Medical Informatics and Electronic Medical Records

Integrating Clinical Decision Support Systems

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Objectives

• Define Medical Informatics
• Define Electronic Medical Records
• Demonstrate some Clinical Decision Support Systems and explain how they integrate with EMRs
• Future considerations
To improve the quality of our health care while lowering its cost, we will make the immediate investments necessary to ensure that, within five years, all of America’s medical records are computerized.

President-Elect Barack Obama, Jan. 8, 2009
http://abcnews.go.com/Health/President44/story?id=6606536
Medical Informatics

- Information Science
- Computer Science
- Health Care

What is Health Informatics?
What is Medical Informatics?

• The analysis, use and dissemination of medical data and information through the application of computers to various aspects of health care and medicine. (MeSH) National Library of Medicine

• Includes terminology, semantics, information mapping, data capture, indexing, retrieval, interpretation, and dissemination.
Four Areas of Medical Informatics

- Knowledge Management
- Clinical Information Management
- Communication
- Decision Making
Four Areas of Medical Informatics

• Knowledge Management
  – Medical journals
  – Medical reference books
  – Consumer health information

• Communication
  – Telemedicine
  – Email patients
  – Shared calendars
  – Social media

• Clinical Information Management
  – Electronic health records
  – Billing/coding systems
  – Ordering systems

• Decision Making
  – Point of Care databases
  – Drug interaction tools
Shift to Merge Systems into ONE System

Knowledge Management

Clinical Information Management

Communication

Decision Making
Four Areas of Medical Informatics

- **Knowledge Management**
  - Medical journals
  - Medical reference books
  - Consumer health information

- **Communication**
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- **Clinical Information Management**
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- **Decision Making**
  - Point of Care databases
  - Drug interaction tools
Electronic Medical Records
What are they really?

• EMRs have integration and interoperability within one health system
• EHRs – electronic health records are the patient care system – can be shared by other systems
• ECRs – electronic clinical records
• EPRs – electronic patient records
• PHRs – personal health records
• EMRs represent the impact of technology in health care
• Major shift away from paper records
• Combines data analytics, data mining and “Big Data”
Electronic Health Records

Electronic record of patient health information

It encompasses:

– Patient demographics
– Progress notes
– Medications
– Vital signs
– Past medical history
– Immunizations
– Laboratory data
– Radiology Reports
Meaningful Use Regulation for EHRs

• Healthcare Information and Management Systems Society says -- EHR technology is "meaningful" when it has capabilities that include: e-prescribing, exchanging electronic health information, provide clinical decision support to support practitioner order entry and submitting clinical quality measures.

• Officials say physicians must meet the definition within a specified time frame, which as described in the American Recovery and Reinvestment Act of 2009.

• HITECH Act
Meaningful Use

Eligible Professional
Meaningful Use Table of Contents
Core and Menu Set Objectives
Stage 1 (2014 Definition)
Last Updated: May 2014

<table>
<thead>
<tr>
<th>Eligible Professional Core Objectives</th>
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<tbody>
<tr>
<td>(1) Use <a href="#">CPOE</a> for medication orders directly entered by any licensed healthcare professional who can enter orders into the medical record per state, local and professional guidelines.</td>
<td>AVAILABLE</td>
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<td>(2) Implement drug-drug and drug-allergy interaction checks.</td>
<td>AVAILABLE</td>
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<td>(3) Maintain an up-to-date problem list of current and active diagnoses.</td>
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<td>(4) Generate and transmit permissible prescriptions electronically (eRx).</td>
<td>AVAILABLE</td>
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Centers for Medicare & Medicaid Services
Meaningful Use Update
September 4, 2014

The final rule provides additional flexibility by allowing eligible professionals, eligible hospitals and critical access hospitals to use the 2011 Edition certified EHR technology or a combination of 2011 and 2014 Edition certified EHR technology for the 2014 EHR reporting period (Bowman, *FierceEMR*, 8/29).

http://tinyurl.com/puxgalk

Choice of Electronic Medical Records Systems

EPIC, CERNER, MEDITECH top three vendors 2013 for EMR software (Gregg, 2014).

The EHRs market expected to reach $9.3 billion annually by the end of 2015 (Gregg, 2014).

Other vendors:  GE Healthcare, McKesson, Misys, Siemens, Allscripts, NextGen, eClinicalWorks, CPSI, Healthland, athenahealth, and SOAPWare
Positive Impact

• Improved documentation
• Better coordination of care
• Increased administration efficiency
• Empower patients
• Patient safety
• Tracks compliance

• Financial incentives (Eligible Medicare physicians could receive up to $44,000 over 5 years, Hsiao, 2014).
Negative Impact

• Changes to workflow
• Changes in work distribution
• Complicated technology systems need user support
• Ongoing training – more work for physicians
• Patient confidentiality, security issues
Staff issues, Clinician resistance, Missed targets, Disruption, Training issues, Increased costs, delays, Integration issues, Reduction in patient throughput.
Implementation/Adoption Issues

- Privately owned hospitals less likely to invest in EHRs than public hospitals
- Costs of EHRs outweighs the benefits
- Suitable software – speed, reliability, flexibility
- Hardware in terms of mobile equipment, access to computers
Implementation/Adoption Issues

• Needs the support of management
• Strong leader roles
• Implementation strategy/plan
• User involvement
• “Physicians are the most influential medical care providers, and their resistance can delay EHRs implementation…”
Clinical Decision Support: Providing Quality Healthcare with Help from a Computer

By Katharine Miller

In a classic cartoon, a physician offers a second opinion from his computer. The patient looks horrified: How absurd to think that a computer could have better judgment than a human doctor! But computer tools can already provide valuable information to help human doctors make better decisions. And there is good reason to wish such tools were broadly available.

About half of the time, doctors fall short of providing quality medical care as defined by national guidelines, according to a 2003 paper in the New England Journal of Medicine. In addition, patients leave their doctors' visits with an average of 1.6 unanswered questions. “That’s too many,” says Blackford Middleton, MD, assistant professor of medicine at the Harvard Medical School and corporate director of clinical and informatics research and development at Partners Healthcare System in Boston. And because medical professionals have incomplete knowledge or incomplete information about a patient, “we order too many tests, patients are called back, and sometimes bad things happen,” Middleton says. “It’s embarrassing. That’s why I get up every day and run to work.”
Clinical Decision Support Systems

• Brings evidence-based information to Point of Care decision making
• Organized clinical knowledge
• Patient information/education
• Practice Guidelines
• How information is displayed/format
Compliance

Meaningful use – must implement one **clinical decision support rule** that includes diagnostic test ordering, and be able to track compliance.
“The use of clinical decision support systems is expected to increase in light of the Health Information Technology for Economic and Clinical Health (HITECH) Act, which stipulates that health care providers must demonstrate the meaningful use of health IT by 2015 or face reduced Medicare reimbursements beginning in 2016.”

(TechTarget
http://searchhealthit.techtarget.com/definition/clinical-decision-support-system-CDSS)
Clinical Decision Support Systems

- UpToDate
- Clinical Key -- FirstConsult
- EBSCO DynaMed
- Access Medicine (McGraw Hill)
- Johns Hopkins ABX Guide
- Clinical Pharmacology
- VisualDx
Computerized Information Retrieval--InfoButton

- HL7 Context-Aware Knowledge Retrieval (InfoButton) Standard – BUTTON added to EHRs – Health Level 7
- UpToDate integration
- Visual DX
- Clinical Key InfoButton

Elsevier Clinical Solutions

Infobutton Integration

Elsevier Infobutton provides access to the most relevant content from each of the institution’s licensed Elsevier products, including ClinicalKey, Clinical Pharmacology, ExitCare, Mosby’s Skills and Mosby’s Nursing Consult.
EMRs Add Patient-Centered Access

- Remote delivery of services
- Patient portal
- Patient Education: Medline, UpToDate, Clinical Key
- Social Media – Facebook, Twitter, Google+, YouTube, LinkedIn
EMRs Add Web Based Services

- Request medication refills – #1
- Mobile text messages – patients checking/texting their BPs, blood sugar, etc. Patient check-in
- Patient Portal that includes chat services and virtual patient encounters
- E-visits less expensive
- Facebook/Twitter/LinkedIn presence – knowledge/information transfer
Do EMRs limit physician critical thinking?
Future

• Up in the cloud with EMRs
• Apps
• Clinical teaching of EMRs
• Genomic data integration
• Google Glass
Bibliography

http://biomedicalcomputationreview.org/content/clinical-decision-support-providing-quality-healthcare-help-computer


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  https://www.youtube.com/watch?v=ssldTFWBv3E#t=122

• Images from Google Images