Title - The expanding role of medical informatics in medicine

Introduction-

The employing of medical informatics in medicine has gained widespread acceptance among the stake holders of the health science community. [1,2] Today; medical informatics includes data monitoring, information retrieval, image processing, pattern recognition, lab information systems, medical education, diagnoses aids, therapy recommendations and much more.[3,4] This technology has caused a paradigm shift in the way we learn, think, work and interact.

Discussion -

Applications of medical informatics in medicine:

Tele medicine

This is a novel concept where clinical data including case history, lab reports and image archives are exchanged online; the patient and doctor need not even be in the same place at the same time for a therapeutic process. This is a time effective, convenient option that allows continued consultation/monitoring of the patient by the doctor. The concepts of Tele-dermatology and Tele-surgery are some of the recent advances in this field. [5,6]

Bioinformatics

It is the application of statistics and computer science in the field of molecular biology, primarily DNA sequencing, genomics and genetics. It enables chromosomal classification, comparison and identification in large scale computerized database. The human genome project has made it possible to interpret and predict biological processes and genetic disease patterns.[7]

Medical research

Computerized statistical analysis programs give meaningful inference to research data.AI programs interpret complex patterns, discover previously unexpected associations in data that could not have been possible by normal human observation; and thus contribute to the creation of new medical knowledge. [3]

Electronic Hospital Record Systems (EHRS)

They provide integrated multi disciplinary patient information to clinicians, medical students and biomedical researchers .Such elaborate clinical data systems enable inter and intra institutional collaboration within health care management beyond the physical barriers of person, place, time and distance. This facilitates care providers to evaluate and integrate patient health in a global perspective. [8]

CDSS (computerized decision support systems)

These are computerized programs based on complex clinical algorithms that are designed to assist doctors with diagnosis tasks and make therapy recommendations; according to clinical symptoms and investigation results of patients. CDSS not only guide medical beginners, but also supplement experienced professionals and optimize overall health care in an institution. They even raise alarm in case of any incidental overlooking or drastic change in the medical condition of the patient. [9]They often save valuable clinical hours of diagnostics. [10]

E-learning

The online learning concept has gained huge popularity among health professionals, care givers and clinical undergraduates. It uses the internet to deliver a wide portal of web based information and is especially useful for continued professional development, independent learning, evaluation and accreditation. This is in fact a 'classroom without walls'.[3]

Intelligent tutoring systems

These are computerized self adaptive teaching programs that use 'virtual teachers' to impart medical education. These are learner friendly pedagogical tools, where the student can direct his own tutoring time, place and frequency. This flexibility is particularly attractive for many students with out of university commitments. AI tutors are effective in resolving logistic issues like student overloads, time constraints and scarcity of teaching staff.[2,11]

Medical image teaching systems (MITS)

These are digital library archives of biomedical image scans which are very helpful for specialists as well as trainees of neuro-radiology and surgical anatomy. They allow for multiple quick visual

comparisons, reference aids, revisions, assessment and independent learning.[12]Advanced imaging tools even indicate the site and grade of pathology.[6]

Virtual patients

Clinical learning systems are employing simulated patients in surgery/dentistry/psychiatry settings to allow medical trainees to practice their clinical skills in a risk free environment. Patient simulations are effective in dealing with issues like student overloads, time crisis and noncompliant patients. [13,14,15]

Conclusion-

The medical informatics domain forms an ideal intersection of thought, science, information and technology of the 21st century. Today, it is a pervasive phenomenon that has affected every sector of our lives, including the health care and education sector. In the present medical scenario, it has found a wide range of applications; ranging from pedagogical systems, investigation tools, reference aids, record systems and diagnoses aids. The benefits of medical informatics are too many and undisputable. This technology has the potential to alleviate the logistic burden on health care institutions in a global perspective and translate into a better quality of life for the common man.

References-

1. McCarthy J, Hayes P J. Some philosophical problems from the standpoint of artificial intelligence. Machine Intelligence .1969.4: 463–502.

2. KoschmannT. Medical education and computer literacy; learning about, through and with computers.AcadMed.1995.70;818:21

3. Eta S, BernerED, Boulware DW. Medical Informatics for medical students. Not just because its there. Medical education online. U Alabama school of medicine.1996;1:23-25

4. Shortiffe, E.H. The adolescence of AI in medicine: will the field come of age in the '90s? Articial Intell Med- Review.1993; 5:93-106.

5. Wootton R.Recent advances of telemedicine.BritMedJ.2001; 323:556-557

6. Faisal RA, Yawar A. Novel ways to increase medical informatics use by clinicians. Rawal medical journal.2006;31:1-3

7. Bayat A. Science,medicine and the future.Bioinformatics.BMJ.2002;324:1018-1022

8. Lovell N, Celler BG. Implementation of a clinical workstation for general practice.Medinfo.1995 ;8: 777

9. Tierney WM, Hui SL, McDonald CJ. Delayed feedback of physician performance versus immediate reminders to perform preventive care: effects on physician compliance. Med Care. 1986;24: 659-666.

10. Earnest MA,Ross SE. Record in practice for congestive heart failure: patient and physician experiences.J am Med Inform Assoc.2004;11:410-417

11. Rubino F, Soler L,Marescaux J, Maisonneuve H. Advances in virtual reality are wide ranging.BMJ.2002;324:612

12. Serge G, Mike S. The Use of a Computerized Brain Atlas to Support Knowledge basedTraining in Radiology "Artificial Intelligence in Medicine .1998;13: 181-205

13. Poulton T, Conradi E, Kavia S, Round J, Hilton S. The replacement of 'paper' cases by interactive online virtual patients in problem-based learning. Medical Teacher .2009;31: 752.

14. Huang G, R. Reynolds R, CandlerC.Virtual Patient Simulation at U.S. and Canadian Medical Schools. Academic Medicine .2007;82: 446-451.

15. Naveed S. The Value of Virtual Patients in Medical Education. Annals of Behavioral Science and Medical Education 2010;16: 29-31