Scoping Health Care Informatics

Integrating effective technology into the complex, high-risk environment of health care requires the consideration of fields as diverse as sociology and computer science.
IPRO Action Plan

• Define medical informatics
• Gain an understanding of the medical informatics field by reading relevant journal articles
• Define direction: focus on issues with automation
• Secondary research on automation
• Hospital visit, field observations
• Draw connections between observations and research
Information science studies structures, use, and display of information, with the objective of promoting the communication of desired data, knowledge and meaning.

Computer science, the study of computational structures and processes.

Health care encompasses large scale organizations like hospitals as well as smaller, long-term care facilities like clinics and private practices.

Seeking to understand the limits and abilities of humans, human factors is the applied science of human behavior and physiology.

Medical Informatics

Overlapping Domains of Knowledge
The health care industry consumes 18% of the GDP every year. In the year 2000, costs associated with health care were estimated to be $1.31 trillion in the United States.

The challenge is to improve quality and minimize costs.

Efficient communication is extremely important when many people of different disciplines are concentrated in one area, such as in a health care setting.
Patient Safety & Medical Informatics

Delivering Safer Health Care

• With as many as 98,000 hospitalized Americans dying from medical errors, patient safety is a major health care concern.

• Understanding and applying medical informatics to improve patient safety can lead to enormous demands on practitioners.

• The best way to improve the quality of health care is to deeply study the structure of the work environment and view health care as a system in which medical informatics plays a vital role.
Medical Informatics Software Categories

- Practice Management
- Diagnostic and Decision Support
- Software
- Inventory Control
  - Tracking resources
  - Ordering
- Patient Management
- Patient Records
- Billing
- Tracking
Benefits of Medical Software

- Increases the ability to see more patients on a daily basis because of more efficient office procedures

- Reduces costs associated with documentation and chart supplies

- Reduces hospital and office staff used to locate, pull, copy, store, and transport charts
Automation in Medical Informatics

Making Life Easier for Medical Professionals?

• Automation:
  – exists in informatics products to automate processes previously carried out by humans

• Automation may:
  – Surprise users
  – Fail to deliver appropriate results
  – Transform work
Case Study of Automation

*Learning from ACORN*

**What is ACORN?**

- Decision support system (DSS)
- ACORN collects patient symptom information to provide recommendations to the practitioner
- ACORN illustrates automated system surprise, failure, and work transformation
Case Study of Automation
Learning from ACORN - Surprise

As a decision aid, ACORN produced surprising results:

• Ambiguous recommendations – over 30% of the cases were classified in the middle category, between “send home” and “send to CCU.”

• The ambiguity was a surprise and frustration to practitioners
Case Study of Automation
Learning from ACORN - Failure

Some surprises lead to failures, directly impacting patients and practitioners.

ACORN recommendations:
• Often admitted patients that were not in need of hospital care
• Rejected patients that were clearly in need of CCU care
Case Study of Automation
Learning from ACORN - Transformation

Automation often transforms the way practitioners work, as practitioners must incorporate the new software and hardware in their work environment.

Practitioners use task and system tailoring:
– System tailoring is adapting a system to the users needs
– Task tailoring creates new work methods to adapt to the features of a new system.

ACORN has transformed the work environment by giving nurses the authority to admit patients to the CCU.
Case Study of Automation
Learning from ACORN - Conclusions

• Technology alone is not enough to achieve a well-functioning electronic information or decision support system; organizational aspects must be accounted for as well.

• The adaptation process has to begin with an in-depth analysis of the needs and processes of the work environment.
Improving Medical Informatics

Training is Necessary

• Adequate training is essential for all users of an information system.

• Training programs vary widely by institution and even department.

• Circumstances of health care environments necessitate training outside of normal work hours.
Improving Medical Informatics

*Training is Necessary*

• Without adequate training:
  – users may become frustrated
  – sophisticated tools may be under-utilized

• Training is the solution to this problem:
  – It takes untrained users an average of 22 hours to get to the same skill level that can be gained after 5 hours of training.
  – Training is an essential tool for making sure any organization benefits from new software and hardware.
Smart automation incorporates:

- Support at the cognitive level of the user
- Appropriate input prompts
- Concise menu structure
- Governance structures
- Filters to ensure relevant data
- Support for user speculation
- Appropriate output
Improving Medical Informatics

Transparent Processes

• Black Box
  - User’s view is obstructed
  - No information on internal processes

• Clear Box
  - User is able to see internal processes (●)
  - Intervention is possible
  - Supports input at multiple stages
  - Facilitates user understanding of internal processes
• Provide industry wide standards for automation

• Standards should be monitored by software oversight committees

• The direct input of health care professionals who will be using the software is an indispensable component of any new system design
Improving Medical Informatics

Conclusions

• Health care is big business in the United States.

• The current focus in informatics is to increase the efficiency of patient care administration while maintaining patient safety and privacy.

• Automation of tasks is the means to increased efficiency.

• Regulations must be in place to protect patient safety.
Thanks

Please visit http://www.iit.edu/~ipro372f03/ to view our full report.