Health Informatics: Current Issues and Challenges

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Agenda

- What is health Informatics
- Histories
- Information System and Electronic Records
- Information Needs and Use Within Health Care
- Data Mining
- Ethical Issue
- Challenges in Health Informatics
- Opportunities for health informatics
- Questions
What is health Informatics

Nursing Informatics
Dental Informatics
Primary Care Informatics

Specific Professions / Health Sectors

Sub-group

3 separate, related and overlap fields
What is health Informatics

How information and communications technologies (ICTs) are used in health sectors

GOAL

Develop and improve the organization and management of information.

Improve the overall quality of patient care.

For more general applications & Involve more different health professions.
What is health Informatics

**GOAL**

- Use of information technology (IT).
- Use of ICT. (to a lesser extent)

**Improve patient care.**

**Have a specific clinical focus & Involve clinicians and doctors**

**Medical Informatics**

For specific clinical applications:

- e.g. storing medical images, decision support tools, etc.
What is health Informatics

Health Information Management

**GOAL**

More conceptual

Concern how information is organized and managed within health

Improve patient care.
What is health Informatics

<table>
<thead>
<tr>
<th>Health Informatics</th>
<th>Medical Informatics</th>
<th>Health Information Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>More general</td>
<td>More specific</td>
<td>More conceptual</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Involve different health Professions</td>
<td>Involve mainly clinician and doctors</td>
<td>Involve different health Professions</td>
</tr>
</tbody>
</table>
Histories

A keyword citation search in article titles and topics in the Web of Knowledge.

Medical Informatics
1974 – first appear
Mid -1980 - prominence

Health Informatics
1969 – first appear
1990 - prominence

Health Information Management
1969 – first appear
Round 2000 - prominence
What is health Informatics

Health Informatics

Medical Informatics

Health Information Management
The development of information systems for medical and health care (last 10-20 years)
Information System and Electronic Records

The issue:
System compatibility and information exchange.

System A
---
System B
---
System C
---
System D
---
System E
---
System F
Information System and Electronic Records

The Solutions:

Develop system to integrate existing legacy systems

**Con:**
proven to be problematic:
- a. Legacy systems are in different geo. Location.
- b. Uses different OS.

VS

Develop new Systems to replace the legacy systems

**Con:**
Overcome obstacles:
- a. Incorporating previous data from a variety of systems.
- b. Data redundancy (paper + electronic versions)
Information System and Electronic Records

Changing of information and communication systems.

Collect Data for Management

Patient Centered System
Information System and Electronic Records

What to consider when electronic medical records are to be developed?

Data complexity!
Information System and Electronic Records

Complexity of health information: data types.

- A Single Patient
- A Single Patient

- numeric
- high res. images
- textual
- Complex signal data
Complexity of health information: data sources

- doctors
- nurses
- radiologists
- pathologists
- physiotherapists
Information System and Electronic Records

Complexity of health information: data records

Data records

- medical history
- symptoms
- clinical measurements
- diagnosis
- treatments
Information System and Electronic Records

Complexity of health information: data format

Free text

Data format
Complexity of health information: data collection and usage
Q: How can we use ICTs to benefit:
   • Patients
   • General Publics
   • Health Professionals

A: Provide more health related information to educate them.

Q: What are the information these group of people need?
A: According to researches in information science:
   • Different information behavior model have been studied
     • To understand how people seek information.
   • Information needs are not necessarily the same within a particular group
     • e.g. Information avoidance. (refuse info. -> diagnosis; accept info. -> treatment options.)
   • Consider information needs of individuals -> designing intervention/provide information. (e.g. stages/ when to provide information.)
Information Needs and Use Within Health Care

Q: What are the current issues on information delivery to health professionals and health researchers?

A: Information behavior models
   - well known within information science.
   - relatively unknown among health professionals and health researchers.

=> Help develop better information-related interventions.
**Information Needs and Use Within Health Care**

Health Professionals demand highly on 2 particular type of information:

<table>
<thead>
<tr>
<th>Explicit information</th>
<th>Implicit Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known information by health professionals. (e.g. treatment options of known diseases.)</td>
<td>Information that health professional are yet not aware of. (e.g. treatment of unknown symptoms of diseases.)</td>
</tr>
<tr>
<td>Information Easily Accessible.</td>
<td>Information acquire through: Post-mortem.</td>
</tr>
</tbody>
</table>

Possible Solution: Change implicit info. To explicit.
Information Needs and Use Within Health Care

How do we deal with too much information?

**Summarizing Information**

Health Professionals and the general public can use the information more efficiently.

How do we deal with information accuracy and quality especially on the web?

**Information Evaluation Tools**

Generic tools for checking information accuracy.
Information Needs and Use Within Health Care

Benefits of CITs (Pros)

• information sharing and communication among patients (with similar conditions)
• improve quality of life
• give them a sense that they can manage their life → reduce stress (based on a research.)
• …

Cons

• Replace face-to-face and verbal communication → affect the relationship between health care professionals and patients.
Data Mining

What is data mining?

- Knowledge discovery in database (KDD)
- Analyse large amount of data → identify hidden patterns and relationship among variables.

What do we want to pay attention when applying data mining to health informatics?

- Applying data mining on stock market vs health informatics?
- Safety issue → statistical relationship SHOULD NOT overrule clinical importance. AND domain experts.
- Other issue → data set size, missing data, etc.
Ethical Issue

General Issues:

Patients records stored, transferred, and access from one location to another.

• Online Security
• Online Privacy & Confidentiality
• Human rights …

open questions:

• Data access control. (Can your parents access your record? Brother? Spouse?)
• Can a patient with mental problem access his own record?
• Should health professional obtain certification regarding ethical use of patients info.?
• How about information professionals? (U.S. currently only require to sign a Health Insurance Portability and Accountability Act (HIPAA) Agreement.)
Challenges in Health Informatics

- Initial Cost
- Health Professionals and Managers: comfortable with current methods.
- ICTs systems in place: (further problems)
- Incorrect data entry $\rightarrow$ training
- Not trusting the system $\rightarrow$ have health professionals involve designing the system.
Challenges in Health Informatics

- Data incompatible for exchange between systems.
- Standard for Data
- Digital Imaging and Communication in Medicine (DICOM)
- Health Level 7 (HL7)
- International Classification of Diseases (ICD)
Opportunities for health informatics

Supporting an aging society (rise until 2050) → we all will be OLD then.

Sensor based technologies → collect and send data back & forth continuously.

Remote fall detections for seniors.

Detect early stage of diseases → disease controlling.
Questions?