Informatics and the Future Healthcare Workforce Webinar

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Informatics and the Future Healthcare Workforce

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Clinical Professor of Biomedical Informatics

Arizona State University
Biomedical Informatics Defined

- **Biomedical informatics** is the scientific field that deals with the storage, retrieval, sharing, and optimal use of biomedical information, data, and knowledge for problem solving and decision making.

- **Biomedical informatics** touches on all basic and applied fields in biomedical science and is closely tied to modern information technologies, notably in the areas of computing and communication.

Another point of view...

Informaticist: 
Worthwhile

Engineer: 
Possible?

Clinician: 
Useful?
Biomedical Informatics Sub Disciplines

Domains of Clinical Informatics

Clinical Informatician Skillsets

Clinical informaticians use their knowledge of patient care combined with their understanding of informatics concepts, methods, and tools to:

- assess information and knowledge needs of health care professionals and patients,
- characterize, evaluate, and refine clinical processes, develop, implement, and refine clinical decision support systems, and
- lead or participate in the procurement, customization, development, implementation, management, evaluation, and continuous improvement of clinical information systems.

The Cycle We Envision

# 2011 EHR Adoption Rates

## US EMR Adoption Model℠

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cumulative Capabilities</th>
<th>2011 Q1</th>
<th>2011 Q2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP</td>
<td>1.0%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Physician documentation (structured templates), full CDSS (variance &amp; compliance), full R-PACS</td>
<td>3.5%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Closed loop medication administration</td>
<td>5.9%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Stage 4</td>
<td>CPOE, Clinical Decision Support (clinical protocols)</td>
<td>10.7%</td>
<td>12.3%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology</td>
<td>48.4%</td>
<td>46.3%</td>
</tr>
<tr>
<td>Stage 2</td>
<td>CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable</td>
<td>14.1%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Ancillaries - Lab, Rad, Pharmacy - All Installed</td>
<td>6.7%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Stage 0</td>
<td>All Three Ancillaries Not Installed</td>
<td>9.6%</td>
<td>10.0%</td>
</tr>
</tbody>
</table>

Data from HIMSS Analytics℠ Database © 2011

Source: [http://www.himssanalytics.org/hc_providers/emr_adoption.asp](http://www.himssanalytics.org/hc_providers/emr_adoption.asp)
EHR Incentive and Penalty Program for Eligible Professionals (EPs)

“For 2015 and later, Medicare eligible professionals, eligible hospitals, and CAHs that do not successfully demonstrate meaningful use will have a payment adjustment in their Medicare reimbursement.”

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>First CY for which the EP Receives an Incentive Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011</td>
</tr>
<tr>
<td>2011</td>
<td>$18,000</td>
</tr>
<tr>
<td>2012</td>
<td>$12,000</td>
</tr>
<tr>
<td>2013</td>
<td>$8,000</td>
</tr>
<tr>
<td>2014</td>
<td>$4,000</td>
</tr>
<tr>
<td>2015</td>
<td>$2,000</td>
</tr>
<tr>
<td>2016</td>
<td>---</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$44,000</td>
</tr>
</tbody>
</table>

Meaningful Use Requirements

• The American Recovery and Reinvestment Act of 2009 specifies three main components of Meaningful Use:
  – The use of a certified EHR in a meaningful manner, such as e-prescribing.
  – The use of certified EHR technology to submit clinical quality and other measures.

# Requirements for Stage 1 of Meaningful Use (2011 and 2012)

<table>
<thead>
<tr>
<th>Eligible Entity¹</th>
<th>Total Number of Core + Menu Set Objectives</th>
<th>Required Number of Core Objectives</th>
<th>Required Number of Menu Set Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible professionals</td>
<td>15 + 10</td>
<td>15</td>
<td>5 of 10</td>
</tr>
<tr>
<td>Eligible hospitals and critical access hospitals</td>
<td>14 + 10</td>
<td>14</td>
<td>5 of 10</td>
</tr>
</tbody>
</table>

¹ For eligibility requirements, see: [http://www.cms.gov/EHRIncentivePrograms/15_Eligibility.asp](http://www.cms.gov/EHRIncentivePrograms/15_Eligibility.asp)

# Meaningful Use: Core Set

<table>
<thead>
<tr>
<th>Objective</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core set of objectives to be achieved by all eligible professionals, hospitals, and critical access hospitals to qualify for incentive payments</td>
<td>Over 50% of patients' demographic data recorded as structured data</td>
</tr>
<tr>
<td>Record patient demographics (sex, race, ethnicity, date of birth, preferred language, and in the case of hospitals, date and preliminary cause in the event of death)</td>
<td>Over 50% of patients 2 years of age or older have height, weight, and blood pressure recorded as structured data</td>
</tr>
<tr>
<td>Record vital signs and chart changes (height, weight, blood pressure, body mass index, growth charts for children)</td>
<td>Over 80% of patients have at least one entry recorded as structured data</td>
</tr>
<tr>
<td>Maintain up-to-date problem list of current and active diagnoses</td>
<td>Over 80% of patients have at least one entry recorded as structured data</td>
</tr>
<tr>
<td>Maintain active medication list</td>
<td>Over 80% of patients have at least one entry recorded as structured data</td>
</tr>
<tr>
<td>Maintain active medication allergy list</td>
<td>Over 80% of patients have at least one entry recorded as structured data</td>
</tr>
<tr>
<td>Record smoking status for patients 13 years of age or older</td>
<td>Over 50% of patients 13 years of age or older have smoking status recorded as structured data</td>
</tr>
<tr>
<td>For individual professionals, provide patients with clinical summaries for each office visit; for hospitals, provide an electronic copy of hospital discharge instructions on request</td>
<td>Clinical summaries provided to patients for over 50% of all office visits within 3 business days; over 50% of all patients who are discharged from the inpatient department or emergency department of an eligible hospital or critical access hospital and who request an electronic copy of their discharge instructions are provided with it</td>
</tr>
<tr>
<td>On request, provide patients with an electronic copy of their health information (including diagnostic-test results, problem list, medication lists, medication allergies, and for hospitals, discharge summary and procedures)</td>
<td>Over 50% of requesting patients receive electronic copy within 3 business days</td>
</tr>
<tr>
<td>Generate and transmit permissible prescriptions electronically (does not apply to hospitals)</td>
<td>Over 40% are transmitted electronically using certified EHR technology</td>
</tr>
<tr>
<td>Computer provider order entry (CPOE) for medication orders</td>
<td>Over 30% of patients with at least one medication in their medication list have at least one medication ordered through CPOE</td>
</tr>
<tr>
<td>Implement drug–drug and drug–allergy interaction checks</td>
<td>Functionality is enabled for these checks for the entire reporting period</td>
</tr>
<tr>
<td>Implement capability to electronically exchange key clinical information among providers and patient-authorized entities</td>
<td>Perform at least one test of EHR’s capacity to electronically exchange information</td>
</tr>
<tr>
<td>Implement one clinical decision support rule and ability to track compliance with the rule</td>
<td>One clinical decision support rule implemented</td>
</tr>
<tr>
<td>Implement systems to protect privacy and security of patient data in the EHR</td>
<td>Conduct or review a security risk analysis, implement security updates as necessary, and correct identified security deficiencies</td>
</tr>
<tr>
<td>Report clinical quality measures to CMS or states</td>
<td>For 2011, provide aggregate numerator and denominator through attestation; for 2012, electronically submit measures</td>
</tr>
</tbody>
</table>

### Meaningful Use: Menu Set

<table>
<thead>
<tr>
<th>Objective</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible professionals, hospitals, and critical access hospitals may select any five choices from the menu set</td>
<td></td>
</tr>
<tr>
<td>Implement drug formulary checks</td>
<td>Drug formulary check system is implemented and has access to at least one internal or external drug formulary for the entire reporting period</td>
</tr>
<tr>
<td>Incorporate clinical laboratory test results into EHRs as structured data</td>
<td>Over 40% of clinical laboratory test results whose results are in positive/negative or numerical format are incorporated into EHRs as structured data</td>
</tr>
<tr>
<td>Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, research, or outreach</td>
<td>Generate at least one listing of patients with a specific condition</td>
</tr>
<tr>
<td>Use EHR technology to identify patient-specific education resources and provide those to the patient as appropriate</td>
<td>Over 10% of patients are provided patient-specific education resources</td>
</tr>
<tr>
<td>Perform medication reconciliation between care settings</td>
<td>Medication reconciliation is performed for over 50% of transitions of care</td>
</tr>
<tr>
<td>Provide summary of care record for patients referred or transitioned to another provider or setting</td>
<td>Summary of care record is provided for over 50% of patient transitions or referrals</td>
</tr>
<tr>
<td>Submit electronic immunization data to immunization registries or immunization information systems</td>
<td>Perform at least one test of data submission and follow-up submission (where registries can accept electronic submissions)</td>
</tr>
<tr>
<td>Submit electronic syndromic surveillance data to public health agencies</td>
<td>Perform at least one test of data submission and follow-up submission (where public health agencies can accept electronic data)</td>
</tr>
</tbody>
</table>

**Additional choices for hospitals and critical access hospitals**

| Record advance directives for patients 65 years of age or older            | Over 50% of patients 65 years of age or older have an indication of an advance-directive status recorded                                  |
| Submit electronic data on reportable laboratory results to public health agencies | Perform at least one test of data submission and follow-up submission (where public health agencies can accept electronic data)       |

**Additional choices for eligible professionals**

| Send reminders to patients (per patient preference) for preventive and follow-up care | Over 20% of patients 65 years of age or older or 5 years of age or younger are sent appropriate reminders                                 |
| Provide patients with timely electronic access to their health information (including laboratory results, problem list, medication lists, medication allergies) | Over 10% of patients are provided electronic access to information within 4 days of its being updated in the EHR                       |

The Goals

• Enable informed automation (clinical decision support) to decrease the cognitive load on clinicians so they can better attend to communication, relationship and information management

• Respond to national movement toward individual and collective responsibility and interoperability (“send data to others as you would have them send data to you”)

• Increase quality, safety and efficiency
Informatics
From the practical perspective

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CIO, Health Sciences Center
The University of Florida
Informatics from the practical perspective

- What is “practical” informatics
- Why do we need Informatics Professionals?
- Who are they?
- Who do we need?
- What will they do
- Where will we find/grow them?
What is “practical” informatics?

- Biomedical informatics is the field devoted to improving human health, health care, and biomedical research through **optimal use of information**, usually with the aid of information technology (IT)\(^1\).

- Informatics solves problems in health care delivery, pharmaceutical, biomedical and health sciences research, health education and clinical/medical decision making\(^2\).

1 myamia.org; 2 informaticsprofessor.blogspot.com
Careers in informatics

“...informatics is the synergistic and unique intersection of health sciences, computer sciences, and management sciences ...”

It does not simply mean being the IT guy in a hospital or a computer programmer in a basement somewhere

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1Bill Hersh, informaticsprofessor.blogspot.com
What is informatics?

Among other things - It is about figuring out how to deal with and learn from huge amounts of health data and information …

that we collect, but struggle to use effectively to improve medical research, decision making and the health of individuals and populations
A Tsunami of Data

"There is a tsunami of data that is crashing onto the beaches of the civilized world. This is a tidal wave of unrelated, growing data formed in bits and bytes, coming in an unorganized, uncontrolled, incoherent cacophony of foam. It's filled with flotsam and jetsam. It's filled with the sticks and bones and shells of inanimate and animate life. None of it is easily related, none of it comes with any organizational methodology."

Informatics Definitions

› Biomedical Informatics
  › Considered by AMIA to be the core scientific discipline (1)
  › Investigates and supports reasoning, modeling, simulation, experimentation and translation across the spectrum from molecules to individuals to populations, from biological to social systems, bridging basic and clinical research and practice, and the healthcare enterprise.”

› Applied Clinical Informatics and Health Informatics:
  › “A discipline at the intersection of information science, computer science, and health care." (2)
  › "Deals with the resources, devices, and methods required to optimize the acquisition, storage, retrieval, and use of information in health and biomedicine." (2)
  › A platform for knowledge sharing between clinical medicine and health IT specialists (3)
  › Bridges the gap between visionary design and successful and pragmatic deployment

Source:
(1) AMIA: http://www.amia.org/biomedical-informatics-core-competencies
Why do we need informatics professionals?

- Few IT trained professionals have the deep knowledge of healthcare needed
  - to deliver solutions that actually make the clinicians' jobs easier
  - many “solutions” take time away from patient care...
- Systems are better at capturing single events than at capturing complex documentation
- Much EMR data remains unstructured
- Increasing adoption of electronic health records
  - Competitive pressures
  - Federal incentives and penalties
  - Importance of process in achieving value
- Informatics is an increasingly important part of research grant proposals
What do we need done?

- Enable more effective use of the EHR/EMR - assist in making the systems more "usable"
- Ensure appropriate training of healthcare workers on use of EHR technology
- Must capture integrated STRUCTURED data to serve long-term strategic decision support and research needs - need informatics assistance to get the "right" structured data
- Enable usage of structured data in research studies
- Assist in appropriate scoping and costing of research proposals
Skillset: Biomedical Informaticians

- Individuals trained specifically on medical ontologies, data utilization, education, etc.
- Trained in official informatics programs or fellowships
- Able to participate in and support grant proposals
- Logical, creative, analytical
- Collaborative, communicative and willing to partner with IT and others
Skillset: Clinical Informaticians

- Clinical experience as a MD, RN, Lab Tech, etc.
- CMIO or equivalent should be trained in clinical informatics and must have the respect of other clinicians
- Able to translate between IT, clinicians and informatics community
- Logical, creative, analytical
- Collaborative, communicative, charming
- Passion for making things better
What we need from Informaticians

- Work with researchers to effectively utilize resources, support research proposals, and devise studies
- Teach informatics – systems usage, importance of structured/correct data and data usage for clinical decision support and research
- Work with IT and researchers to ensure appropriate systems are in place to support the research mission
What we need from Clinical Informaticians

- Work with clinicians to implement best practice, improve system usability, patient safety, quality of care, and cost efficiency of healthcare delivery
- Work with IT and training staff to appropriately train current healthcare workers on EMR usage
- Work with health science colleges curriculum planners to appropriately train students on EMR usage, importance of structured and correct data, and the many usages of data for clinical decision support and research
- Ensure that an organization meets meaningful use requirements and other regulations
Who do we need?

We need multiple informaticians - both leaders and staff...

Clinical

Imaging

Bioinformatics

Analytic

Health/population
Strategies for finding the right talent?

- Individuals with a penchant for applying digital information and technology to problems and opportunities have existed for years:
  - Departmental and grant specific
  - Many organizations have not had an enterprise home for them
- Grow them
  - Ensure that your health sciences colleges teach EMR utilization and offer informatics coursework
  - Encourage student enrollment in informatics programs
  - Make a home at the enterprise level - CMIO’s Office, CTSA Core
- Through AMIA, Clinical Research Forum, recruitment firms or personal networking
Building an informatics core: Organizational challenges

- Informatics still not well understood
- Getting on the same page
  - Executive leaders
  - Researchers
  - Informaticians
  - IT
- Often not an enterprise home for informatics
- Recruiting faculty and developing academic informatics
Building a team

- Sell leadership on the need to include informaticians
- Get appropriate funding
  - Start with project funding
  - Long term funding found in
    - Grant growth opportunities / new emphasis on translational research
    - Opportunities to improve healthcare and reduce healthcare costs
- Ensure that they are part of AMIA and other professional societies, on mail lists and bulletin boards
- If they’re not formally trained, make it happen
- Don’t settle - you must have the right people
- Look for passion, creativity, charisma AND an ability to “partner” with IT and customers
Meaningful Use of Health Information Technology Requires a Competent Workforce

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Web: www.billhersh.info
Blog: informaticsprofessor.blogspot.com
Use of information is critical to improving health and healthcare

- Improved use of information is essential for quality, safety, and integration of care
  - This is even more imperative with ARRA/HITECH and ACA legislation
- Biomedical and health informatics is the discipline of improving healthcare, biomedical research, and public health through better use of information (Hersh, 2009)
  - It’s about information, not technology
- Competency in informatics varies by group
  - Clinicians (Stead, 2010; Shortliffe, 2010)
  - Informaticians (Hersh, 2010)
- Physicians are not luddites: 72% use smartphones (Dolan, 2010)
We have entered a new “ARRA” of health IT and informatics

“To lower health care cost, cut medical errors, and improve care, we’ll computerize the nation’s health records in five years, saving billions of dollars in health care costs and countless lives.”

First Weekly Address
Saturday, January 24, 2009
Implications of the new “ARRA” for health IT and informatics

- Health Information Technology for Economic and Clinical Health (HITECH) Act of the American Recovery and Reinvestment Act (ARRA) (Blumenthal, 2010)
  - Incentives for “meaningful use” of electronic health records (EHRs) by physicians and hospitals (up to $27B)
    - We have a long ways to go: ~10% complete adoption by physicians (Hsaio, 2010) and hospitals (Jha, 2010)
  - Direct grants administered by federal agencies, including workforce development ($2B)
- Patient Protection and Affordable Care Act (ACA) initiatives require IT and informatics, e.g., accountable care organizations (ACOs), value-based purchasing, etc.
What do we know about the informatics workforce?

• Systematic reviews show benefit for HIT interventions but many studies done in small number of academic centers (Garg, 2005; Buntin, 2011)

• Problematic health IT implementations well-known, with failure often attributable to lack of understanding of clinical environment and workflow (Leviss, 2010; Einbinder, 2010)

• Case study: implementation of computerized physician order entry (CPOE) showed adverse consequences
  – Mortality rate increased from 2.8% to 6.6% at Children’s Hospital of Pittsburgh Pediatric ICU (Han, 2005)
  – Increased mortality not seen at other academic centers (Del Baccaro, 2006; Jacobs, 2006)
  – Pittsburgh adverse outcome may have been avoided with adherence to known “best practices” (Phibbs, 2005; Sittig, 2006)
Who is the HIT workforce?

- Three historical groups of HIT professionals
  - Information technology (IT) – usually with computer science or information systems background
  - Health information management (HIM) – historical focus on medical records
  - Clinical informatics (CI) – often from healthcare backgrounds
- A challenge: with exception of HIM, no standard occupational classification (SOC)
How many IT personnel do we have and do we need?

- **IT** – to reach level of known benefit and meaningful use, may need 40,000 (Hersh, 2008)
  - Medical Records and Health Information Technicians (RHITs and coders) – projected 20% growth in next 10 years
- **CI** – growing number of individuals who combine clinical knowledge and informatics skills
  - Analysts, trainers, support staff, etc.
  - Recognition of growing role of CMIO and other CI leaders (Leviss, 2006; Shaffer, 2010), leading to proposal for medical subspecialty (Detmer, 2010)
What competencies must informaticians have? (Hersh, 2009)

**Health and biological sciences:**
- Medicine, nursing, etc.
- Public health
- Biology

**Management and social sciences:**
- Business administration
- Human resources
- Organizational behavior

**Computational and mathematical sciences:**
- Computer science
- Information technology
- Statistics
HITECH Workforce Development Program

- Community College Consortia to Educate Health Information Technology Professionals Program ($70M)
  - Five regional consortia of 70 community colleges offering short-term training for 10,000 individuals per year
- Curriculum Development Centers Program ($10M)
  - Five universities collaboratively developing (with community college partners) HIT curricula for 20 components (courses)
  - One of the five centers (OHSU) additionally funded as National Training and Dissemination Center
  - Curriculum now available: www.onc-ntdc.info
- Competency Examination for Community College Programs ($6M)
  - Developing competency examinations based on the six community college job roles
- Program of Assistance for University-Based Training ($32M)
  - Funding for education of individuals requiring university-level training at nine universities (including OHSU)
  - Emphasis on short-term certificate programs delivered via distance learning
Informatics now viewed as a core competency for health professionals

- According to IOM, the modern health professional must have competency in informatics as part of larger goal to provide patient-centered care (Greiner, 2003)

- Informatics competency is not just computer literacy
  - The “Google generation” (aka, “digital natives”) does not necessarily have good information skills (CIBER, 2008)
Competencies and workforce development for clinicians

Growing recognition that healthcare professionals need

- Basic computer literacy
- Competency with primary and secondary uses of information (Stead, 2010; Shortliffe, 2010)
  - e.g., quality measurement and improvement, evidence-seeking, collaboration, etc.

Some noteworthy initiatives (Hersh, 2010)

- AAMC MSOP (1998) – details old but framework still valid
- Also nursing (Gugerty, 2009), public health (CDC, 2009), nutrition (Hoggle, 2010) and others
For more information

- Bill Hersh
  - http://www.billhersh.info
- Informatics Professor blog
  - http://informaticsprofessor.blogspot.com
- OHSU Department of Medical Informatics & Clinical Epidemiology (DMICE)
  - http://www.ohsu.edu/informatics
  - http://oninformatics.com
- OHSU financial assistance for informatics training
  - http://www.informatics-scholarship.info
- What is BMHI?
  - http://www.billhersh.info/whatis
- Office of the National Coordinator for Health IT (ONC)
  - http://healthit.hhs.gov
- American Medical Informatics Association (AMIA)
  - http://www.amia.org