Health Informatics

CIS 1902103: Computer Skills for Medical Students

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Informatics: definition!

- Is the science of information.
- Health Informatics:

  An interdisciplinary field comprising computer science, information science and healthcare. It includes the various resources, data management, storage, and related processing on health information.

Hierarchy of Data

Data

A set of symbols/numbers/words without any meaningful associations.

Example :

5, 10, 7

Information

Meaningful data or facts from which conclusions can be drawn by humans or computers .

Example :

Five Fingers is the number of fingers in the normal human hand.

Knowledge

Information that is justified to be considered true .

Example

a rising specific antigen level suggests an increased likelihood of prostate cancer.

Wisdom

The critical use of knowledge to produce intelligence.

Example

a rising prostate cancer antigen could mean prostate infection and not cancer.

Example

Data: Differences (or observations) that may or may not be meaningful

112321411 162.9

Information: Data that has meaning

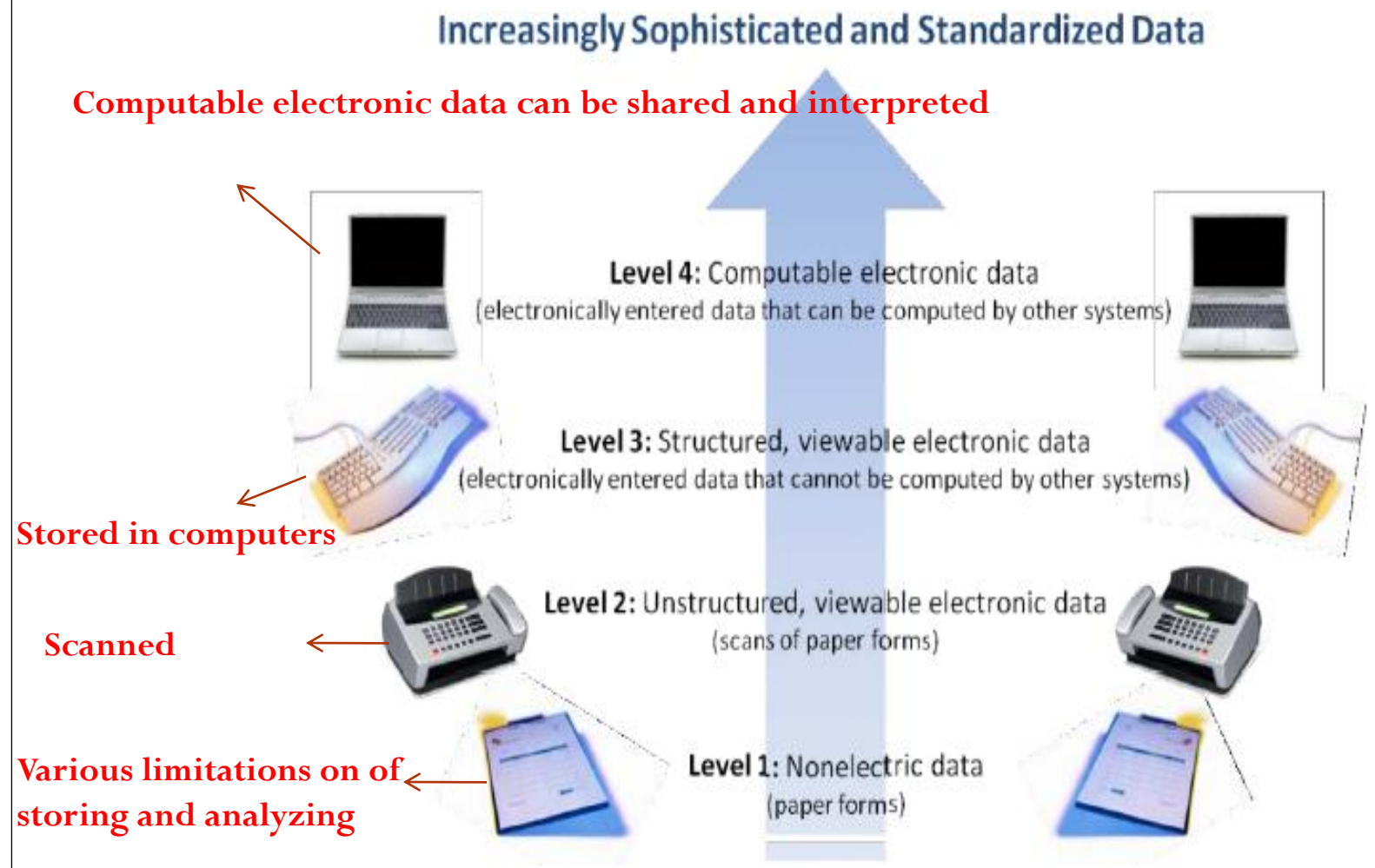
PATIENT ID

LUNG NEOPLASM, NOS

Knowledge: General information believed to be justifiably true.

SMOKERS ARE MORE LIKELY TO DEVELOP LUNG CANCER

Levels of Data



Health Information Technology(HIT)

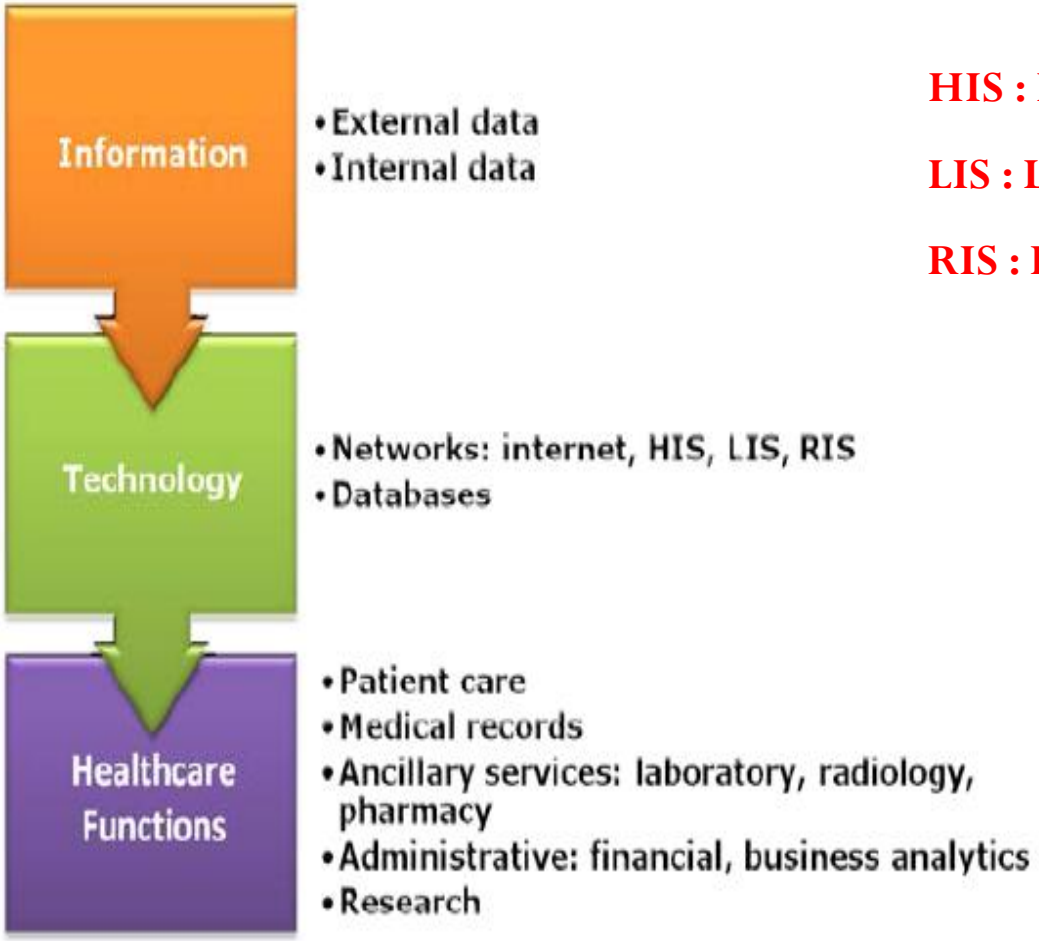
Health Information Technology (HIT or healthIT) is defined as the application of computers and technology in healthcare settings.

Health Information Management

Health Information Management (HIM) traditionally focused on the paper medical record and coding.

HIM is mostly electronic now and requires IT support.

Information,Information Technology and Healthcare Functions



HIS : Hospital Information System

LIS : Laboratory Information System

RIS : Radiology Information System

Why Adoption of HIT ?

- Increase the efficiency of healthcare .

[decrease medical cost, improve physician productivity].

- Improve the quality (patient outcomes) of healthcare , resulting in improved patients safety.

Example on HIT:

a healthcare organization is concerned that too many of its **diabetics** are not well controlled and believes it would benefit by offering a **diabetic web portal**. With a portal, diabetics can upload blood sugars and blood pressures to a central web site so that diabetic educators and/or clinicians can analyze the results and make recommendations.

HIT Goals

Health information technology (HIT) is important to multiple players in the field of medicine. The common goals of these different groups are outlined in the following table :

Goal	Process
Improve	Communication and continuity of care Quality of care Patient outcomes Clinician productivity Return on investment
Reduce	Medical errors and resultant litigation Duplication of tests
Standardize	Medical care by individuals and organizations
Accelerate	Access to care and administrative transactions
Protect	Privacy and ensure security

KEY Players on HIT

1. Patients
2. Clinicians and Nurses
3. Support Staff
4. Public Health
5. Hospitals
6. Insurance company
7. Medical educators

Examples

Patients	Nurses	Public Health
1. Online patients survey. 2. Personal health records 3. Telemedicine and Home Telemonitoring.	1. Online searches with Pub med , Google. 2. Online resources and digital libraries. 3. Electronic billing and coding .	1. Remote reporting using mobile technology .
Support Staff	**Hospitals**	**Insurance Company**
1. Patients enrollment 2. Electronic appointments	1. Electronic Health records . 2. Wireless technology Telemedicine	1. Electronic Claims transmission.

Barriers to Health Information Technology Adoption .

- Financial Barriers
- Physician Resistance and Work Flow Changes
- Integration with current protocols/systems
- Lack of Standards
- Privacy Concerns

Clinician Resistance and Work Flow Changes

Clinicians resist change in clinical routine!

To adopt a new technology, it has to prove it effectiveness, utilization of clinician's time, money savings, improvement of patient care, standardization of care …. And many other factors.

Transition has to be seamless!

Integration with current Systems

New technology needs to integrate with older system in place.

Usually older programming languages, older database management systems, older operating systems,… may prevent the usage of newer technology.

Lack of Standards

Clinicians variability is significant including: terminology, clinical exams, diagnosis, and even recommended treatment.

Healthcare IT faces significant challenges when designing newer databases and management systems due to lack of standards.

Efforts are underway for a longtime to standardize medical examinations, patient intake, exam findings, treatment dissemination…. etc

Privacy Concerns

Clinicians and patients express privacy concerns when adopting any new technology.

In 1996, The Health Insurance Portability and Accountability Act (HIPAA) was created initially for the portability, privacy and security of Personal Health Information (PHI) that was largely paper-based.

Newer healthcare technology must take HIPAA into consideration.

Health Records

Electronic Medical Record (EMR)

Electronic record of health-related information for an individual that can be created, gathered, managed and consulted by authorized clinicians and staff within one healthcare organization.

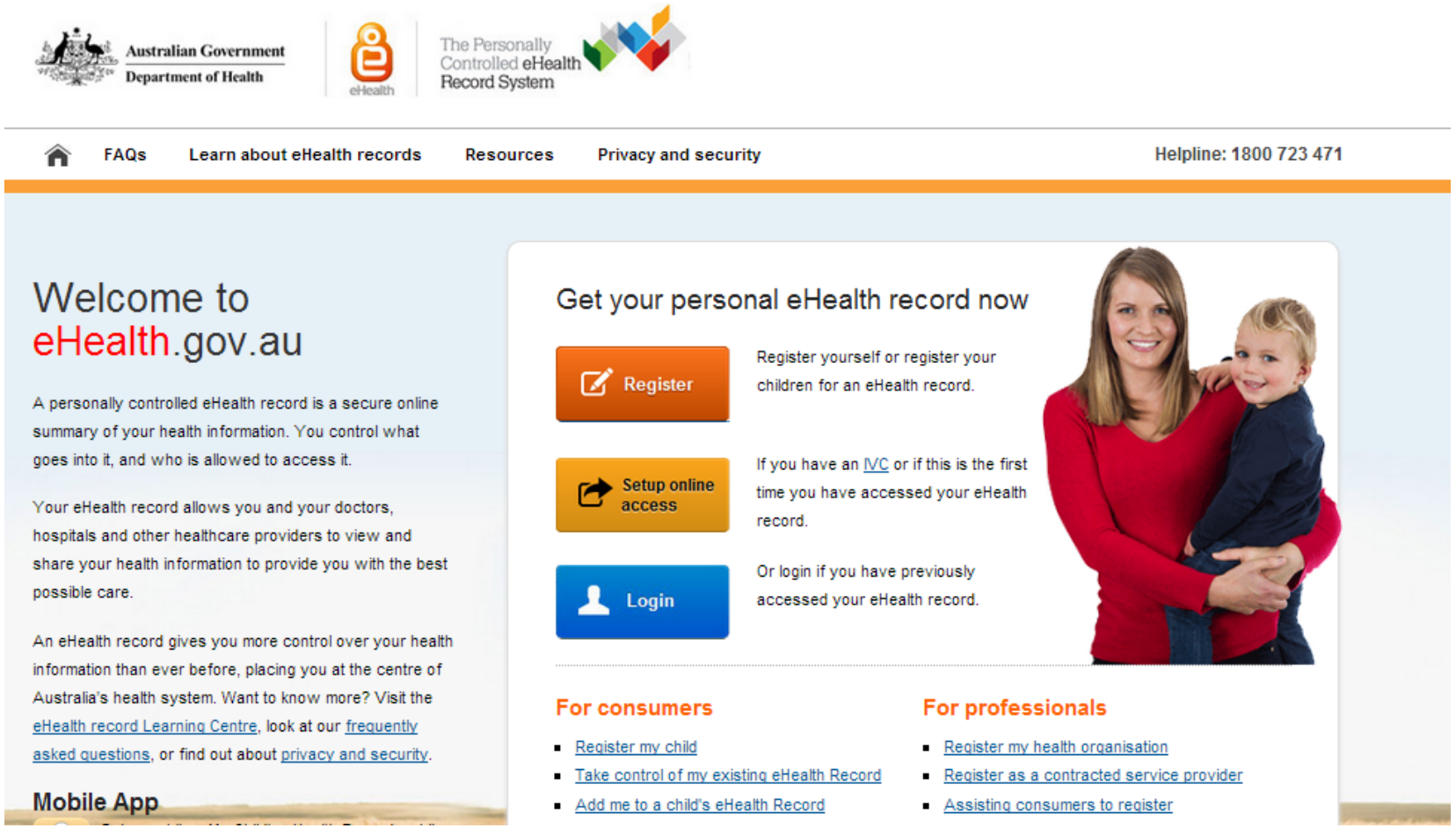
Electronic Health Record (EHR)

An electronic record of health-related information for an individual that conforms to nationally recognized interoperability standards and that can be created, managed and consulted by authorized clinicians and staff across more than one healthcare organization.

Personal Health Record (PHR) An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared and controlled by the individual.

Examples of PHR

- Australian Governmental portal:



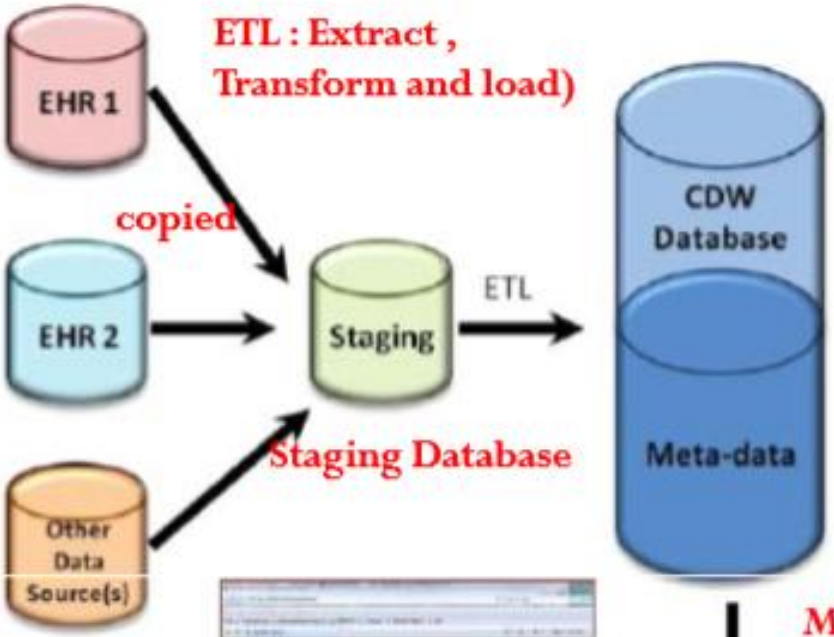
Examples of PHR

- In the United States: for Medicare (Seniors). [myphr.com]

Clinical Data Warehouse

A clinical data warehouse is a shared database that collects, integrates and stores clinical data from a variety of sources including electronic health records, radiology and other information systems .

Clinical Data Warehouse(CDW)



Analytics

Meta Data : it is the data (description)about data.

The clinical records in the EHR are composed of both structured and unstructured data(free text).

Such as : counts ,means ,median…etc

Clinical Data Warehouse (CDW)

Data from multiple sources including one or more EHRs are copied into a staging database, cleaned and loaded into a common database where they are associated with meta-data.

Clinical Data Warehouses

Clinical records within EHRs are composed of both :

- **structured data: such as billing codes , lab results .**

  +ve: much easier to organize, store and retrieve in databases .

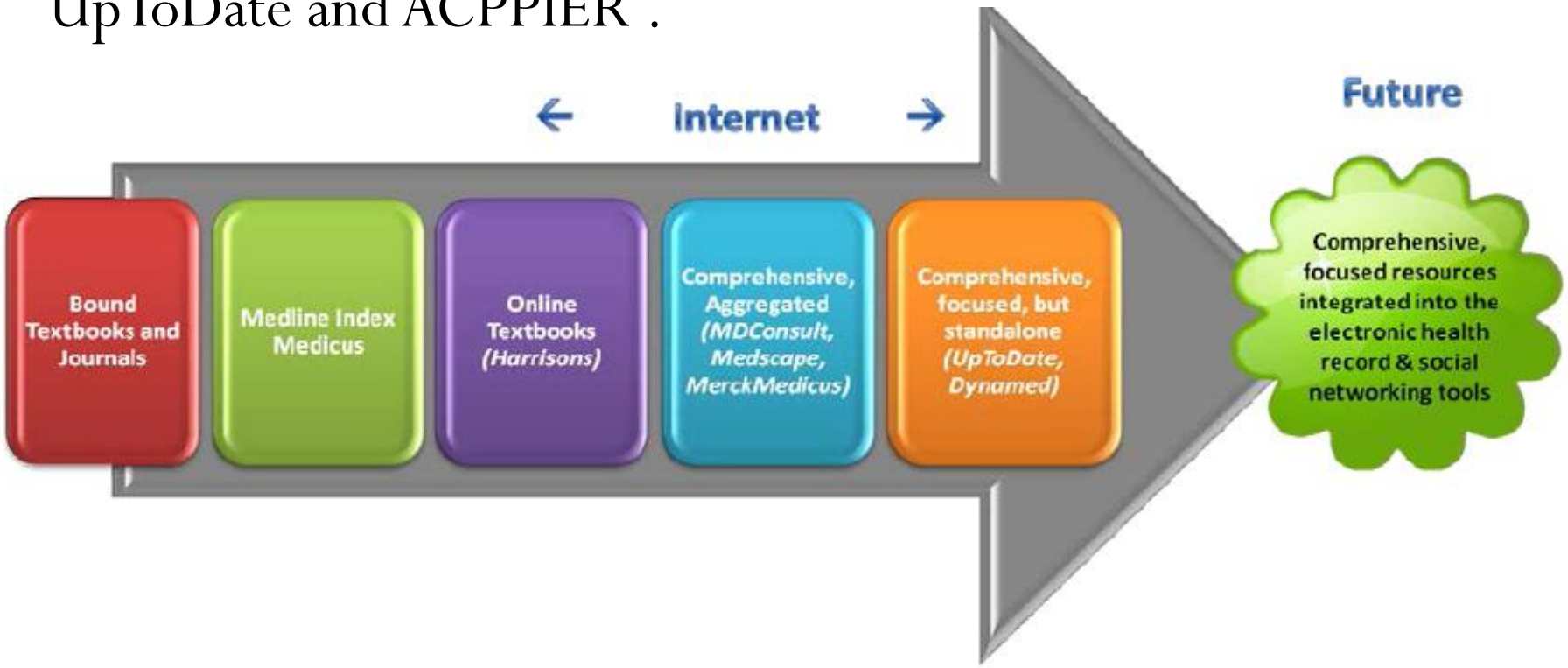
- **unstructured data: written in Natural Languages, clinical notes are often dedicated and are represented in records as free text.**

  +ve : Easy for clinicians.

  -ve : Difficult to implement .

Online Medical Resources

Several medical resource vendors are in the process of making the leap towards having the resource embedded into electronic health records. Examples would include iConsult, Dynamed, UpToDate and ACPPIER .



Search Engines

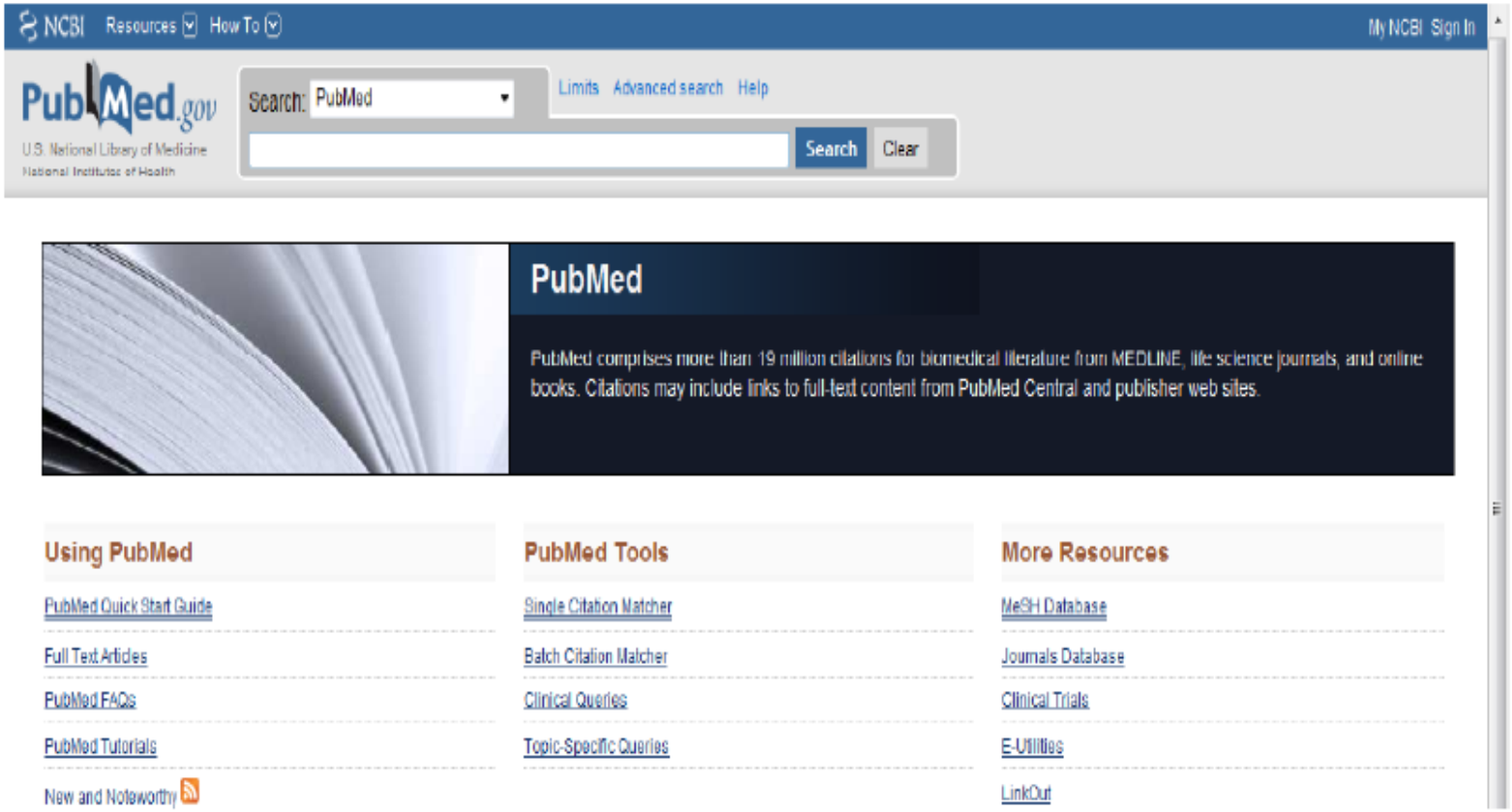
- Google : Google is by far the most widely used search engine in the world .

We Can here demonstrate how to use Google for Advanced Search

PubMed Search Engine

is a web-based retrieval system developed by the National Center for Biotechnology Information (NCBI) at the National Library of Medicine (NLM) .

PubMed Home Page



We Can here demonstrate how to use PubMed

Examples

- Liver Tumor
- Brain Tumor
- Case study in cardio