

m-health services for COVID-19 afflicted and infected victims

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Received on 05 June 2021, accepted on 06 June 2021, published on 11 June 2021

doi: 10.4108/eai.11-6-2021.170232

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COVID-19 also known as the coronavirus has tremendously devastated the whole world. In the last two years, several remarkable implications of this global epidemic on different facets of human lives have been recorded. In the second wave, the fear and chaos have been excessively intensified among the citizens of the USA, India, Brazil, France and Turkey. This outbreak has profoundly shambled different global sectors like education, entertainment, tourism, hotels, agriculture, and real-estate [1][2].

To avoid mass dissemination, different countries have imposed several lockdowns and curfews. Despite the precautionary measures, it is a very scary and risky scenario for the persons to stay on their job during these days. In most places, the work from home option has been given. However, there are some sectors in which work from the home scheme is not applicable. The persons employed in the essential service providing departments (bank, healthcare, cleaning, and police) are deeply frightened of infection as they have to directly deal with the public. Amid this unprecedented environment, the commitment of the workers has not been compromised.

Several smart and artificial intelligence (AI) based diagnostic [3][4][5] and remote monitoring [6][7][8][9][10][11] frameworks for COVID-19 patients have been already proposed. Different emerging computing methods like machine, transfer and deep learning techniques have been used for the same. The use of cloud, fog and soft computing techniques have been also explored in designing and remote monitoring of the COVID-19 patients. To reinforce the physical and mental state of the individuals, in addition to meditation, yoga and regular exercise, m-health services are to be designed to cater to both local and global requirements. In addition, to maintain the social distancing, isolation, and to avoid the unnecessary movements of the individuals to the healthcare centres, the use of m-health services seems to be an optimal solution during this global epidemic. This work aims to accentuate the potential implications and challenges in the implementation of m-health services to mitigate the impact and spread of COVID-19.

m-health refers to the smart healthcare methodology that uses different mobile devices like mobile phones, tablets, phablets, and other hand-held wireless devices. The m-health services can be provided through voice calls, messages (text, audio, video), and dedicated mobile health portals. The use of this healthcare technology assists the persons to capture the status of their health without the intervention of any healthcare professional. The use of m-health found to be suitable in self-diagnosis, monitoring, treatment, telemedicine, and chronic disease management [12]. In the last few years, tremendous growth has been seen in the development and deployment of m-health services. The m-health services have been satisfactorily deployed in distinct health services like health promotion [13], mental-health [14], elderly people support [15], maternity [16], public health [17], diabetes [18] and Alzheimer [19].

The Google trend for the term ‘mHealth’ for the last five years have also been examined for India, Brazil, China, France, Turkey, United States and the world. The statistical analysis of the same has been presented in Table 1.

Table 1. Google Trend

Country	Min	Max	Average	Std. Dev	Variance
Worldwide	20	100	50.34	13.51	182.42
China	0	100	0.70	8.03	64.46
United States	0	100	35.72	16.72	279.43
Brazil	0	100	6.74	16.35	267.27
India	0	100	20.85	21.06	443.71
France	0	100	6.20	15.91	253.00
Turkey	0	100	3.56	16.36	267.55

The highest average value for the Google trend has been observed for United States followed by India and France. A substantially higher degree of variation in Google trend (‘mHealth’) has been recorded for India, followed by Turkey and France.

The m-health services need to be properly utilized to manage the scary and traumatic environment. To date, m-health services have been mostly used for contact tracing only. However, these potential services can also be used to educate, track, and monitor the complete activities of COVID-19 victims. The m-health services appear to be highly reliable for digital psychological intervention. Undoubtedly, this will reduce the line-ups and chaos in the health centres and will ultimately bring down the expense of travelling and chances of transmission of this fatal infection. The physiological data (temperature, oxygen level, blood-pressure, etc.) acquired through the use of m-health services along with sensors and wearable devices will be useful in maintaining the electronic health record and providing digital decision support to the COVID-19 patients [20]. Furthermore, the services will facilitate reminding and adhering to the prescribed medication schedule. The m-health apps are also useful in increasing the medical reconcile precision. The use of m-health services will also boost the potential to connect the complete healthcare system including physicians, and other healthcare professionals like counsellors and nurses.

Nevertheless, there are several challenges in the implementation of these COVID-19 related m-health services. Firstly, due to illiteracy and unawareness, it is very challenging to capture the people living in a remote or secluded area. Moreover, they might have not the potential to buy a smart mobile phone or other m-health supported devices. The limited or no internet connection will be another constraint. The language of the app will also induce major problem as most of them will not be comfortable in operating these smart devices and m-health apps. The scenario for the urban area is significantly different. In an urban area, people are often aware, educated and have high usage and bandwidth of the internet connection. However, as per the study, the users of the smart device are still hesitant to use advanced features of their phones and rather preferred to use these devices merely to make voice calls and send text messages [21]. They need to take the support of a third person to start and manage the smart features of their mobile phones. The elderly people mainly falls into this category. Despite these impediments, the use of m-healthcare services during this pandemic acts as a rescuer and redeemer. Given the aforementioned implications, it is assessed that a comprehensive m-health therapeutic system is required to assist in the intervention, tracing, and monitoring of COVID-19 infected or afflicted persons.

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