MEDICAL INFORMATICS
A Course for Health Professionals

NATIONAL LIBRARY OF MEDICINE

Educational Objectives and Outlines

Day 1 - Monday, October 1, 2001

Session 1: 8:30 - 9:00 AM

What is Medical Informatics?

Faculty

Daniel Masys, M.D.

Educational Objectives

The class will develop its own definition of Medical Informatics and discuss the personal qualities and skills needed for success.

Return to Schedule

Session 1A: 9:00 - 10:00 AM

HPCC, NII, current issues in medical informatics

Faculty

Donald A.B. Lindberg, M.D.

Educational Objectives

This lecture will summarize the federal interagency High Performance Computing and Communications program accomplishments in non-medical and health related aspects and will enumerate some past, current, and future research funding sources.

At the completion of the session, participants will:

- Understand the "interagency model" and the government-industry-university approach to the HPCC work.
- Understand the initial opportunities in biomedical applications of the NII.
- Have a beginning set of funding contacts.

Session Outline

1. High Performance Computing and Communications federal program
   - Background and Legislation
   - Objectives and Organization
   - Phase 1
     - Accomplishments - Grand Challenges
     - Progress on Grand Challenge Problems
   - Phase 2
     - National Information Infrastructure
     - National Challenge Applications
       - Non-medical
       - Medical
2. NLM Role in the NII
   - Intramural Research
     - UMLS
     - Visible Human

- Extramural Research
  - NII medical testbed
  - Telemedicine
  - Computer-based patient record
- Public Policy Issues
  - Medical Data Privacy
  - National Security
  - Intellectual Property Rights
    - Traditional Copyright Demands
    - Today's Revolution in Electronic Publishing
- Federal Research Funding Sources for Medical Informatics
  - NLM Programs
  - Other HHS Programs
  - Other federal agency support

Session 2: 10:30 AM - 12:00 N

Principles of database design

Faculty

Daniel R. Masys, M.D.

Educational Objectives

This lecture and lab session will introduce basic principles of organization of data in computerized systems. At the completion of the session, participants will:

- Understand the historical evolution of computerized data handling methods
- Know the relative strengths and weaknesses of hierarchical, relational, information network, and object-oriented database systems
- Understand the process of development of a set-theory-based relational data model, including entity-relationship definitions, principles of fully normalized relational models, state transitions and data flow diagrams.

- Understand the design principles involved in the transformation of a flat file record structure to a normalized relational structure (lab exercise).

Session Outline

- Database definitions and paradigms
  - What is a Database?
  - Historical Evolution of data management techniques
  - General benefits of Database Management Systems (DBMSs)
  - DBMS types
    - Heirarchical
    - Information Network (linked lists and pointers)
    - Relational
    - Object-oriented
    - XML
  - Principles of Relational database design
    - Representation of real world objects and their attributes
    - Relationships between objects
    - Table notation formalisms
    - Relationships: one-to-one, one-to-many, many-to-many
  - System design and building methods
    - Entity-relationship diagrams
    - State Transition Models
    - Data Flow Diagram
  - Transforming flat files to tables
  - A sample problem in database design

Session 3: 1:30 - 3:00 PM

The Unified Medical Language System; Internet Futures

Faculty

Lawrence C. Kingsland, III, Ph.D.

Educational Objectives

This lecture has two independent segments. The first segment introduces the Unified Medical Language System (UMLS) project initiated by the National Library of Medicine in 1986. The second segment discusses several aspects of upcoming technologies that are having and will have an impact on the way we view and use the Internet. At the completion of the session, participants will:

- Have received an introduction to the history of the Unified Medical Language System
- Be introduced to the content of the UMLS Knowledge Sources: the Metathesaurus, the Semantic Network and the SPECIALIST lexicon
- Have viewed a demonstration of the UMLS Knowledge Source Server
- Have viewed a demonstration of the UMLS Metathesaurus browser application in the Internet Grateful Med program, including the introduction of related concepts and co-terms
- Have received an introduction to technologies that are shaping the further development of the Internet and the ways we use it.

Session Outline

- Unified Medical Language System
  - History
  - The UMLS Metathesaurus
  - The UMLS Semantic Network
  - The SPECIALIST lexicon
  - The UMLS Knowledge Source Server
  - The Internet Grateful Med Metathesaurus browser as an example of a UMLS application, with emphasis on related concepts and co-terms
- Internet Futures
  - Context
  - Internet Protocol (IP)
  - IPv6
  - Quality of Service (QOS)
  - Optical switching
  - Virtual Private Networks (VPNs)
  - Digital Spread Spectrum
  - Bluetooth
  - Wireless Access Protocol (WAP)
  - Ubiquity (wearable computing)
  - Dynamic content
  - Standards/open source

Session 4: 3:30 - 5:00 PM

PubMed and the NLM Gateway

Faculty

Annette Nahin

Educational Objectives

This lecture and lab session will look at the National Library of Medicine's PubMed interface for searching MEDLINE. Searching techniques will be presented as well as a review of recent enhancements. There will also be a demonstration of the NLM Gateway - an interface for searching multiple NLM products. During the hands-on lab time, students can choose from various projects including creating Cubby stored searches in PubMed, creating a link to PubMed search results for a personal web site, and searching the Gateway and emailing the search results to someone

Session Outline

1. PubMed Overview
2. Automatic Term Mapping
   - Search Refinement
   - Feature's Bar (Limits, Preview/Index, History and Clipboard)
3. Related Articles
4. Cubby - stored searches & LinkOut
5. NLM's Gateway Overview
6. Searching Multiple Databases
7. Searching OLDMEDLINE for journal citations, 1958 - 1965
8. Define Your Own Display Format
9. Hands on lab time

Evening Session

Class of 2001 Personal Web pages workshop

Faculty

[Daniel Masys, M.D.](#)

Educational Objectives

This hands on laboratory will introduce participants to WYSIWYG HTML editing, basic digital image editing and compositing, and publishing web pages to a server.

At the completion of the session, participants will:

- Have created a personal web page with one or more images, and hyperlinks using free HTML editor (Netscape Composer)
- Have a basic understanding of digital image editing software (Photoshop).
- Have created a class resource that enables participants to know one another better

Day 2 - Tuesday, October 2, 2001

Session 1: 8:30 - 10:00 AM

Bioinformatics and Genomics

Faculty

[Daniel Masys, M.D.](#)

Educational Objectives

This session will provide an overview of the information resources and informatics challenges associated with genome-related science. Databases relevant to molecular biology and to clinical genetics will be demonstrated.

Session Outline

- Historical evolution of the science of genetics
- The Human Genome Project
- Databases supporting molecular biology and genetics
  - NCBI resources
    - Entrez
    - GenBank
    - UniGene

- - - LocusLink
      - RefSeq
      - OMIM
    - Other resources
      - Commercial/private
      - Public
- Functional Genomics
  - Chip and Slide Arrays for gene expression
  - Analytical challenges
  - Implications for healthcare
- Lab exercise: using NCBI OMIM as a clinical reference

Session 2: 10:30 - 12:00 N

Encryption and public policy issues

Faculty

Donald A.B. Lindberg, M.D.

Educational Objectives

This lecture and discussion will present the theoretical and practical bases for recommendations concerning medical data privacy, data encryption technology, and identification/authentication.

At the completion of the session, participants will:

- Know the issues facing the US regarding copyright and database protection world-wide
- Know if they support or do not support federal privacy legislation, and its features
- Understand the basis for current data encryption methods.
- Will have examined at least two Security Token Authentication devices.
- Have tested or seen tested fingerprint, voice, or facial ID systems

Session Outline

1. Intellectual Property Rights
   - WIPO Treaty proposals
   - Pub Med Plans
2. Encryption
   - Basic concepts
   - DES Public-Private Key
   - Implementation and Devices
   a) Data Encryption Technology
   - Private Key Encryption
     - Digital Encryption Standard
     - Kerberos
   - Public-Private Key Encryption
   b) System Considerations
   - Length of Cipher Keys
   - Security Token Authentication
   c) Devices
   - Challenge - Response
   - Time Synchronous
   - Fingerprint, voice, facial ID systems
3. Medical Data Privacy
   - Requirements
   - Legislation
     - Overview
     - Status of Federal Privacy Legislation
     - Contentious Issues
   - Initial Practical Experience with Medical Data Privacy Assurance

Session 3: 1:30 - 3:00 PM

Digital Library Research

Faculty

Alexa T. McCray, Ph.D.

Educational objectives

This lecture presents the basic principles and practices involved in designing and implementing a digital library, as well as the research issues that need to be addressed. Two case studies, ClinicalTrials.gov and Profiles in Science are introduced, and participants are given an opportunity to do a short exercise.

By the end of the session students will:

- Understand the basic principles that underlie the design, implementation, and maintenance of a successful digital library.
- Have an understanding of digital library research issues.
- Have pointers to useful resources in digital library research.

Session Outline

1. Informatics Research Agenda for Digital Libraries
2. Basic Principles in the Design and Implementation of a Digital Library
   - System Design Principles and Practices
     - Standards
     - Modularity
     - Extensibility
     - New technologies

   - Content and Collection-based Principles and Practices
     - Data acquisition and selection
     - Metadata
     - Intellectual property
     - Permanence and persistence of digital objects
   - Human Factors Principles and Practices
     - Accessibility, usability
     - Automation of manual tasks
1. Case Studies
   - ClinicalTrials.gov
   - Profiles in Science
2. Hands-on Exercise
   - Assigning metadata tags

Session 4: 3:30 - 5:00 PM

Principles of Web page design

Faculty

David Remsen, MBL staff

Educational Objectives

At the completion of this session, participants will have an understanding of Hypertext Markup Language (HTML) and its application in the creation of World Wide Web pages.

Evening Session

Introduction to Personal Databases

Faculty

David Remsen

Educational Objectives

This hands on workshop will create sample databases and discuss the implications of different data models.

Day 3 - Wednesday, October 3, 2001

Sessions 1 and 2: 8:30 a.m. - 12:00 n

Principles of Controlled Terminology

Faculty

James Cimino, M.D.

Session Outline

- What is special about medical data?
    Large number of entities
    Complex naming
    Degrees of granularity
    Temporal nature
    Perspectives for classification
    Nesting of modifiers
- Clinical vocabularies
    Goals: coding, translation, decision support
    Methods
    Maintenance issues

    Established vocabularies

Sessions 3 and 4: 1:30 p.m. - 5:00 p.m.

Evaluation Methods in Medical Informatics

Faculty

Charles P. Friedman, Ph.D.

Session Outline

This section of the course examines medical informatics as an empirical science. As such, the section will focus on formal studies of applications of information technology in medicine. We refer to these applications generically as information resources. Studies can be conducted while information resources are under development as well as after they are in routine service. Studies typically address questions such as: Is the resource functioning as anticipated? How can it be improved? Does it make a difference? Are the differences it makes beneficial?

Within medical informatics, there is increasing interest in evaluation and empirical studies. From an administrative perspective, as institutions invest in new technology, it is critical for them to know how these systems can contribute to health care, education, and research so they can set develop plans and set priorities. From a more academic perspective, research projects in informatics, including doctoral dissertations and masters theses, now often include an evaluation or empirical study component. Much of the funded research in informatics is required to have such a component.

These sessions on evaluation will provide participants with an understanding of the range of evaluation methods that are used in informatics and will address how studies are designed as well as how data for these studies are collected, analyzed, and reported. We will address during the day many of the challenges that make evaluation difficult, emphasizing those challenges that are particular to medical informatics, and we will discuss methods that have been developed for addressing many of these challenges.

Educational Objectives:

At the completion of the session, participants will be able to:
1. Describe the purposes of evaluation in medical informatics.
2. List several factors that can make it difficult to do evaluation in medical informatics effectively, as well as strategies that can be employed to address these difficulties.
3. Distinguish objectivist (quantitative) and subjectivist (qualitative) approaches, describe the assumptions that underlie them, and explain why both methods are used.
4. Identify the major steps in the process of conducting objectivist and subjectivist studies.
5. Identify the individuals or groups comprising the "audience" for an evaluation study.
6. Describe how the methods and purposes of a study can be matched the level of maturity of an information resource.
7. Frame many of the recurring difficulties of evaluation in medical informatics as problems of measurement.
8. Distinguish between measurement errors that are issues of reliability from those that are issues of validity. Distinguish between different types of validity.
9. Explain how "measurement studies" can be conducted to identify the sources of error in any measurement process, and to estimate the magnitude of these errors.
10. Explain what is meant by a "gold standard" in the framework of a measurement study.

    Identify measurement methods and features of measurement instruments that can be employed to reduce measurement errors.
11. Identify some specific evaluation questions or issues that lend themselves particularly well to subjectivist approaches.
12. Explain how the questions and key issues of a study arise through the process of immersion.
13. Describe the major data collection strategies in subjectivist research, how these are used in a complementary way within a study, and how the data generated by each are analyzed.
14. Explain the steps a researcher can take to ensure the veracity of the findings of a subjectivist study.
15. Describe some of the barriers to combining objectivist and subjectivist methods within a single study.

MBL Clambake (no evening workshop)

Day 4- Thursday, October 4, 2001

This day will begin with an overview of the day to establish the context of the presentations.

Session 1: 8:30 AM - 9:00 AM

Clinical decision making as a cognitive process: a case

Faculty

Randolph A. Miller, M.D.

Educational Objectives:

- Understand the types of decisions clinicians make in practice settings
- Understand current knowledge about human decision-making in such settings
- Provide background to understand approaches of decision support systems

Session Outline

- Presentation & Discussion of Clinical Case
- Types of decision-making in clinical setting:
    1. Diagnosis
        - Elicitation of "findings"

- Hypothesis generation
- Test-or-treat / threshold for treatment
- Differential Diagnosis & its refinement
- Establishing a diagnosis
- Repeating process for multiple diagnoses
  2. Prognosis
  3. Therapy
     - Empirical
     - Evidence-based
  4. Observation & Alteration of Plan
- Insight into clinical decision-making
  1. Elstein et al: early hypothesis generation
  2. Eddy & Clanton: role of pivotal finding
  3. Kassirer et al: refinement of hypotheses
  4. Simon et al: Chess & expert vs. novice (compiled knowledge)
  5. Studies of clinical information needs: Covell, Osheroff, Timpka, et al

Session 2: 9:00 AM - 10:00 AM

The Basics of Decision Support

Faculty

Randolph A. Miller, M.D.

Educational Objectives:

- Understand the types of diagnostic decisions support systems developed

- Understand requirements related to bringing DSS to real world "front lines"
- Understand impediments to implementing decision support systems

Session Outline:

- Previous approaches to diagnostic decision support
  - Branching logic
  - Simple Bayesian
  - Rule-based
  - Criterion-based
  - Mathematical models, e.g., clustering, set-covering
  - Heuristic
  - Bayesian belief networks
  - Neural networks
- Requirements for decision-making in clinical setting:
  1. Source of clinical expertise: human vs. other
  2. Knowledge base with ongoing maintenance
  3. Separation of KB and algorithms
  4. Methods for feedback to improve system
  5. User interface
  6. Integration into workflow
- Discussion of impediments related to 1-6 above

Session 3 - 10:30 AM - 11:00 AM

Interactive demo of the Vanderbilt decision support interface

Faculty

Randolph A. Miller, M.D.

Educational Objectives:

To view an active decision support interface system.

Session Outline:

- Conflict of Interest Disclaimer: re McKesson
- WizOrder Components / Functions include:
  - "Intelligent, Heads-up Display" Approach to Patient Care:
  - What clinicians need to know when they need to know it
  - Electronic record sensitive to patients' specific information
  - Medication prescription with safeguards
  - Flexible tools to present & activate guidelines
  - Implementation of "Best of Care" clinical pathways
  - Respect for individual physicians' preferences
  - Hooks to web-based 'just-in-time' educational resources
  - Linkage of patient cases to literature-based evidence
  - Ability to implement cost-savings precisely & humanely

Session 4 - 11:0 AM - 12:00

Basics of Structuring and Exchanging Data

Faculty:

Judy Ozbolt, R.N., Ph.D.

This session identifies the characteristics and uses of health care data, discusses the role of standards in data exchange, and describes one process of standards development as a case example.

Educational Objectives:

- Identify the types and uses of health care data.
- Describe problems with traditional patient records.
- Discuss the roles of controlled vocabularies, formal terminologies, and coding systems in capturing and using health care data.
- Identify major standards-developing organizations and describe the process of standards development.
- Using the reference terminology model for nursing as a case example, discuss challenges to standards development and ways to meet those challenges.

Session Outline:

1. Health care data
   - Types of data
   - Methods of collecting data
2. Uses of health care data
   - Historical / legal record
   - Basis of planning care and tracking progress
   - Communication
   - Health services management and research
3. Weaknesses of the traditional record as a source of data
   - Difficulties of retrieval and interpretation
   - Redundancy and inefficiency
   - Unsuitability for research
4. Terminology standards for health care data
   - Need for "a terminology of terminologies" and ISO Standard 1087
   - Major terminology standards and standards-developing organizations
5. Progress toward a reference terminology for nursing (case example)
   - Status of nursing terminology in 1998
   - Process of Nursing Terminology Summit Conferences and intervening work
   - Achievements: working draft standard terminology model, collaboration with HL7, LOINC, CEN TC 251, ISO, IMIA, ICN
6. Summary of key points: terminology standards as the key to interpreting and exchanging health care data.

Session 5 - 1:30 PM - 2:00 PM

Clinical Care as an Integration of Process and Discipline—case example

Faculty:

Judy Ozbolt, R.N., Ph.D.

This session discusses the principles and methods of interdisciplinary collaboration and integration in goal-directed patient care, using as a case example Vanderbilt's collaborative care pathways supported by the PathworX system.

Educational Objectives:

- Distinguish between integrated, collaborative interdisciplinary care and disparate multidisciplinary care.
- Describe how interdisciplinary collaboration occurs in a collaborative care pathway.
- Discuss the advantages of goal-oriented care for the individual patient and for the process of quality improvement.

Session Outline:

1. Interdisciplinary care versus multidisciplinary care
2. Illustrative examples of collaborative interdisciplinary care in the pathway for minor ischemic stroke patients
3. Patient/family goals and system goals
4. Goal achievement and quality improvement

Session 6: 2:00 PM - 3:00 PM

Architecture basics: enterprise technology, information and security standards

Faculty

William W. Stead, M.D.

Educational Objectives:

This lecture will introduce basic principles of information technology architecture together with a sample of "best practices" for application, information, and security architectures.

At the completion of this session, attendees should:

- Understand the concept of information technology architecture
- Appreciate the role of layering and componentization for re-use and scale
- Understand the role of various informatics techniques in supporting information re-use and linkage

Session outline:

1. A definition of architecture
2. Application architecture principles
   - n Layer Reference model
   - pragmatic compromises
   - phased approach for migration from legacy applications
3. Information architecture principles
   - Decoupling information content from IT tools
   - VUMC enterprise architecture as an example
   - Managing Application level Logical Unit of Work (LUW)
   - Informatics techniques that make content "understandable"
     - Re-useable data models
     - Standards that "homogenize" data
     - Relating separate information sources
4. Security architecture
   - Context – enterprise security objectives & practices
   - Use of layering and modularity to achieve reuse and scale

Session 7: 3:30 PM - 5:00 PM

Putting the pieces together

Faculty:

William W. Stead, M.D.
Judy Ozbolt, R.N., Ph.D.
Randolph A. Miller, M.D.

This session will include three problem-based blocks. In each block, the faculty will briefly pose a real-world problem and facilitate discussion as the students use the principles from the day's lectures to develop a solution.

Educational Objectives:

Applying the principles from today's lectures

Session Outline:

Case 1: Integrating a stand-alone system to support rehabilitation practice

Case 2: Creating a collaborative care pathway

> In this session participants collaborate to sketch in the elements of a pathway for a patient type of the group's choosing. Participants identify the discipline-based roles they would play in an actual process of pathway development. They play out those roles to fill in some aspects of a pathway, then critique their individual and group performance.
> *Case Objectives*
>
> - Identify distinct roles for different disciplines in pathway development.
> - Experience and critique an exercise in interdisciplinary collaboration to begin to construct a pathway.
>
> *Case Outline*
>
> - Select a patient type for pathway development.
> - Identify the disciplines participating in pathway development and define the role of each.
> - Role-play the process of pathway development.
> - Critique the process for collaboration, disciplinary integration, and goal orientation.

Case 3: Developing a treatment advisor

Evening Workshop: 7:00 - 9:00 PM

Building Web intefaces to databases

Faculty

David Remsen, MBL staff

Educational Objectives

This workshop will give participants hands-on experience in serving databases to the web. In this session they will learn the different necessary components of a database web server. They will create their own interface to a database and learn how to conditionally format the results in HTML. They will get an understanding how HTML form elements translate to database calls, how an HTML form translates to a database query, and how a query is processed and the results are returned.

Session Outline

1. Present an overview of a generic database web serving system. This overview will consist of identifying and defining the function of the the different elements that compose a database server.
2. A brief introduction to a few of the different database solutions to show how different vendors address the model described in 1.
3. Create an interactive web database using Filemaker Pro 4.0 with a sample database which will address the following: Querying the database using FORM and embedded URLS
4. Editing a Record via the web
5. Adding/Deleting Records
6. Processing results with format files.

7. Understanding how HTML and database meta tags can interact by:

   a. Listing multiple records
   b. Formatting a single record
   c. Using conditionals to selectively format records
   d. Using color and graphics with numeric content

   Creating embedded links to Entrez, PubMed, others

Day 5 - Friday, October 5, 2001

This day will begin with an overview of the day to establish the context of the presentations.

Session 1 - 8:30 AM - 10:00 AM

Aligning Enterprise & Information Technology Strategies

Faculty:

William W. Stead, M.D.

This lecture explores how to align enterprise and information technology strategies, together with how to organize the information technology/informatics function for success.

Educational Objectives:

- Understand where IT/Informatics holds the greatest potential value to an enterprise
- Appreciate the role of scenario planning in imagining discontinuous change
- Understand the challenges that face the enterprise IT function and strategies for overcoming barriers to success
- Appreciate the importance of achieving fit between organization structures of the enterprise and the IT function

Session Outline

1. What is the purpose of IT/Informatics in an enterprise?
   - IT Value Proposition
   - IT trends and implications for the future
   - "Core competencies" of IT
   - Vignettes of possible changes in roles and learning
2. Strategies for a successful Enterprise IT Function
   - Scaling up to enterprise scope
   - Managing data as an enterprise asset
   - Providing core planning functions
   - Bridging the gap between academics and operations
     - The basic science of biomedical informatics
     - Linking research and training to operations
     - Linking Bioinformatics to Clinical Informatics
     - Linking informatics research to informatics support of research
     - Vanderbilt - a case of organization in evolution
3. Selecting a strategy for your enterprise
   - Stages of penetration of Integrated Information Management
   - Challenges for the enterprise

Session 2 - 10:30 AM - 12:00

Managing Technological Change

Faculty:

Nancy M. Lorenzi, Ph.D.

This session presents an overview of the issues that must be addressed to effectively manage technological change. It will include a case study.

Educational Objectives:

- To become aware of the non-technical issues connected with technological-informatics changes.
- To understand several of the reasons for system failure
- To review a case to determine what non-technological issues could have been addressed initially.
- To review what change agents need to do to facilitate organizational success

Session Outline:

1. Systems" in broader context
    - A system is not just technology
    - Begins with a perception of the overall need for change
    - Developing a definition of the specific needs/requirements
    - Begin to prepare the staff for change
    - Development/selection—the technical system
    - Implementation preparation, includes training
    - Implementation
    - Support—of users and to repair deficiencies
2. Why Systems Often Fail
    - What Is Failure?
    - Failure Issues
        - Communication
        - Culture
        - Underestimation of complexity
        - Scope creep
        - Organizational
        - More organizational issues
        - Technology Training
        - Leadership issues
3. Case study—Case 12.1: LDS Hospital: Institution-Wide Antibiotic Management David C. Classen and Stanley L. Pestotnik from Transforming Health Care Through Information: Case Studies (NM Lorenzi, RT Riley, MJ Ball, JV Douglas) Springer-Verlag 1995.
4. Managing the Change
    - Gather benchmark data
    - Analyze the benefits from various perspectives
    - Assess the general organizational climate
    - Finding the tipping point
    - Find powerful champions
    - Develop general ownership
    - Strive for rapid implementation
    - Establish realistic expectations
    - Provide timely training
    - Provide extensive support
    - Ensure system stability
    - Protect professional egos
    - Plan some end-stage fun

Session 3 - 1:30 PM - 2:00 PM

The Zen of WizOrder: Implementation Paradigm

Faculty

Randolph A. Miller, M.D.

Educational Objectives

To understand the implementation of one successful system.

Session Outline:

Conflict of Interest Disclaimer: re McKesson

1. Key concept: system implementation represents a profound workflow change for users
    - Users' concerns must be continuously respected, listened to, and addressed.
    - "Social engineering" is 75-90% of effort, technical implementation is 10-25%
    - Engineer the system to optimally support good work processes and redesign work to take advantage of technical capabilities of the system.

2. Clinical system implementation can change and improve the way an institution does its work.
    ○ Implementation is a process, not an event
    ○ Evolving way of implementing good ideas from all employees
    ○ Adapt to strategic needs of the institution.
    ○ Clinical systems are NOT "shrink wrapped" products to simply buy and install passively.
    ○ Ongoing collaboration between support staff, clinical experts, and programmers' necessary.
    ○ Put best, most experienced personnel in End User Support positions.
    ○ Meaningful involvement in customization and pre-implementation planning by all stakeholders
3. Details of Clinical Implementation
    ○ Learning curve significant. It takes 2-4 weeks of consistent use to build up speed and begin to take full advantage of short cuts
    ○ Clerical support requirements are not reduced
    ○ Users must determine when system is ready for implementation; cannot "force"
    ○ After initial demo, agree on key requirements to be met before implementation
    ○ Set a target date for implementation but make it clear that the date will be adjusted PRN until key requirements met or revised by joint agreement
    ○ Have users test to validate that requirements met
    ○ Have users agree they are ready for implementation
    ○ Programmers must understand/support the patient care mission of the project.
    ○ Everyone on the team must share vision that patient care improvement is highest priority.
    ○ Realistic expectations at all levels
4. Use of system by institution for quality, safety, clinical improvement
    ○ Continuously incorporate user feedback into initial customization and ongoing enhancement process
    ○ Provide multiple ways to get end user feedback
    ○ Have structure in place to quickly process user input, prioritize requests, and respond
    ○ Ensure ongoing oversight of clinical content by appropriate clinical areas
    ○ Have an adequately large Pizza budget

Session 4 – 2:00 PM - 3:00 PM

Negotiating the Political Minefields

Faculty

Nancy M. Lorenzi, Ph.D.

Educational Objectives:

- Understand the political side of information system/informatics system implementation
- To learn 12 strategies to assist you the change agent in more effectively managing the political process

Session Outline:

1. Examples of Political Problems
2. Politics and Power
3. Sources of Power
    ○ Interpersonal power
    ○ Knowledge-expertise power
    ○ Knowledge-information power
    ○ Positional power
    ○ Derived power
    ○ Referent power
4. Twelve Key Strategies
    ○ be patient
    ○ maintain your sense of perspective
    ○ identify and work with the power people
    ○ maintain good communications
    ○ avoid isolation
    ○ know the "rules of the game,"
    ○ maintain high energy
    ○ be directly involved
    ○ manage your ego
    ○ maintain a sense of trust
    ○ maintain your sense of humor
    ○ use your silver bullets wisely.

Session 5 - 3:30 PM - 5:00 M

Putting Ideas into action

Faculty
Nancy M. Lorenzi, Ph.D.
Judy Ozbolt, R.N., Ph.D.
Randolph A. Miller, M.D.

This session will include three problem-based blocks. In each block, the faculty will briefly pose a real-world problem and facilitate discussion as the students use the principles from the day's lectures to develop a solution.

Educational Objectives

Applying the principles from today's lectures

Session Outline:

Case 1: Meanwhile, Back at the Ranch…

> In this session you will be asked to focus on what specific ideas and/or plans you are going to carry back to enhance the change processes used in your organization.

Case 2: Return on Investment, Managing to Objectives

> In this session participants consider how to manage information systems to assure that they meet the objectives for which they were developed or acquired and identify factors to include in calculating return on investment.
> *Case Objectives*
> - Identify objectives of different types of information systems and describe methods of managing to assure that those objectives are met.
> - Identify factors to consider in calculating return on investment for information systems.
>
> *Case Outline*
>
> 1. The case of JCW Hospital (from assigned reading)
>   - Identifying objectives of clinical information system
>   1. Provide foundation of CPR
>   2. Capture and retrieve clinical data for evaluation, outcomes research
>   3. Monitor quality of care
>   - Planning to evaluate return on investment (ROI): Cost-benefit analysis with 7 year payback
>   1. Identify criteria (items of cost and items of benefit) to be measured. (Be sure benefits are linked to strategic objectives.)
>   2. Specify metrics to assign dollar amounts to items.
>   3. Apply metrics to determine dollar amount for each item for each of 7 years.
>   4. Apply financial formulas to calculate the payback and lifetime ROI percentage ([Cumulative benefits minus cumulative costs] divided by cumulative costs).
> 2. The case of PathworX
>   - Identify objectives
>   1. Provide pathways to support interdisciplinary collaborative care consistent with best-practice standards.
>   2. Facilitate individualized care of each patient with documentation consistent with regulatory requirements.
>   3. Provide feedback on care effectiveness and demonstrate continual quality improvement.
>   4. Shift expenditure of nurses' time away from documentation and toward patient care.
>   - Plan to evaluate ROI with 7-year payback
>   1. Criteria and metrics for costs
>   - Development: salary expenditures for technical team, prorated salaries for others involved in advising and testing
>   - Initial training: salary costs for trainers and trainees (include time to develop training materials)
>   - Ongoing training: salary costs for trainers and trainees
>   - Implementation: salary costs for user support
>   - Ongoing maintenance and operation: salary costs for technical team, help desk (prorated for time devoted to PathworX)
>   2. Criteria and metrics for benefits
>   - Reduced costs of care: mean costs by pathway/ DRG/ ICD-9

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  - Increased revenue per bed: decreased LOS by pathway/ DRG/ ICD-9; constant or increased occupancy rates
  - Shift in nurse time expenditure: time studies showing proportion of time spent in documentation vs. patient care, with time converted to salary dollars.
  - Non-monetary benefits
    - Improved patient outcomes: goal achievement data, SF-36, complication rate, mortality rate
    - Improved patient satisfaction: survey responses
    - Increased compliance with regulatory requirements for documentation: in-house audits, regulatory reviews
    - Feedback on care effectiveness and continual quality improvement: demonstrated processes that use feedback to improve care processes, outcomes, and cost-control

   3. Managing to Objectives
      - Keeping the objective in view
        1. Define objectives and metrics
        2. Set priorities.
        3. Avoid distractions
      - Finding the critical path
        1. Identify necessary resources and processes.
        2. Protect the essential.
        3. Avoid distractions.
      - Removing barriers
        1. Identify obstructions in the critical path
        2. Decide whether to move the obstruction or to go around it.
        3. Spend resources as needed to keep the critical path clear.

Case 3: Randy's choice

Evening Workshop

The Impact of HIPAA on Information Systems for Healthcare and Research

Faculty

Daniel Masys, M.D.

Educational Objectives

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) will have substantial and costly impacts on clinical care and clinical research, with both technology and policy effects. At the conclusion of this session, attendees will:

- Understand the new rights and responsibilities of provider organizations and patients created by the HIPAA Privacy Rule
- Understand the basic principles of information systems security that will be needed to comply with HIPAA
- Know the implications of HIPAA for clinical research

Session Outline

- What is HIPAA?
- Definitions
  - Covered Entities
  - Types of information
    - Health information
    - Individually Identifiable Health Information (IIHI)
    - Protected Health Information (PHI)
    - De-identified Information
- Health information as a tangible object
- Overview of Privacy Rule effects
  - Rights of indivuals with respect to medical records
  - Responsibilities of provider organizations
  - State vs. federal
- Effects on clinical information system design

- General principles of information system security
- Need to know access
- Mimum necessary
- Audit trails
- De-identification issues
- Effects on clinical research
  - When does research create PHI?
  - Consent for use and disclosure of research information
  - IRB review procedures
  - Waivers of authorization

Day 6 - Saturday, October 6, 2001

Session 1: 8:30 - 10:00 AM

Telemedicine

Faculty

[Thomas S. Nesbitt, MD, MPH](#)

Educational Objectives

This lecture will review current telemedicine applications. Specific emphasis will be placed upon how these systems have been evaluated, what are the associated costs, what are the benefits, and what factors are associated with successful applications.

Session Outline

- What is Telemedicine?
- Rationale for telemedicine and how it relates to medical informatics
- What are the various telemedicine technologies?
- What are locations in which telemedicine is being effectively used?
- Operational issues in starting and running a Telemedicine program
- Is telemedicine clinically effective and is it cost-effective?
- What are the barriers to the adoption of Telemedicine?
- What is the future of Telemedicine?

Session 2: 10:30 - 12:00 N

Panel: Medical Informatics - Past and Future

Faculty

Homer Warner, MD
Donald Lindberg, MD
Daniel Masys, MD

Educational Objectives

This panel presentation will review the evolution of the field of medical informatics, including a question and answer period.

Session 3: 1:30 - 3:00 PM

Designing a medical informatics curriculum

Faculty

Faculty Panel

Educational Objectives

At the completion of this session, participants should have an understanding of issues attendant to the development and

implementation of a medical informatics curriculum at the fellows' home institutions.

Session Outline

This session will be an interactive discussion among faculty and fellows. It will review the topics covered at the MBL course and promote discussion regarding future changes.

3:00 PM

Course Wrap-Up and Farewell

Return to Schedule

Last Updated: 22 September 2001