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## Use of Technological Aids in Healthcare: The Indian Scenario

Sharma Ruchika P. <sup>\*1</sup>, Shah Pankti T. <sup>1</sup>, Shah Swapnil D. <sup>1</sup>, Patel Ishani S. <sup>1</sup>, Mansuri Mustakim M. <sup>2</sup>, Deshpande Shrikalp S. <sup>3</sup>

**1** Doctor of Pharmacy, Department of Pharmacology and Clinical Pharmacy, K. B. Institute of Pharmaceutical Education and Research, Gandhinagar, Gujarat, India.

**2** Assistant Professor, Department of Pharmacology and Clinical Pharmacy, K. B. Institute of Pharmaceutical Education and Research, Gandhinagar, Gujarat, India

**3** I/C Principal, Head of Department of Pharmacology and Clinical Pharmacy, K. B. Institute of Pharmaceutical Education and Research, Gandhinagar, Gujarat, India.

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### \*For Correspondence:

Sharma Ruchika P

Department of Pharmacology and Clinical Pharmacy, KBIPER, Gandhinagar, Gujarat, India.

([www.jpsbr.org](http://www.jpsbr.org))

### ABSTRACT:

Blooming field of technology does not only provide us endless entertainment and knowledge but can be an exceptional companion in healthcare. Increasing number of digital devices and technological options makes it even easier to provide effective healthcare due to popularity of technological devices worldwide. Applications of such aids can help to cope up with increasing demand of effective healthcare with time and cost saving manner actively and passively. Worldwide numbers of initiative has been taken to address and introduce such aspects yet Indian scenario is unknown due to lack of studies addressing such issue and quality implementations in respective field. This work is conducted to analyze current scenario of technological aids in healthcare in India. Without any doubts improvement in compliance and adherence is noticed at global and Indian level also. There are evidences of effective management of chronic conditions by technological aids even though there have been several factors which needs attention to make the most of technological aspects, current scenario needs era of thorough improvement and quality research to be up to the mark for being most reliable mean of effective healthcare management.

**KEY WORDS:** eHealth, Technology, Digital, Adherence, informatics, Healthcare

### INTRODUCTION:

eHealth is an emerging field in health care system with a motive to increase life expectancy and serve better care for patients, with the help of medical informatics, internet, and innovative technology. Digital technology interventions show promise in aiding patients attain and maintain their health care goals, including adherence to medication regimens and vaccination recommendations, receiving necessary treatment, attending appointments, and maintaining healthy behaviors.<sup>[1]</sup> Current views are diverse regarding to use of technology to address an effective healthcare intervention in developing countries.<sup>[2]</sup> eHealth has created quite a buzz around

world along with proper explanation of terminology concept of relation between technology and healthcare is properly explained in literatures.<sup>[1]</sup> Introduction of simple technological intervention have not impressed healthcare so far the application of mobile computing and communication technology is rapidly expanding in the fields of health care and public health due to it being proved handy in health research, services and outcomes.<sup>[3,4]</sup> For the last decade, eHealth has constantly expanded as a part of eHealth. Mobile applications for health have the potential to target heterogeneous audiences and address specific needs in different situations, with diverse outcomes, and to complement

highly developed health care technologies. The market is rapidly evolving, making countless new mobile technologies potentially available to the health care system.<sup>[5]</sup> Stepping up telecommunications technology in resource-limited healthcare settings is a priority of the World Health Organization.<sup>[6]</sup>

It is believed that global mobile data traffic will increase 18-fold between 2011 and 2016". By the end of that time period, it is projected that there will be 10 billion mobile devices in use around the world. A 2011 global survey of 114 nations undertaken by the World Health Organization found that eHealth initiatives have been established in many countries, but there is variation in adoption levels. In short, mobile health clearly has expanded in number and type of initiatives. It is expected to become a multi-billion dollar field by 2017. According to a report, annual revenues are projected to reach \$23 billion worldwide. This includes \$6.9 billion in Europe, \$6.8 billion in Asia, \$6.5 billion in North Americas, \$1.6 billion in Latin America, and \$1.2 billion in Africa.<sup>[7]</sup> Though India has the second-largest wireless subscriber base in the world, with more than 150 mobile device vendors, it has, until recently, remained relatively unaffected by the global smartphone wars. Rise in addressing such issue has been notice in current wave.<sup>[8]</sup>

#### USE OF TECHNOLOGICAL AIDS IN HEALTHCARE

The impact of digital technologies on the healthcare sector, then, has so far been relatively limited. But digital and social media innovation is now taking hold. From communication emails, online counselling, reminders, e-prescribing, online reporting, history, online pharmacy, information to remote monitoring can be done with the mean of digital channel of health.<sup>[9,10]</sup> Smart mobile devices have emerged as a significant communication technology. It is estimated that over 85% of the world's population is now covered by a commercial wireless signal, with over 5 billion mobile phone subscriptions (WHO Global Observatory, 2011) and almost are 17,000 m-health apps in major app stores are present.<sup>[11]</sup> Numbers are quite alarming in terms of population covered and industrial aspects involved. Several opinions regarding setup of developing countries suggest that simultaneous delivery of both modern and traditional healthcare with information and communication technologies (ICTs) could play an important role in the management of patients and enhance quality care for patients in particular and healthcare in general.<sup>[12]</sup> Several

trials suggest that technology can be hand in maintenance of healthy life styles and using preventive measures.<sup>[13]</sup> According to WHO, technology in health care includes equipment, machinery, medical supplies and drugs and other things that are used in case for patients.<sup>[14]</sup>

#### Adherence and Compliance

One of the major hurdles to achieve effective healthcare is non adherence of medication.<sup>[15]</sup> Poor adherence to efficacious cardiovascular-related medications has led to considerable morbidity, mortality, and avoidable health care costs.<sup>[16]</sup> Evidences suggest that use of technological aids can improve cardiac rehabilitation and compliance<sup>[17,18]</sup>. A principle behind so much usefulness of technology in increasing adherence may be due to facilitated communication process between healthcare provider and patient which have substantially strong evidence of strengthening communication, education and intervention process to improve adherence.<sup>[19]</sup> special population considering geriatrics rely on their medications to stay healthy, but complex medications schedules leads to mistakes like missing dose, incorrect amounts, or wrong times of administering, which often leads to unnecessary hospital visits, illness, and even death. Hence, medication dispensing device has been designed, which would prevent unplanned hospital visits, resolves medication errors and improves adherence to treatment as it dispenses the medicine at preset time.<sup>[20]</sup>

#### Interventions

Not only this system can improve adherence to medication but it can also inform patients of benefits and risks associated with adherence. Interventions aimed at improving adherence would provide significant positive return on investment through primary prevention (of risk factors) and secondary prevention of adverse health outcomes.<sup>[21]</sup>

#### Informatics and Communication

It is no longer in doubt that to make intervention to provide effective health care and information technological aspects are boon. The effect size comparisons in the use of Web-based interventions compared to non-Web-based interventions showed an improvement in outcomes.<sup>[22]</sup> Apart from them modern communication system even improve the process of providing interventions.<sup>[23]</sup>

### Active and Passive Cost-effectiveness

A study of the U.S. wireless industry by Roger Entner found that mobile devices improve worker productivity in four ways: 1) reducing unproductive travel time, 2) improving logistics, 3) enabling faster decision-making, and 4) empower small businesses and improving communications. He estimated that the industry increased productivity by \$33 billion in 2011 alone. One-third of this gain (\$11.2 billion) came from the medical area. Projected productivity gains of \$305.1 billion over the next 10 years in medicine.<sup>[7]</sup>

### Easy to reach

Even rural population have accepted supporting role of technological aspects in healthcare sector.<sup>[24,25]</sup>

### Diagnosis and Treatment

Digital technology and computerized equipments are very useful in health assessment, decision making and treatment of chronic diseases and surgeries. Improving quality of life is one of the main benefits of integrating new innovations into medicine. Continuous monitoring of patient parameters such as heart rate, rhythm, respiratory rate, blood pressure, blood-oxygen saturation, and many other parameters have become feature of the care of critically ill patient. Telemonitoring devices use can help in precise and remote monitoring of patient's vital signs are associated with reduced rates of re-hospitalization and mortality.<sup>[26]</sup> From small inventions like adhesive bandages and ankle braces, to larger, more complex technologies like MRI, digital x-rays, CT-scan, artificial organs (pace-maker) and robotic prosthetic limbs, technology has undoubtedly made an implausible and amazing impact on healthcare.<sup>[20]</sup> Use of innovative medical equipment technologies in diagnosis, monitoring and treatment promotes adequate and accurate results in health care management.<sup>[27]</sup> Digital x-ray machine which is used for diagnosis purposes, provides high resolution images at a low radiation dose, this allows radiologist to view clean, very high resolution images without concern of information being lost in the acquisition process.<sup>[14]</sup> Computerized equipments are progressively used in fast-paced healthcare environs such as intensive care units (ICU) where core decisions are to be taken quickly. Computerized equipment used in ICU frequently are computerized monitoring system intra-aortic balloon pump, ventilators, defibrillators, blood gas machines, ECG (electrocardiograph machine), continuous veno venous

hemodialysis (CVVHD), bilateral positive airway pressure (BIPAP), pathology. Studies showed that the implementation of these many computerized equipment in daily usage has been in ICU since 2000. There is great diversity and complexity in the computerized equipments used in ICU for patient's better health and immediate diagnosis and treatment.<sup>[28]</sup>

### ADVANTAGES

- A multi-way interaction between patient and provider(s) does facilitate the dynamic nature of this relationship.<sup>[2]</sup>
- Cost effectiveness of this system has been proved in several studies in managing chronic condition which has been mentioned prior in this literature.<sup>[29]</sup>
- Individualization emerged as the key feature and design principle to reduce user burden and increase attractiveness and acceptability (e.g. Dose according to patient, Pregnancy, Co-morbidity). Mobile eHealth uniquely enables individualization, context-aware and real-time feedback, and tailored intervention delivery.<sup>[30]</sup>

### DISADVANTAGES

- Sharing may be a serious drawback to use of mobile telephones as a healthcare intervention in terms of stigma and privacy, but its magnitude is unknown.<sup>[2]</sup>
- Many of the interventions do not take full advantage of the affordances of mobile and connected health information and communication technologies, the inability of most electronic medical record systems to receive and process information from mobile devices continues to be a major impediment in realizing the full potential of Health technology.<sup>[31,32]</sup>

### INDIAN SCENARIO AND FUTURE PROSPECTUS

Worth of quality is proved especially for chronic conditions with intention of providing quality healthcare with explained short term and long term benefits whether in monetary terms or non-monetary terms.<sup>[33,34]</sup> Apart

from that its use is also proved in management of mental disorders.<sup>[35]</sup> With the ubiquity of mobile devices both in developing and developed countries, there have been innovations in awareness, prevention, diagnosis, and treatment. Mobile technology is especially helpful in regard to chronic health diseases because it frees physicians from routine office visits while still providing data on patient conditions. This helps doctors focus office care on those requiring more detailed medical assistance.<sup>[7]</sup> Current theories, however, appear inadequate to inform mobile intervention development as these interventions become more interactive and adaptive.<sup>[36]</sup> Deployment of such services requires collaboration between academic research and healthcare centers in order to design digital solutions that are individualized for patients and care provider's needs.<sup>[37]</sup> Even when these methods do not engage patients in shifting their behavior towards better compliance applying persuasive techniques in a personalized manner should be considered.<sup>[38]</sup> Underserved populations without computer experience or can be educated to use an Internet telemedicine system.<sup>[39]</sup> Moreover it is also documented that there is drastic need of government involvement in implementation of such influencing procedures.<sup>[40]</sup>

### Digital India

Initiative taken by Indian government in 2016, Mr. Narendra Modi, the current Prime Minister of India, dreamt of quality healthcare which reaches right up to the remotest areas through ehealth.<sup>[41]</sup> This concept of ehealth will allow medical records to be uploaded and shared with doctors. Mr. Arvind gupta, head of the digital India foundation and the BJP's (Bharatiya Janata Party, a political party of India) information and technology group, spoke on the sidelines of the 46<sup>th</sup> union conference on lung disease that, "technology is a good intermediary". There is a demand-supply gap when it comes to medical care, which can be reduced through technology. ehealth initiative will involve integration of the patient's electronic health records in a 'digital locker', which can be maintained over a life time.<sup>[42]</sup>

### CONCLUSION

Technological aids in health care enables more informed decision making and enhanced quality of care. It facilitates earlier and more accurate diagnosis, improves administration efficiency and coordination. It allows rural

residents to receive expert diagnosis and treatment from distant medical centers. Telemedicine creates more efficient, convenient and potentially more cost effective delivery of care, provides faster access to a patient's medical history of the patient and reducing poor response to a course of treatment. Hence, digital technologies such as mobile health and telemedicine can help in improving adherence, disease self management, accurate diagnosis and effective treatment.

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