Wisdom is not the product of schooling but the lifelong attempt to acquire it.
- Albert Einstein

The New Medicine: E-Healthcare

Gerhard Fischer and Hal Eden
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E-Healthcare, Health informatics or Medical informatics

- **intersection of**
  - information science
  - computer science
  - health care

- **objective:**
  - 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

- **American Medical Informatics Association (AMIA)**
  - [http://www.amia.org/](http://www.amia.org/)
  - US not-for-profit organization dedicated to promoting the effective organization, analysis, management, and use of information in health care in support of patient care, public health, teaching, research, administration, and related policy
E-HealthCare — Many Topics

- computer-based technologies for medical examinations

- implants: to disperse medication, to carry a patient’s medical history

- telemedicine

- patient records

- monitoring the use of medication

- information sites (e.g.: American Heart Association) → to inform and empower patients

- online communities for specific medical issues (torn ACL, Hip replacements, ..)
Questions / Issues

- Under what situations would you visit a web page for medical advice?

- How would you go about deciding what site(s) to visit?

- How would you go about deciding whether to follow the advice given on the site(s)?

- Under what situations do you think you would participate in an online community formed around a health issue? What type of information do you think you would be willing to share with the community?
Questions / Issues

- There currently exists the technology to implant a small device about the size of a large grain of rice in (for example) your arm that would contain your medical information. This could theoretically be instantly read upon entering a doctor’s office or hospital.

  - What are some of the potential positive effects of this technology?
  - What are some of the potential negative effects of this technology?
  - If made available to you with no more discomfort than receiving an inoculation, would you have one of these devices placed in your arm?
AI Versus IA

Artificial Intelligence versus Intelligence Augmentation

- **Artificial Intelligence**
  - replace the human
  - example: MYCIN — an expert system for diagnosing infectious diseases

- **Intelligence Augmentation**
  - empower the human being
  - example: Center for Human Simulation
AI: Mycin — a rule-based expert system

- extensive knowledge base (approx 800 rules)
- inference engine
- reasoning under uncertainty
- interactive transfer of expertise (→ meta-design, end-user development)
- used for tutoring
IA: Center for Human Simulation — University of Colorado

http://www.uchsc.edu/sm/chs/open.html

- synthesis of human anatomy and computed three-dimensional imaging

- This synthesis resulted in a three-dimensional, high resolution database of human male and female anatomy (the Visible Human) as derived from direct analysis of anatomical specimens and radiological imaging

- The general purpose of this Center is to facilitate the collaboration of anatomists, radiologists, computer scientists, engineers, physicians and educators to promote the application of this and other anatomical data to basic and clinical research, clinical practice and teaching
Excerpts from Answers by Students

- Most hospital rooms are now a maze of computerized devices used to monitor and treat patients.

- When it comes to patient records, the American health care industry lags behind most other industries in terms of adoption of information and computer technologies.

- The benefits of adopting electronic medical records are not only seen in financial terms but in better care for patients.
Patient-Accessible Electronic Medical Records (EMRs)

- Learning more about their condition
- Coordinating care
- Learning about medical decision-making
- Reinforcing memory
- Increasing participation in medical care
- Streamlining the flow of information
- Confirming normal results and the accuracy of the record
Shift of Power between Doctors and Patient

- the power balance between patient and doctor is being renegotiated

- This influx of information could render patients more knowledgeable and thus more capable of communicating with their doctors and/or it could lead patient's to question the accuracy of their doctor.

- Ben Shneiderman: “increased access to health information stands to strain relationships with medical professionals who are uncomfortable or not used to patients questioning their authority.”

interesting books from Ivan Illich about “deprofessionalization”
Examples of the Shift of Power between Doctors and Patient

- The weakness in "doctor-free" medicine becomes obvious when we try to find resources on a common problem such as **insomnia**. → A Google search on this topic yields such an enormous amount of information it is hard to know where to start.

- After about 20 minutes of searching and reading about a torn **ACL** I was able to find out about the symptoms, diagnosis, and treatment of them. → “I think I would still need to see a doctor if I had something like a torn ACL because it seems it usually needs surgery.”

- **Obsessive Compulsive Disorder**: a large array of resources and even a foundation for OCD. → “I would see a doctor in person just to be certain.”

- **high cholesterol**: an enormous amount of information

- **Attention-deficit hyperactivity disorder (ADHD)**: a variety of information from questions to ask your doctor, various support groups, professional conferences, and online quizzes designed to "diagnose" ADHD.
More Examples

- Back pain is a common problem, and its prevention is something that everyone should know. A quick search on the web finds plenty of information about exercise, stretching, lifting techniques, and even mattresses → It is a lot more convenient to try some of these suggestions than to go see a doctor for suggestions.

- popular health and medicine related sites that people find useful to search on for answers: WebMD, AllRefer Health, Mayo Clinic, WrongDiagnosis, and MedicineNet.
  - It is common on these sites that questions about certain conditions or symptoms are posted in the forums
  - certified doctors and nurses respond as best as they can within generally a 24-hour time period to these questions - though, they too strongly encourage an actual visit to a doctor over what can be called a "forum diagnosis".

- World Health Organization website for travelers → Information like this makes me feel very prepared for my fake trip, but even with all of it, I still would feel better after asking my doctor about it well before I leave. This need arises from a lack of authority found online.
Model Authoritative underlying Consumer Cultures

- Strong Input Filters, Small Information Repositories, Weak Output Filters
- Limitation: Making All Voices Heard
Model Democratic underlying Participation Cultures

- Weak Input Filters, Large Information Repositories, Strong Output Filters
- Limitation: Trust and Reliability of Information
The State of the Art

- The full potential of ICTs in this realm has not been achieved.

- If medical records could pass easily from doctor to doctor and from hospital to insurance provider, the health care business could become more efficient in the use of both time and money.

- why not:
  - privacy — perhaps be the ultimate limitation on taking medical records "online."
  - initial overhead investment that health care businesses may be unwilling or unable to make,
  - a resistance by current providers to system change