

Influence of Information and Communication Technology in Health Sectors

Saraswati Mishra, Abhishek Kalra, Kavita Choudhary

Abstract: This paper represents that how Information and Communication Technology (ICT) is influencing the health services. Emergence of Internet has boosted the use of this technology and now this has become an inimitable source of healthcare services. We have listed the technologies that are being used to cure the patient in various medical sectors and hospitals. Further, comparison between traditional methods of treatment and methods that include ICT, shows that it is beneficial to implement ICT to provide e-health services which helps developing countries to reduce cost of treatment. As obvious that installation cost is more but after implementation it becomes more facilitating solution. Conclusion can be made that if technology is easy to understand, learn and implement as well as solves various problems at a one stretch then no harm in its procurement even though installation cost is a bit high because after effects are more beneficial.

Index Terms— Cybermedicine, e-health, telemedicine.

I. INTRODUCTION

In this technical era we are completely in the grip of technology. Every day to day activity is under the influence of techno appliances. Technology can be defined as the application of scientific knowledge to design contrivance and service solutions. Two widely applicable technologies have mesmerized our lives these are – Information Technology and Communication Technology. Information Technology is a branch of engineering that deals with the use of computers and telecommunications to retrieve, store and transmit information. Communication Technology is a method of meaningful exchange of information among people. Combination of these two technologies has given birth to more effectual technique- ICT. Information and Communication Technology is a tool that facilitates storage, processing, manipulation transmission and reception of information by electronic means. This definition covers full range of ICTs, from radio and television to telephones (fixed and mobile), computers and the Internet.

ICT has powerful application in various sectors like, in education sector smart classes, distance learning, webinars and online tutorials come under the category of e-learning. E-agriculture teaches the application of new techniques in farms and improves knowledge of farmers. E-business provides efficient means of establishing and promoting business through electronic means and creating market for the new product. E-governance makes citizens of country aware of new government policies and develops services at all level according to the need of business and citizens.

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Saraswati Mishra, Department of EECE, ITM University, Gurgaon, INDIA.

Abhishek Kalra, Department of EECE, ITM University, Gurgaon, INDIA.

Kavita Choudhary, Department of CSE (Asst. Prof.), ITM University, Gurgaon, INDIA.

E-health improves healthcare procedure and suggests quick and better solution. In this paper, we are mainly concerned about the improvement of healthcare due to application of ICT. E-health is a recent term for healthcare practice supported by electronic processes and communication. E-health promotes cooperation of governments, doctors and health specialists at national and international level to create a reliable, high quality and affordable health care systems. Also provides medical training and education to doctors as well as patients and introduces about new research.

II. ICT IN HEALTH SECTOR

We can say health is a physical condition of a living thing. ICTs have potential to make major impact on improving the health of the members of each class in the society and encouraging sustainable development and governance. Effectively used ICTs have enormous potential to gather information, process them and find out better solutions to eliminate all the problems, which empowers citizens as well as Government [1]. Not only for humans but for animals and plants also eHealth is incredible.

The main goal of the eHealth is to invent a technique of healthcare which is pervasive in nature. EHealth can certainly provide such an access especially in the rural regions where physicians or doctors may not be available [1]. High treatment costs are the main problem of the modern-day health services in many countries. These costs may not be acceptable and viable both for developing and developed countries [3]. EHealth can reduce treatment costs by decentralizing the medical services and providing global access to all the patients as well as helps to fend off unnecessary trouble like transportation etc.

Here some e-health services are defined that are already implemented internationally.

Telemedicine: Telemedicine is an application of information and telecommunication technology in order to provide best possible clinical health care over a long distance. This technique facilitates physical and psychological treatments at a distance, including telemonitoring of patient's functions. It acts as a life saving solution in critical accidental cases and emergency situations [3].

EPrescribing: All types of diseases including physical illness, anxiety, incompetence, anthrax, skin disorder, allergies, phobias etc. can be cured by consulting with the specialist available throughout the world [4].

MHealth: This is a term used for healthcare supported by mobile devices. The application deals with the use of mobile devices to gather the health data or signals and deliver it to doctor, practitioner or researcher. This kind of real-time monitoring of patient improves health treatment and facilitates doctor to

handle multiple issues of multiple patients at a time. Immense rise in mobile phone users in developing countries has created an opportunity of success for m-health. With the ease of communication mobile phones can act as a life-saver [2].

Healthcare Information System: This is a software solution for appointment scheduling, patient data management, work schedule management and some other administrative tasks related to healthcare.

Cybermedicine: This is a use of internet to deliver medical services, such as medical consultation and drug prescription. It is the successor to telemedicine. Cybermedicine is implemented already. It involves transmission of images from a primary care centre to a specialist, who studies the case and suggests more beneficial intervention [4].

ICT with WSN: ICT and wireless sensor network (WSN) works together and forms new platform of healthcare of animals and medicinal plants. It also helps to search new medicinal plants existing on earth. There are several projects working on in this area.

III. PICTORIAL REPRESENTATION



Figure1: Pictorial representation of ICT in Healthcare system

IV. ICT HAS BEEN IMPLEMENTED

History: The very first application of ICT in health care was the hospital information systems (HIS) in the United States of America. One of the projects is Medinet project at General Electric followed by work at Massachusetts General Hospital (MGH) in Boston [3]. Simultaneously the work on HIS was done at LDS Hospital, Salt Lake City, Utah by Warner and at Kaiser Permanente in Oakland, California by Collen and by Wiederhold at Stanford University. The first HIS' was centralized system that used large computers (mainframes) in 60's which later evolved to modular systems in 70's and finally, after computer networks were developed, to distributed systems in 80's. Italy was the cradle of telemedicine as the medical assistance from the International Radio Medical Centre to the crews of sea going ships started here during 1935. ICT brought spectacular achievements to medical diagnostics. Two well known imaging techniques – computer tomography (CT) and magnetic resonance imaging (MRI) are based on computer reconstruction of images from management data [3]. The inventors of both techniques won

Nobel prizes (Cormack, Hounsfield – 1979 (CT), Lauterbur, Mansfield -2003 (MRI).

Implementation: Effective use of ICTs has prevented maternal deaths in Peru, Egypt and Uganda. In South Africa, mHealth has enabled TB patients to receive timely reminders to take their medication. In Cambodia, Rwanda, South Africa and Nicaragua, multimedia communication programs are increasing awareness to strengthen the public responses to prevent HIV and AIDS [3]. In Bangladesh and India, global satellite technology is helping to track outbreaks of epidemics, to ensure effective prevention and quick treatment availability.

V. IMPACTS

Faithfull dispersal of eHealth information impacts on major public health threats.

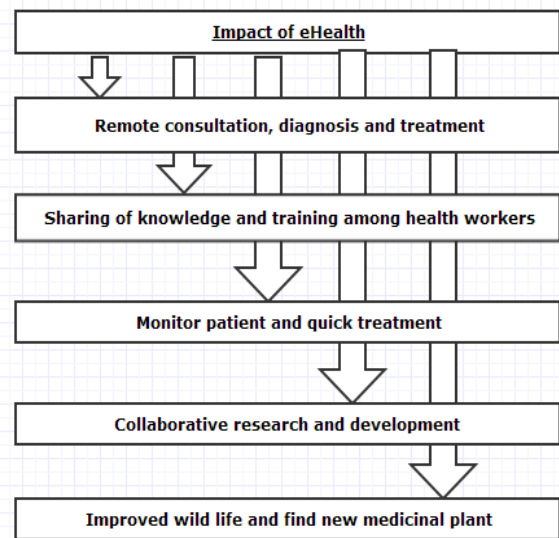


Figure2: impact of e-health in different fields

VI. CHALLENGES

Developing countries do not have appropriate infrastructure to facilitate eHealth system. The implementation is still at the lowest level. Various geographical areas still are not equipped with wireless communication systems which cut them off from the development procedures. Large group of people are ignorant about these techniques.

To bridge the knowledge gap, several aspects must be evaluated where further experimentation, research and analysis are needed [1], including -

- 1) Lowering down the cost of eHealth facility for economically poor people,
- 2) Plan for large-scale implementation all over the region,
- 3) Gather information about the area out of the reach of eHealth system,
- 4) Availability of the resources to share information and experience at national, regional and international levels,
- 5) Promoting the health care activity with proper information systems,
- 6) Involve private sectors and other organizations for their contribution to improve the facility.

- 7) Provide proper training to the regional doctors and health specialist for the technology usage,
- 8) Connect all the health centers together through communication medium to solve critical cases.

VII. OPPORTUNITIES IN HEALTH SECTORS

If eHealth services are implemented all over the world it will provide ease of cure to every member of the society irrelevant to the class. Here we are discussing the opportunities that will lead to sustainable development-

- 1) To gather information about new emerging diseases,
- 2) Find out the cure or treatment of those diseases by way of cooperative and collaborative approach [1],
- 3) Increase the potential of technology by continuous research,
- 4) Development of communication facility and increasing its range of services,
- 5) Provide employment to deserving people and boost up the contribution of educational sectors,
- 6) Monitoring wild life and saving endangered species,
- 7) Increase resources of finance and establishing public-private partnership [1],
- 8) Getting knowledge about new vegetables and medicinal plants, and finding ways to nourish them and consume.

VIII. ANALYSIS OF APPLICATION OF ICT IN HEALTHCARE

General healthcare services		Healthcare services with ICT
1	Accessibility is restricted to a local region.	Accessibility is Global
2	Quality of service is Good.	Quality of service is Best
3	Cost of transportation is more	Cost of transportation is less.
4	Cost to establish infrastructure is comparatively less.	Cost to establish infrastructure is more.
5	Cost of service is more.	Cost of service is less
6	Depends on availability of expert	Expert advice is always available
7	Continuous monitoring of patient is not possible.	Continuous monitoring of patient is Possible.
8	Multiple patients cannot be cured at a time	Multiple patients can be cured at a time.
9	Difficulty in reaching at places suffering from natural disaster.	Easy (if infrastructure is available)
10	Delay in treatment is large.	Quick treatment is possible.
11	Difficult to monitor wild life hence animals cannot be cured immediately.	If proper infrastructure is established easy to cure wild animals.
12	No provision to save endangered species.	Helps to save endangered species.
13	New medicinal plants cannot be easily found.	New Medicinal plants can be found and nourished.
14	Difficult of publicity of new technology.	Ease of publicity of new technology.
15	Learning requires proper arrangement of workshop organized by specialist.	Learning all new procedure requires internet connection.

IX. FUTURE SCOPE

Single technology will not be suitable for all situations. Innovative and creative combinations of old and new ICTs will provide added value and new possibilities. Focus should be increased towards rural areas and for poor people. Work towards the development of suitable technologies to provide cure during natural disasters. Application of eHealth should also be improvised for wild life and environment. Use of already existing technique with some modification should be emphasizes, so that the initial cost of deployment can be reduced.

X. CONCLUSION

ICT can improve the health care practices in developing countries and provide expertise advice instantly on need. This technique is a bit costly by to implement but after implementation it reduces the cost of healthcare [5]. For any technology, to be worldwide acceptable and adoptable following criteria must be considered

- 1) Technology should be simple, easy to use, affordable and sustainable.
- 2) Implement new technologies on existing technologies [5].
- 3) Involve private sectors in the design by demonstrating benefit helps in cost sharing and enhancing the use the technique.
- 4) Implement revolutionary changes on existing techniques [5].
- 5) Strong need of sharing of knowledge and resources amongst the researchers and healthcare providers.
- 6) Continue to research and bring new projects, according to the need and cost bearing ability of consumers.

REFERENCES

1. Connecting people, improving health: the role of ICTs in the health sector of developing Edited by Andrew Chetley, et al. chetley.a@healthlink.org.uk InfoDev Task Manager: J Dubow February 2006 *infoDev*
2. Newsletter LAC 2010, Number 12, July 2010 ICT and HEALTH
3. Impact of Information and Communication Technologies (ICT) on Health Care Robert Rudowski, Department of Medical Informatics and Telemedicine, Medical University of Warsaw, Poland
4. wordnetweb.princeton.edu/perl/webwn
5. National Knowledge Commission Management of Health Sector in India Recommendations for the NKC "Report of the working group on health information network"



Saraswati Mishra is pursuing M.Tech from ITM University. She did her graduation B.Tech (ECE) from LAD College Nagpur University, Maharashtra with distinctions. She is currently working on Cognitive radio technology.



Abhishek Kalra is pursuing M.Tech from ITM University. He did his graduation B.Tech (ECE) from Somany Institute of Technology & Mgmt, Maharishi Dayanand University Rohtak. He is currently working on image processing.



Kavita Choudhary working as an Assistant Professor in Department of Computer Science in ITM University, Gurgaon. Currently, she is pursuing PhD from Banasthali University. She did her Post graduation with distinction from Guru Gobind Singh Indraprastha University. She did her graduation, B.Tech (CSE); in honors from University of Rajasthan. She have more than five year of teaching experience. Her core subjects are Software Engineering, Computer Networks, and Software Testing.