Role of ICT in Medical Health Care

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ABSTRACT

Today, the technology is changing the landscape of the world and leading us towards a sophisticated technical world. The emerging role of ICT has created a huge impact on Healthcare. It enhances the quality of care, increases the patient security and data protection; and reduces operating & administrative cost. ICTs also provide the capacity to improve health system efficiencies, increases patient safety, prevent medical errors and strengthens the interaction between patients and healthcare providers. Some issues like Computer illiteracy, Absence/ poor internet connection and Poor **ICTs** awareness are the major challenges of ICT in healthcare system.

Keywords: Healthcare, Information Technology, Clinical Decision Support, Clinical Data Processing, Electronic Health Record.

INTRODUCTION

Information and communications technologies (ICTs) are playing a critical role in improving health care for individuals and communities. By providing new and more efficient ways of accessing, communicating, and storing information, ICTs can help bridge the information divides that have emerged in the health sector in developing countries—between health professionals and the communities they serve and between the producers of health research and the practitioners who need it, through the development of databases and other applications [1]. The telecommunication devices are more user friendly & used by a huge population around the world which have reduced the communication gap to a zero level. Therefore, accessibility to information has become simple using ICT and also people find themselves more relaxed while availing healthcare service. If a doctor has the right communication channel it is easy to deliver treatment and care for the patient who is located anywhere around the world [2]. The system helps the Doctor to continuously monitor the patient's history, diagnostic report, and track the current health condition. The Doctor can also interact with patient; recommend taking medical examination and prescribing medicine. The village population lacks proper healthcare awareness due to the absence of accurate information [3]. The transportation difficulties in rural areas are also a disadvantage taking the patient to the hospital on time. This is a major reason for the increased number of infectious diseases and death rates in villages. This can be addressed by installing proper communication channel so that the Doctors in the villages can communicate with the nearby towns and thus the life of many people can be saved. By digitalizing the reports, one can have a track on his own health condition. It also helps in getting second opinion from any medical practitioners around the world [4]. This keeps the people to be connected with their doctors and fine tune the patient- doctor relationship. This system ensures the people to have a better medical experience and leads them to a healthy life. This indirectly improves the health status of the country [5].

The use of ICT in healthcare can be categorized into 4 main streams such as;

Health & Education; in this Digital era, people can easily seek, access, learn & communicate with others within a quick span of time. This makes education

accessible, available and open to all. Health education creates awareness among the public about the communicable diseases, health status, prevention measures and various current diagnostic & therapeutic procedures [6]. This gives a freedom to the people to choose the best hospitals and doctors to approach for treatment and to have their life in a healthy way.

Hospital Management System; ICT helps the Hospital management to lead the organization in a successful way and to overcome some numerous challenges faced by the Hospital. ICT equally helps the management to improve the patient safety and satisfaction, get updated to the latest technology, have a clear knowledge on population health & statistics and keep a note on the government mandates on track. Primarily, the workplace can be strengthened.

Health Research; ICT in healthcare research helps in finding the possible prevention measures to eradicate and reduce the spread of diseases. We can find new technology in diagnosis which reduces the time and cost. This saves the lives of many individuals by providing treatment in advance. Through ICT, the traditional healthcare systems can be eliminated and new models can be formed for effective quality care.

Health Data Management; The fundamental use of ICT in Hospital is for electronic storage of medical data. This helps to retrieve the information easily. Through ICT the data can be transferred to the patient or to the Doctors for consultation. The patient can have medical records in hand which can be used anywhere, anytime. Information & Communication Technology offers various ways to improvise the Healthcare system [7]. The healthcare field has to use ICT more intelligently to bring in more changes and elevate the healthcare to a much higher level which is important for the country's development.

Current status of ICT in healthcare

The degree of use of ICT in healthcare varies by health care setting. ICT and the internet had a significant impact on consumers. Numerous websites have made health information available to patients, thereby strengthening their role in care decisions [8]. Nowadays some technologies are emerging in healthcare such as Clinical Data Warehouse, Clinical Decision

Support Systems (CDS), Data-mining Techniques, Online Analytical Processing (OLAP) and Online Transactional Processing (OLTP). These technologies are used to maintain and utilize patient data intelligently, based on the user's requirements. Information systems are used to educate patients about the latest developments in medical science through the internet and specially configured kiosks in hospitals and clinics.

Major challenges;
Cost
Educational status
Poor infrastructure
Management problems
Computer illiteracy
Resource shortage
Poor staffs' initiation
Absence/ poor internet connection
Poor computer access, workload and absence of responsible body to **ICTs**

Some ICT Tools in Healthcare

These Health ICT tools support in specific areas and promote better, more efficient healthcare through the use of today's technologies. Commonly used health ICT tools are discussed below:

I.   Electronic Medical Records (EMR**):** The EMR provides a clinician with real-time access to patient information, such as patients medical condition, visits to health providers, images and reports of diagnostic procedures, schedule of services, allergies and contact information to caregivers and a complete longitudinal record of care evidence based on decision support tools that can be used to aid clinicians in decision making [9]. A fully integrated EMR enables a physician to update clinical and other information about a patient on a continuous basis. The EMR can automate and streamline a clinician's workflow, ensuring that all clinical information is

communicated .The EMR can support the collection of data for uses such as billing, quality management, outcome reporting, public health disease surveillance and reporting. Electronic document has tremendous advantages over the paper document such as it does not require a warehouse for storage and is readily accessible from anywhere.

II. Clinical Decision Support (CDS): CDS encompasses computerized alerts and reminders to care providers and patients, clinical guidelines, condition-focused order sets, patient data reports and summaries, diagnostic support, and other tools that enhance decision making in clinical workflow. CDS provide clinicians, staff and patients with knowledge and person-specific information, presented at appropriate times to enhance health and health care [10]. CDS has the potential to increase adherence to clinical guidelines, protocols and best practices which helps to avoid medication errors, and to prevent complications. CDS requires computable biomedical knowledge, person-specific data, and a reasoning or inferencing mechanism that combines knowledge and data to generate "advice" to clinicians.

III. Computerized Physician Order Entry (CPOE): CPOE is used by physicians for ordering medications, orders for x-rays and other diagnostic procedures, referrals, discharges, and transfers. One important higher-level application in CPOE is that providers write orders including prescriptions using computers. Computerization of ordering is important because most actions in health care follows an order.

IV. Electronic Prescribing (E-prescribing): E-prescribing is the transmission, using electronic media of prescription between a prescriber, dispenser, pharmacy manager, either directly or through an intermediary, including an e-prescribing network. E-prescribing includes, two-way transmissions between the point of care and the dispenser. It is recommended that electronic prescription applications should be robust enough to include safety checks for allergies, drug-drug interaction warning, dose appropriateness, drug-clinical condition warning, and drug-laboratory alerts [11].

V. Health Information Exchange: It is the electronic connectivity via internet and other networks that enables health care providers to exchange patient health information. It is necessary that the networks that permit electronic communication among providers must be secure in order to safeguard the information from unauthorized access, use and disclosure. It requires to develop data and messaging standards to establish the critical goal of interoperability to communicate with one another.

VI. Personal Health Record (PHR): PHR is an electronic application through which individuals can maintain and manage their health information in a private, secure, and confidential environment. The most salient feature of PHR, and the one that distinguishes it from the EMR and EHR, is that information it contains is under the control of individual [12] [13]. The individual is distinctively the guardian of information stored who can decide what volume of information to include, how it is maintained and ordered, and who to read them or "check them out." It is necessary to decide standards and policy to determine how individuals can delete or modify information in a PHR that originated from an EHR and how these modifications are

communicated to other providers with whom the data in the PHR are shared. Significant sources may include health care providers, medical devices, individuals, health insurers, research institutes etc.

VII. Remote Monitoring: Remote monitoring is the electronic transmission of health care data either entered directly by a patient (or his/her caregiver) or through a medical device to a clinician's Electronic Health Record (EHR) or a Patient's Personal Health Record (PHR) [14]. The ability for a clinician to monitor patient information about diagnostic, medication tracking, and activities of daily living (ADL) measurements, captured remotely is a key enabler for the management of chronic health problems and management of new conditions. Remote monitoring could include physiologic measurements (e.g., weight, blood pressure, heart rate and rhythm, pulse oximetry, glucose), diagnostic measurements, medication tracking ,device information (e.g., medication pumps, infusion devices, electronic pillboxes), and activities of daily living measurements (e.g., ADL biosensors, pedometers, sleep actigraphy etc).

VIII. Telehealth/Telemedicine:
Telehealth is the use of telecommunication technologies to deliver health-related services and information that support patient care, administrative activities, health education, health services and information over distances [15]. It is a new method of delivering health care by sharing/exchanging the patient related data and medical opinion between medical specialist and a doctor in a remote location through telecommunication networks. The technology is a means to improve access to care, while reducing cost of transportation and increasing convenience to patients care. Tele-homecare, video-conferencing and electronic health records are all components of telehealth and use information technology in delivering their service. It can source expertise within seconds anywhere and effectively mediates the diagnostic shortages and surplus.

IX. Home monitoring of Patients: Due to the institutional healthcare costs escalating worldwide, ICT can be applied to home monitoring of patients particularly the chronic sick aged patients [16]. In one project, a system which is linked to the home telephone can measure, collect and record information about ECG, blood pressure and body temperature of the patient with cardiovascular problems at home. The telephone is modified to hold an IC memory card and multifunction such as simple character and picture processing functions. The collected information is sent from the patient's home to the medical facilities by using online facility to the physician.

X. Clinical Data Processing (CDP): Clinical data processing is used for patient monitoring. Often patients have to be monitored continuously (for ECG monitoring) or periodically (monitoring of vital signs). These monitoring processes may be done for diagnostic purposes in emergency room, for therapeutic purposes in the operating theatre or for surveillance purposes in the ICU [17]. By automating the monitoring process, manpower cost can be saved as more nursing time can be freed from recording observations for patient care activities.

CONCLUSION

With the help of ICT, it is possible to transform health care and improve patient safety by better leveraging information technology to improve the efficiency, accuracy, and effectiveness of health care system. Implementing and supporting ICT applications require skills; hence physicians must make significant changes to both office and physician workflow and take time away to learn how to use ICT. Information and communication technology has the potential to substantially improve healthcare by bringing decision support to the point of care, by providing vital links and by allowing routine quality measurement to become reality [18] [19].

Healthcare ICT market is fastest growing where the hospitals across the country are leveraging the power of ICT to provide the best of healthcare services. Health ICT may be especially beneficial for inner-city and rural populations and other medically underserved areas. It is necessary that latest ICT technologies in healthcare centre that are available in urban population to be made available to rural areas. Rural users can access information by connecting block headquarters to fiber optic network, using wireless technology to achieve last mile connectivity. Achieving this potential will be challenging task, but it is possible.

REFERENCES

1. Cyrille Delpierre, Lise Cuzin, Judith Fillaux, Muriel Alvarez, Patrice Massip and Thierry Lang, "A systematic review of computer- based patient record systems and quality of care: more randomized clinical trials or a broader approach", International Journal for Quality in Health Care , Volume 16, No. 5, 2004.
2. J. G. Proakis and D. G. Manolakis – Digital Signal Processing – Principles, Algorithms and Applications; Third Edition; Prentice Hall of India, 2003.
3. Dr. Simon Wallace. "Patient Safety and the Role of Information Technology", Open clinical Knowledge Management for Medical Care, 2008.
4. Dr. Vijaya Pithadia, and Dr.Vandana Parmar, "Renovation in Healthcare and Information technology", Faculty column , indianmba.com, 2009.
5. Girosi F, Meili R, and Scoville R.- Extrapolating Evidence of Health Information Technology Savings and Costs, RAND Corporation, MG-410-HLTH, 2005.
6. Hillestad R, Bigelow J, Bower A, Girosi F, Meili R, Scoville R, and Taylor R, "Can Electronic Medical Record Systems Transform Health Care ?", An Assessment of Potential Health Benefits, Savings, and Costs, Health Affairs, Vol. 24, (5), 2005.
7. James B.Rebitizer, Mari Rege, Christopher Shepard, Influence, Information, "Overload and information Technology in Healthcare", National Bureau of Economic Research, Niber Working Paper Series, 2002.
8. K. C.Lun, "The Role of Information Technology in Healthcare Cost Containment" , Singapore Med J, Vol.36, 1995.
9. Madhuri Shriniwas, "IT Initiatives in the Indian Services Sector", International Journal of Information Technology and Knowledge Management, July-December Volume 1, No.2, 2008.
10. Mike Klein(2006)."Will Technology improve Healthcare Delivery ?", WTN News , Publications congressional_reports_june04_ch07, May 2006.
11. Stephen T. Parente and Jeffrey S. McCullough, "Health Information Technology And Patient Safety Evidence From Panel Data Health Affairs ", The Policy Journal of the Health care, Vol.28, No. 2 , 2009.
12. Bashshur, L (1995) On the definition and evaluation of

telemedicine. Telemed J 1995; 1:19-30.

13. Beauchamp, T L & Childress, J F, (1989). Principles of Biomedical Ethics, Oxford: Oxford University Press

14. Beck, E. (1997). Managing Diffracted Rationalities: IT in a Home Assistance Service. Technology and Democracy: Gender, Technology and Politics in Transition? Moser,

15. Aas, G.H., Eds, Centre for Technology and Culture, University of Oslo, Oslo: 109-132. (06/12/2005).

16. Garpenby, P & Hisberg, M, 2000, Hälso information idag och imorgon, CMT Rapport 2000:

Linköpings universitet, Linköping (unpublished)

17. Hodge, J, Gostin, L and Jacobson, P (1999). Legal issues concerning electronic Health information: Privacy, Quality and Liability. JAMA October 20, 1999, Vol 282, No 15.

18. Kahan, S, Seftel A and Resnick, M (2000) Sildenafil and the Internet. The Journal of Urology, Vol. 163, 919-923, March 2000

19. Lahtiranta, J. & Kimppa, K. (2004) Telemedicine and responsibility: why anthropomorphism and consent issues muddle the picture. The 5th International We-B (Working For E-Business) conference, 25-26 November, Perth, Western Australia