Teaching Quality Use of the Electronic Health Record

William Hersh, MD, FACP, FACMI
Diplomate, Clinical Informatics, ABPM
Professor and Chair
Department of Medical Informatics & Clinical Epidemiology
Oregon Health & Science University
Portland, OR, USA
Email: hersh@ohsu.edu
Web: www.billhersh.info
Blog: http://informaticsprofessor.blogspot.com

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William Hersh, MD, FACP, FACMI
Diplomate, Clinical Informatics, ABPM
Professor and Chair
Department of Medical Informatics & Clinical Epidemiology
Oregon Health & Science University
Portland, OR, USA
Email: hersh@ohsu.edu
Web: www.billhersh.info
Blog: http://informaticsprofessor.blogspot.com

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Outline

- Rationale for use of the electronic health record (EHR)
- Health Information Technology for Economic and Clinical Health (HITECH) Act
- Results of HITECH – good and bad
- What must we teach for quality use of the EHR?

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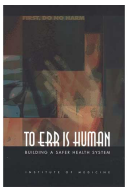
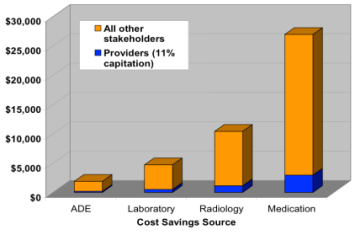
A decade ago, information problems in healthcare were well-known

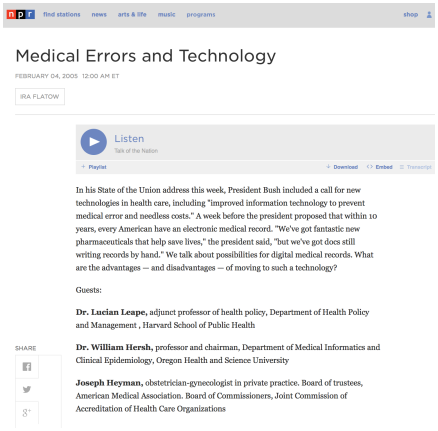
- Safety – IOM "errors report" documented 48-96K deaths per year due to medical errors (Kohn, 2000)
- Quality – patients received appropriate care only 55% of time (McGlynn, 2003)
- Cost
  - EHRs cost-effective overall, but benefits did not accrue to those making the investment (Johnston, 2003)
  - Widespread interoperable EHRs could save $77B per year (Hillestad, 2005)
- Access to information – physicians unable to access known information about patients in 44% of ambulatory visits (Smith, 2005)





Solution seemed simple: Interoperable EHRs!

- Many made the case, e.g.,
  - http://www.npr.org/templates/story/story.php?storyId=4486530
- Could allow additional value via "secondary use" (Safran, 2007)
- Implementing the learning health system (Friedman, 2010; Smith, 2012)



Medical Errors and Technology

FEBRUARY 04, 2005 12:00 AM ET

IRA FLATOW

Listen

Talk of the Nation

In his State of the Union address this week, President Bush included a call for new technologies in health care, including "improved information technology to prevent medical error and needless costs." A week before the president proposed that within 10 years, every American have an electronic medical record. "We've got fantastic new pharmaceuticals that help save lives," the president said, "but we've got docs still writing records by hand." We talk about possibilities for digital medical records. What are the advantages — and disadvantages — of moving to such a technology?

Guests:

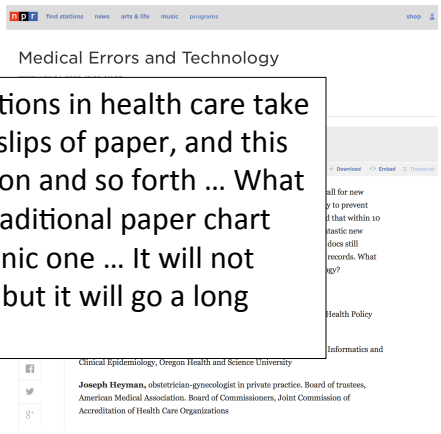
Dr. Lucian Leape, adjunct professor of health policy, Department of Health Policy and Management , Harvard School of Public Health

Dr. William Hersh, professor and chairman, Department of Medical Informatics and Clinical Epidemiology, Oregon Health and Science University

Joseph Heyman, obstetrician-gynecologist in private practice. Board of trustees, American Medical Association. Board of Commissioners, Joint Commission of Accreditation of Health Care Organizations

Solution seemed simple: Interoperable EHRs!

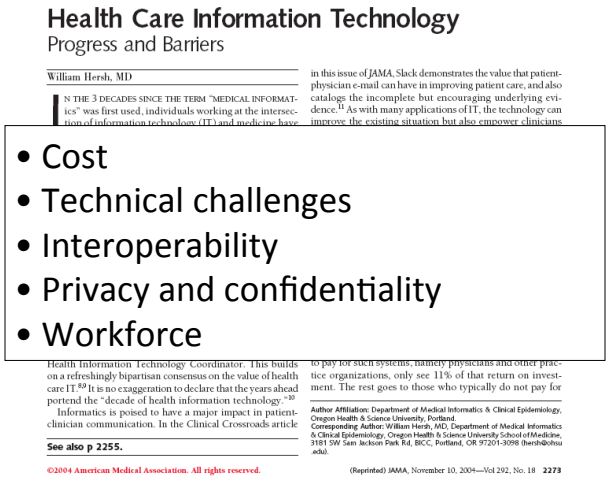
What we have now is most transactions in health care take place on paper, whether it's fax or slips of paper, and this leads … to medical errors, duplication and so forth … What we're advocating is replacing the traditional paper chart and all its problems with an electronic one … It will not solve all the problems in medicine, but it will go a long ways towards solving some.


Medical Errors and Technology

Clinical Epidemiology, Oregon Health and Science University

Joseph Heyman, obstetrician-gynecologist in private practice. Board of trustees, American Medical Association. Board of Commissioners, Joint Commission of Accreditation of Health Care Organizations

What was holding us back? (Hersh, 2004)


Health Care Information Technology
Progress and Barriers

William Hersh, MD

- Cost
- Technical challenges
- Interoperability
- Privacy and confidentiality
- Workforce

American Recovery and Reinvestment Act (ARRA) provided the opportunity

"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 … It just won't save billions of dollars and thousands of jobs – it will save lives by reducing the deadly but preventable medical errors that pervade our health care system."

January 5, 2009

HITECH Act (Blumenthal, 2011)

- Incentives for EHR adoption by physicians and hospitals (up to $27B)
- Direct grants by federal agencies ($2B, including $118M for workforce development)

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And informatics entered the HITECH world

INFORMATICS PROFESSOR

THIS BLOG MAINTAINS THE THOUGHTS ON VARIOUS TOPICS RELATED TO BIOMEDICAL AND HEALTH INFORMATICS BY DR. WILLIAM HERSH, PROFESSOR AND CHAIR, DEPARTMENT OF MEDICAL INFORMATICS & CLINICAL EPIDEMIOLOGY, OREGON HEALTH & SCIENCE UNIVERSITY.

SUNDAY, JANUARY 24, 2010

Informatics Now Lives in a HITECH World

The flurry of activity from the Office of the National Coordinator for Health IT (ONC) in late 2009 laid out the implementation plans of the Health Information Technology for Economic and Clinical Health (HITECH) Act of the American Recovery and Reinvestment Act (ARRA, also known as the economic stimulus package). The scope of programs was so immense that few aspects of the biomedical and health informatics field will be unaffected by HITECH. I think we can plainly say that informatics now lives in a HITECH world.

WILLIAM HERSH

http://www.billhersh.info/

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And informatics entered the HITECH world

INFORMATICS PROFESSOR

This is a defining moment for the informatics field. Never before has such money and attention been lavished on it. HITECH provides a clear challenge for the field to "get it right." It will be interesting to look back on this time in the years ahead and see what worked and did not work. Whatever does happen, it is clear that informatics lives in a HITECH world now.

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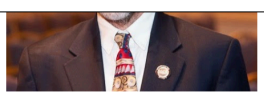

http://www.billhersh.info/

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What did HITECH entail?

- Incentives for "meaningful use" (MU) of the EHR, which required (Blumenthal, 2010)
  - Eligible hospitals and professionals meeting criteria in three stages
  - Using certified EHR technology
  - Adhering to specified standards
  - Able to measure and send quality measures as well as enable health information exchange (HIE)

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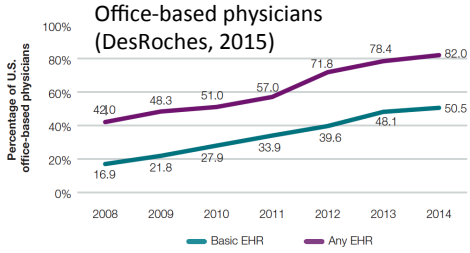
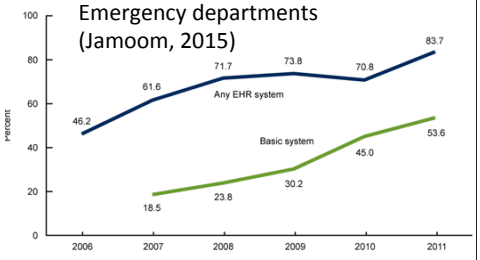
Results of HITECH

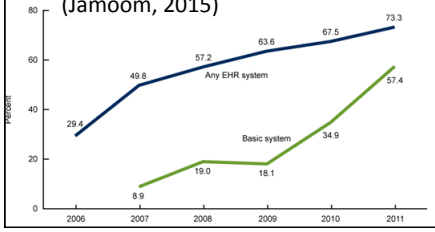
Office-based physicians
(DesRoches, 2015)



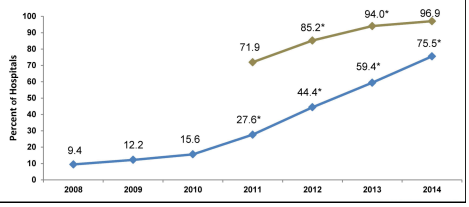
Emergency departments
(Jamoom, 2015)



Outpatient departments
(Jamoom, 2015)



Non-federal hospitals
(Charles, 2015)



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Although adoption increased, other problems arose

- Incomplete interoperability
- Adverse impact on workflow
- Conundrum of structured vs. unstructured data
- Problems with usability
- Safety
- Security

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Lack of interoperability

- Despite large-scale adoption, systems do not communicate well
- Several causes
  - Incomplete adoption of standards
  - JASON report criticized lack of use of "modern" API-based approaches (MITRE, 2014)
    - ONC established JASON Task Force to respond to recommendations
  - Information blocking (ONC, 2015; ASCO, 2015)

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Adverse impact on workflow

- Famous JAMA cartoon (Toll, 2012)
- Too much focus on computer than patient – "writing the wrong" (Patel, 2015)
- Dr. Paul Chang and the "demise of radiology rounds" (Jersild, 2012)
- Facilitates workarounds, such as copy-and-paste (or "sloppy and paste" [O'Reilly, 2013]?)

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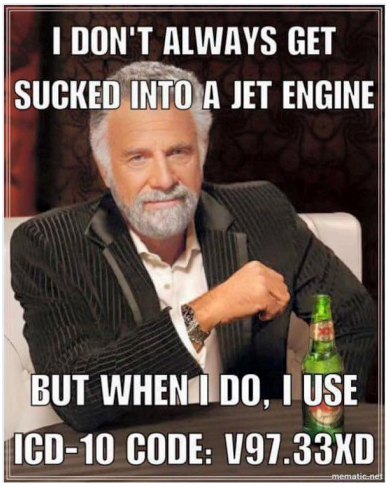
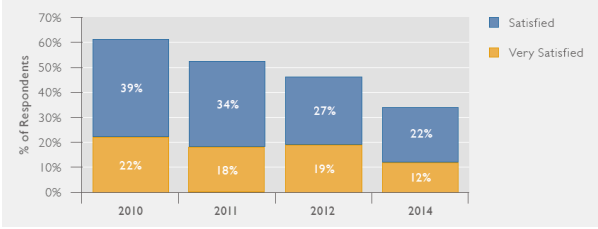
Other adverse impacts

V97.33xD Sucked into jet engine, subsequent encounter



Usability

- Substantial physician dissatisfaction (Lewis, AmericanEHR, 2014)
- Partly due to conundrum of structured vs. unstructured data
  - Structured data facilitates re-use
  - Narrative data tells the patient's story
    - "Patients do not speak template" (Lewis, 2011)
    - Many physicians do not trust check boxes and the like (Personal Communications)
- Vendors not adhering to usability requirements as part of ONC EHR certification (Ratwani, 2015)



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RESEARCH REPORT

Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy

Mark W. Friedberg • Peggy G. Chen • Kristin R. Van Busum • Frances M. Aunon
Chau Pham • John P. Caloyeras • Soeren Mattke • Emma Pitchforth
Denise D. Quigley • Robert H. Brook • F. Jay Crosson • Michael Tutty

The Pros and Cons of Electronic Health Records

- Physicians approved of EHRs in concept and appreciated having better ability to remotely access patient information and improvements in quality of care.
- However, for many physicians, the current state of EHR technology significantly worsened professional satisfaction in multiple ways.
- Aspects of current EHRs that were particularly common sources of dissatisfaction included poor usability, time-consuming data entry, interference with face-to-face patient care, inefficient and less fulfilling work content, inability to exchange health information, and degradation of clinical documentation.

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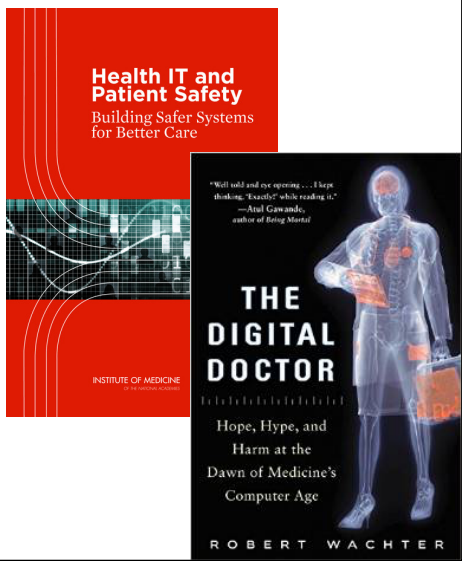
The same EHRs we tout for safety may undermine it

- Concerns led to Joint Commission Sentinel Event alerts (42, 2008; 54, 2015)
- IOM report called for more effective monitoring and study (IOM, 2012), including a roadmap for avoiding e-iatrogenesis (Ash, 2012)
- Well-known mishaps
  - 38 times dose of antibiotic (Wachter, 2015)
  - Ebola patient in Dallas hospital (Cortese, 2015)



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Security

- 2015 has been the year of major breaches
  - Anthem – over 80M records (Rubenfire, 2015)
  - Premera Blue Cross – over 11M records (Vinton, 2015)
  - Excellus Blue Cross – over 10M records (Rubenfire, 2015)
- Going forward from 2015-2019, estimated 1 in 13 patients will suffer medical identify theft, at cost of $300B to system (Kalis, 2015)
- Not limited to healthcare
  - https://www.opm.gov/cybersecurity

"Your previous provider refused to share your electronic medical records, but not to worry —I was able to obtain all of your information online."

(Two-fer, NewYorker)

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Toward quality use of the EHR

- There is still research evidence that health IT improves care
- Emerging models for more effective use
- Advocacy for improved usability, interoperability
- Robust opportunities, especially related to data science/analytics

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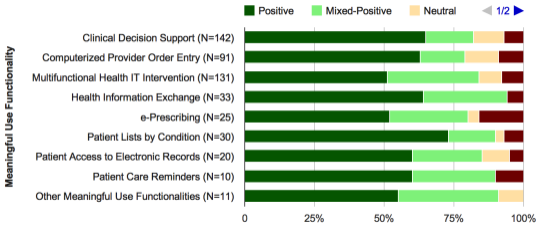
There is still a (mostly) positive evidence base (Jones, 2014)



Author Sentiment of Meaningful Use Functionality					
Meaningful Use Functionality	Number of MU Impacts	Positive	Mixed-Positive	Neutral	Negative
Clinical Decisions Support	142	65%	17%	11%	7%
Computerized Provider Order Entry	91	63%	16%	12%	9%
Multifunctional Health IT Intervention	131	51%	33%	8%	8%
Health Information Exchange	33	64%	30%	0%	6%
e-Prescribing	25	52%	28%	4%	16%
Patient Lists by Condition	30	73%	17%	3%	7%
Patient Access to Electronic Records	20	60%	25%	10%	5%
Patient Care Reminders	10	60%	30%	0%	10%
Other Meaningful Use Functionalities	11	55%	36%	9%	0%

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Evidence in support of value of EHR continues

- Enhancing patient-provider communication (Berry, 2011)
- Extracting phenotype from the EHR (Denny, 2013; Wei, 2015)
- Rapid learning in oncology (Yu, 2015)
- Detection and early action on, e.g.,
  - Delays in cancer diagnosis (Murphy, 2014; Murphy, 2015)
  - Risk of readmission (Amarasingham, 2013; Hebert, 2014)
  - Postoperative complications (Menendez, 2015)

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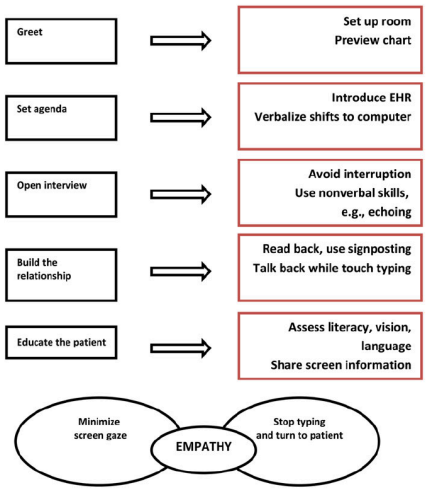
Emerging models for more effective exam room use (Duke, 2013)



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Growing advocacy for making systems better

- AMA usability principles (AMA, 2014)
- AMIA white paper (Payne, 2015)
- ACP documentation (Kuhn, 2015)
- ONC Shared Nationwide Interoperability Roadmap (ONC, 2015)

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Advocacy

Improving Care: Priorities to Improve Electronic Health Record Usability

EXECUTIVE SUMMARY

The American Medical Association (AMA) recognizes the potential value of electronic health records (EHRs) Effec Tripl (incl of pc care. how gene poor clinic

- Enhance Physicians' Ability to Provide High-Quality Patient Care
- Support Team-Based Care
- Promote Care Coordination
- Offer Product Modularity and Configurability
- Reduce Cognitive Workload
- Promote Data Liquidity
- Facilitate Digital and Mobile Patient Engagement
- Expedite User Input into Product Design and Post-Implementation Feedback

have identified this national priority and have made recommendations to improve usability.[3] The AMA adds to sired d ently rch

25 to advance EHR usability through understanding and

Report of the AMIA EHR 2020 Task Force on the Status and Future Direction of EHRs

Thomas H. Payne,[1] Sarah Corley,[2] Theresa A. Cullen,[3] Tejal K. Gandhi,[4] Linda Harrington,[5] Gilad J. Kuperman,[6] John E. Mattison,[7] David P. McCallie,[8] Clement J. McDonald,[9] Paul C. Tang,[10] William M. Tierney,[11] Charlotte Weaver,[12] Charlene R. Weir,[13] Michael H. Zaroukian[14]

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Over envi Ince there resu are cons tera to Inter desp to a In p in cl

1. Improve documentation requirements and functionality to empower patients
2. Refocus regulations so that patients and their caregivers can derive the most benefit
3. Increase transparency
4. Foster innovation
5. Support person-centered care

EHRs has created. Clinicians ask for help getting through their days, which often extend into evenings devoted to writing to reconcile medications that some providers feel add to their workload and slow them down. Informed by careful stud-

AMIA POSITI

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Annals of Internal Medicine

POSITION PAPER

Clinical Documentation in the 21st Century: Executive Summary of a Policy Position Paper From the American College of Physicians

Thomson Kuhn, MA; Peter Basch, MD; Michael Barr, MD, MBA; and Thomas Yackel, MD, MPH, MS, for the Medical Informatics Committee of the American College of Physicians*

Clinical documentation was developed to track a patient's condition and communicate the author's actions and thoughts to

used for clinical documentation is inadequate. The Medical Informatics Committee of the American College of Physicians has un-

- The primary purpose of clinical documentation should be to support patient care and improve clinical outcomes through enhanced communication
- As value-based care and accountable care models grow, the primary purpose of the EHR should remain the facilitation of seamless patient care to improve outcomes while contributing to data collection that supports necessary analyses
- Structured data should be captured only where they are useful in care delivery or essential for quality assessment or reporting
- Patient access to progress notes, as well as the rest of their medical records, may offer a way to improve both patient engagement and quality of care

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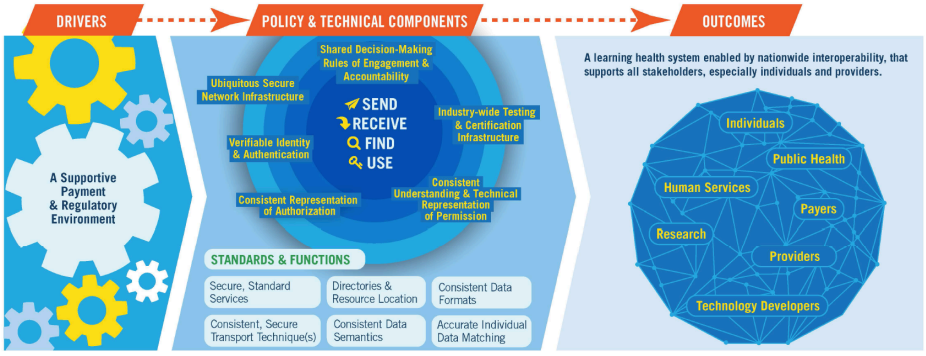
Interoperability Roadmap (ONC, 2015) and Standards Advisory (ONC, 2015)



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Opportunities still exist

- Optimists note the "data dividend" of MU (Perlin, in Walsh, 2015)
- Predictive analytics has potential to augment modern clinical practice (Sniderman, 2015)
- Rationale for EHRs still exists
  - Diagnostic (IOM, 2015) and therapeutic (James, 2013) errors still abound; informatics part of the solution
  - Precision medicine will require EHRs and mobile devices to build 1M patient cohort (NIH, 2015)

What do we need to teach for quality use of the EHR?

- Competence in clinical informatics is essential for 21st century physicians and other clinicians
  - Competencies for medical students (Hersh, 2014)
- Many medical school curricula being revised to include clinical informatics
  - Pan-discipline nature makes introduction into curriculum challenging
- Clinical informatics is now a subspecialty of all medical specialties (Detmer, 2014)
  - Recognizes role of physicians informatics leaders, e.g., the Chief Medical Informatics Officer (CMIO)

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PERSPECTIVES

Beyond information retrieval and electronic health record use: competencies in clinical informatics for medical education

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William R Hersh[1]
Paul N Gorman[1]
Frances E Biagioli[2]
Vishnu Mohan[1]
Jeffrey A Gold[3]
George C Mejicano[4]

[1]Department of Medical Informatics and Clinical Epidemiology, [2]Department of Family Medicine, [3]Department of Medicine, [4]School of Medicine, Oregon Health & Science University, Portland, OR, USA

Abstract: Physicians in the 21st century will increasingly interact in diverse ways with information systems, requiring competence in many aspects of clinical informatics. In recent years, many medical school curricula have added content in information retrieval (search) and basic use of the electronic health record. However, this omits the growing number of other ways that physicians are interacting with information that includes activities such as clinical decision support, quality measurement and improvement, personal health records, telemedicine, and personalized medicine. We describe a process whereby six faculty members representing different perspectives came together to define competencies in clinical informatics for a curriculum transformation process occurring at Oregon Health & Science University. From the broad competencies, we also developed specific learning objectives and milestones, an implementation schedule, and mapping to general competency domains. We present our work to encourage debate and refinement as well as facilitate evaluation in this area.

In reality, applicable to all healthcare professional students.

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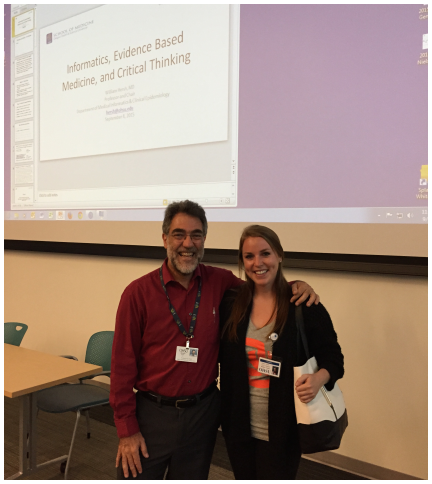
Table 1 Competencies in clinical informatics and specific learning objective/milestone within each

Competency	Learning objectives/milestones
Find, search, and apply knowledge-based information to patient care and other clinical tasks	Information retrieval/search: choose correct source for specific task, search using advanced features, apply results Evaluate information resources (literature, databases, etc) for their quality, funding sources, biases Identify tools to assess patient safety (eg, medication interactions) Utilize knowledge-based tools to answer clinical questions at the point of care (eg, textbooks, calculators, etc) Formulate an answerable clinical question Determine the costs/charges of medications and tests Identify deviations from normal (laboratory tests/X-ray/results) and develop a list of causes of the deviation
Effectively read and write from the electronic health record for patient care and other clinical activities	Graph, display, and trend vital signs and laboratory values over time Adopt a uniform method of reviewing a patient record Create and maintain an accurate problem list Recognize medical safety issues related to poor chart maintenance Identify a normal range of results for a specific patient Access and compare radiographs over time Identify inaccuracies in the problem list/history/medication list/allergies Create useable notes Write orders and prescriptions List common errors with data entry (drop down lists, copy and paste, etc)
Use and guide implementation of CDS	Recognize different types of CDS Be able to use different types of CDS Work with clinical and informatics colleagues to guide CDS use in clinical settings
Provide care using population health management approaches	Utilize patient record (data collection and data entry) to assist with disease management Create reports for populations in different health care delivery systems Use and apply data in accountable care, care coordination, and the primary care medical home settings
Protect patient privacy and security	Use security features of information systems Adhere to HIPAA privacy and security regulation Describe and manage ethical issues in privacy and security
Use information technology to improve patient safety	Perform a root-cause analysis to uncover patient safety problems Familiarity with safety issues Use resources to solve safety issues
Engage in quality measurement selection and improvement	Recognize the types and limitations of different types of quality measures Determine the pros and cons of a quality measure, how to measure it, and how to use it to change care
Use HIE to identify and access patient information across clinical settings	Recognize issues of dispersed patient information across clinical locations Participate in the use of HIE to improve clinical care
Engage patients to improve their health and care delivery though personal health records and patient portals	Instruct patients in proper use of a personal health record Write an e-message to a patient using a patient portal Demonstrate appropriate written communication with all members of the health care team Integrate technology into patient education (eg, decision making tools, diagrams, patient education) Educate patients to discern quality of online medical resources (Web sites, applications, patient support groups, social media, etc) Maintain patient engagement while using an electronic health record (eye contact, body language, etc)
Maintain professionalism through use of information technology tools	Describe and manage ethics of media use (cloud storage issues, texting, cell phones, social media professionalism)
Provide clinical care via telemedicine, and refer those for whom it is necessary	Be able to function clinically in telemedicine/telehealth environments
Apply personalized/precision medicine	Recognize growing role of genomics and personalized medicine in care Identify resources enabling access to actionable information related to precision medicine
Participate in practice-based clinical and translational research	Use electronic health record alerts and other tools to identify patients and populations for offering clinical trial participation Participate in practice-based research to advance medical knowledge

Implementing competencies and curricula for OHSU medical students

- Interactive lectures and series, e.g.,
  - "Information is Different Now That You're a Doctor"
  - "Informatics, EBM, and Critical Thinking"
- Pearls – weekly 7-10 minute asynchronous recording
- Clinical skills – e.g.,
  - Using EHR
  - Applying quality measures
- Enrichment (optional) – in-depth topics (EHR), clinical informatics careers, etc.



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Conclusions

- MU has been a mixed bag (DesRoches, RWJF, 2015), with substantial adoption, yet
  - Suboptimal systems
  - Inadequate interoperability
- What are the solutions for promoting and teaching quality use of the EHR?
  - Mine: Leadership and responsibility, solving the conundrums
  - Yours?