted interventions for the same. Since there is a huge growth in users of such internet technologies such as social media worldwide, the amount of data generated is also large and this can further be analyzed. It may even help in tracking or detecting mental health issues and public health concerns. Such kind of research in the past has been used in collecting data using common online platforms such as Twitter, Instagram, or Facebook. This happens by asking users to participate in online quizzes and questionnaires on their mental health issues, monitoring their well-being, any risky behaviors, or thoughts of suicide. There have been also a thorough screening of the words, language and behaviors used online-like violence, negative emotions, anger, the patterns through which users are communicating online and their association with mental health issues. Social media posts made during any traumatic or triggering events or happy, travel stories can be a great tool in analysis as well. This can be used in the generation of tools that can ease mental stress and help in a therapeutic way. For example, analysis of data from Twitter in a study has shown over 70% accuracy in predicting onset of postpartum depression and major depressive disorder.[1]

**DIGITAL INTERVENTIONS**

A lot of ongoing research has indicated the potential that can be there for some interventions for mental health digitally and it may even ease the stigma that is usually associated with going and seeking help for mental health in a traditional setup. However, some low-income countries still do not have any major provisions for mental health services to the youth. This may not let the services reach them and may create a huge gap in access. India, for example, has 90% mobile phone penetration, more than 225 million smartphone subscribers, and rapidly increasing rates of internet and social media usage, though there is a lot of gap in access to connectivity and possession of smartphone in urban and rural areas, and among men and women. Yet, these platforms can offer great opportunities to those who need it and break barriers that are present in the conventional mental health services.[1]

Digital treatment for depressive disorders, anxiety disorders, and insomnia are well established.[2] The best-studied digital technological intervention (DTI) in mental health care is internet-delivered cognitive behavioral therapy (ICBT), which has been used for over 20 years. A meta-analysis of 29 Swedish studies including 2866 patients treated with ICBT for anxiety disorders, depression, and other disorders revealed that 65.6% of all patients improved, with one-third achieving remission.[3] As digital approaches to mental health increase, there is also space for artificial intelligence (AI) to be used to predict or detect or treat mental health issues. This can be incorporated into digital modalities via cell phone apps which can personalize mental health care and natural language, and access to data use can lead to formulation of conversation assistants online as well to be used for therapeutic intervention. AI can refer
to several different things such as several techniques and ways to processing of human cognitive models, sensing personality traits; they are also incorporated in wearable devices such as smartwatches and actigraphy devices. Major research in this process of digital phenotyping is toward depression and anxiety and their correlation with movement or physical activity; there can further be recommendations of personalized therapies based on these data. However, there are some ethical and legal implications of such kind of data access and there shall be a constant need of regulation for the same; if not kept in check appropriately, it may just increase the issues already being faced in the conventional mental health services. Furthermore, the rapport and alliance that exists between a mental health professional and a patient has a great impact on outcome of the therapy or treatment; as AI cannot always offer human therapists, this may be a huge challenge.\textsuperscript{[4]}

**E-HEALTHCARE**

E-healthcare and m-healthcare include the health-care delivery by latest technology carriers, be it smartphone or monitoring devices or wireless devices. They can vastly improve access to mental health care and services and can boost treatment adherence as the services can be customized as per patient requirements and needs. They may include video consultations, telepsychiatry, and different mobile apps for assessing and intervention for mental health issues. These, however, come with cost pressures and economic feasibility or access issues and hence there are ways being sought to deliver services. This is just not about the technology but also is present to generate a cultural change in the mental health care and putting power in the hands of the patients in terms of choice and availability. Potential benefits to patients can include more engagement in care giving and earlier detection of issues, more adjustment in treatment, and shared decision-making. Even though there is a clear potential of DTI, there is currently insufficient evidence to suggest that this potential is being fully realized. Several challenges exist such as making sure that patients and their needs remain the primary motive of technology development and implementation and ensuring that the opportunity provided by data sharing between patients, carers, and clinicians does not threaten privacy and has equal access for all.\textsuperscript{[9]}

**TELEMEDICINE**

The use of electronic communication and information technologies to supply or support clinical care at a great distance is called Telemedicine. Every new technology can offer advantages and disadvantages. Telemedicine can provide access to medical care for mental health in different areas via video conferencing as it links specialists and caregivers from various academic or regional health-care centers even in underprivileged areas. Information is being researched on its costs and outcomes and how it affects communication and interventions. Telepsychiatry can support primary care providers who can then locate psychiatrists than send their patients to a mental health facility. This can also help them sit in on the evaluation and gain hands on experience with further treatment modalities. Those who practice it would need to learn comfort with the equipment, adapt to this modality, and even know the limitations. However, there are medicolegal issues, adequate financial support, and ease of access that limits its use currently.\textsuperscript{[6]} Apart from AI, telepsychiatry, social media data collection, and wearable devices, there are also self-tracking mobile health applications. These could later be used as health technology interventions.\textsuperscript{[7]}

The growing burden of mental health with the limitation of the presence of workforce to meet this demand has created difficulties in the treatment and has generated a gap. The COVID-19 pandemic has further highlighted the requirement for new and innovative techniques to increase access to care. There are efforts for computer-based therapy and mobile phone apps, but they still are at a nascent stage. These have not yet transformed mental health needs, even though they can potentially offer accessible and affordable options. A recent study showed that 33\% of psychiatrists preferred voice calls to video conferencing visits because they lacked confidence in how to use telehealth technologies with patients. The main barriers that are faced for telehealth include creating digital health literacy, patient and clinician’s willingness to adopt digital tools, workflow issues, and regular usage of the medium. As this requires usage of smartphone and internet, access to them is a prerequisite.\textsuperscript{[8]}

The COVID-19 pandemic has brought to light major challenges for the delivery of psychiatric services. As there are lockdown and social distancing measures being implemented, in-person services have been affected in terms of access. Hence, telehealth has been utilized for the same and people had to switch to it instead of in-person contact which has raised several challenges.

This also underlines the need for making digital mental health services accessible and available even as a routine part of care for psychiatric services. Majority of the mental health professionals are using these services for the first time; they are educating themselves on the best way to deliver these services via a digital medium. It also faces legal challenges and social ones as well such as training and supervision of these practices needs to be legitimized and added to standard mental health training. There are
limited data about the efficacy of digital therapies for many serious mental disorders, for example, psychoses and substance use disorders. The immediate emphasis should be on decreasing barriers to using digital mental health interventions and to extend these services further.\textsuperscript{[9]}

Part of the challenges for DTI in psychiatry is the legal implications. General ethical principles also seem to be of concern along with security of the data. There are also debates regarding the diminution of human connection and face-to-face interactions along with encroachment of clinical and governmental bodies into personal lives.\textsuperscript{[10]}

In this 21\textsuperscript{st} century, there are hardly any surprises about video conferencing and in the transmission of sound and vision; it has become an almost normal experience, though initially it was considered as a revolution. However, for patient–doctor communication, the clinic or work place has a symbolic quality. On the other hand, if digital technology intervention has to be used, psychiatry seems to be an ideal specialty for the application of telemedicine (telepsychiatry) for several reasons: most diagnostic and treatment information is taken via audiovisual communication and there is a little need for diagnostic and laboratory investigations and there is a specific necessity to take these services to the areas which are remote and rural.\textsuperscript{[11]}

Digital technology, which includes the internet and mobile phones, provides a great possibility in bridging the gap of delivery of psychiatric services and treatment. This can be achieved by providing flexible and custom-made approaches to assessment as well as treatment modalities which can be more accessible and associated with lesser stigma. However, the confirmation of the utility of DTIs, such as clinical effectiveness and cost-effectiveness in real world settings, remains inadequate. A consequence not desired yet present can be a generation of digital divide which excludes the ones not having technology either due to choice or cost, age group, region or location, strata of society, or lack of knowledge about digital media. Furthermore, certain mental health conditions, such as depression, paranoia, or psychosis, might make it more difficult for a person to engage with or trust digital technology.\textsuperscript{[12]}

There is also a risk of a technology push where apps are developed by companies suiting their own requirements and agendas than focusing on the needs and requirements of the people with mental health issues.

**CONCLUSION**

Undoubtedly, DTI appears promising. A number of studies indicate that DMHI has resulted in some less-studied populations getting much needed attention; DMHI treatment outcomes are comparable to traditional therapeutic modalities; and efforts are ongoing to apply newer technologies such as virtual reality and AI to assessment, diagnosis, and treatment of psychiatric disorders. On the other hand, there are also limitations for certain medical conditions and medical therapies in both real-world situations and clinical settings. In addition, there are adherence and engagement challenges, absence of long-term research and cost-effectiveness data is also contributory to existing concerns. Moreover, there are many unregulated apps and platforms for delivering these interventions that are emerging rapidly, which raises the question of quality. Further, there is insufficiency of evidence about the privacy, safety, accuracy, and clinical benefits or cost-effectiveness. Hence, we must tread carefully regarding the balance of use of DTI for mental health.\textsuperscript{[12,13]}

There is every likelihood of DTI supplementing traditional treatments rather than replacing it.

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