Reviewed By

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RESEARCH FOCUS IN MEDICAL INFORMATICS IN SAUDI ARABIA

"Special thanks to Lama Alassiri for helping out"

Color index:

- Important
- Golden notes
- Doctors notes

Editing File

Definitions

Medical informatics

- "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.) The Doctor like this definition.
- "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).
- This definition focuses in technology more.Medical informatics isn't about info. technology or info. system, it's about data, info,knowledge.
- Medical informatics is a new field, however academically & scientifically has been their for a few decades.

Data:

- "data are numbers, words or images that have yet to be organised or analysed to answer a specific question" (Audit Commission, 2007).
- What makes numbers, words and images all data? **rawness**. No exact meaning or context.

Information:

- Information is the result of processing, manipulating and/or organising data or combinations of data to answer question.

Knowledge:

- Data, information and knowledge are **not** the same.
- Data, in itself is not knowledge, nor is information. Data is without a meaningful relation to anything else" (Bellinger, 2004).
- Knowledge: is the understanding and **interpretation** of information and its **settings** within a **meaningful** context.
- "Knowledge Involves interpreting information received, adding relevance and context to clarify the insights the information contains" (Audit Commission, 2007)
- There are numerous theories existence regarding not only the creation of knowledge, but also the different types of knowledge that exist. Skipped by doctor.
- Cook and Brown (1999) define four types of knowledge: individual/explicit; individual/tacit; group/explicit; group/tacit. Skipped by doctor.
- Knowledge is the full utilization of information and data, with the potential of people's skills, competencies,...(Grey, 2009*7) The doctor ask student to ignore this definition, But we wrote a question about it in our quiz lol

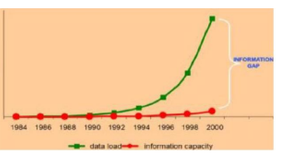
Definitions

Environment public health KM			
	Data	**Information**	**Knowledge**
Asthma	Number of hospital visits due to asthma	Asthma case data organized by geographic location, population, etc.	Understanding of the times and places to alert asthma patients due to risks posed by air quality
Air Quality	Ambient air quality monitoring data	Air quality measurements organized by geographic location and time.	

Doc Notes: If we look at asthma for example:

1) The NO. of hospital visits have no meaning by itself.
2) Process it by location, population, gender & time > so we have information.
3) Interpretation of info give knowledge & show us how time & gender are related to asthma risk factors & prognosis.

Why knowledge in health care



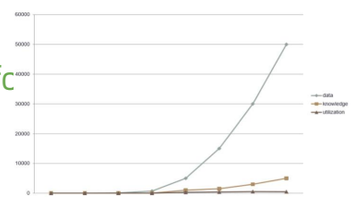
Flood of Information

- Huge gap in data acquisition and Information is the knowledge capacity
  - We've 2 curves, the green curve represents increased in No & amount of data from Pt file or other resources. While the red curve represents how much we're analyzing & getting useful info out of these data.

Data – knowledge – utilization

- Institute of Medicine (IOM) at 1998-1999 estimated that around 98,000 patients die each year as a consequence of preventable errors. Likewise, a study of two UK hospitals found that 11% of admitted patients experienced adverse events of which 48% of these events were most likely preventable if the **right knowledge was applied** at the right time.
- The **under-utilization** of healthcare knowledge contributes to improper clinical decisions, medical errors, under-utilization of resources and raise in healthcare delivery costs.

1) Here we've 2 curves also, the gray one show the accumulation of data with time. While the brown one shows how much we're doing interpretation.
2) There's a gap cuz we're having data, info & knowledge but we're doing the minimal utilization.
3) The informatics comes & try to fill these gap by using data, info & knowledge fc CDSS, Pt safety, researches & medical services.



Examples of research in medical informatics

Evidence based medicine (EBM)

Definition is the integration of best research evidence with clinical expertise[1] and patient values.[2]

History of EBM:
The name of EBM appeared in 1992 by group led by **Gordon Guyatt** at McMaster University in Canada. Since then the number of articles[3] about evidence based practice has grown exponentially from one publication in 1992 to about 1000 in 1998 and international interest has led to the development of six evidence based journals that summarize the most relevant studies in clinical practice and have a combined worldwide circulation of over 175000.

Q from doc: What is the diff between EBM and traditional medicine (current practice)?
The main diff is that they're not referring to the latest best research. We use different tools (UpToDate and BMG) and then they have research like clinical trials, cohort studies that practitioners refer to for the best diagnosis and treatment.

Literature Searching[4]	
Main benefits: Can improve the treatment of medical inpatients, even those already receiving evidence-based treatment.	**Example of a research:** • Random sample of 146 inpatients cared for by 33 internal medicine attending physicians. • After physicians committed to a specific diagnosis and treatment plan, investigators performed standardized literature searches and provided the search results to the attending physicians. • Attending physicians changed treatment for 23 (18%) of the 130 eligible patients as a result of the literature searches.

Doctor's Notes:

1. The current practice is looking mainly to expertise not to Pt (by taking the history, examinations, lab analysis and ultrasound and having the Pts values as a main concern and by looking to the best practice). It shouldn't be the latest it should be the best but most of the time the latest is the best.
2. EBM works and searches on the level of info & knowledge.
3. Google scholar is not just a search engine, it's an index.
4. Literature is the previous researches about specific question.
    - The Question based on Hx that we collected from patients & clinical expertise.
    - We search for knowledge NOT data.
    - Literature is more important and accurate decision.
    - You're not going to search literature and leave patient so you use structured knowledge/database. The tool of EBM they have a structured databases that easily that you easily search for your questions and gives you the most relevant questions. And for that they train physicians how to write questions in the best way.

Examples of research in medical informatics

Medical Records (The Accenture study)

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

Findings:

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

- 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.

★ Majority of doctors surveyed believe that healthcare IT does provide some **common top benefits, including:**
  - Better **access**, **quality** data for clinical research (70.9%). Quality of handwriting description.
  - Improved coordination of care (69.1 %) by sharing your knowledge/opinion/ data with others.
  - 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 %).

- The main challenge of moving from paper to electronic records is **Resistance** of professionals.
- If the student use the traditional database (books), he'll face problems if the doctor ask him to use electronic database (blackboard).
- The graph shows: the more you use the more positive impact you get.

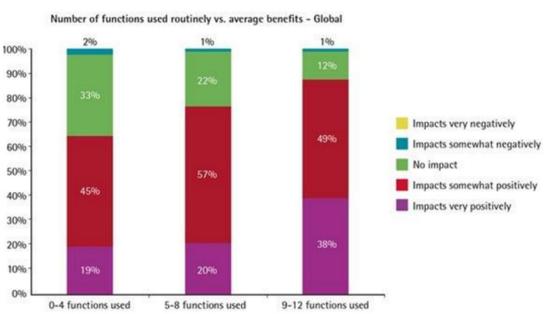


Figure 1 Average Benefits of Functions Used Routinely -- The Accenture eight-country physician survey found, as the number of routinely used healthcare IT functions increases, doctors' overall perception of the benefits grows more positive

Examples of research in medical informatics

Veterans Health (tele-health)

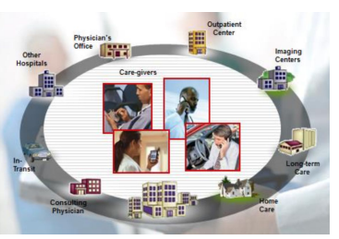
- Veterans Health, which runs the largest and one of the most cost-effective healthcare systems in the United States.
- The VA has been employing tele-health tools for more than 11 years. “The VA is absolutely a pioneer in the use of telehealth,” They published a study linking telehealth and 17,000 VA patients with chronic disease that showed a tremendous impact. nearly a 20 % reduction in hospital admissions.”.

Students examples

Qs will not come from the following researches

1) Wireless in healthcare:

Mobility is addicting , once you use it you can't live without it.



Conclusion

- Healthcare professionals **acceptance** seems to be one of the keys to success for this new industry .
- We may **dream** of delivering healthcare without being forced to use network cables or **tripping** over computer wires .

- Try to see the impact of using wireless on mobile application.
- Since 2010, the mobile application became one of the main sectors in mobile health.

2) Towered electronic health record

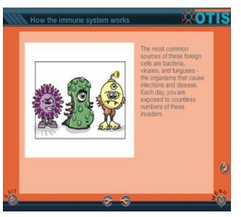
- **BARRIERS AND ISSUES**

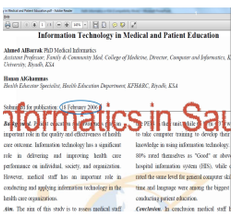
Many players and many approaches	Lack of a health network architecture
while the expansion of health care providers and services has been a factor behind the call for EHRs and improved sharing of health information , it also means that their implementation requires support from many stakeholders . An individual may now receive care from several physicians and other providers at once . Policies to govern the implementation and use of EHRs will therefore require the support of many different provider groups .	Privacy issue : ★ What information should be included in the EHR? ★ Who should have access to the EHR? Which information in the EHR and under what circumstances should the EHR be shared with other health providers? How will a patient be able to access his or her own EHR? ★ In what instances can the information in an EHR be used fIAT secondary purposes (eg , research , administration)? When is consent from the patient required?

Examples of literature searching (from students)

Methods:

- A total of 60 medical staff from different specialty (Physician - 21, Nurses = 25, Health Educator = 8, others = 6 ; Total N = 60, Female = 33, Male = 27) responded to the study questionnaire in KFSH & RC
- The questionnaire was designed in six sections.

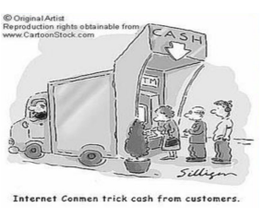




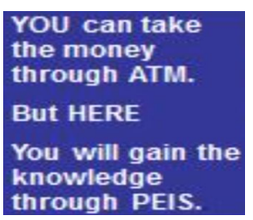
Information Technology in Medical and Patient Education

Conclusion

In conclusion medical staff had a very positive attitude towards applying patient education information system. However, the language barrier and lack of time were considered as the biggest barriers for conducting patient education. Accordingly the results showed that there is a significant need for computer training.



Internet Conmen trick cash from customers.

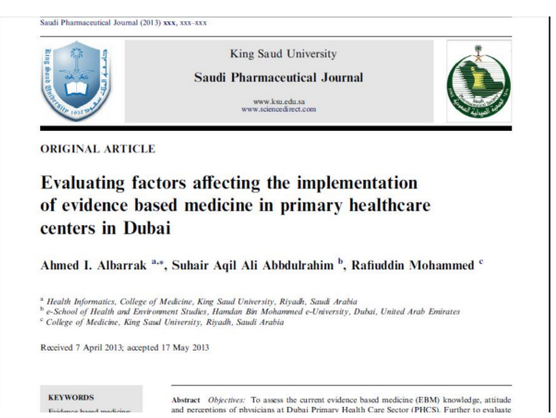


Barriers	%
Language barrier	18.3
Lack of time	23.3
Lack of plans for educational activates	8.3
Lack of financial resources	8.3
Uncooperative patient	11.7
All of the above	28.3
Other	1.7

Barriers of conducting patient education in %

Software selection

Remember that the end **GOAL** is not just to buy hardware and software . Rather, it is to buy **successful**, Well - installed system that effectively **meets the needs** of the organization.



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ORIGINAL ARTICLE

Evaluating factors affecting the implementation of evidence based medicine in primary healthcare centers in Dubai

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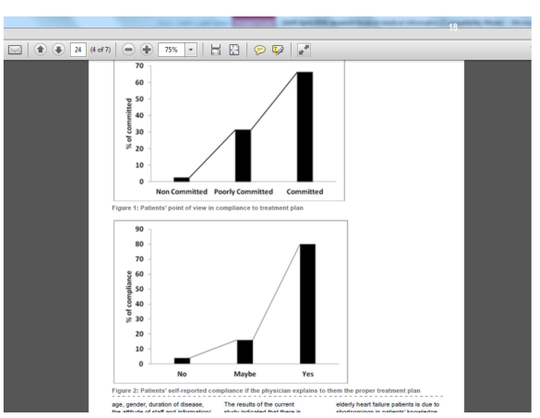
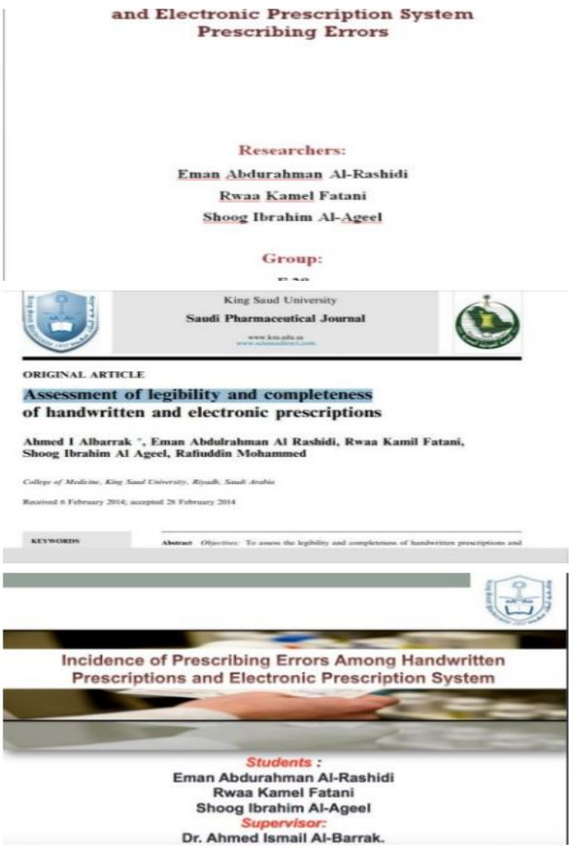
KEYWORDS

Abstract Objectives: To assess the current evidence based medicine (EBM) knowledge, attitude and perceptions of physicians at Dubai Primary Health Care Sector (PHCS). Further to evaluate

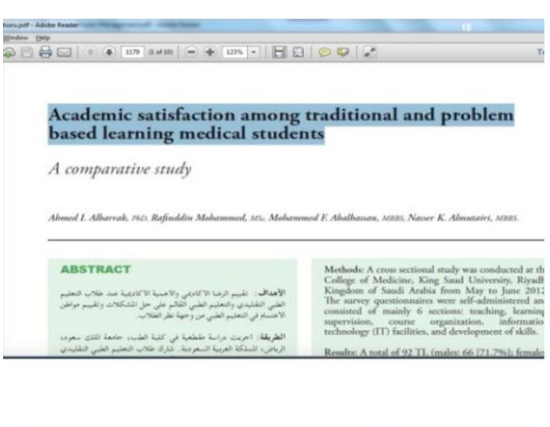


Examples of literature searching (from students)

Assessment of skills and attitude of dental students and interns toward e-learning in KSU



Incidence of prescribing errors among handwritten prescription and electronic prescription system



Academic satisfaction among traditional and problem based learning medical students

Book Summary

- **Clinical Research Informatics:** the sub-domain of biomedical informatics concerned with the development, evaluation and application of informatics theory, methods and systems to improve the design and conduct of clinical research and to disseminate the knowledge gained.
- ***Clinical Research***:
    - (1) ***Patient-oriented research***: *Research conducted with human subjects (or on material of human origin such as tissues, specimens and cognitive phenomena) for which an investigator (or colleague) directly interacts with human subjects. Patient-oriented research includes*:
        - (*a*) *mechanisms of human disease*;
        - (*b*) *therapeutic interventions*;
        - (*c*) *clinical trial*;
        - (*d*) *development of new technologies*.
    - (2) ***Epidemiologic and behavioral studies***.
    - (3) ***Outcomes research and health services research***.

Examples of focus areas in which CRI researchers and practitioners apply bio- medical informatics theories and methods can include the following:

- Evaluation and modeling of clinical research workflow
- Social and behavioral studies involving clinical research professionals and participants
- Designing optimal human-computer interaction models for clinical research applications
- Improving information capture and data flow in clinical research
- Leveraging data collected in EHRs
- Optimizing site selection, investigator and patient recruitment
- Improving reporting to regulatory agencies
- Enhancing clinical and research data mining, integration, and analysis
- Phenomic characterization of patients for cohort discovery and analytical purposes
- Integrating research findings into individual and population level health care

Clinical Research:

- **historical controls:** can be used for comparison with a group of subjects under study. For example, if a disease is known to have a particular fatality rate, subjects could be given a potentially life-saving treatment and their fatality rate can be measured and compared to past experience.
- **Randomization:**A more rigorous method of establishing comparison groups is through randomization , in which prospective subjects are assigned to different groups (often referred to as **study arms**) and undergo different interventions. Typically, randomization might take into account observable characteristics (such as gender and race) to create balanced groups, especially where the characteristics are known to have some influence
- **control intervention** (for example, the usual treatment for a condition or even no treatment) while one or more other groups receive an **experimental intervention**.

- For example, randomization can include **blinding**, in which the subject, the investigator, or both (as in **double-blinded** studies), are kept unaware of group assignment until after all assessments have been made. This might include the use of a **placebo** for a group receiving no treatment

Phased Randomised Control Trial

- It is important to note that clinical research endeavors exist on a spectrum of scientific activity that is commonly referred to as **clinical and translational research.**
- **T1-type translation:** a process by which **basic science discoveries** are used to design **novel therapies**. Such discoveries are then evaluated during clinical research studies, first pre-clinical and subsequent clinical trial phases.
- **T2-type translation:** involves methods such as those borrowed from implementation science and clinical informatics, and focus on translating the findings of such clinical research studies into common practice

preparatory phase: a protocol document is generated as part of the project development process. The protocol document usually contains background information, scientific goals, aims, hypotheses and research questions to be addressed by the trial

- IRB approval
- Deasable?
- Finding subjects… enrollment

Active phase: the participant receives the therapeutic intervention indicated by their study arm and is actively monitored to enable the collection of study-specific data.

dissemination phase: the results of the study are evaluated and formalized in publications or other knowledge dissemination media, for translation into the next phase of an RCT or into clinical practice.

Validity: One key metric used to assess clinical trial quality is validity, which can be defined both internally and externally.

- **Internal validity** is defined as the minimization of potential biases during the design and execution of the trial
- **external validity** is the ability to generalize study results into clinical care

Questions

1- "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" is the definition of which of the following?
A- Medical Informatics
B- Health Information System
C- Clinical Decision Support System
D- Simulation Centre

2- Which of the following is the result of processing, manipulating and/or organizing data to answer a question?
A- Knowledge
B- Clinical trial
C- Information
D- Research

3- Which of the following is NOT a data?
A- 40
B- 3/6/2015
C- 120 over 80
D- epidemiology of obesity in SA

4- "Analyzed data that have been suitably curated and organised so that they have meaning" is the definition of which of the following?
A- Database
B- Information
C- Knowledge
D- Clinical datum

5- "Interpreting information received, adding relevance and context to clarify the insights of the information contains". The statement above describe which of the following?
A- Knowledge
B- Information
C- Bioinformatics
D- Data

6- "Integration of best research evidence with clinical expertise and patient values" is a definition of?
A- Medical informatics
B- Evidence based medicine
C- knowledge
D- Literature Searching

1-A 2-C 3-D 4-B 5-A 6-B

Good Luck!

TEAM LEADER
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DONE BY OUR AMAZING MEMBER:

Alwaleed Alarabi

NOTE TAKEN BY OUR SHARP MEMBER: