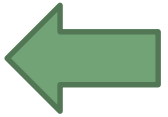
Topic 01
Introduction to Health Informatics

Kevin Robertson, MBA

ACS-2816-050 Health Information Systems

Winter 2020

Topic 1 Outline



- General Information
- Course Overview
- Health Informatics (HI) Introduction
  - What is HI?
  - HI Relation to Other Sciences & Sub-disciplines
- Medical Charts & Electronic Health Records (EHR)
- EHR Expansion & Integration
  - Clinical Trials / Evidence Based Medicine
  - Integration with Other Health Information Sources
  - Public Health Networks

General Information

- **Instructor:** Kevin Robertson, MBA, B.Sc. Applied Comp
- **Office:** 3C07
- **Office Hours:** Tue 16:45 pm – 17:45 pm
- **E-mail:** ke.robertson@uwinnipeg.ca

- **Course Name:** Health Information Systems
- **Course Number:** ACS-2816-050
- **Course Web Page:** www.acs.uwinnipeg.ca/2816-050
- **Class Meeting Time:** Tue 18:00 pm – 21:00 pm
- **Class Room:** 3D03

Important Dates

- **First Class:** Tuesday Jan 7th
- **Midterm Exam:** Tuesday Feb 25th
- **Final Withdrawal Date w/o Academic Penalty:**

  Fri March 13th (A minimum of 20% of the work on which the final grade is based will be evaluated and available to the student before the voluntary withdrawal date)
- **Last Class:** Tuesday March 31st
- **Final Exam:** Tuesday April 7th @ 6:00 pm

Evaluation Criteria

- Assignments 15%
- Term Paper 10%
- Midterm Exam 30%
- Final Exam 45%

Evaluation Criteria - Assignments

- **Assignments (15%)**
  - There will be 3 assignments worth 5% each
  - All assignments are to be completed **individually**
  - May include any or combination of the following:
    - Theory or analysis homework exercises
    - Close-book in-class quizzes
  - Due at the beginning of class on due dates. Handwritten assignments will not be accepted.
  - No late assignment will be accepted, or under special circumstances accepted with **20% off for each late day**
  - Multiple submissions are not permitted. Students may submit a partially completed assignment, and will receive credit for those attempted problems
  - **If** electronic hand in is requested, students are responsible to review their assignments before submission to make sure the correct files are attached to the email

Evaluation Criteria – Term Paper

- **Term Paper (10%)**
  - Team Presentation (generally 2 per students per team)
  - Study a current article related to the course
  - Prepare a PowerPoint presentation
  - Present article summary in class by using the PowerPoint presentation
  - Schedule Presentations

- **Marks Distribution**
  - Content 40% including section compliance and content quality
  - Presentation style 20%
  - Question period 20%
  - Time precision 20% including material delivery compliance and ppt format

Evaluation Criteria - Exams

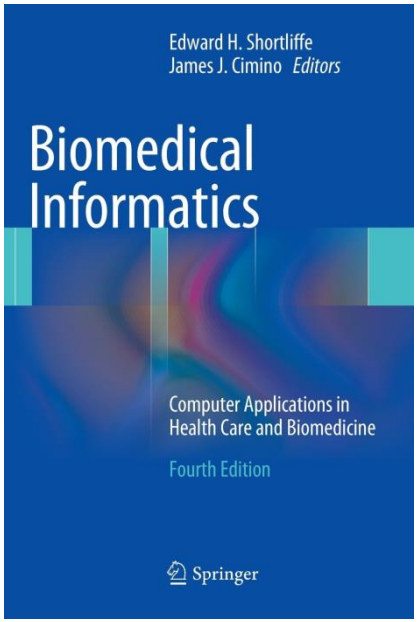
- **Midterm Exam (30%)**
  - Closed-book in-class midterm exam
- **Final Exam (45%)**
  - Closed-book final exam
- **Exam Requirements**
  - Photo ID at exam is required
  - You are expected to write the exam on its given day
  - No electronic devices (e.g. cell phone, laptop, scientific calculators, translators, etc) are permitted
  - **Simple calculators can be used though. Subject to approval**.
  - Unless a medical certificate is provided, no accommodation is made for missed exams

Text Book (Required)

Required Text Book:

Biomedical Informatics,
Computer Applications in Health Care and Biomedicine
Shortliffe, E. & Cimino, J. (Eds)
Springer
4th Edition 2014

ISBN 978-1-4471-4473-1 (Hardcover)
ISBN 978-1-4471-4474-8 (eBook)

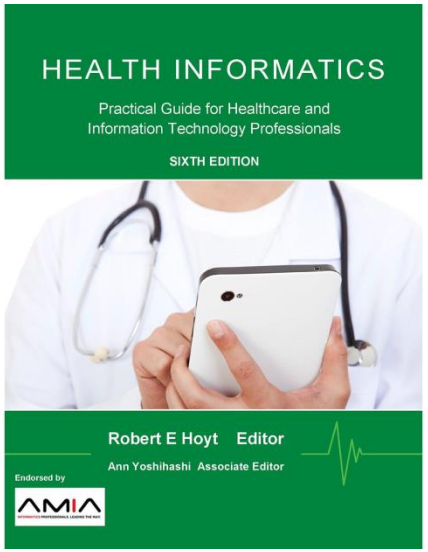


Text Book (Optional)

Complementary Book (optional)

Health Informatics,
Practical Guide for Healthcare and
Information Technology Professionals
Holt, Robert & Yoshihashi, Ann (Eds)
Informatics Education
6th Edition 2014

ISBN 978-1-3047-9110-8 (Paperback)
ISBN 978-0-9887-5292-4 (eBook)



Email Communication

- It is recommended Email from accounts at uwinnipeg.ca be used in electronic communication related to the course

- Email from other accounts have greater risk to be filtered by UofW email system spam filters

Three Questions

- How is the course organized and managed?
- What is Health Informatics about?
- Why are Electronic Health Records important?

Reading: Biomedical Informatics, 4th Ed Chapter 1

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- General Information
- Course Overview
- Health Informatics (HI) Introduction
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  - HI Relation to Other Sciences & Sub-disciplines
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- EHR Expansion & Integration
  - Clinical Trials / Evidence Based Medicine
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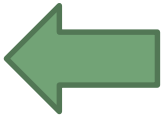

Course Overview - Objectives

- Introduction to health informatics concepts and their applications.
- It provides an overview of foundational and current themes in health informatics, central to the understanding of the field.
- It is intended for those who wish to get sufficient background to follow progress and potentially carry out development activities in the field.

Course Outline (Tentative)

- I. Foundational Health Informatics
  - Introduction to Health Informatics
  - Medical Data: Acquisition, Storage and Use
  - Medical Decision Making
  - Health Systems Design and Basic Concepts
  - Standards in Health Informatics
  - Integration and Interoperability
  - Ethics, Privacy and Confidential in Health Informatics
  - Evaluation and Technology Assessment
- II. Applied Health Informatics
  - Electronic Health Record Systems
  - Management of Clinical Information
  - Consumer Health Informatics
  - Patient Monitoring Systems
  - Medical Imaging Informatics
- III. Health Informatics Ahead
  - Future of Computer Applications in Health Care

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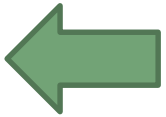


What is Health Informatics?

- **Health informatics** is the field of information science concerned with management of healthcare data and information through the application of technologies
  - Interdisciplinary field
  - Assists caregivers and patients with decisions and actions
  - Improves patient outcomes by better use of information

- AKA Medical Informatics, Clinical Informatics, **Biomedical Informatics** among others

Emergence of a Discipline

- Technology advances (a sample)
  - Graphical user interfaces
  - Data storage
  - Internet
  - Mobile technologies
- Health care system
  - Needs and requirements to evolve to 21st century
  - Slow to understand & adopt technology

Health Informatics

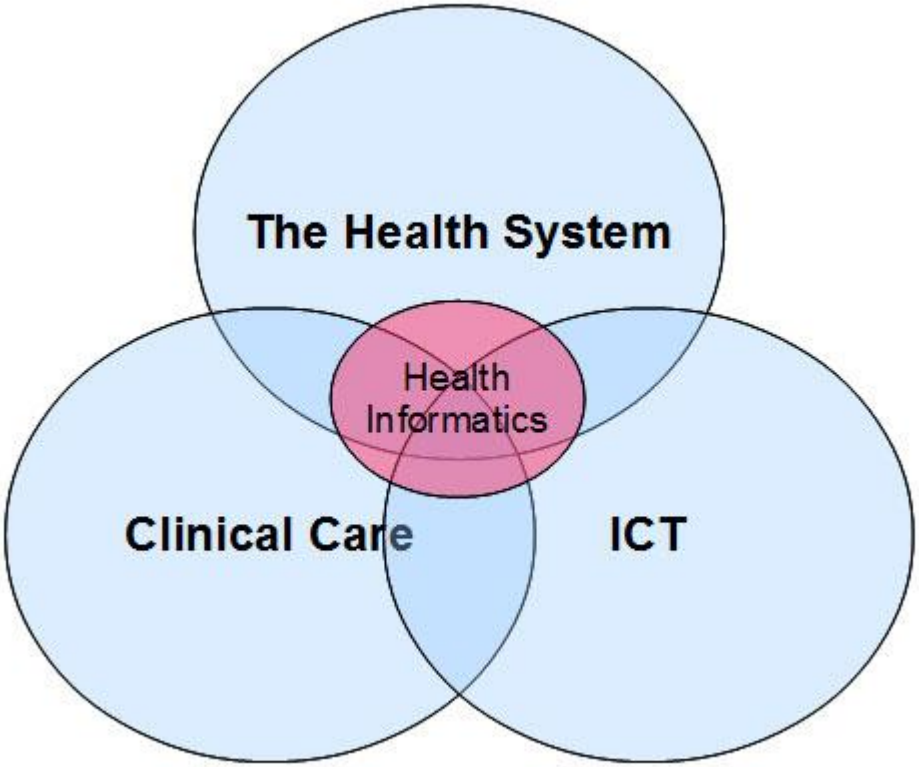


Figure source: austemrs.com.au/page/health.html

HI in Relation to Other Sciences

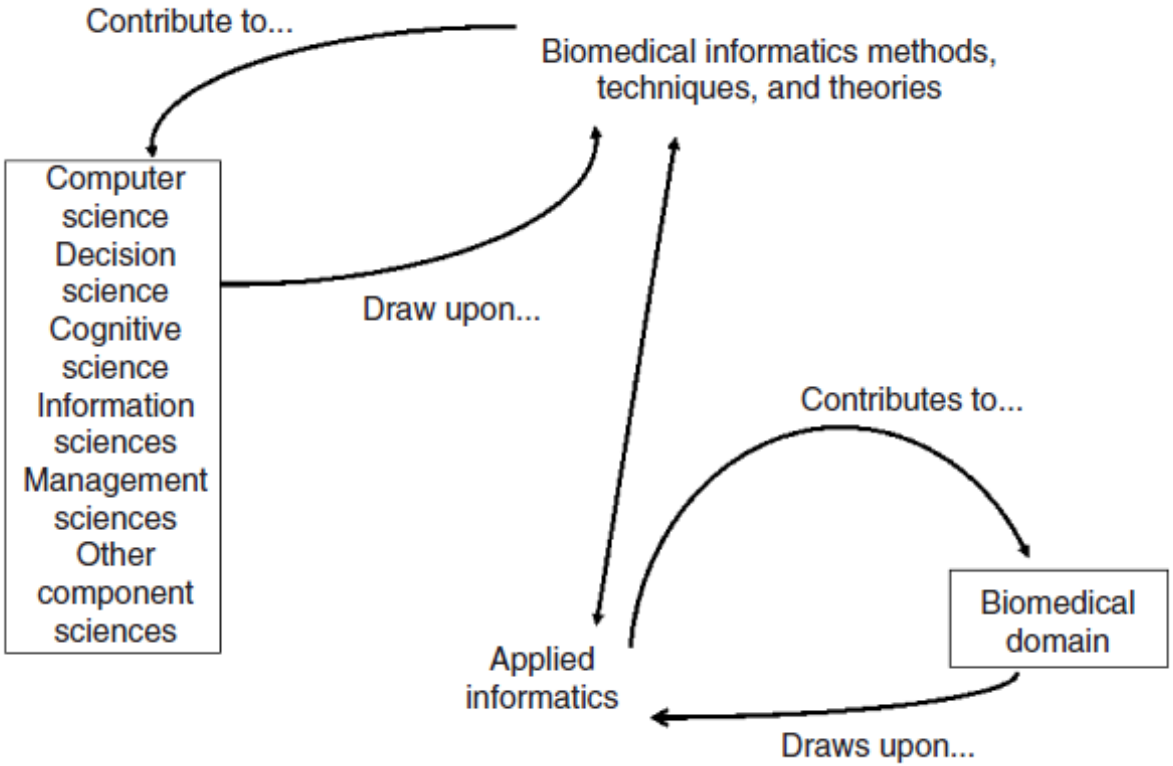


Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.22, p37

HI in Relation to Other Sciences – Radiology Case

Diagnostic Imaging / Radiology Reading Station

Figure source: usa.healthcare.siemens.com/medical-imaging-it/radiology-information-systems/syngo-workflow

HI in Relation to Other Sciences – Radiology Case

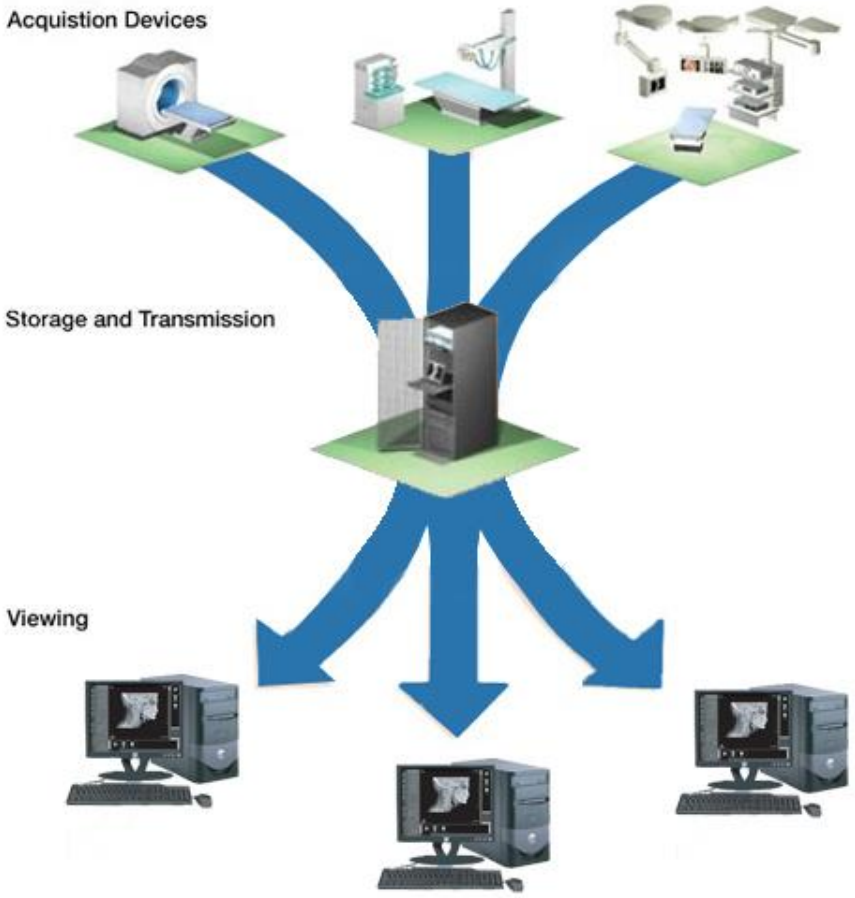
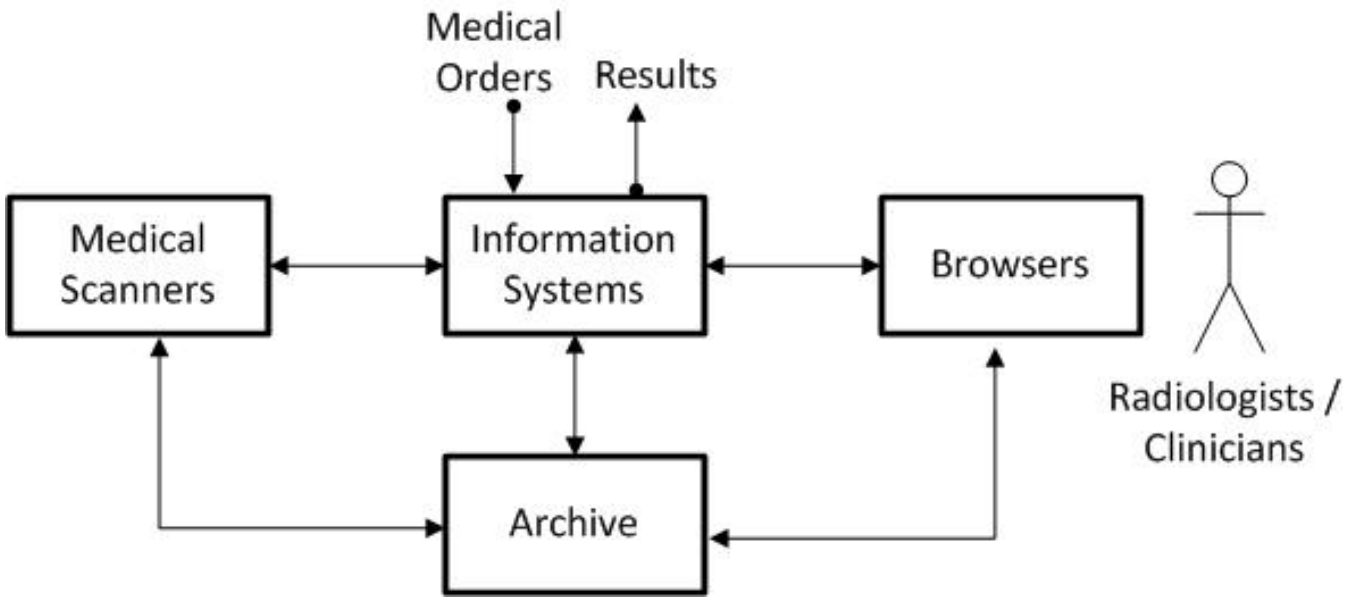


Figure source: www.flatpaneldr.com/index.php/category/human-medical-dr/

HI in Relation to Other Sciences – Radiology Case



Generic Workflow for Diagnostic Imaging / Radiology Services

Health Informatics Sub-Disciplines

- Radiology Informatics,
- Diagnostic Informatics
- Medical Imaging Informatics,
- Nursing Informatics,
- Consumer Health Informatics,
- Telehealth Informatics,
- Public Health Informatics,
- Bioinformatics,
- Infectious Disease Informatics,
- Dental Informatics, etc.

Health Informatics Sub-Disciplines

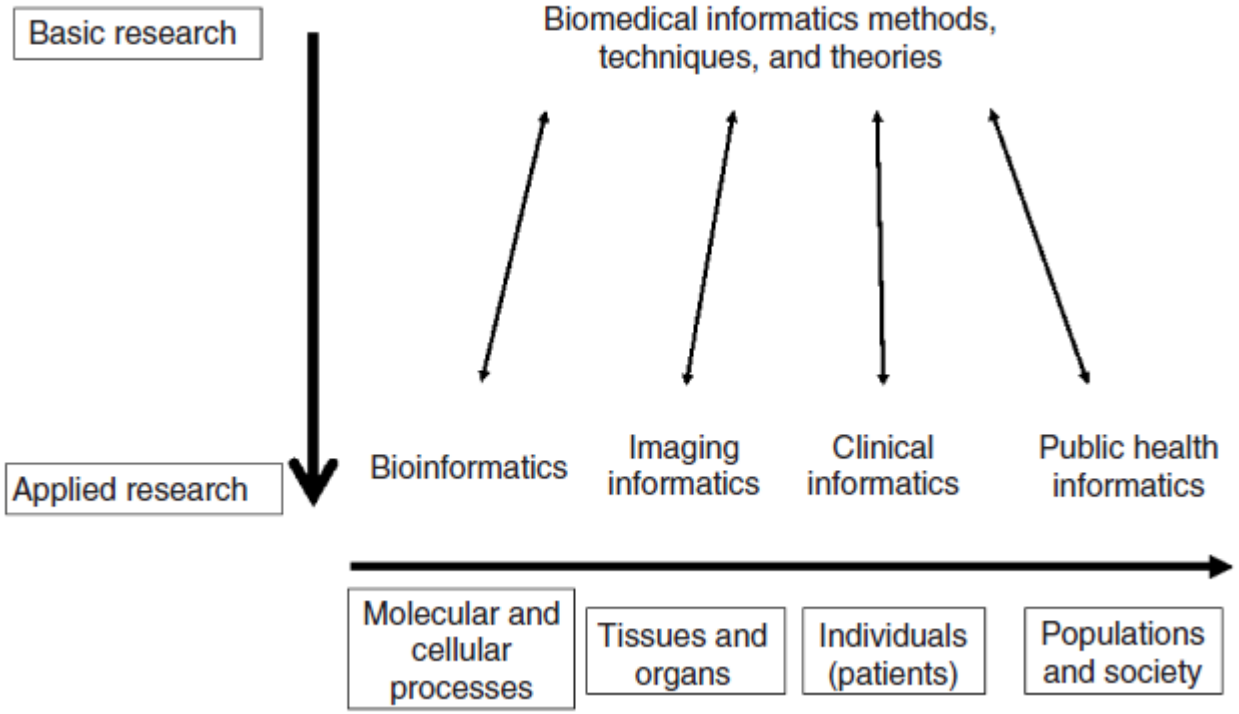


Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.21, p34

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Medical Chart / Medical Record

- Issues with paper records
  - Integration challenges
  - Medical silos
  - One copy
- Old way to practice medicine
- Continuity of care
- Patient safety
- Quality of care

Figure source: people.howstuffworks.com/electronic-medical-record-implementation.htm

Medical Record Inputs

- Challenges
  - Multiple sources
  - Limited capabilities
  - Workflows
  - Automation processes
  - Data integration
  - System integration

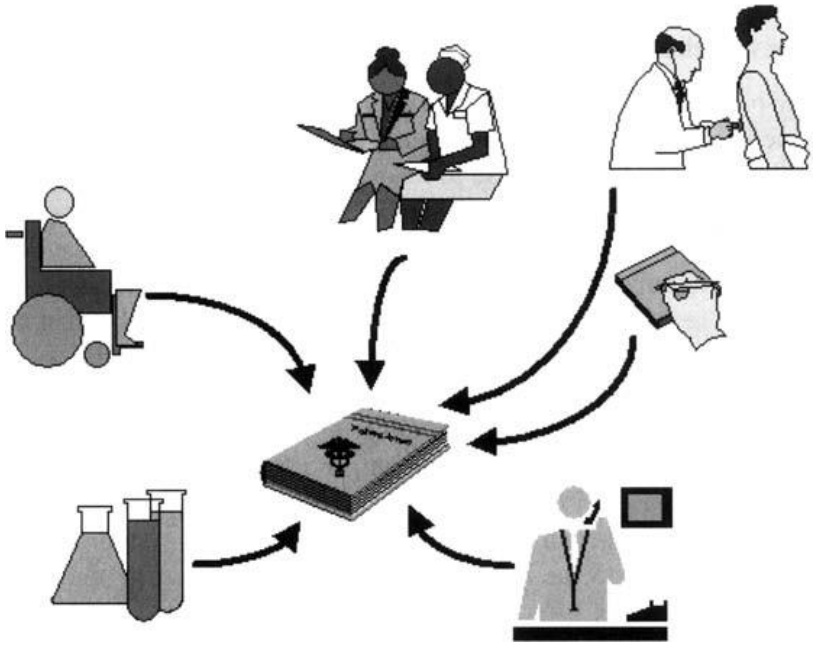

Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.1, p6

Medical Record Outputs

- Challenges
  - Multiple users
  - Workflows
  - Automation processes
  - Data access
  - Security / Privacy
  - System integration

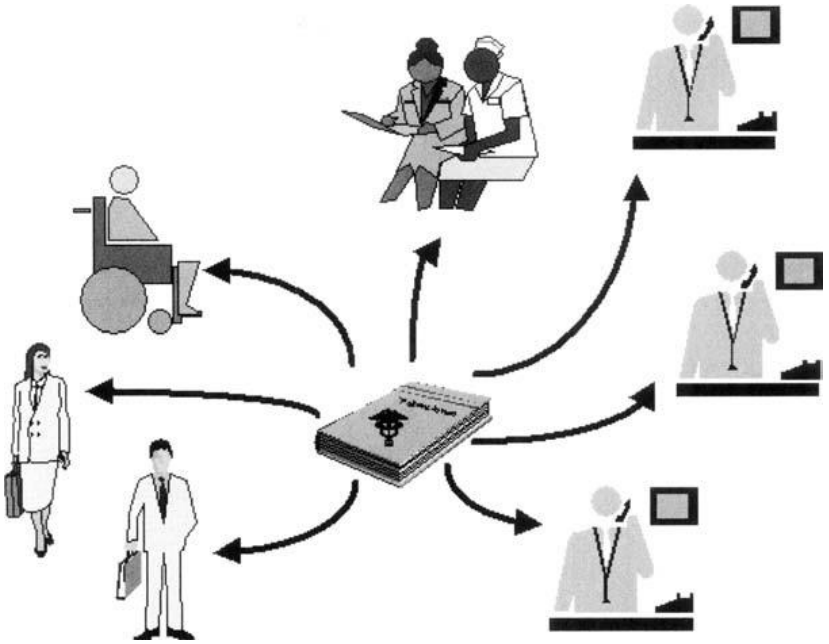

Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.2, p7

Electronic Health Records

- Electronic Health Record (EHR)
  - *"A longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting"*[1]
  - Includes patient demographics, progress notes, problems, medications, vital signs, medical history, immunizations, lab and radiology data, etc.
- Electronic Medical Record (EMR)

[1]Healthcare Information and Management Systems Society website www.himss.org, accessed Dec/2012

EHR Sample - Patients

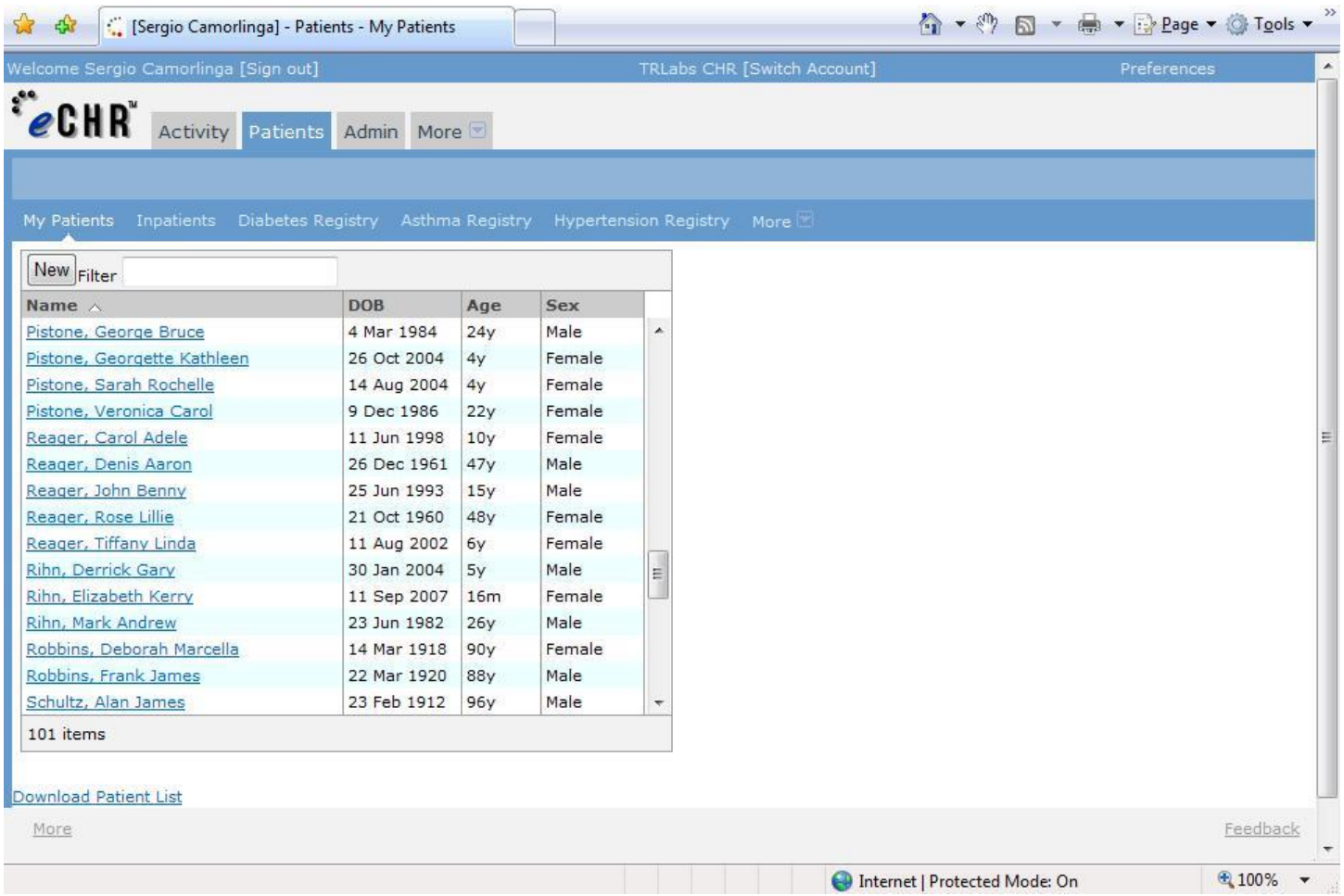

Figure Source: The Tolven Open Source Project website www.tolven.org, accessed Dec/2012

EHR Sample – Patient John

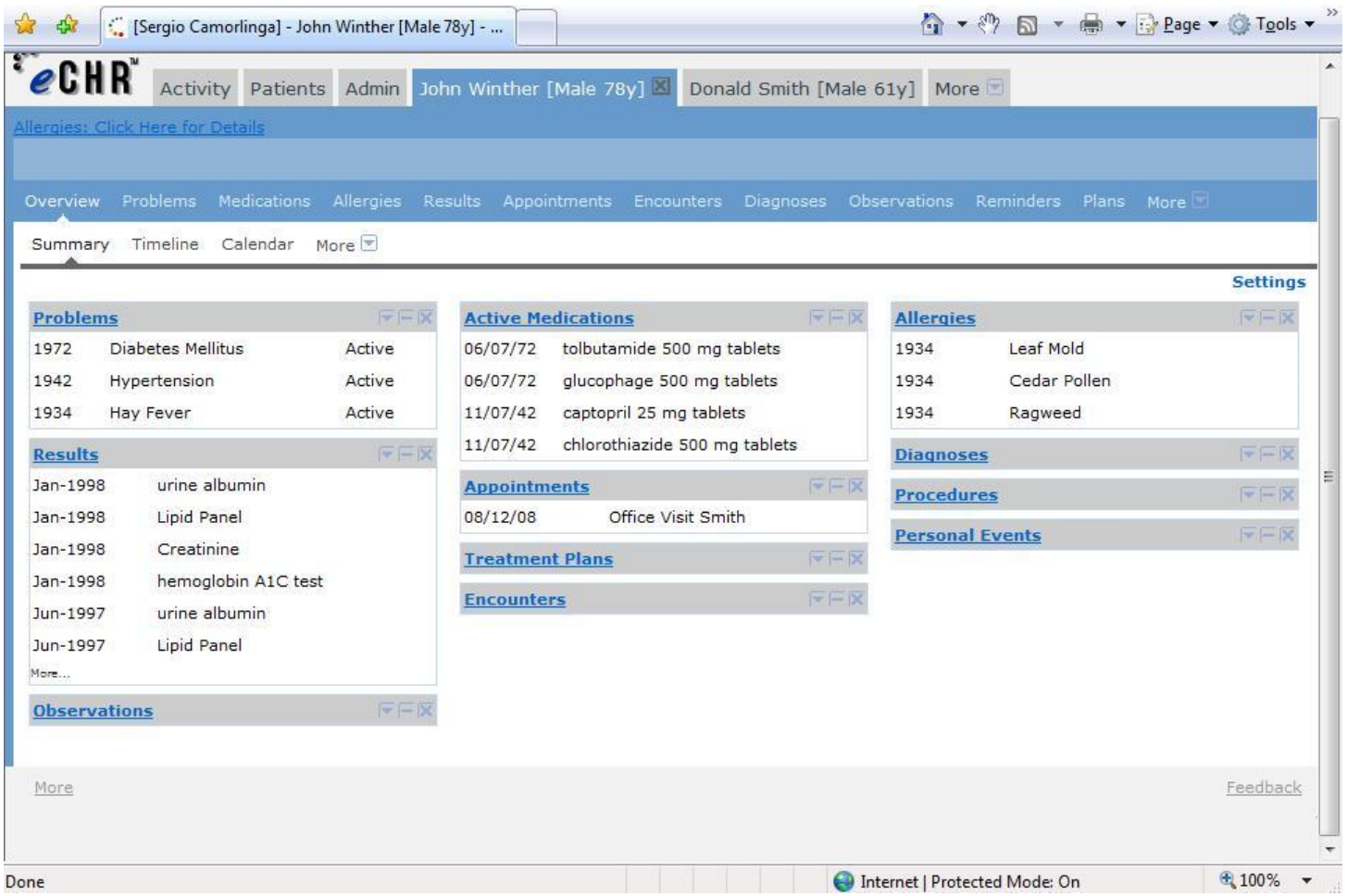

Figure Source: The Tolven Open Source Project website www.tolven.org, accessed Dec/2012

EHR Recurring Issues

- Standards and interoperability
- Data privacy and security
- Data entry and usability
- Quality and patient safety
- Information integration

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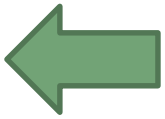

Evidence Based Medicine / Clinical Trials

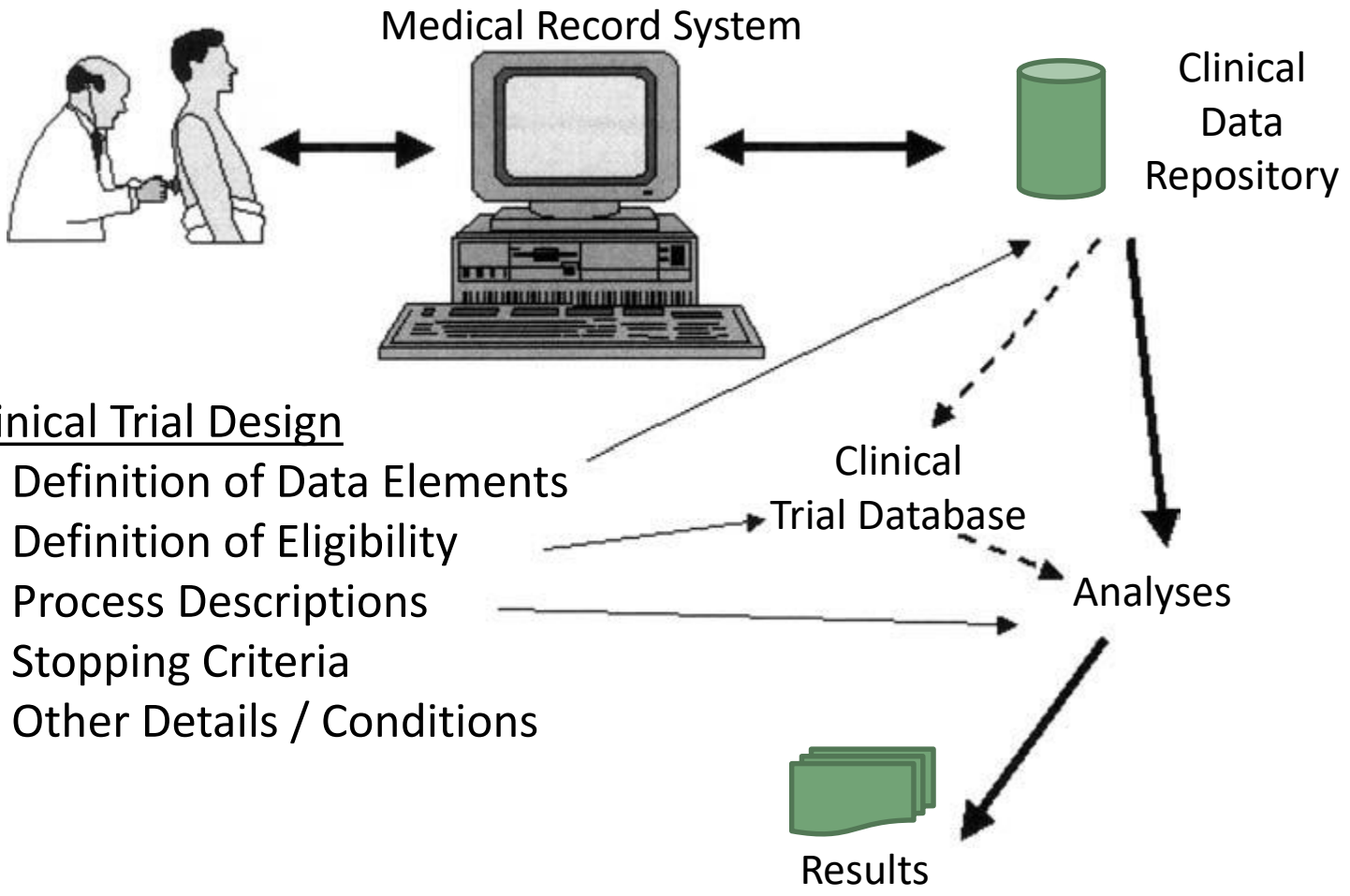

Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.5, p10

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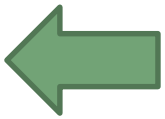


Integration with Other Information Resources

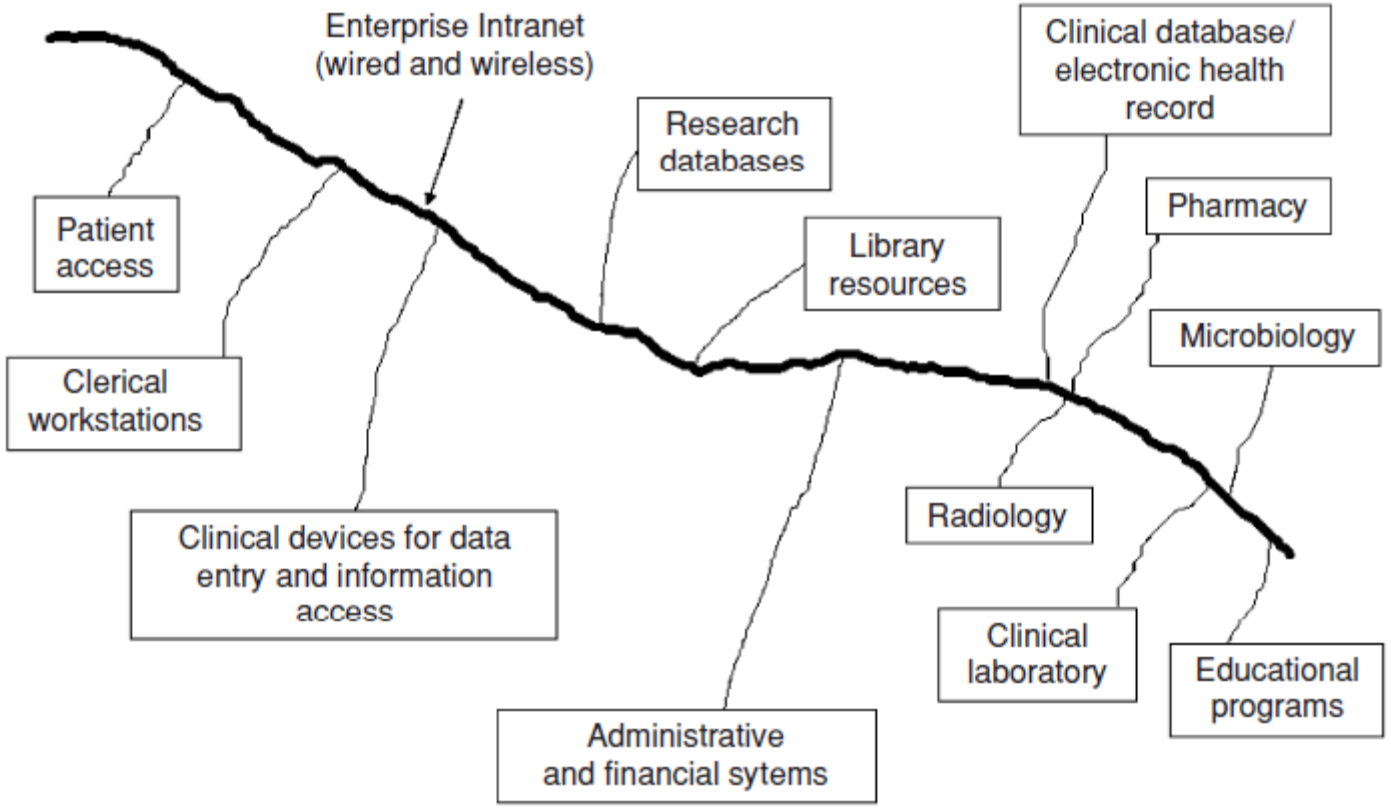


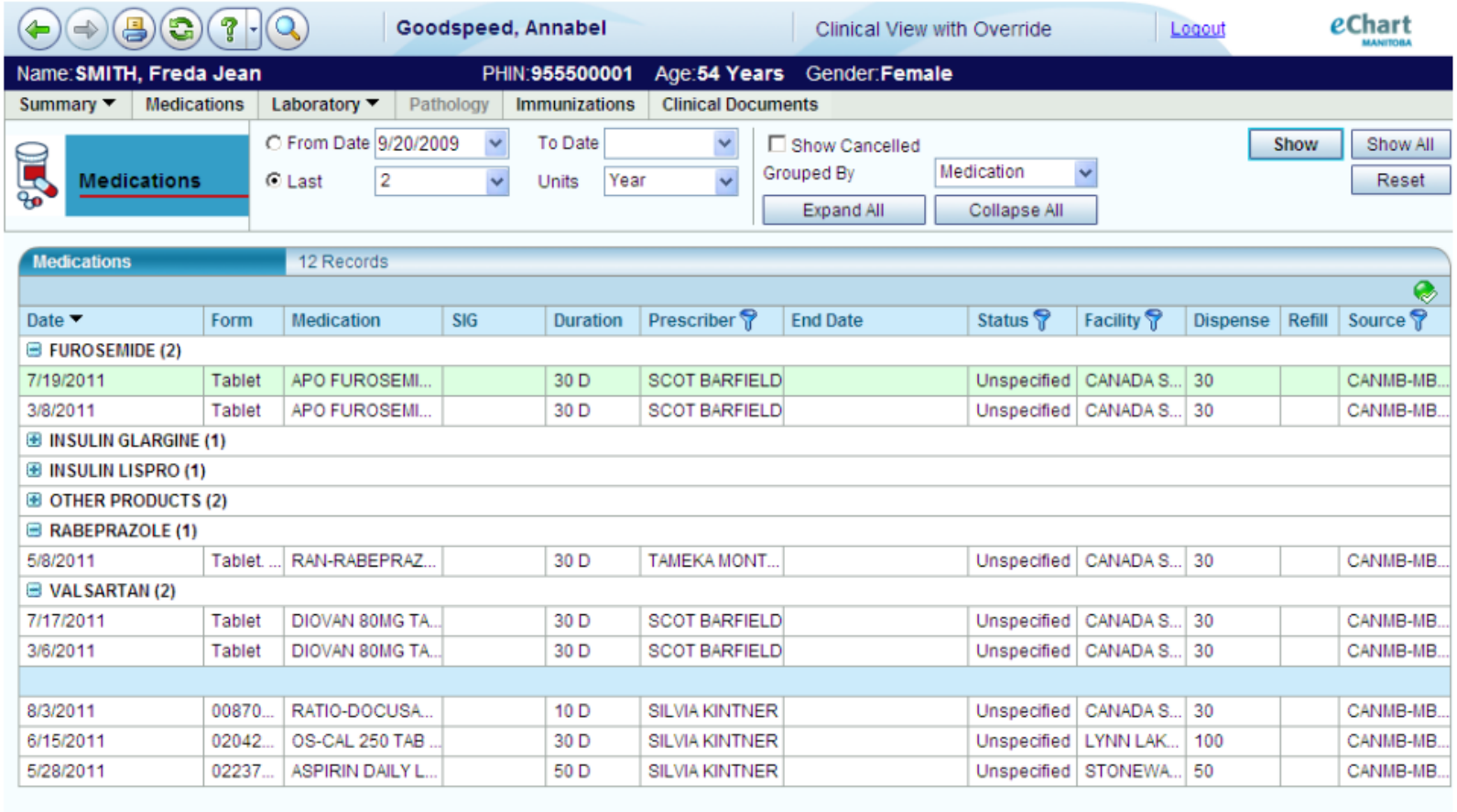
Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.6, p11

Integration with Other Information Resources – MB eChart Example

- eChart Manitoba
  - Secured electronic system that connects authorized health-care providers with a summary of an individual's key health information
- Info Sources
  - Prescriptions filled – Drug Programs Info Network (DPIN)
  - Immunization – MB Immunization Monitoring System (MIMS)
  - Demographics – MB Provincial Client Registry (CR) system
  - Lab results – several private/public labs
  - Diagnostic imaging reports – MB Radiology System (RIS)
  - Encounter info – St. Boniface Hospital

Source: eChart Manitoba http://www.connectedcare.ca/echartmanitoba/

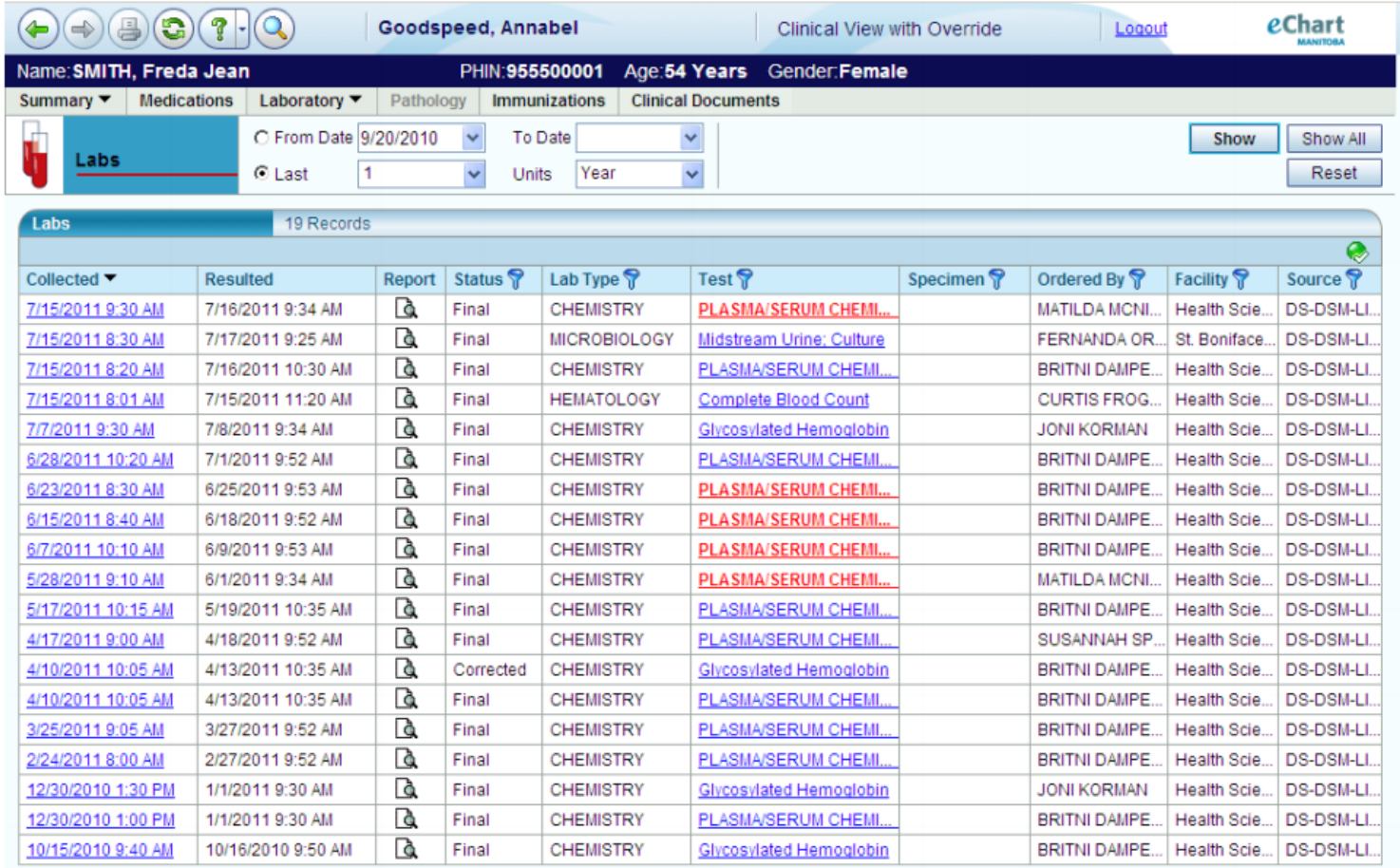
Integration with Other Information Resources – MB eChart Example



Date	Form	Medication	SIG	Duration	Prescriber	End Date	Status	Facility	Dispense	Refill	Source
FUROSEMIDE (2)											
7/19/2011	Tablet	APO FUROSEMI...		30 D	SCOT BARFIELD		Unspecified	CANADA S...	30		CANMB-MB...
3/8/2011	Tablet	APO FUROSEMI...		30 D	SCOT BARFIELD		Unspecified	CANADA S...	30		CANMB-MB...
INSULIN GLARGINE (1)											
INSULIN LISPRO (1)											
OTHER PRODUCTS (2)											
RABEPRAZOLE (1)											
5/8/2011	Tablet. ...	RAN-RABEPRAZ...		30 D	TAMEKA MONT...		Unspecified	CANADA S...	30		CANMB-MB...
VALSARTAN (2)											
7/17/2011	Tablet	DIOVAN 80MG TA...		30 D	SCOT BARFIELD		Unspecified	CANADA S...	30		CANMB-MB...
3/6/2011	Tablet	DIOVAN 80MG TA...		30 D	SCOT BARFIELD		Unspecified	CANADA S...	30		CANMB-MB...
8/3/2011	00870...	RATIO-DOCUSA...		10 D	SILVIA KINTNER		Unspecified	CANADA S...	30		CANMB-MB...
6/15/2011	02042...	OS-CAL 250 TAB ...		30 D	SILVIA KINTNER		Unspecified	LYNN LAK...	100		CANMB-MB...
5/28/2011	02237...	ASPIRIN DAILY L...		50 D	SILVIA KINTNER		Unspecified	STONEWA...	50		CANMB-MB...

Figure source: © WRHA & MB eHealth eChart http://www.connectedcare.ca/echartmanitoba/

Integration with Other Information Resources – MB eChart Example



Collected	Resulted	Report	Status	Lab Type	Test	Specimen	Ordered By	Facility	Source
7/15/2011 9:30 AM	7/16/2011 9:34 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		MATILDA MCNI...	Health Scie...	DS-DSM-LI...
7/15/2011 8:30 AM	7/17/2011 9:25 AM		Final	MICROBIOLOGY	Midstream Urine; Culture		FERNANDA OR...	St. Boniface...	DS-DSM-LI...
7/15/2011 8:20 AM	7/16/2011 10:30 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
7/15/2011 8:01 AM	7/15/2011 11:20 AM		Final	HEMATOLOGY	Complete Blood Count		CURTIS FROG...	Health Scie...	DS-DSM-LI...
7/7/2011 9:30 AM	7/8/2011 9:34 AM		Final	CHEMISTRY	Glycosylated Hemoglobin		JONI KORMAN	Health Scie...	DS-DSM-LI...
6/28/2011 10:20 AM	7/1/2011 9:52 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
6/23/2011 8:30 AM	6/25/2011 9:53 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
6/15/2011 8:40 AM	6/18/2011 9:52 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
6/7/2011 10:10 AM	6/9/2011 9:53 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
5/28/2011 9:10 AM	6/1/2011 9:34 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		MATILDA MCNI...	Health Scie...	DS-DSM-LI...
5/17/2011 10:15 AM	5/19/2011 10:35 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
4/17/2011 9:00 AM	4/18/2011 9:52 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		SUSANNAH SP...	Health Scie...	DS-DSM-LI...
4/10/2011 10:05 AM	4/13/2011 10:35 AM		Corrected	CHEMISTRY	Glycosylated Hemoglobin		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
4/10/2011 10:05 AM	4/13/2011 10:35 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
3/25/2011 9:05 AM	3/27/2011 9:52 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
2/24/2011 8:00 AM	2/27/2011 9:52 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
12/30/2010 1:30 PM	1/1/2011 9:30 AM		Final	CHEMISTRY	Glycosylated Hemoglobin		JONI KORMAN	Health Scie...	DS-DSM-LI...
12/30/2010 1:00 PM	1/1/2011 9:30 AM		Final	CHEMISTRY	PLASMA/SERUM CHEMI...		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...
10/15/2010 9:40 AM	10/16/2010 9:50 AM		Final	CHEMISTRY	Glycosylated Hemoglobin		BRITNI DAMPE...	Health Scie...	DS-DSM-LI...

Figure source: © WRHA & MB eHealth eChart http://www.connectedcare.ca/echartmanitoba/

Integration with Other Information Resources – MB eChart Example

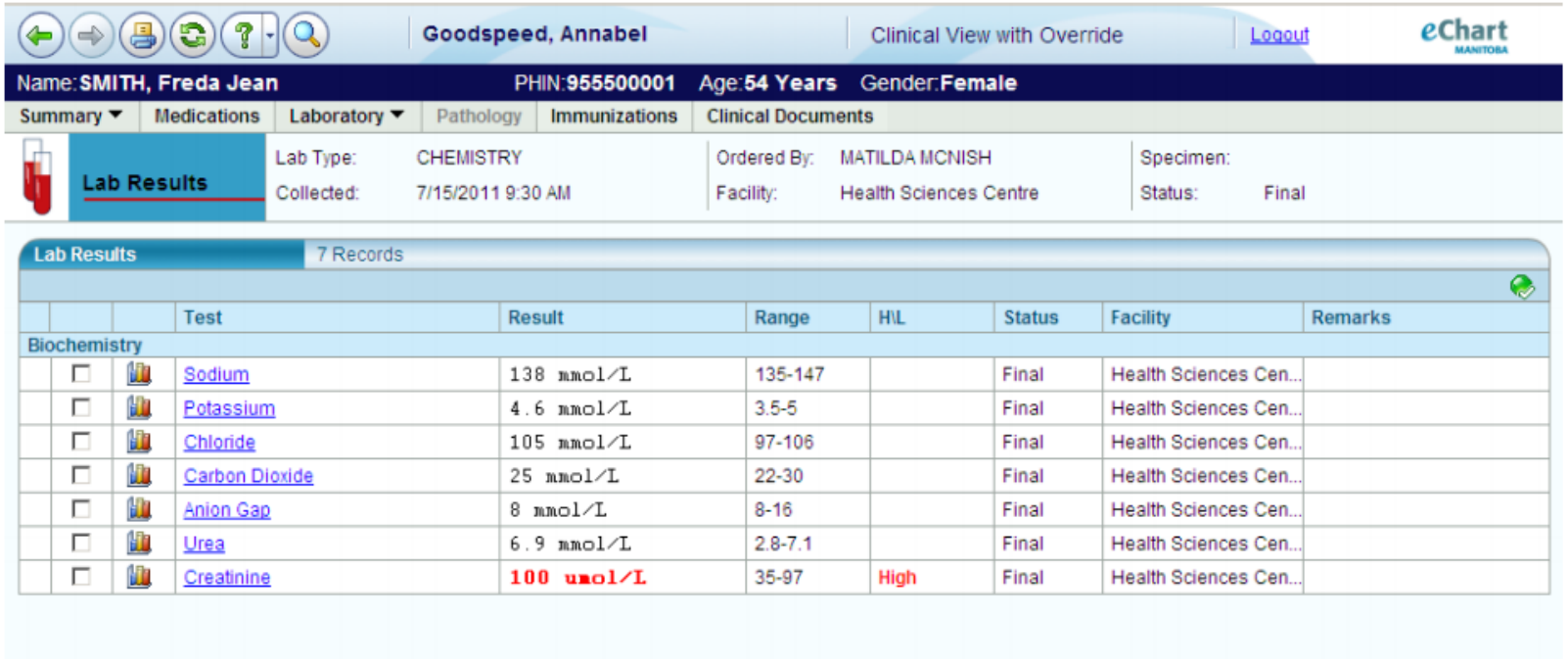


Figure source: © WRHA & MB eHealth eChart http://www.connectedcare.ca/echartmanitoba/

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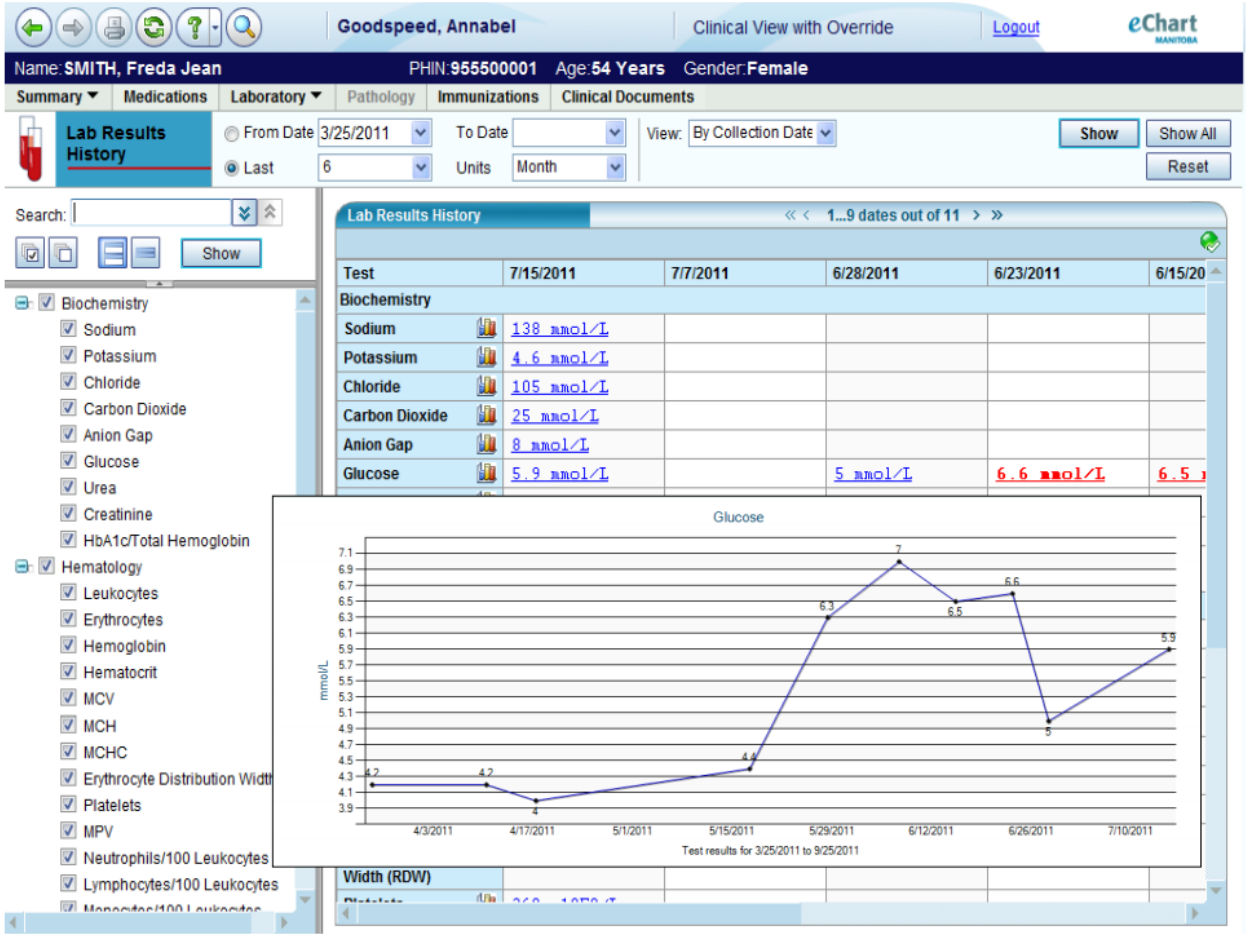

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Public Health National Network

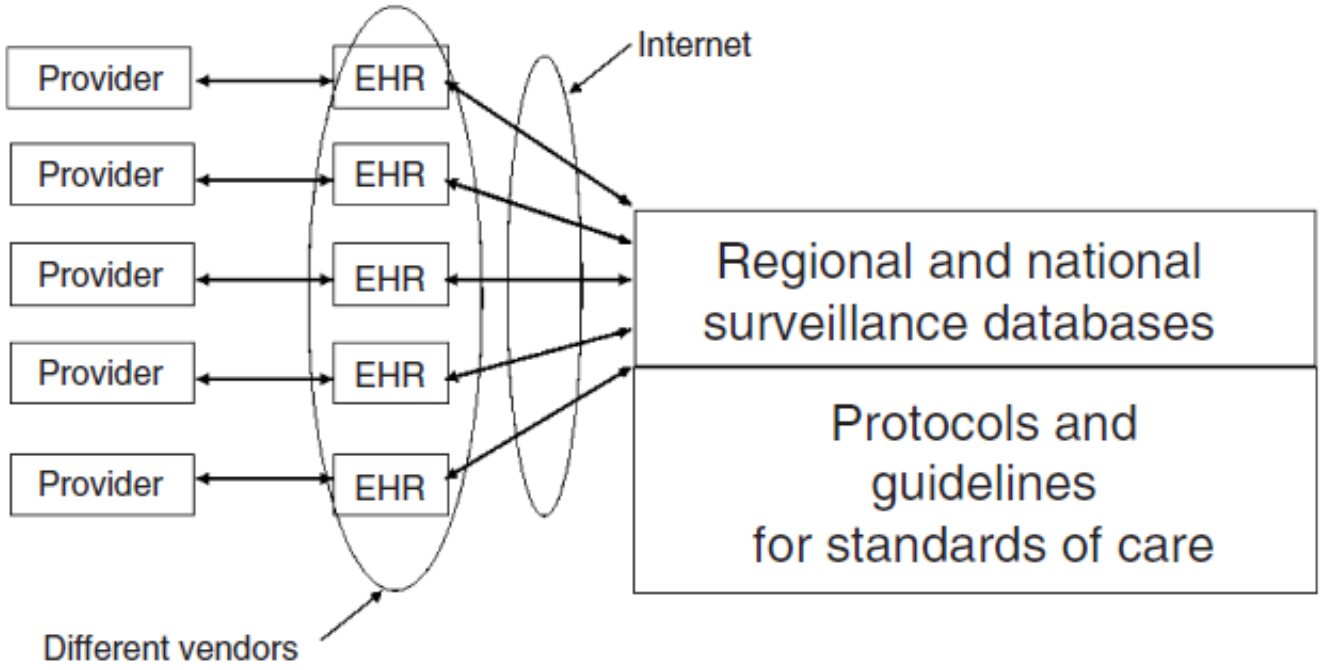

Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.7, p14

Public Health National Network

- Issues
  - Data encryption
  - Privacy government policies
    - USA - Health Insurance Portability and Accountability Act (HIPAA)
    - MB - Personal Health Information Act (PHIA)
  - Standards for data transmission and sharing
    - E.g. Health Level 7 standard
  - Standards for data definitions
    - E.g. International Classification of Diseases (ICD 9, ICD 10)
  - Quality control
  - Regional & National Surveillance Databases

Public Health Agency of Canada – Surveillance Sample

- Canadian Chronic Disease Surveillance System
- Canadian Paediatric Surveillance Program
- Chronic Disease Infobase
- FluWatch
- HIV/AIDS Surveillance
- Tuberculosis Prevention and Control Surveillance
- West Nile Virus Surveillance

Source: Public Health Agency of Canada http://www.phac-aspc.gc.ca/surveillance-eng.php

Why Is EHRs' Expansion & Integration Important?

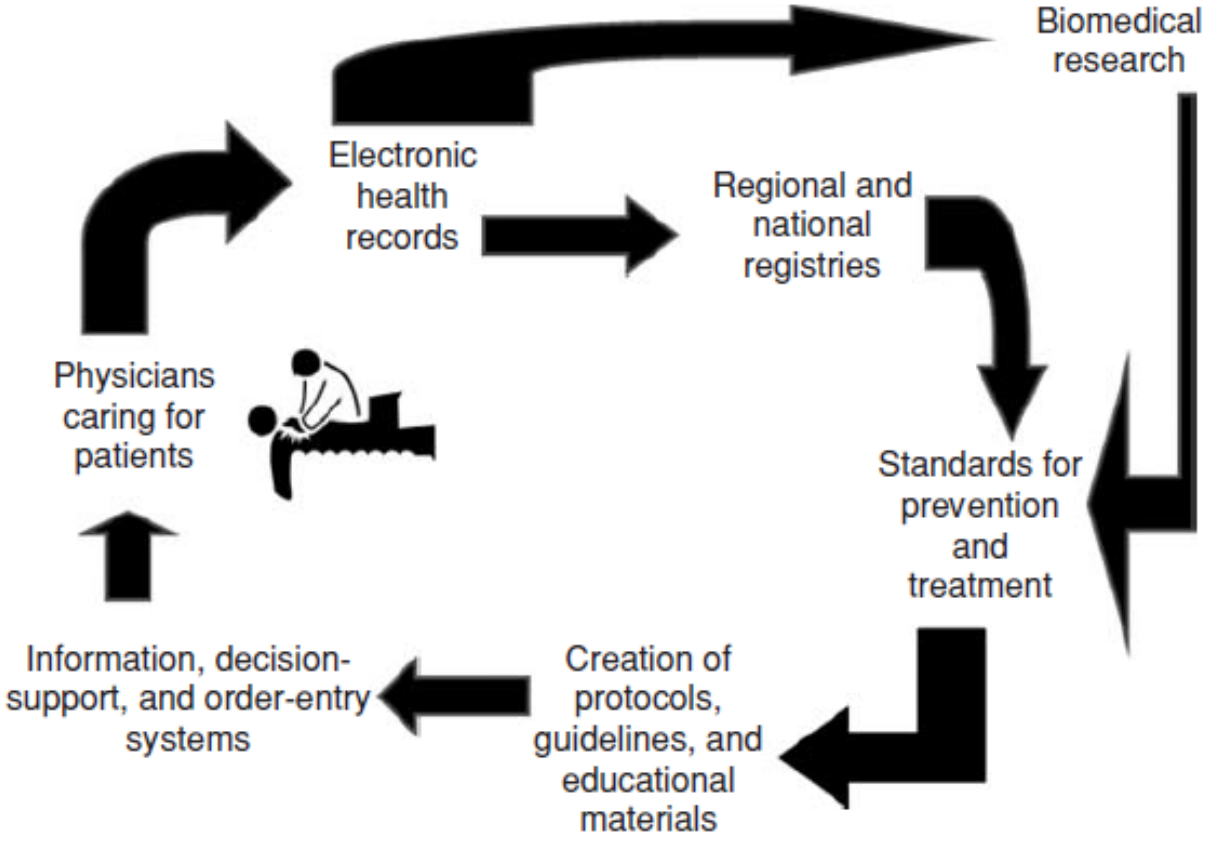

Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.10, p18

Cycle of Improvement

- The more data and information collected leads to improved areas of research
- Accurate data supports better analysis
- Improves methods, processes and outcomes
- Improves available information and increases knowledge

Why Is EHRs' Expansion & Integration Important?

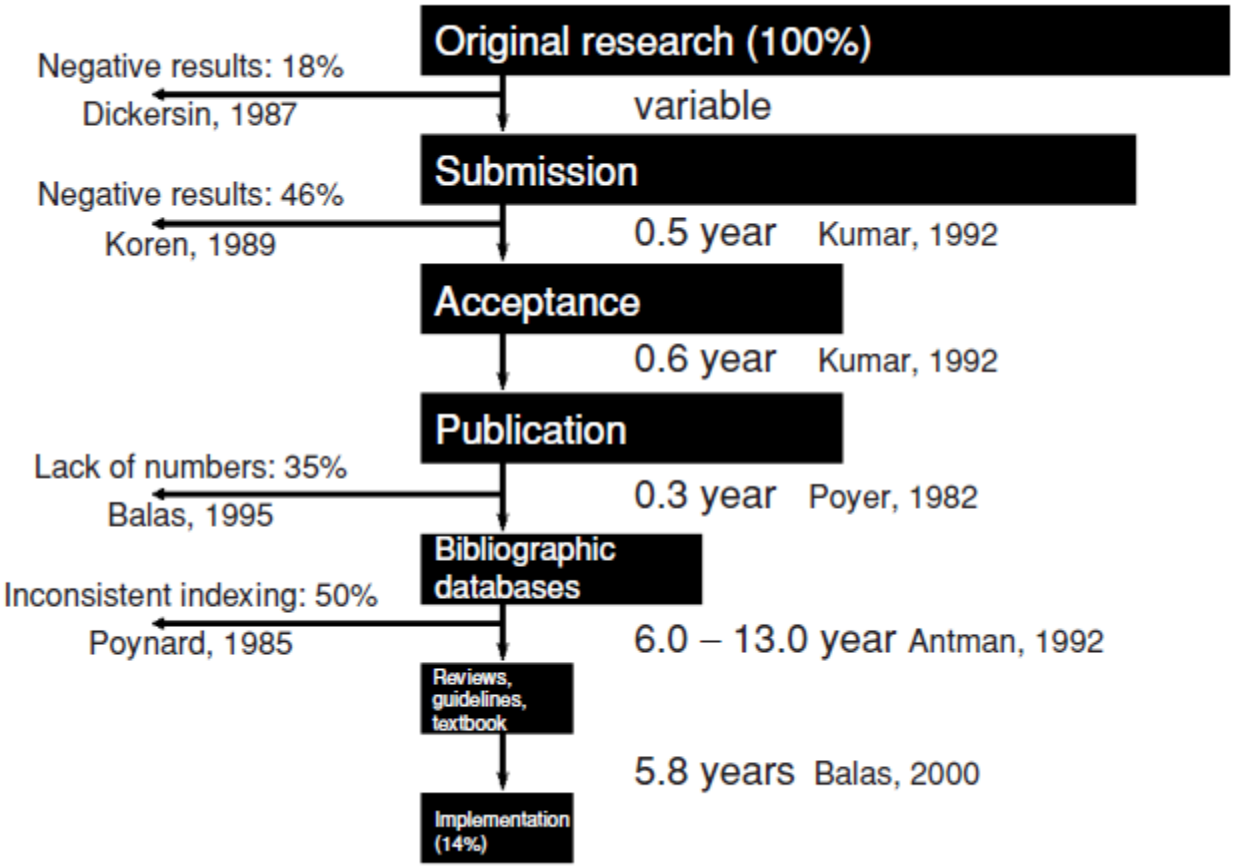

Figure source: Shortliffe et al, 'Biomedical Informatics', 3rd Edition, Figure 1.20, p33

Integrating HI and Medical Practice

- Information management is fundamental to medical practice
- Factors affecting rate of adoption of HI into medical practice
  - Advances in hardware & software applications
  - Professional awareness of HI and medical needs
  - Healthcare costs containment
  - Information management needs

➔ There is a need to demonstrate financial and clinical value for HI systems

Three Questions (Recap)

- How is the course organized and managed?
- What is Health Informatics about?
- Why are Electronic Health Records important?

Term Paper – Step 1 – Due Tues 14th

- Find a partner to team up with
- Select a topic to present
- Develop your plan (work distribution, deadlines)
- Select your date you want to present
  - Preliminary submission – March 3rd
  - Presentations March 10th – 31st
  - 2-3 presentations per class