Medical Informatics
An Overview
Saudi Board For Community Medicine

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Medical informatics began in the 1950s with the rise of usable computation devices, and computers 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.
The earliest use of computation for medicine was in a dental project in the 1950’s at the National Bureau of Standards by Robert Ledley.

The next step in the mid 1950s was the development of an expert systems such as MYCIN and INTERNEST-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, primarily for the purpose of secure medical billing.
HISTORY

- In the UK, moves towards registration and regulation of those involved in Health Informatics have begun with the formation of the **UK Council for Health Informatics Professions (UKCHIP)**

- In the US, progress towards a standardized health information infrastructure is underway. In 2004, the US Department of Health and Human Services (HHS) formed the Office of the National Coordinator for Health Information Technology (ONCHIT), headed by David J. Brailer, M.D., Ph.D. The mission of this office is to achieve widespread adoption of interoperable electronic health records (EHRs) in the US within 10 years.
Russian = informatika 1968 by Al 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
Informatics

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

Approximately more than 30 of the 150 medical schools in the United States have a department or Units of medical informatics.
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.

- “Intersection of information technology and medicine in health care” (Gennari 2002)
- is the intersection of information science, computer science, and health care.

- It deals with the resources, devices, and methods required to optimize the acquisition, storage, retrieval, and use of information in health and biomedicine.

- Health informatics tools include not only computers but also clinical guidelines, formal medical terminologies, and information and 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" and "...the name of an academic discipline developed and pursued over the past decades by a world-wide 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 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."

"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).
"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."

"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."

"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.
**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.
is composed of the Greek word τελε (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.
The delivery of health related services, enabled by the innovative use of technology, such as videoconferencing, without the need for travel.
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.
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.
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.
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;
E-commerce has become one of the most common business applications of the Internet;

E-health is the health industry's component of e-commerce;

E-health describes the increasing use of electronic communication and information technology in the health sector.
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;
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.
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 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.
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.
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, e.g., Open University.

• It is now possible to earn university degrees from home, at every level from bachelor’s to doctorate.
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 outcome 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
HEALTHCARE IS AN INFORMATION-BASED SERVICE

– Healthcare IS AND will increasingly be an information-driven service;

– Information is a major resource which is crucial to the health of individual patients, the population in general, and to the success of the organization;
• Person who can read but does not have books does not have an advantage over person who cannot read.

• Person who has data but cannot see it does not have an advantage over person who does not have data.

• ENTER THE DATA ONE TIME AND USE IT MANY TIMES.
Applications of computer technology in Healthcare

- **Clinical Applications:**
  - Direct Patient Care
  - Diagnosis
  - Monitoring
  - Treatment

- **Special Purpose Applications:**
  - Use of computers in education and pharmacy

- **Administrative Applications:**
  - Office Management
  - Scheduling
  - Medical Office Management

- **Telemedicine:**
  - The delivery of Healthcare over telecommunications lines.
  - Clinical
  - Special purpose
  - Administrative applications of computer technology.
Diagnosis related group (DRG): code used for diagnosis; hospital reimbursement by insurers is based on a formula using DRGs.


ICD9-CM(International Classification of Disease) and ICD10: classifies diseases using 4-5 digit codes.
THANKING YOU

Dr. Ahmed Al Barrak