Health Information Technology Workforce: Identifying the Gaps

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Overview of talk

- Barriers and challenges to health information technology (HIT)

- Recent research and its limitations

- Implications for research, policy, and education

Despite the benefits, there are barriers and challenges to HIT (Hersh, 2004)

Health Care Information Technology
Progress and Barriers

William Hersh, MD

IN 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 aim-

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.[11] 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.[8,9] It is no exaggeration to declare that the years ahead portend the "decade of health information technology."[10]

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

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

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Why do we need to know about the HIT workforce?

- Chaudhry (2006) systematic review of HIT benefits showed 25% of all studies done at 4 medical centers
  - Can results be generalized and/or scaled?
- Studies of computerized physician order entry (CPOE) show possible adverse consequences
  - Han et al. (2005) found mortality rate increased from 2.8% to 6.6% in Children's Hospital of Pittsburgh pediatric ICU
  - Increased mortality not seen at other academic centers (Del Baccaro, 2006; Jacobs, 2006)
  - Pittsburgh adverse outcome may have been avoided with known "best practices" (Phibbs, 2005; Sittig, 2006)

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What do we know about the HIT workforce?

- Traditional groupings of professionals
  - Information technology (IT) – usually with computer science or information systems background
  - Health information management (HIM) – historical focus on medical records
  - Clinical informatics (CI) – usually from health care backgrounds
  - Others – librarians, trainers, etc.
- Most studies have focused on professional groupings (usually IT or HIM staffing)

What does the data show?

Group	Quantitative	Qualitative
IT	US and UK: ~1 FTE per ~50 non-IT FTE[1,2,3]; need for 40-60,000 more[4,5]	Knowledge of health care deemed essential[6]
HIM	~170,000 now, increasing to ~200,000 by 2016[7]	Evolving role as technology changes[8]
CI	Unknown; estimates of 10,000-13,000 clinical[9.10] and ~1,000 public health[11]	CMIO is example of a new position and is evolving[12,13]

[1]Shaffer, 2008; [2]Eardley, 2006; [3]Hersh, 2008; [4]Hersh, 2008; [5]Friedman, 2009;
[6]Monegain, 2004;[7]Dohm, 2007;[8]AHIMA, 2003, [9]Safran, 2005; [10]Friedman, 2007;
[11]Friedman, 2007; [12]Leviss, 2006; [13]Shaffer, 2008

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More details on previous data

- IT
  - Gartner study of US-based integrated delivery systems
  - English NHS
  - Study of HIMSS Analytics Database™
- HIM
  - Bureau of Labor Statistics data
- CI
  - Mainly estimates so far

Gartner on IT staffing in integrated delivery systems (Shaffer, 2008)

- About 2.1% of organizational FTE in IT, i.e., one IT staff per 48 non-IT employees
- Typical IT job functions include
  - Programmer/analyst – 49%
  - Management – 15%
  - Technical support/help desk – 13%
  - Computer operations – 8%
  - Telecommunications/ network support – 7%
  - Administration – 3%
  - Security – 2%

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"Informatics" workforce in English NHS (Eardley, 2006)

- Estimated 25,000 full-time equivalents out of 1.3 million workers in NHS
  - One IT staff per about 52 non-IT workers
- Distributed in following categories
  - Senior managers – 7%
  - Health records staff – 26%
  - Knowledge management staff – 9%
  - Information and Communication Technology staff – 37%
  - Information management staff – 18%
  - Clinical informatics staff – 3%
- Other issues
  - Retention problems – attributed to uncompetitive pay
  - Future skills shortages anticipated
  - Strong support for establishment of formal informatics profession

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Nationwide Health Information Network (NHIN) Workforce Study

- (Altarum, 2007)
- Estimated workforce needed to implement NHIN nationally over five-year implementation time
  - 7,600 FTE for installation of EHRs for 400,000 practicing physicians who do not currently have them
  - 28,600 FTE for the 4,000 hospitals that need EHRs
  - 420 FTE to implement the health information infrastructure

HIM data from US Bureau of Labor Statistics

- From US Bureau of Labor Statistics occupational employment projections 2006-2016 (Dohm, 2007)
  - Medical Records and Health Information Technicians – about 170,000 employed now, increasing to 200,000 by 2016 (17.8% growth)
  - Need 76,000 employed for growth and net replacements

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HIMSS Analytics study (Hersh and Wright, 2008)

- Question: Can we characterize the IT workforce in US hospitals?

- Answered using HIMSS Analytics Database™ (www.himssanalytics.com)
  - Contains self-reported data from about 5,000 US hospitals, including elements such as number of beds, total staff FTE, total IT FTE (as well as broken down by major IT job categories), applications, and the vendors used for those applications
  - Recent addition is EMR Adoption Model™, which scores hospitals on eight stages to creating a paperless record environment

HIMSS Analytics EMR Adoption Model™

Level required for documented benefits of HIT (*meaningful use?)*

Stage 7	Medical record fully electronic; CDO able to contribute to EHR as byproduct of EMR
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS
Stage 5	Closed loop medication administration
Stage 4	CPOE, CDSS (clinical protocols)
Stage 3	Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology
Stage 2	CDR, CMV, CDSS inference engine, may have Document Imaging
Stage 1	Ancillaries – Lab, Rad, Pharmacy – All Installed
Stage 0	All Three Ancillaries Not Installed

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Methods

- Computed IT staffing ratios, defined as the number of IT FTE per hospital bed for each level of the EMR Adoption Model and for our dataset overall

- Used the staffing ratios to extrapolate the total number of IT staff required for to cover all licensed hospitals beds in the US (American Hospital Directory, http://www.ahd.com/state_statistics.html)

Results

- IT FTE per bed <0.1 for stages 1-2, rising to ~0.2 for stages 4-6

- Extrapolating to US
  - 108,390 IT staff at current adoption at present
  - Would increase to 149,174 if all stages <4 hospitals moved to stage 4
    - Sound bite: Need for >40,000 more!
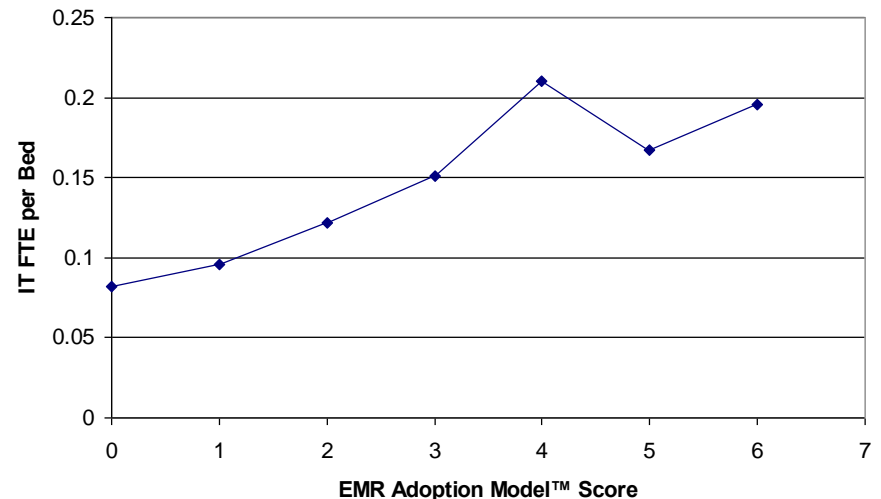
Limitations of study

- Mostly related to HIMSS Analytics Database not being explicitly designed to answer these questions
- Data incomplete
  - Missing or unrealistically low values
- No data on
  - Informaticians
  - Any who work outside hospital settings or in non-clinical areas (e.g., bioinformatics, public health informatics, etc.)
- Describes current practices, not necessarily best practices

Clinical informatics

- Individuals who bring skills at intersection of health care and IT (Hersh, 2008; Hersh, 2009)
  - Focus more on information than technology
  - Likely to lead "meaningful use" of HIT
- Estimates of need
  - Safran (2005): One physician and nurse in each US hospital (~10,000)
  - Friedman: About 13,000 in health care (2008) and 1,000 in public health (2007)
  - Limitation: Lack of Standard Occupation Code (SOC) (BLS, 2004)

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Case study of two Oregon health systems (Jacobs, unpublished)

- Semi-structured interviews of leadership and managers
- Key qualifications for CI professionals included
  - Clinical training or exposure and an understanding of clinical workflow
  - Soft skills, including "culture fit," service and team orientation, communication skills, patience, and adaptability to a rapidly changing environment
  - Aptitude for technology learning and appreciation of data rather than highly advanced technical skills or a computer science background
  - Six Sigma, Lean, and Change Management training
  - Bachelors degree as a baseline

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HIT needs for the ARRA agenda (i.e., health care reform)

- ONC has defined six different types of HIT workers for ARRA-driven EHR adoption
  - Estimated need for 60,000 workers (Friedman, 2009)
- Categories of worker needed
  1. Implementation technical support staff
  2. Implementation support managers
  3. Workflow redesign specialists
  4. Clinical consultants
  5. Software support specialists
  6. Trainers

Implications for practice and education

- Transformation of environment
  - Informatics has become more of an organizational strategy than a research area
  - Needs for expertise are more substantial in implementation than development
- Transformation of workforce needs
  - Greater needs for professionals than researchers
  - Professional certification coming (e.g., for physicians, Gardner, 2009; Sarfan, 2009)
- Transformation of education
  - On-line and/or smaller offerings

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Research and policy issues

- Research
  - Need to better understand optimal organization and training of workforce
  - Notable finding of Chaudhry systematic review: 25% of all studies from 4 institutions – how can we generalize that success?
- Policy
  - Advocacy for research – need to look beyond individual situations and study systems issues
  - Funding to develop and expand workforce (Section 3016 of ARRA)

How to get there? Informatics education

- Historically at graduate level
  - Role for community college and undergraduate institutions?
    - Informatics is inherently multidisciplinary and there is no single job description or career pathway
- More information on programs on AMIA web site
  - http://www.amia.org/informatics-academic-training-programs
- Commentary at
  - http://informaticsprofessor.blogspot.com

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Overview of OHSU approach (http://www.ohsu.edu/dmice/)

PhD
- Knowledge Base
- Advanced Research
  Methods
- Biostatistics
- Cognate
- Advanced Topics
- Doctoral Symposium
- Mentored Teaching
- Dissertation

Masters
- Tracks:
    - Medical Informatics
    - Bioinformatics
- Thesis or Capstone

Graduate Certificate
- Tracks:
    - Medical Informatics
    - Health Information Management

10x10
- Or introductory course

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Education in smaller doses – 10x10 (Hersh, 2009)

- Partnership with American Medical Informatics Association (AMIA)
  - Based on Safran's estimated need of one physician and one nurse trained in informatics in each US hospital
  - Or, put another way, aim to educate 10,000 health care professionals by 2010
- Course consists of introductory on-line course and adding one-day face-to-face session
  - Adaptation of graduate-level BMI 510 course
  - Initial (Hersh, 2007) and subsequent (Feldman, 2008) offerings well-received
  - Nearly 750 have completed nearing end of 2009
  - An entry way into field; not definitive training

AMIA 10x10
10,000 Trained by 2010

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Conclusions

- HIT is impacting all areas of individual health, health care, public health, and biomedical research

- A requirement for its successful use and dissemination is a highly competent workforce, especially in CI

- We need research and policy attention to optimize the organization and education of this workforce