



Introduction To Medical Informatics

Ahmed AlBarrak
PhD Medical Informatics
Professor, Family & Community Med/Medical
Education,
College of Medicine
albarrak@ksu.edu.sa
[@aalbarrak2](https://www.linkedin.com/in/aalbarrak)
<https://sa.linkedin.com/in/aalbarrak>



What is Medical Informatics?

- ***Medical Informatics comprises the theoretical and practical aspects of information processing and communication, based on knowledge and experience derived from processes in medicine.***

INFORMATICS

The science concerned with gathering, manipulating, storing, retrieving and classifying recorded information.

HISTORY

- ❑ *Medical informatics began in the 1950s with the growth of devices, and computer applications in medicine.*
- ❑ *Early names of medical informatics included **medical computing**, medical computer science, computer medicine, **medical electronic data processing**, medical automatic data processing, **medical information processing**, medical information science, medical software engineering and medical computer technology.*

HISTORY

- ❑ *The earliest use of computation for medicine was in dental projects in the 1950's at the National Bureau of Standards by Robert Ledley.*
- ❑ *The next step in the mid 1950s was the development of expert systems such as MYCIN and INTEREST-I.*

HISTORY

- ❑ *In France in **1968** university departments established with the title "informatique de medecine "*
- ❑ *In the United States in 1996, HIPAA regulations concerning privacy and medical record transmission created the impetus for large numbers of physicians to move towards using EMR software, primarily for the purpose of secure medical billing.*

ORIGIN OF TERM: "MEDICAL INFORMATICS"

Russian = informatika **1968** by AI Mikhailov, "Oznovy Informatika" ("Foundation of Informatics")
structure and properties of scientific information

French = informatique de medecine **1968**
university departments established with this title

English = first appeared in **1970s**
Columbia University changed its name from Medical Information Science to medical informatics



- Health Informatics *is the intersection of information science, Information Technology, and health care.*
- *It deals with resources, devices, & methods required to optimize the acquisition, storage, retrieval, and use of information in health and biomedicine.*
- *Health informatics tools include clinical guidelines, formal medical terminologies, information & communication systems. It is applied to the areas of nursing, clinical care, dentistry, pharmacy, public health and (bio)medical research.*



- ***"...the understanding, skills, and tools that enable the sharing and use of information to deliver healthcare and promote health" ---***
- ***"...the name of an academic discipline developed and pursued... by a scientific community engaged in advancing and teaching knowledge about the application of information and technologies to healthcare - the place where health, information and computer sciences, psychology, epidemiology, and engineering intersect." British Medical Informatics Society***



- ***"Medical informatics attempts to provide the theoretical and scientific basis for the application of computer and automated information systems to biomedicine and health affairs . . . medical informatics studies biomedical information, data, and knowledge - their storage, retrieval, and optimal use for problem-solving and decision-making."***

Lindberg, D.A.B. NLM Long Range Plan. Report of the Board of Regents, 1987, p. 31.



- ***"Medical informatics is a developing body of knowledge and a set of techniques concerning the organizational management of information in support of medical research, education, and patient care.... Medical informatics combines medical science with several technologies and disciplines in the information and computer sciences and provides methodologies by which these can contribute to better use of the medical knowledge base and ultimately to better medical care."***
definition by Asso. of American Medical Colleges (AAMC) 1986.



- ***"Medical informatics comprises the theoretical and practical aspects of information processing and communication, based on knowledge and experience derived from processes in medical and Healthcare."***

Van Bommel, J.H. "The structure of medical informatics" *Medical Informatics*, 9(1984), p. 175.



- ***"Medical informatics is the application of computer technology to all fields of medicine - medical care, medical teaching, and medical research."***

Preliminary announcement for the Third World Conference on Medical Informatics, MEDINFO 80, 1977.



- ***"Medical informatics is a rapidly developing scientific field that deals with the storage, retrieval, and optimal use of biomedical information, data, and knowledge for problem solving and decision making."***

Blois, M.S., and E.H. Shortliffe. in *Medical Informatics: Computer Applications in Health Care*, 1990, p. 20.



- ***"Medical informatics is the application of computers, communications and information technology and systems to all fields of medicine - medical care, medical education and medical research."*** definition by MF Collen (MEDINFO '80, Tokyo, later extended).

- ***Biomedical Informatics: (BMI) is the interdisciplinary field that studies and pursues the effective uses of biomedical data , information, and knowledge for scientific inquiry, problem solving , and decision making, driven by efforts to improve human health .*** E.H. Shortliffe and Marsden S. Blois 2014



- ***Scope and breadth of discipline: BMI investigates and supports reasoning, modeling, simulation, experimentation, and translation across the spectrum from molecules to individuals and to populations, from biological to social systems, bridging basic and clinical research and practice and the health care enterprise.***



- ***Theory and methodology : BMI develops, studies, and applies theories, methods, and processes for the generation, storage, retrieval, use, management, and sharing of biomedical data, information, and knowledge.***
- ***Technological approach : BMI builds on and contributes to computer, telecommunication, and information sciences and technologies, emphasizing their application in biomedicine.***

TELEMEDICINE



is composed of the Greek word $\tau\epsilon\lambda\epsilon$ (tele) meaning 'far', and medicine. It is therefore the delivery of medicine at a distance. A more extensive definition is that it is the use of modern telecommunication and information technologies for the provision of clinical care to individuals located at a distance and to the transmission of information to provide that care.

TELEHEALTH



The delivery of health related services, enabled by the innovative use of technology, such as videoconferencing, without the need for travel.

EHEALTH



*Also written **e-health**, is a relatively recent term for healthcare practice which is supported by electronic processes and communication, some people would argue the term is interchangeable with Health Informatics.*

TELE-HEALTH OR E-HEALTH

E-health is much more than tele-health as tele is a limiting factor to the form of technology in health. E-health could be at distance or local.

FROM TELEMEDICINE TO EHEALTH

- ❑ *The practice of telemedicine will become more prominent and will be part of the mainstream of Healthcare;*

- ❑ *It will become increasingly difficult to differentiate telemedicine from many other uses of technology in the delivery of healthcare;*

FROM TELEMEDICINE TO EHEALTH

- ❑ E-health is all inclusive and captures the use of Internet technologies and the rise of the information economy. This includes:
 - information technology;
 - telecommunication technology;
 - Data transmission protocols and techniques;

- ❑ E-Health is all inclusive and captures all types of Healthcare and Healthcare professionals: it is not limited to medicine and not limited to doctors;

EVIDENCE BASED MEDICINE

Entails a system that provides information on appropriate treatment under certain patient conditions. A healthcare professional can look up whether his/her diagnosis is in line with scientific research. The advantage is that the data can be kept up-to-date.

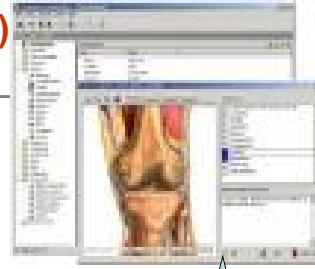
BIOINFORMATICS



The collection, organization, and analysis of large amounts of biological data, using computers and databases. Historically, bioinformatics concerned itself with the analysis of the sequences of genes and their products (proteins), but the field has since expanded to the management, processing, analysis, and visualization of large quantities of data from genomics, proteomics, drug screening, and medicinal chemistry. Bioinformatics also includes the integration and “mining” of the ever-expanding databases of information from these disciplines.

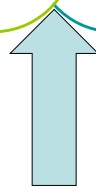
ELECTRONIC MEDICAL RECORD (EMR)

A general term describing computer-based patient record systems. It is sometimes extended to include other functions like order entry for medications and tests, amongst other common functions.



BIOMEDICAL INFORMATICS

Computer & Information
Science Biology Medicine



Biomedical Informatics

DENTAL INFORMATICS

Is the name given to the application of information technology to dentistry. It is often considered a subset of Medical Informatics and Biomedical Informatics.

NURSING INFORMATICS

Nursing Informatics is a specialty of Health Informatics (like Medical Informatics, Consumer Health Informatics, and Telehealth) which deals with the support of nursing by information systems in delivery, documentation, administration and evaluation of patient care and prevention of diseases.

CONTINUING MEDICAL EDUCATION (CME)

- *The science of medicine advances at such a rapid rate that much of what is taught becomes outmoded, and it has become obligatory for physicians to be lifelong learners, both for their own satisfaction and, increasingly, as a formal government requirement to maintain licensure.*
- *Doctors who practice in rural areas or other more isolated locations may face considerable obstacles to obtain hours for CME.*

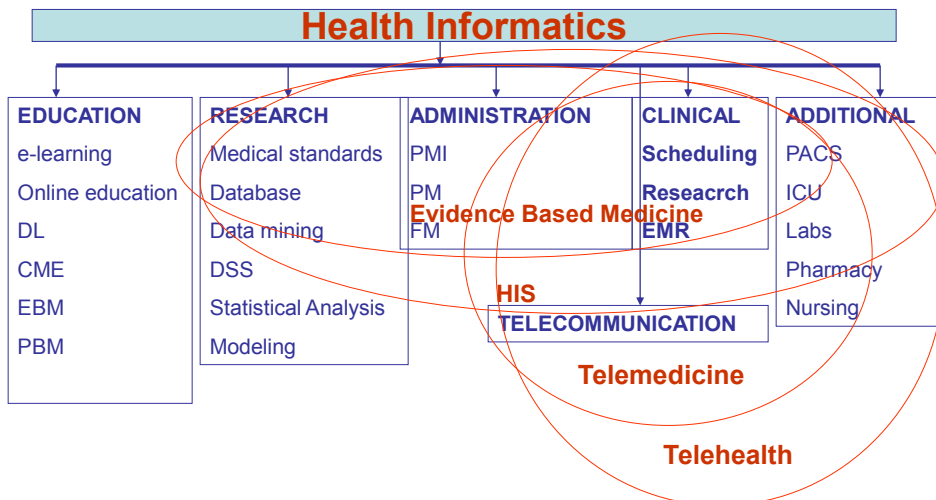
CONTINUING MEDICAL EDUCATION (CME)

- *The cost of web-based or online CME is much lower than the cost of traditional CME.*



DISTANCE LEARNING

- *With aid of telecommunications technologies and internet, distance learning is now widely applied in many universities, eg Open University*
- *It is now possible to earn university degrees from home, at every level from bachelor's to doctorate.*



E-HEALTH COMPONENTS

Four essential components make the e-health

- Medical knowledge that lends itself to being stored in computer files (digital format);
- People who are willing to share, apply and use this knowledge;
- Data processing equipment to record, store and process this data;
- Telecommunication facilities to transfer (exchange) this data electronically between remote locations.

WHY MEDICAL INFORMATICS FOR HEALTHCARE?

- *Improve Healthcare quality*
- *Better data access*
- *Faster data retrieval and storage*
- *High quality data*
- *Support medical and non-medical decision-making*

WHY MEDICAL INFORMATICS FOR HEALTHCARE?

- *Enhance quality assurance*
- *Enhance out-come researches and studying programs*
- *Sharing medical data*
- *Reduce duplication of efforts*
- *Provide unified access to all existing data*

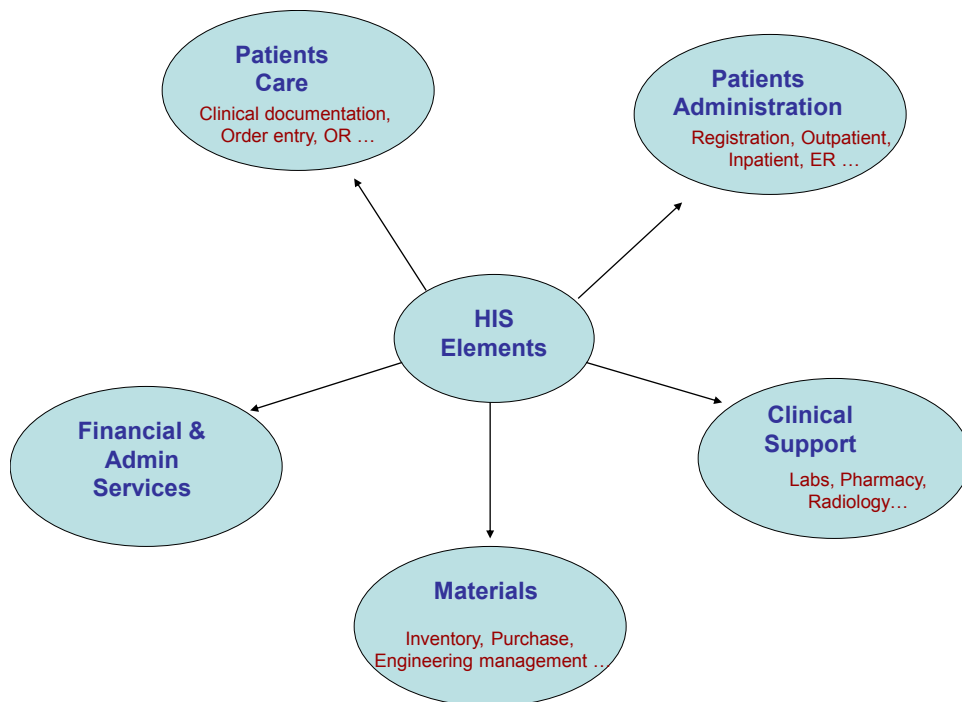
WHY MEDICAL INFORMATICS FOR HEALTHCARE?

- *Increase healthcare organization efficiency*
- *Reducing cost and achieves quality of healthcare*
- *Improve staff productivity*
- *Reduce redundant tests, services and information entry*
- *Manage billing and payment system*
- *Eliminate and reduce errors*

HOSPITAL INFORMATION SYSTEM

HIS: is a comprehensive information system dealing with all aspects of information processing in a hospital.

- This encompasses human (and paper-based) information processing as well as data processing machines.
- As an area of Medical Informatics the aim of HIS is to achieve the best possible support of patient care and administration by electronic data processing.





Discussion

What is the difference between Medical Informatics & IT?

What are the benefits of learning MI for a physicians' career?

What are the harmful effects of computers in medicine? How can we avoid them?

Are computers useful in Medicine? Why and why not?

Will Medical Informatics impact the healthcare system in Saudi Arabia? Justify your arguments.



THANKING YOU

Dr. Ahmed Al Barrak