

# What is Biomedical and Health Informatics? (4/7)

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## We also need to think beyond the EHR of a single organization

- Patients are “mobile” – may develop medical problems or receive care away from their physician office or local hospital
  - Of 3.7M patients in Massachusetts, 31% visited 2 or more hospitals over 5 years (57% of all visits) and 1% visited 5 or more hospitals (10% of all visits) (Bourgeois, 2010)
  - Of 2.8M emergency department (ED) patients in Indiana found 40% of patients had data at multiple institutions, with all 81 EDs sharing patients in common (Finnell, 2011)
- Also greater need in public health sphere with growing threats of emerging diseases, bioterrorism, etc.



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## Beyond the EHR: health information exchange (HIE; Kuperman, 2011)

- “Anytime, anywhere access to clinical information for the care of patients” – William Yasnoff, MD, PhD
- “Data following the patient” – Carolyn Clancy, MD, Director, AHRQ
- Requires that information seamlessly flow across business boundaries
  - Challenges are not only technical, but also financial, legal, etc.
- But there are other successful examples of information exchange, such as ATM cards, wireless networks, etc.

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## Example of HIE: Indiana Health Information Exchange

- (McDonald, 2005)
- [www.ihie.org](http://www.ihie.org)
- Access to clinical information in real time by
  - Most hospital emergency departments
  - Many hospital-based clinicians
  - Some primary care providers in community
  - Homeless care network
  - Public school clinics
  - County Health Department
  - Indiana State Health Department



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## “Results” of other HIE efforts have been mixed

- Successful
  - Inland Northwest Health System (INHS, [www.inhs.org](http://www.inhs.org)), Spokane, WA
  - Massachusetts eHealth Collaborative ([www.maehc.org](http://www.maehc.org)) (Halamka, 2005; Gorroll, 2009)
- Less so
  - Santa Barbara County Care Data Exchange – combination of technical, leadership, and funding problems (Miller, 2007; Brailer, 2007)
  - Portland, Oregon (Conn, 2007)

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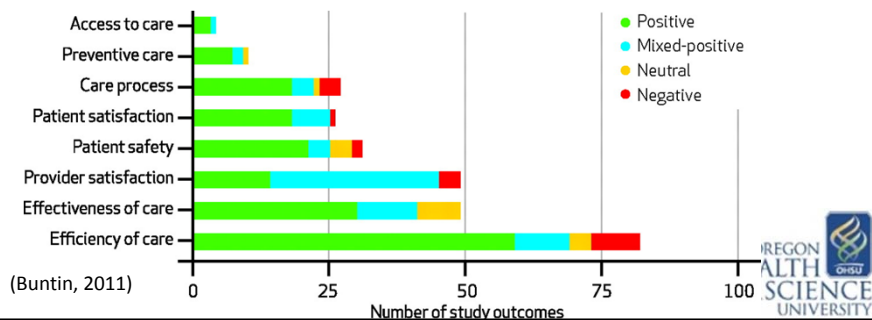
## Nationwide Health Information Network (NwHIN)

- <http://healthit.hhs.gov/nhin>
- HITECH investing \$547M in state-level HIE as well as in standards and tools to facilitate NwHIN
  - e.g., Direct Project, [wiki.directproject.org](http://wiki.directproject.org)



## How much progress have we made?

- Systematic reviews (Chaudhry, 2006; Goldzweig, 2009; Buntin, 2011) have identified benefits in a variety of areas
  - Although 18-25% of studies come from a small number of ‘health IT leader’ institutions



## Caveats about progress

- HIT may introduce error (Koppel, 2005) or other unintended consequences (Ash, 2004)
- Report from National Research Council found IT had not met its potential in healthcare (Stead, 2009; good overview in: Conn, 2009 and Conn, 2009)
- Growing area of concern: HIT system safety (Leviss, 2010; Sittig, 2011)

# Why are we not there? What are the barriers? (Hersh, 2004)

## Health Care Information Technology Progress and Barriers

William Hersh, MD

**I**N THE 3 DECADES SINCE THE TERM "MEDICAL INFORMATICS" was first used, individuals working at the intersection of information technology (IT) and medicine have developed and evaluated computer applications aimed at improving patient care and clinical practice. The most common applications are electronic health records (EHRs), patient portals, and decision support systems. The most recent applications are patient-physician e-mail, patient-physician e-consult, and patient-physician e-referral. The most recent applications are patient-physician e-mail, patient-physician e-consult, and patient-physician e-referral.

in this issue of JAMA, Slack demonstrates the value that patient-physician e-mail can have in improving patient care, and also catalogs the incomplete but encouraging underlying evidence.<sup>11</sup> As with many applications of IT, the technology can improve the existing situation but also empower clinicians and patients to think more fundamentally about how innovation can lead to changes in the way medicine is practiced.

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

care IT.<sup>10</sup> It is no exaggeration to declare that the years ahead portend the "decade of health information technology."<sup>10</sup>

Informatics is poised to have a major impact in patient-clinician communication. In the Clinical Crossroads article

See also p 2255.

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ment. The rest goes to those who typically do not pay for

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## Cost barriers

- Even though there is overall return on investment (ROI), benefit does not accrue to those who pay, especially in small practices (Johnston, 2003)
  - Practices only see 11% of ROI – most goes to insurance companies and laboratories
  - But they are usually asked to pay the cost of EHRs
- Later data showed physicians achieved positive ROI around 2.5 years after initial investment, although range was wide (Miller, 2005)



## Technical challenges

- While underlying technology (e.g., networks, relational database systems) is well-established, other technical issues remain, such as
  - Implementing systems, especially in office settings (Carter, 2008; Daigrepont, 2011)
  - Matching systems to workflow is essential – best systems add time in some areas but make it up in others (Overhage, 2001; Samuels, 2008)
- Most successful implementations have transformed care delivery and not just replaced paper records (Liang, 2010; Schulte, 2011)

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## Need for interoperability

- Clinical data is trapped in “silos,” not easily moved from one system to another (Brailer, 2005)
- Growing push for attention to “secondary use of clinical data,” which can align benefits for quality assessment, clinical research, public health surveillance, etc. (Safran, 2007)
- To achieve this, need standards for data elements, communications, etc. (EHRA, 2009; Benson, 2010)

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## Concerns about privacy and confidentiality

- Much written, strong opinions (McGraw, 2009; ACP, 2009)
- VERY real, but
  - Security technologies are well-known and proven effective
  - Paper-based records are at least as insecure as EHRs and probably more so
  - Human curiosity will trump even best methods, so we need to consider benefits vs. risks
  - HIPAA is a mixed blessing; many argue for modification, e.g., (Ness, 2007; Nass, 2009)

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## HIT workforce – what do we know?

- Not much, other than it is important!
- 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)
- Problematic health IT implementations well-known, with failure often attributable to lack of understanding of clinical environment (Leviss, 2010)

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## Who is the HIT workforce? (Hersh, 2010)

- 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

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## How many HIT personnel do we have and do we need?

- IT – to reach level of known benefit and meaningful use, may need 40,000 (Hersh, 2008)
- HIM – from US Bureau of Labor Statistics occupational employment projections 2008-2018 (BLS, 2009)
  - Medical Records and Health Information Technicians (RHITs and coders) – about 172,500 employed now, increasing to 207,600 by 2018 (20% growth)
- CI – estimates less clear for this emerging field
  - One physician and nurse in each US hospital (~10,000) (Safran, 2005)
  - About 13,000 in healthcare (Friedman, 2008) and 1,000 in public health (Friedman, 2007)
  - Growing role of CMIO and other CI leaders (Leviss, 2006; Shaffer, 2010)

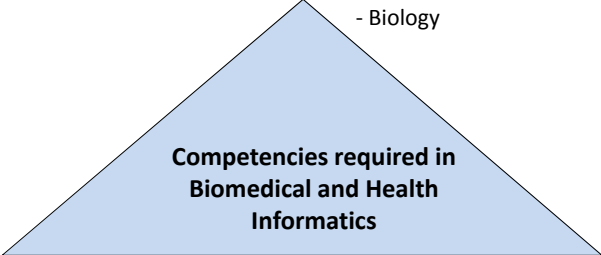
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## What competencies must CI professionals have? (Hersh, 2009)

### Health and biological sciences:

- Medicine, nursing, etc.
- Public health
- Biology



### Competencies required in Biomedical and Health Informatics

### Management and social sciences:

- Business administration
- Human resources
- Organizational behavior

### Computational and mathematical sciences:

- Computer science
- Information technology
- Statistics

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## ONC estimated 51,000 needed for HITECH agenda in 12 workforce roles

- Mobile Adoption Support Roles
  - Implementation support specialist\*
  - Practice workflow and information management redesign specialist\*
  - Clinician consultant\*
  - Implementation manager\*
- Permanent Staff of Health Care Delivery and Public Health Sites
  - Technical/software support staff\*
  - Trainer\*
  - Clinician/public health leader†
  - Health information management and exchange specialist†
  - Health information privacy and security specialist†
- Health Care and Public Health Informaticians
  - Research and development scientist†
  - Programmers and software engineer†
  - Health IT sub-specialist†

(to be trained in \*community colleges and † universities)

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## Other important workforce developments

- Physicians
  - Proposal to establish a clinical informatics subspecialty (Detmer, 2010) based on core curriculum (Gardner, 2009) and training requirements (Safran, 2009)
- Other health professionals
  - Nursing – TIGER initiative (Gugerty, 2009)
  - HIM (Wilhelm, 2007; Dimick, 2008)
  - Nutrition (Hogge, 2010)

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