The Revolutionary Impacts of the COVID-19 Pandemic on Mobile Health; Highlights of the Fourth Shiraz International Congress on Mobile Health

Kamran Bagheri Lankarani (MD)[1], Seyed Jalil Masoumi (MD, PhD)[2*], Behnam Honarvar (MD)[1], Amirali Mashhadiagha (MD, MPH Student)[1,3], Marzieh Shirvani (PharmD, MPH Student)[3,4], Seyedeh Yasamin Parvar (MD, MPH Student)[3,5], Marzieh Karami (MD, MPH Student)[1,3]

[1]Health Policy Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
[2]Nutrition Research Center, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran
[3]Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran
[4]School of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran
[5]Molecular Dermatology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

ABSTRACT

Mobile health (m-health) is considered an undeniable part of health service delivery, planning, and marketing, which has dramatically changed due to the unique situation caused by the COVID-19 pandemic. The Forth International Congress of Mobile Health, from February 14th to 16th, 2021, in Shiraz, Iran, aimed to provide a venue to exchange ideas, techniques, relevant experiments, and applications with a particular focus on the COVID-19 pandemic impacts. More than 70 experts from different countries in engineering, biomedical sciences, and humanities presented their recent experiences in m-health advancements, particularly in response to the COVID-19 outbreak. In this article, highlights of the most valuable ideas presented at the congress are concisely summarized to give scientists, entrepreneurs, policymakers, and other stakeholders a better understanding of the growing opportunities, and challenges toward the development of m-health.

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Keywords

Mobile Health; M-health; Telemedicine; COVID-19; E-health

Introduction

M-Health

Health ensures a more productive and effective life [1, 2]. Information resources are mainly based on electronic devices, in which mobile phones play a key role in information communication [3].

Today, health is highly associated with the use of mobile systems. The development of mobile health (m-health) provides services to patients outside the hospitals and clinics and facilitates doctors' education and supervision of treatments [3].

Applicants of online health services have been surging, with mobile health (m-health) applications more than doubled since 2015, showing the potential market in this field [4]. Moreover, mobile devices have facilitated not only health service delivery but also forged the foundation for educating people, thus improving public health.

*Corresponding author:
Seyed Jalil Masoumi
Nutrition Research Center, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran
E-mail: masoumi7415@gmail.com

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The Congress

The 4th International Congress of Mobile Health was held from February 16th to 18th, 2021, in Shiraz, Iran, as a step toward mobile health's preventional, therapeutic, and rehabilitative role in the COVID-19 pandemic.

This congress aimed to provide the best ideas and applications in m-health by a venue for academic and industry-based individuals and companies by holding exhibitions and start-ups concerning previous symposiums [5]. More than 70 researchers and experts from Asia, Europe, and America in different fields of engineering, biomedical sciences, and humanities presented their recent experiences in m-health advancements, particularly in response to the COVID-19 pandemic.

A brief review of panels

An area for entrepreneurship

M-health is revolutionizing healthcare delivery, providing patients services beyond geographic boundaries. Health applications for smartphones, tablets, wearable digital devices, and other digital technologies have been developing and improving health status.

Digital health entrepreneurship started some years ago based on telemedicine. However, the unprecedented advancements in health technologies and the widespread use of digital devices have transformed the field at an incredible pace. Unlike the past trend in telemedicine, m-health involves every aspect of health, improving patient outcomes, increasing healthcare quality, improving health professional experience, and reducing costs.

M-Health was sporadically used in Iran to educate people and provide consultation or follow-up after discharge. With the spread of the COVID-19 pandemic and the restrictions imposed on in-person visits, and on the other hand, recommending vulnerable people to stay at home and not visit medical centers, these approaches are systematically applied to health policies on a large scale.

Digital health technology offers a solution to solve many current health system issues. Two successful experiences were introduced at the congress, including the Sleep Disorder Center of Ordibehesht Hospital in Shiraz, Iran, and the HEALAA INTERNATIONAL HEALTH GROUP.

Health information system proceedings and chances

The health information and technology system has changed in recent years. With the COVID-19 pandemic, this issue has become more critical. The pandemic has provided several significant opportunities to improve m-Health: Many smartphone applications are based on using health information. As a result of increased health literacy and awareness after the pandemic, people care more about their health. They spend more time with their smartphones and PCs as another effect of the pandemic, distance working. Beyond these matters in society, mechanization and intelligent organizational processes through developing a comprehensive and integrated system are among the goals different organizations in developed countries are looking for today. The successful establishment of an advanced and flexible system results in transparency and equity, significant organizational performance improvement, increased service quality, reduced time and cost, and promotion agility, ultimately satisfying customers, managers, and staff.

This pandemic proved the urgent need for converting information systems to improve efficiency and productivity. A well-designed information system can alter health organizations' costs and efficiency. This change in the health information system includes how different organizations approached to deal with the recent pandemic.

Among the items that have changed in this direction, we can name electronic prescription writing and prescription providing, entitlement assessment, electronic exchange of admission documents, smartphone applications for mass screening, and telemedicine. The

Fars Province Health Insurance Office has introduced the Fars Province Health Insurance App. This highly potential app includes contracting health institutions, health insurance partners, and insured colleagues and management.

With the ever-growing aged population and changing lifestyles in Iran, providing healthcare at home will become integral to improving the m-health system and long-distance caregiving. Numerous challenges and barriers to providing health information system improvement may intertwine to make them more complicated.

Mobile Applications for Medical Image Analysis

Image processing in m-health services has a remarkable role. Smartphones and portable (or wearable) devices incorporate sensors and enhance computing ability, offering a practical, accurate, and low-cost medical diagnosis and monitoring solution, thus enabling the analysis of medical images/sequences for initial self-diagnosis of disease, self-monitoring of health conditions, and preliminary examinations. These advantages can reduce the burden of referrals to medical centers during the COVID-19 pandemic.

Calorie Mama is a successful image analysis app that offers diverse services, such as recognizing ingredients and computing the total calorie rate to help diabetic or overweight patients in their endeavors to lose weight. It scans the content of the dish of food and can be beneficial for patients with metabolic risk factors for COVID-19. Also, another app that can be used in viewing radiology with food and drug administration approval is Mobile MIM, which provides remote diagnostic viewing of any medical images and radiation therapy treatment plan review and approval. It can reduce a physician's follow-up sessions.

Mobile Rad is another one that enables secure viewing of patient reports and key images and provides access to diagnostic reading and referring physician functions anytime, anywhere. In addition to these services, dermatologic care for early-stage skin cancer diagnosis and optical disease diagnostic and treatment that includes a wide variety of handheld testing capabilities, from color vision to a fluorescein light to pediatric fixation targets, can be found in image analysis apps.

Although different tools are available for creating image analysis apps, software developers still have to cope with numerous difficulties and limitations that will be removed via high-speed technology enhancement, particularly during the recent pandemic. Nonetheless, more and more applications use advanced solutions to run the image and video analyses with excellent results.

Mobile Health in Nutrition Science

The use of mobile devices in nutrition has grown rapidly in line with digital technology developments. Mobile tools can enhance flexibility and efficiency to improve diet and enable efficient communication between caregivers and care recipients. A Grand View Research clarifies that the global mobile health market will grow at a compound annual growth rate (CAGR) of 29.2 percent. Statista reports that 53% use these apps to track their physical activities, 48% to track their food habits, 47% to lose weight, and 37% to learn exercises. It is believed that the market will reach $ 316.8 billion by 2027. In addition to smartphone apps, social media has also played a role: using online social networks besides the diet therapy of overweight and obese adults can positively affect their follow-up rate. Also, engaging patients in an online community is more effective than providing weight-loss information via social networks.

During the ongoing COVID-19 pandemic, when social distancing limited group gatherings and halted the further spread of the virus, the healthcare system underwent many fundamental changes. In that regard, telehealth technologies in diet therapy provide education and self-management support to facilitate and sustain lifestyle changes and assist patients

with chronic diseases in achieving dietary and behavioral adaptations. Telehealth is used in one-on-one visits (for children specifically), group visits (for obese clients who need follow-ups and motivation and pediatrics), and inpatient visits. In addition to all these measures, dietary intake assessment apps have also been launched that use methods like 24 hours recall and food record/diet record that assess the food amounts consumed, Diet record method that is the detailed listing of all foods consumed, and Food photography/ electronic images method that hold the capability of substituting for conventional methods.

The mobile software can provide consumers with easy-to-understand nutrition information, FAQs, and practical tips for disease management. M-health can be a potentially helpful approach in empowering patients to acquire self-care abilities and ensure general health.

Elderly population; A challenge, An opportunity

Aging has been a challenge for every society and individual in history. With improvements in healthcare delivery services, life expectancy has increased, and as a result, the world is facing a demographic revolution called global aging. According to the United Nation's recent report, in 2020, there are an estimated 727 million individuals aged 65 years or over worldwide, which is projected to double by 2050. These numbers reveal nothing except the importance and expanse of these demographic changes, requiring immediate action and planning.

This age group has some unique characteristics and needs, which makes policymaking challenging in some aspects; e.g., considering the natural process of aging, they suffer from a variety of complex chronic diseases, physical disabilities, and mental illnesses, which makes it hard for them to take health services in persons.

Gerontechnology, the application of m-Health technologies to elderly populations, seems to be a fundamental tenet in planning and providing health-related services to this vulnerable age group considering their particular physical, economic, and social traits. However, some obstacles like technophobia are in the way, which should be considered.

With the spread of SARS-CoV-2 and the restrictions imposed on in-person visits, guidelines have recommended that vulnerable people should stay at home and not visit medical centers for minor problems or routine workups; these approaches are widely implemented in health policies, especially in the first year, and before initiation of vaccination. This situation made a unique challenge and allowed beneficiaries to establish m-health-based devices and technologies for this particular group. An example of such approaches in Iran was establishing telemedicine clinics and launching the follow-up nurse program.

Rehabilitation medicine; A pioneer

Rehabilitation is a long route and needs close and continuous communication between patients and clinicians. Though the need for rehabilitation settings is mainly focused in big cities, the demand for these services is not limited geographically. That is where m-health technologies come across. Moreover, this service delivery method in rehabilitative medicine seems to enhance the quality of care provided concerning timing, intensity, and sequencing of intervention. M-health has found its place in this field by considering this feature of rehabilitative therapies in the last couple of years. However, many more advancements, like virtual reality-based devices, were launched during the pandemic.

Discussion

The 4th International Congress of Mobile Health, focusing on the COVID-19 pandemic, examined all aspects of mobile technology in the lives of all members of society. The congress was held in several sections, summarized in part 2.

The COVID-19 pandemic paved the way for entrepreneurship and increased the avail-

ability and deployment of digital devices in health care. It is obvious that due to the growing population and changing lifestyles, health technologies should be fundamentally transformed. Accordingly, innovation should be strengthened by, for instance, introducing health applications in image analysis and nutrition science, especially for chronic disease management. The rising elderly population is a day-to-day challenge for many communities. Serving this group according to the needs and problems they face is very rewarding and has created many opportunities to solve these challenges, such as rehabilitation, which, despite the many problems, m-health has been able to offer solutions. Furthermore, there are still chances for more effort to make the health system more efficient and make the world a better place to live [6, 7].

The COVID-19 pandemic has unprecedentedly forced people to use m-health, creating an excellent opportunity for health policymakers to implant the technologies and educate people, thus solving the many issues faced by the health system today. M-Health technology may present a valuable method of support that can be used to increase access to knowledge, monitoring, and self-management, which has initiated this pandemic. M-Health has become more prominent on quarantine days during the COVID-19 pandemic [8, 9]. Being familiar with the power of electronic health applications in response to this global crisis was a golden opportunity for developing and expanding public health infrastructure to respond early to infectious outbreaks. Poor electronic knowledge, lack of interest in technology, and related disabilities, such as visual or cognitive impairments are some barriers for recruiting m-Health. Health system authorities should also acknowledge mentioned challenges and provide public education programs through mass media.

The use of mobile health technology is growing dramatically as consumer demands have emerged over the past few years [8, 10]. As we move forward, mobile health technology and telemedicine will continue to replace traditional medicine, especially during global crises, such as the COVID-19 pandemic, that forced people to distance themselves physically and limit in-person visits. Therefore, the next step includes integrating m-health with the medical record system, developing and expanding m-health infrastructure, and providing strategies for early response to outbreaks.

Conclusion

The COVID-19 pandemic is a unique opportunity for m-health-based start-ups and companies. It realized the potential market to investors and entrepreneurs healthcare delivery efficiently. With the remarkable changes in population, ideas, and culture, m-health can replace conventional health delivery in nutrition, geriatrics, rehabilitation, and several other areas of science. Awareness of this accelerated change in health delivery is crucial to all stakeholders, including policymakers, healthcare providers, and patients.

Authors' Contribution

K. Bagheri Lankarani. SJ. Masoumi and B. Honarvar conceived of the presented idea and supervised the project. A. Mashhadiagha, M. Shirvani, SY. Parvar, and M. Karami gathered the data and drafted the manuscript. All authors discussed the results and contributed to the final manuscript with a significant contribution to the project.

Conflict of Interest

None

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