A Prelude Stride in Praxis & Usages of Healthcare Informatics

Murtaza Hussain Shaikh[1],   Munazza Ahsan Shaikh[2]

[1] **School of Information Science and Engineering, Central South University (CSU), Changsha, 4100083 – People's Republic of China.**

[2] **Department of Medicine Unit-IV (LUH), Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, 76090 – Pakistan.**

Abstract

The Healthcare informatics is essential to bridge the research-practice gap that keeps widening with exploding medical knowledge; human brain power cannot keep pace with these explosions. Every developed nation is facing grim difficulties in the delivery of healthcare to its citizens. The causes are causes are universal (rising proportion of elderly requiring care, expensive medical technology, good expectations of services and quality and government`s poor ability to fund healthcare). These factors drive up cost and reduce equity of access. In this article we have tried to explore some challenges to highlight the importance of healthcare informatics as an emerging field and have given commendations for this profession to cope the coming trials and hurdles. We have has also tried to highlight some developed countries economic percentage on healthcare and medical field and proper usage of ICT as a good source of accessing information to be an updated tool in healthcare informatics.

Keywords: Healthcare Informatics; Technology; Spectrums; Clinical; Patients; Processes; Medical Research; Management.

1. The Provocation

Healthcare informatics stands at cross roads of other disciplines (e.g. nursing informatics, public health programs, health policy, communication science etc) and its one of the most exigent and indeed most promptly expanding field in medical sciences. It's improving its way for healthcare in this information technology era. Many research surveys have shown that patients are willing to use computer systems and communication devices for health purpose. It's slow but a steady progress is helping to resolve the social issues, technological challenges and organizational boundaries that interfere with providing the ICT support needed by patients in community. Patients are playing a vital and important role in a healthcare sector. There is growing recognition of understanding patient`s preference for healthcare in making treatment verdicts and in carrying out treatment schedule and action plans. Patient preferences for treatment options may become a deciding factor in selecting among successful clinical treatments [12]. These preferences also serve as guidelines for action and advising clinical care providers of the patient`s wishes for life support measures [4]. Patient plays an essential role in treatment, carrying out clinical directives in their home and monitoring for changes in their health state. It is logical that our technologies focus un-swerving on patient as an active user of informatics developments and an active beneficiary of their products. Patients require ICT to aid them as they engage in self-help, self-care and disease management activities. Some self help activities like the health learning support needed by patient to live in as healthy a way as possible and may include a social support, a general health education and life style modification strategy [7, 9]. Using ICT systems, the chronically ill can monitor their health (e.g. blood pressure, sugar levels etc) at home, while participating in telemedicine videophone consultation with qualified healthcare professional. Besides identifying medical events, informatics can now guide the development of infrastructure. Healthcare Cost and Utilization Project (HCUP), a public-private partnership is using to assemble a healthcare data system across the entire USA. The United Kingdom, national program for ICT in National Health Service (NHS) is the biggest healthcare informatics project undertaken to connect more than 30,000 general practitioners and approximately four hundred hospitals [1, 17]. In 1999, Australian government decided to double health & medicinal research (HMR) expenditure every three years [3].

2. Health Informatics Spectrum in Modern Epoch

Health informatics is an emerging continence with no firm boundaries but the information processes and types intrinsic to healthcare its scope. These processes encompass a broad spectrum of clinical, administrative and managerial functions and information systems and

IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 6, No 1, November 2012
ISSN (Online): 1694-0814
www.IJCSI.org

86

contribute to healthcare development by facilitating the acquisition, storage and management of healthcare informatics. There are three main spectrums as shown in the figure 1;

1) Managerial: This performs in service planning data and in managing the demographic information.

2) Administrative: This process is used in procurement and contracting data.

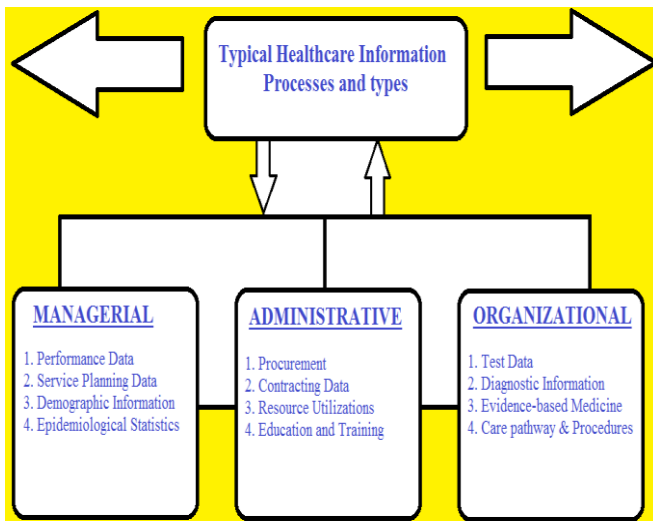*3) Clinical:* This process performs test data and diagnostic information.

Fig 1. *Three major spectrums in healthcare informatics*

The NHS in United Kingdom recently adopted a policy to improve the information quality of patient electronic records. Governing bodies like NHS have requirements of accountability in governance; an effective method for organization to support their decision is analysis of good quality clinical information. Informatics has been a tool for transforming paper based patient record into manageable database. In a similar example of its usefulness, although in Greece Hellenic National Health Service (HNHS) has a tree like managerial structure in which regional areas maintain autonomy, informatics enable effective communication within the system [8]. Informatics can also assist with education in healthcare. A recent medical research team featured delegates from 18 different EU and non EU countries who sought the advice of medical professionals on the role of informatics in practices. It was highlighted that healthcare informatics is efficient for rapid retrieval of information, scheduling appointments and monitoring repeat prescriptions [1]. Healthcare informatics is a field that is concerns itself with cognitive, information processing, communications tasks of medical practice and education [11, 5].
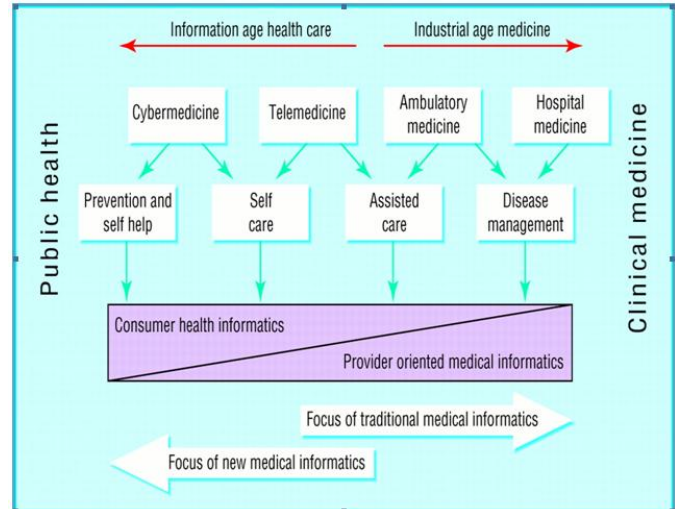

Fig 2. *Traditional medical informatics drifts towards professional and modern stakeholders [7].*

Healthcare informatics focused on developing application for health sector & medical informatician looked at medical practice mainly through the eyes of health professional rather through eyes of patients as highlighted in figure 2. About fifteen years ago the author said that *"After many years of development of information systems to support the infrastructure of medicine, greater focus on the needs of physicians and other health care managers and professionals is occurring to support education, decision making, communication and many other aspects of professional activity"* [2]. Increasing availability of interactive information that is accessible to patient most notably through the internet and related technologies such as web television and satellite radio coincides with the desire of most consumers to assume additional responsibility for their health and pressure of costs on healthcare systems, the emphasis on health of populations on prevention, and growing desire of health professionals to realize the potential of patients and their families [6, 14].

3. Effective Mediums for Healthcare Informatics

Computer technology is not always the most effective medium for delivering information; it is source in health informatics that is concerned;

a) Analyzing consumer preference, information needs, and information use [10].

b) Developing methods and application to support consumers in obtaining health information [10].

c) Evaluating methods and application to integrate into information management systems in clinical practice, education and research [10].

d) Investigating determinates, conditions, elements, model and processes to design, implement and maximize the effectiveness of computerized information and network systems for local consumer and health professionals [10].

Although, the current information society offers tremendous potential for reducing knowledge gap between the healthcare professionals and patients. It also brings a risk of a widening of gap between those who have access to improved communication technology and those who have been excluded [15]. Following are some major enhancements in Healthcare informatics;

1) Several initiatives are addressing about the quality of healthcare information over the internet are being developed to educate the stakeholders.

2) Software systems designed to help users and clarify their values and CBDS`s (Computer Based Decision System`s) helps to make informed choices.

3) Existing systems aimed at professional are being to be used at home by patients.

4) Those systems that are accessible to patients empower stakeholders can be used to tailor healthcare information to individuals.

4. Improved Tools for Health Informatics Exploration

Healthcare sector is an important part of our society, regarding informatics research and ICT industry; it represents a extensive economic and financially attractive area of application. Here, we would like to characterize the current state of informatics in general followed by healthcare in particular; the percentage of ICT in healthcare on the world-wide market is difficult to estimate. The following numbers may, however, indicate the significance of ICT in healthcare. The predictable size of overall healthcare ICT market in US is about 17.5 billion $ in the year 1999. Around 3 billion $ was spent in US just for hospital information systems, compared to 2.6 billion € in European Union [2]. In 1999, the German Research Association Foundations (GRAF) funded hardware and software investments for 36 German university hospitals with 27 million €. The total amount of investments for hardware and software of these hospitals were estimated to be in range of 100 € to 200 € million. In 1996, in European Union the costs for healthcare, including costs for approximately 14,000 hospitals amounted 814 million € which is 8.7% of the total GDP of

all EU members [9]. In 1998, the cost for approximately 2,200 German hospitals with their 5, 7000 beds amounted to 107 billion € and about 1.1 million people worked in these hospitals in Germany and 16 million patients were treated annually in these hospitals [14]. There is a significant increasing economic relevance of ICT in general medicine and in healthcare. It even has an enormous significance for national economies. We have variety of research tools for healthcare informatics, but the most visible tools are an Electronic Medical Record Systems.

5. Electronic Medical Record Systems (EMRS)

A core application using patient`s specific information is the electronic medical record [8]. The paper based medical record has its tradition and virtues; however, research has shown it can be illegible, incomplete, difficult to access in more than one place and insecure from unauthorized uses [3]. Although EMR overcomes some of these problems, there are challenges to implementing the EMR at levels of the individual and association. The main challenge to individual use of the EMR has been its integration into the busy clinical workflow. Few studies that have been performed show computerized physician order entry (CPOE) adds time for the clinician, although other time savings are usually gained elsewhere through error reduction or the automation brought about by other features of EMRS. A related challenge is determination of optimal computing device for clinical setting. Handhelds are increasingly popular, as documented by their use by internal medicine and family practice physicians [13, 19]. At organizational level, the key challenges have been managing complex informatics applications & computer networks upon which they run. Although, individual computers are relatively inexpensive, maintaining large networks and training myriad of healthcare workers is not an easy task. A final challenge to all involved with EMR is the protection of patient`s privacy and confidentiality health insurance portability and accountability act legislation their protection at substantial costs [1, 7].

6. Splendid Encounters in Healthcare Informatics

There is variety in spenders of healthcare informatics as;

a) *Discovering effective information and management tools*

Most of the health informatics application employed today was conceived with user model for professional user. These applications presuppose knowledge levels,

motivation and skill levels more commonly found in health care workers, not health care consumers. Yet as health services become more specialized patients themselves must assume many of information processing and knowledge amalgamation activates. In absence of cross-institutional records and communication systems, it's up patient to convey the treatment plan of cone clinician to another. Furthermore, the reduction in time available for professional service places time urgency on the encounter reducing the opportunity for patient teaching and coaching activities [21].

b) Literacy for all stakeholders

Access to health information via the web or other medium in only as useful as a patient`s ability to comprehend and interpret it. Beyond the functional literacy needed for daily living, patients require the capacity to seek out, acquire and interpret both general health information and that specific to their own situation. Educational strategies that help improve the scientific literacy to general population provide a modicum of assistant; still require for all citizens is basic skill in understanding body processes, disease model and their relevance in an individual`s life [21].

c) Modeling for clinical practices to capitalize patient

For every problem, technology is not the answer. As patients develop the knowledge, skill and motivation to participate in their care, and have better access to information technologies to support their participation, clinical practice will need to change. Re-examination of the activities within the clinical encounter will facilitate highlighting of activities that have become redundant or which could be moved to a time prior to or following the clinical encounter. Additionally, as perspective of health services moves from the episode of encounter to the context of patient new elements may need to be added to the clinical encounter. To fully capitalize on patient as collaborator requires an individualization of treatment presently not accounted for in the system. Patient with the capacity for high levels of involvement will require a different constellation of services than those with more restricted capacities for participation [19].

7. Endorsements for Healthcare Profession

Health profession should retool their skills and develop a healthcare informatics infrastructure, which will aid the efforts to improve patient safety, reduce costs, and enhance both effectiveness and the superiority of healthcare. Different events and programs in educating health services administrators, establishing an interdisciplinary training and research in informatics and performance improvement should result in a framework at a professional level. The formation of partnerships with leaders in the healthcare industry who may want to shape the research and

educational agendas will yield fruitful results. Furthermore, it is a fact that healthcare informatics is an interdisciplinary field that draws upon knowledge from computer sciences; engineering; cognitive management; and health sciences. The field of healthcare informatics is defined as a *"study of computer and information science applications within the context of healthcare management to compile, manage and process data and knowledge for delivering quality healthcare and improving the performance of healthcare organizations"* [1]. The healthcare system would then deal more effectively with significant medical events, infrastructure support and the exploration of information technologies [15, 16]. Finally, raising scope & quality of knowledge in medical informatics and having educated professionals worldwide considerably help to raise the efficiency in health informatics. Although considerable challenges remain, the impact of medical informatics would certainly grow. Improvements in medical documentation, reducing error and empowering patients would continue to motivate use of ICT in healthcare. There is plenty of substantiation that healthcare informatics application can address these imperatives to reduce costs and provide access to knowledge [18, 20]. It is mentioned that *"it is increasingly difficult to practice modern medicine without future technologies"* [3]. However, in this era there is additional trend that it is increasingly unlikely health professionals will encounter patients who have not used ICT to influence their Health knowledge and behavior. Healthcare professional should understand that consumer health application are important but also ensure that these applications are effectively developed and evaluated properly. Optimal use of healthcare informatics applications would require a re-engineering of existence systems. It would be crucial for medical informatics to field to account for needs and concerns of all parties who participate in the process (i.e. Patients, Clinicians and Governments). Clinicians have to accept some collisions on their practices, as individual physician becomes more accountable to document increasingly expensive care and demonstrate avoidance of error.

Acknowledgments

References

[1] A.C.Norris (2002)"Current trends and Challenges in health informatics". Health Informatics Page: 8-205. London, UK.

[2]   Coiera E (2003)" Guide to Health Informatics". (2e). London: Arnold UK.

[3]   National Program for IT in NHS (2009).Available online at http://www.connectingforhealth.nhs.uk [Accessed on March 3rd, 2010].

[4]   National Health and Ageing Portfolio Budget Statements (2005-2006), Commonwealth of Australia. Budget Related Paper no.11, Canberra- 2005, Australia.

[5]   Greenes R.A,Shortliffe E.H(1990) "Medical Informatics. An emerging academic discipline and Institutional priority". JAMA 1990; 263:1140.

[6]   Gunther.E (2000)" Recent advances Consumer Health Informatics". BMJ Vol: 320,24 June 2000.Universoty of Heidelberg,69115 Heidelberg, Germany.

[7]   Eysenbach G (1999)"shopping around the internet today and tomorrow: towards the millennium of cyber-medicine". BMJ Vol: 319. Germany.

[8]   Jadaj A.R (1999)"Promoting partnerships: Challenges for the internet age". BMJ Vol: 319:7614.Germany.

[9]   Irving L, Klegar-Levy.K, Everette.W (1999)"Falling through the net: defining the digital divide. A report on the Telecommunications and Information Technology gap in US". Washington DC: National Telecommunication and Information Administration. Department of Commerce.USA.

[10] Kasper J.F (1992)"Developing shared decision-making programs to improve quality of healthcare". Qrtly Rev Bltn, 1992- June. 18(6):183-90.

[11] Hakim R.B (1996) "Factor associated with do not resuscitate order: Patient`s preferences, prognoses and physician`s judgments". Support Investigators, Annual of International Med 1996; August 25th (4)284-93.

[12] Steiner C, Elixhauser A,Schnaier J (2002)"The healthcare cost and Utilization project. An overview". Effect Clinical Practice: 143-151, May, 2002. USA.

[13] Brennan P.F (2005) "Health Informatics and Community Health: Support for Patients as Collaborations in Care". School of Nursing and College of Engineering, University of Wisconsin – Madison WI 53705. USA.

[14] C. H. Matthews (2005) "Using linear programming to minimize the cost of nursepersonnel," Journal of Health Care Finance, vol. 32, pp. pg. 37, 13 pgs, fall 2005.USA.

[15] E.W. Boberg (1995), "Development, Acceptance and Use Patterns of a Computer Based Education and Social Support System for people living with AIDS/HIV infection".11 (2) (1995) 289/311.

[16] W. Slack, Cybermedicine, San Francisco Josse-Bass, 1997. USA.

[17] T. Eng, D. Gustafson (1999)," Wired for Health and Well- Being: The Emergence of Interactive Health Communication". US Department of Health and Human Services, Washington, D.C USA

[18] M. Connelly, D. Rusinak, L(1999)," Randomized trial of intervention to support decision-making about postmenopausal hormone replacement therapy" .J. General Inter. Med. 14 (2) (1999) A21.

[19] V.K. Fieler, A. Borch (1996), "Results of a patient education project using a touch-screen Computer, Cancer Practice". 4 (1996) 341/345.

[20] D. Gustafson, M. Wise (1993) "Development and pilot evaluation of a computer based support system for women with breast cancer". J. Psychosocial Oncol. 11 (4) (1993) 69/93.

[21] D.H. Gustafson (1999), "Impact of a Patient Centered Computer-based Health Information / Support System". Am. J. Preventive Med. 16 (1) (1999) 1/9.