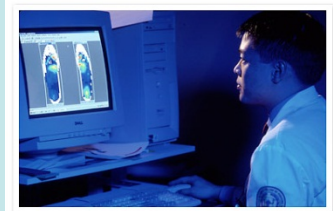# Introduction To Medical Informatics 301 W1-2

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Demand: Online Health Information

- In 2010, it was estimated that:

- **Google**: **34,000** searches per second (2 million per minute; **121** million per hour; **3** billion per day; **88** billion per month, figures rounded)

- **Yahoo:** 3,200 searches per second (194,000 per minute; 12 million per hour; 280 million per day; 8.4 billion per month, figures rounded)

- **Bing:** 927 searches per second (56,000 per minute; 3 million per hour; 80 million per day; 2.4 billion per month, figures rounded)

  - http://searchengineland.com/by-the-numbers-twitter-vs-facebook-vs-google-buzz-36709

- Manual Analysis of 3.000 search engine queries show that **4.5%** of all queries are health related

Health related searches on the internet. JAMA 2004

Saudi Arabia: Internet Growth and Population Statistics

2011 USERS-→12,500,000

YEAR	Users	Population	% Pop.	Usage Source
2000	200,000	21,624,422	0.9 %	ITU
2003	1,500,000	21,771,609	6.9 %	ITU
2005	2,540,000	23,595,634	10.8 %	C+I+A
2007	4,700,000	24,069,943	19.5 %	ITU
2009	7,761,800	28,686,633	27.1 %	ITU
2010	9,800,000	25,731,776	38.1 %	ITU

http://www.internetworldstats.com/me/sa.htm

The Accenture study

- The Accenture survey asked physicians about the extent to which they used **12** different "functions" of EMR and HIE— such as electronic entry of patient notes, electronic referrals, electronic ordering and prescribing and communicating with other physicians or patients via secure email.

- The results showed that physicians who are routine users of a wider range of healthcare IT functions have <u>a **more** positive attitude</u> towards the these technologies. On average across all the countries, as physicians start to use more "functions" —the more positive they are about the benefits

Number of functions used routinely vs. average benefits – Global

Legend:
- Impacts very negatively
- Impacts somewhat negatively
- No impact
- Impacts somewhat positively
- Impacts very positively

0-4 functions used: 19%, 45%, 33%, 2%
5-8 functions used: 20%, 57%, 22%, 1%
9-12 functions used: 38%, 49%, 12%, 1%
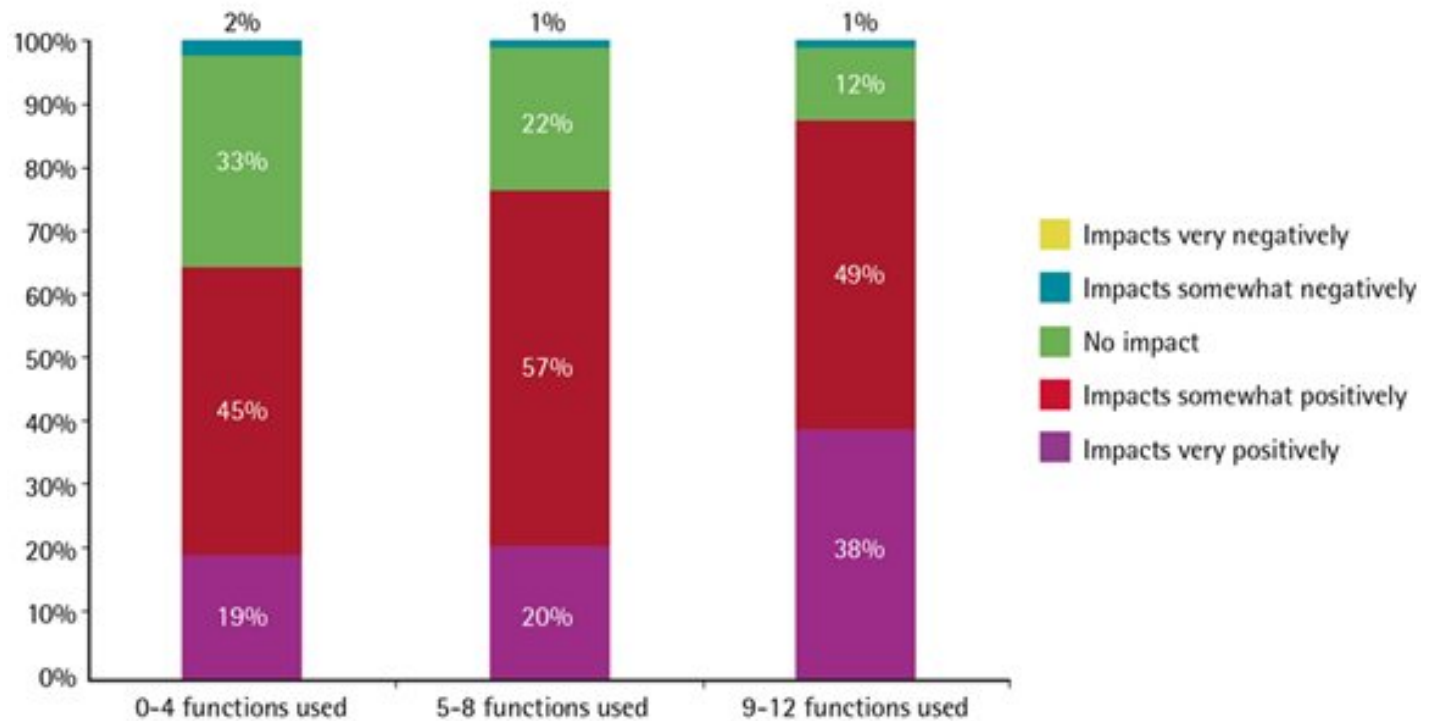
Figure 1 Average Benefits of Functions Used Routinely -- The Accenture eight-country physician survey found, as the number of routinely used healthcare IT functions increases, doctors' overall perception of the benefits grows more positive

The Accenture study

- By
  [Jim Burke, Managing Director, Accenture UK Health Industry](#) Published Friday, 3 February 2012 –

- Research among more than 3,700 doctors in eight countries reveals ripe opportunities to accelerate broad healthcare IT initiatives, according to a new survey from Accenture

- The findings clearly show that the broadest, fastest path to integrated, effective health practices requires <u>outreach, education and</u> changing mindsets.

The Accenture study

- Majority of doctors surveyed believe that healthcare IT does provide some common top benefits, including

- better **access**, **quality** data for clinical research (70.9%),

- improved coordination of care (69.1%)

- reduction in medical errors (66%).

- average score of 61%,

- In England, physicians perceived other healthcare IT benefits to include: increased speed of access to health services to patients (55.3 %), reduced number of unnecessary interventions and procedures (52 %).

Dr Watson the **IBM's supercomputer**

- The computer can analyze about 200 million pages of data in less than three seconds, which could allow physician to more accurately diagnose and treat complex cases. Physicians could, for example, use Watson to consult medical records and the latest research findings for recommendations on treatment.

- FDA Approved?

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)*

History

❑ *Medical informatics began in the 1950 with the rise of useable 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.*

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 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 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

- *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."

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).

- *"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 Association 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 Bemmel, 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.

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

Telemedicine

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 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.

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.

E-Health components
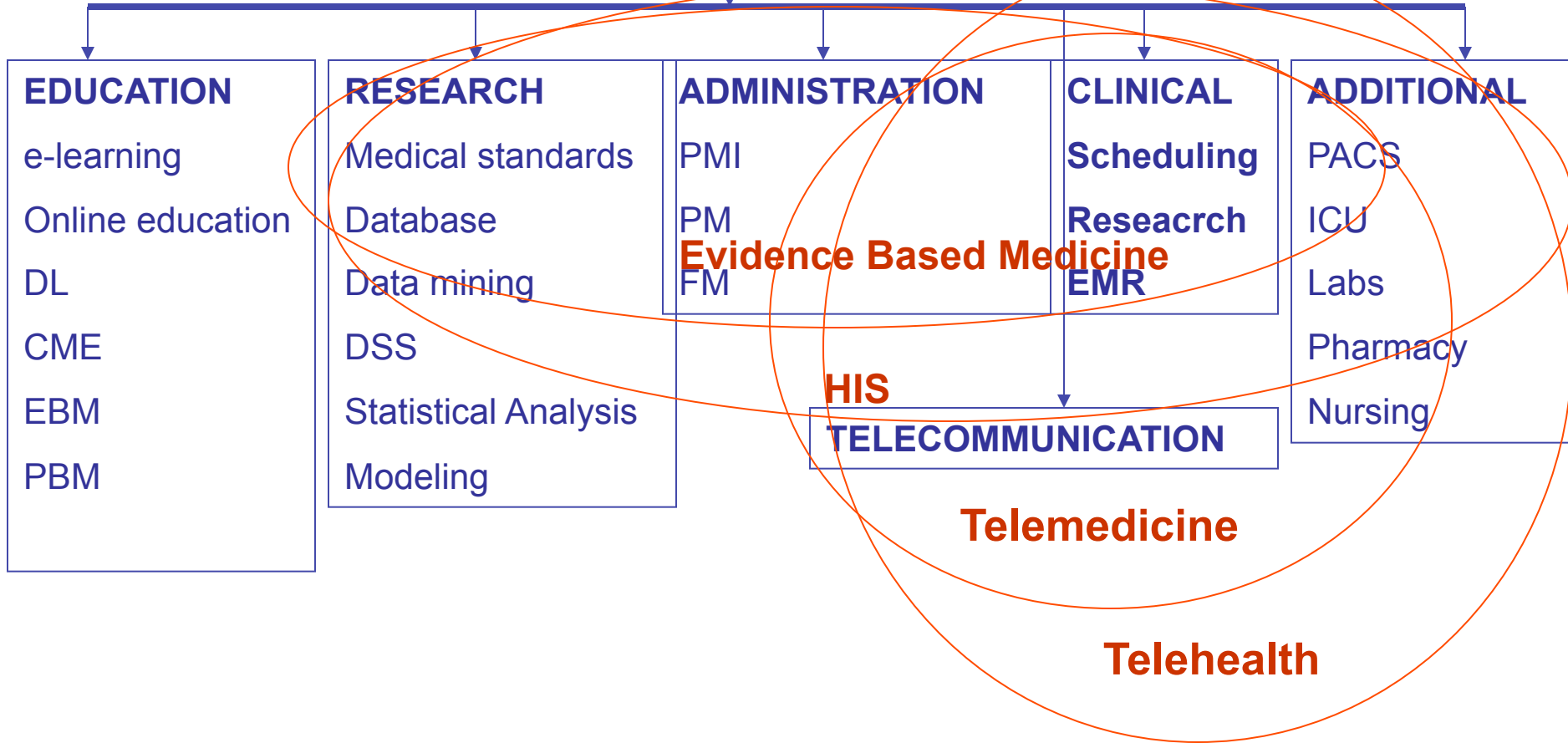
Four essential components make the e-health

➢ 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.

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.

Health Informatics

EDUCATION

e-learning

Online education

DL

CME

EBM

PBM

RESEARCH

Medical standards

Database

Data mining

DSS

Statistical Analysis

Modeling

ADMINISTRATION

PMI

PM

Evidence Based Medicine

FM

CLINICAL

Scheduling

Reseacrch

EMR

ADDITIONAL

PACS

ICU

Labs

Pharmacy

Nursing

HIS

TELECOMMUNICATION

**Telemedicine**

Telehealth

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.*
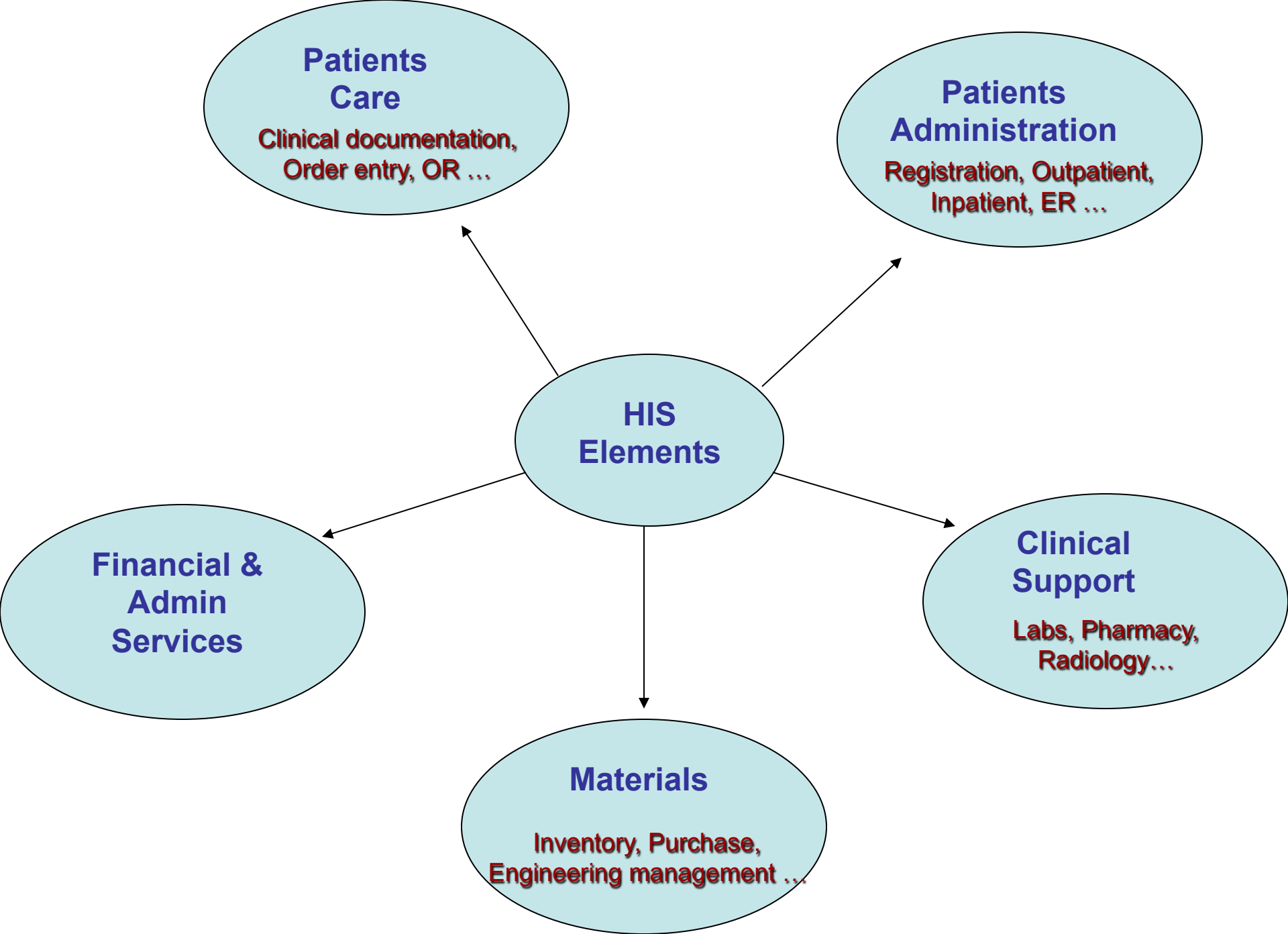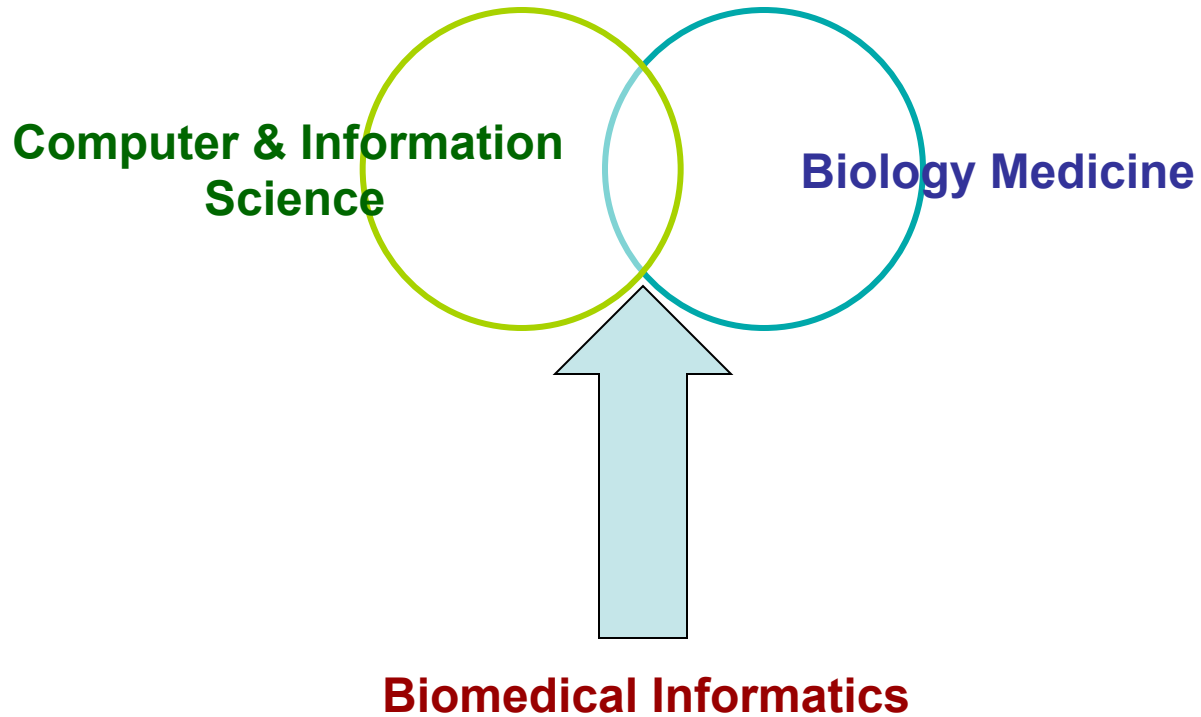
Electronic medical record (EMR)

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
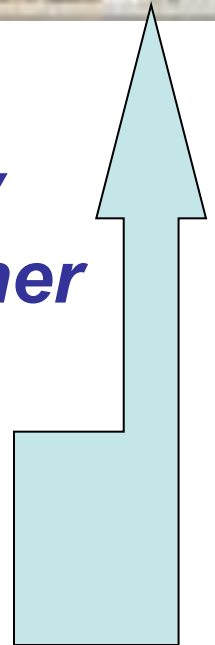
Biomedical Informatics

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 may universities, eg 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 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*

Coding & Grouping

❑ *Diagnosis related group (DRG): code used for diagnosis; hospital reimbursement by insurers is based on a formula using DRGs.*

❑ *Current Procedure Terminology (CPT): codes lab tests, treatments, and other procedures.*

❑ *ICD9-CM(Internatinal Classification of Disease) and ICD10: classifies diseases using 4-5 digit codes .*

Best Luck

Dr. Ahmed Al Barrak