AMIA Annual Symposium 2014
Year in Review

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References and slides at:
http://skynet.ohsu.edu/~hersh/yearinreview2014.html
Acknowledgements

• Dan Masys – years of service in this endeavor
• Bonnie Westra – this year’s SPC Chair who kept this going
• Don Lindberg – who has contributed so much to the field over the decades
• Laurie Novak – Chair of AMIA Diana Forsythe Award Committee
• ACMI members – who nominated papers and events as they have each year
• Students, faculty, and staff of OHSU DMICE – who motivate our work and commitment
Agenda

• Bill’s methods and results for foundations and clinical informatics – 25 minutes
• Joan’s methods and results for mixed methods and qualitative evaluation – 25 minutes
• Bill’s continued results for foundations and clinical informatics and important events for year – 25 minutes
• Open mic for audience to inform us of papers and events left out – 15 minutes
Bill’s methods – normal work

Table of Contents of journals
- Informatics journals
- General medical journals

Email notifications, e.g.,
- MDLinx
- Modern Healthcare

Other sources, e.g.,
- Blogs – THCB, Halamka, Boone, etc.
- Listservs
- Serendipity

Read
↓
Synthesize
↓
Capture in EndNote if used for other purposes

Teaching

Writing

Research
Bill’s methods – additions for this

Table of Contents of journals
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Teaching

Write

Research

AMIA member query

AMIA Year in Review
Methods

• Include
  – Foundations of informatics
  – Clinical informatics

• Exclude
  – Translational bioinformatics
  – Clinical research informatics
  – Public health informatics
  – Informatics in media

• If evaluation study
  – Quantitative – Bill
  – Qualitative or mixed methods – Joan
Organization of candidate topics and papers

- Electronic health record (EHR)
  - Usage
  - Meaningful use (MU)
  - Clinical decision support (CDS)
  - Quality
  - Usability
  - Interoperability

- Personal health record (PHR)
- Big Data and Analytics
- Privacy
- Information retrieval (IR)
- Health information exchange (HIE)
- Telemedicine
- Health IT implementation
- Health IT workforce
- Education
EHR usage – continues to increase


EHR usage – good and bad

In this nationally representative sample, over three-quarters of EHR adopters reported that EHR use enhanced patient care overall. To varying degrees, EHR adopters reported benefits of EHR use for specific measures of clinical quality, patient safety, and efficiency. Physicians using EHRs that met Meaningful Use criteria who had two or more years of EHR experience were the most likely to report clinical benefits.


EHR – meaningful use (MU), evidence for and against


EHR MU – achievable in many settings

Principal Findings. Providers in the dataset performed strongly on all core measures, with the most frequent response for each of the 15 measures being 90–100 percent compliance, even when the threshold for a particular measure was lower (e.g., 30 percent). PCPs had higher scores than specialists for computerized order entry, maintaining an active medication list, and documenting vital signs, while specialists had higher scores for maintaining a problem list, recording patient demographics and smoking status, and for providing patients with an after-visit summary. In fact, 90.2 percent of eligible providers claimed at least one exclusion, and half claimed two or more.


EHR MU – but not without challenges

Table 2. Association of Stage 1 Meaningful Use (MU) Status With Clinical Quality Measures

| Clinical Quality Measure | MU Physicians, No. | Patients With High-Quality Care for MU Physicians, Mean (SD), % | Non-MU Physicians, No. | Patients With High-Quality Care for Non-MU Physicians, Mean (SD), % | P Value
---|---|---|---|---|---
| Hypertension: BP <140/90 mm Hg | 471 | 44 (23) | 155 | 38 (24) | .005
| DM: HbA1c level <8.0% | 320 | 57 (25) | 103 | 55 (29) | .60
| DM: urine protein screen or ACE/ARB | 358 | 76 (24) | 135 | 78 (24) | .39
| DM: LDL-C <100 mg/dL | 373 | 81 (22) | 139 | 76 (26) | .02
| CAD: β-blocker therapy | 128 | 96 (12) | 19 | 99 (4) | .24
| Asthma: chronic therapy | 339 | 59 (24) | 77 | 66 (28) | .03
| Depression: treatment for ≥12 wk | 93 | 42 (25) | 6 | 68 (26) | .02


[Table image]

[Table image]

[Table image]
Clinical decision support (CDS) – still needed


CDS – many successful applications continue to be reported


CDS – successful applications (cont.)


CDS – still beneficial but not enduring or educational


CDS – also with other challenges, including overrides

EHR – does it improve quality?


EHR – can it be used to measure quality?

EHR usability – concerns continue


EHR interoperability

• Hope for standardization of some types of data

• But others have a way to go
Informatics interventions take place in rapidly changing environments—moving targets

- Variables are outside your control
- Software, content, and hardware are continuously upgraded and updated
- So qualitative formative evaluation is often appropriate
For example, qualitative research can enhance randomized controlled trials


- Qualitative study about qualitative studies
  - Found three models for mixed methods—peripheral, add-on, and integral (the best, but hard)
Joan’s selection methods included

Table of Contents of journals
- Informatics journals
- Other journals

ACMI nominations

Diana Forsythe Committee selections (thanks to Laurie Novak and the committee!)

Teaching
- Writing
- Research

Read
Synthesize
Capture

AMIA Year in Review
Qualitative inclusion criteria were

- Date (sometimes had to guess)
- Clearly informatics related
- Adhered to STARE-HI or RATS guidelines
  - Especially triangulation


RATS Qualitative Research Review Guidelines. www.biomedcentral.com
The organization of topics follows a life cycle

• Fundamental understanding of users
• Design of systems
• Procurement
• Implementation and optimization

• Evaluation of usage
  – HIE
  – Long term care
  – Consumer access
  – Communication, cooperation, collaboration, and cooperation

Means important point

Means DFA finalist
The life cycle looks like this

- Evaluate use
- Understand users
- Design systems
- Procure system
- Implement and optimize

The cycle repeats.
First we need to understand users/consumers

Evaluate use → Understand users
Design systems → Procure system
Implement and optimize → Evaluate use
We need a fundamental understanding of users/consumers before research or system design


- Heart disease patients
- Online self management tools
  - Used generative participatory research techniques
  - Be aware of different needs in different stages
Fundamental understanding of consumers before design


- Elderly telehealth studies have been dominated by trials
- Ethnography and photovoice used here

! Theoretical framework
! Many new insights
! “A radical revision of assistive technology design policy may be needed”
More on a fundamental understanding of consumers before design


- Communication for health promotion


- Literature searching by diabetes patients not influenced by demographics
Then we need to design systems

1. Design systems
2. Procure system
3. Implement and optimize
4. Understand users
5. Evaluate use

Design systems
Design using mixed methods

  - Dental EHR
  - Usability lab, interviews, surveys
Design using mixed methods


Pharmacogenomics focus and usability test using scenarios
Design includes user centered design for public health information systems


Focus on public health workers

Mixed ethnographic and UCD methods
Design includes system design for consumers


  - Patient portal
    ! Theory- Generativity while standardizing


  - Consumer self monitoring
    ! Want personalization
Design includes theories about consumers and trust


- UCD for sexual health
  - Trust theory framework


- Self reports about patient generated genetic data
  - Trust in data, company, genetics is a big issue
Design includes system design for consumers’ online discussion groups


- Online patient support groups
- Empowerment and compliance
  
  ! Literary theory

! Groups may become LESS empowered, tend to comply more
Design includes system design for consumers for telecare


– Telecare for elderly
  ! Framework for understanding
  ! Forcing on them could be coercive
Design includes system design for consumers


– Weight loss
  ! Strong methods
  ! Involve stakeholders sensitively and separately


– Elderly self monitoring
  ! Consumers are not as interested as providers
Design includes human factors approaches to nursing documentation


! Scenario based evaluation approach to a nursing information system
Then we procure systems

- Procure system
- Design systems
- Implement and optimize
- Evaluate use
- Understand users
There was one paper on the procurement of systems


- on e-prescribing
  - Methods Qualitative analysis of expert discussions
  - Results outline considerations for procurement
We then implement and optimize systems.
Implementation and optimization evaluations include


- CPOE in community hospitals
- Verifies prior knowledge


- Ambulatory
- Optimization emphasis
Implementation of BCMA


- BCMA and nursing focus
- Sociotechnical framework
  - Theory Frames of reference
    - Practice Frame
    - System Frame
Implementation and optimization includes CDS

  - Activities needed for successful CDS programs
  - Method-- Rapid Assessment Process
    - Four major areas of activities
Implementation includes the safety of HIT

  - Analysis of EHR safety reports in the VA  
  - Uses sociotechnical framework

  - Survey of safety risks  
  - Risks are underreported, need better reporting
Finally, we evaluate use.

1. Procure system
2. Design systems
3. Implement and optimize
4. Understand users
5. Evaluate use
Evaluation of usage of health information exchange


– Ethnographic methods

Theory- Regional health information ecology framework
Evaluation of usage of HIT in long term care nursing


  Deep analysis of unintended consequences in new setting


  Communication, nursing, and long term care
Evaluation of usage by patients of systems to access their records


- Systematic review
- Access may or may not improve quality of care
- But indications are positive
Big this year, the 4 C’s: Communication, cooperation, collaboration, and coordination

- Communication—exchanging information
- Cooperation—working together to the same end, mutual effort, enabling someone
- Collaboration—working alongside someone to produce something, joint effort
- Coordination—harmonious action
About communication, cooperation, collaboration, and coordination


! Annotations help fill gaps, so pay attention to them


– Deep longitudinal study
  ! Do no harm (to interpersonal relations)
About communication, cooperation, collaboration, and coordination


• On process conflict discomfort
  – Grounded model
About communication, cooperation, collaboration, and coordination


Nursing communication “vulnerabilities”
About communication, cooperation, collaboration, and coordination


  Communication and emotion awareness
About communication, cooperation, collaboration, and coordination


Large sociotechnical study
Personal health records (PHRs) – patients want access to their data


PHRs and patient engagement – variety of positive outcomes


Data analytics, data science, Big Data – predictive abilities abound

• Tran, T, Luo, W, et al. (2014). Risk stratification using data from electronic medical records better predicts suicide risks than clinician assessments. *BMC Psychiatry*. 14: 76. [http://www.biomedcentral.com/1471-244X/14/76](http://www.biomedcentral.com/1471-244X/14/76)

• Ferry, Q, Steinberg, J, et al. (2014). Diagnostically relevant facial gestalt information from ordinary photos. *eLife*. 3: e02020. [http://elifesciences.org/content/3/e02020](http://elifesciences.org/content/3/e02020)

Need successful applications while avoiding “Big Data hubris”


Also must be careful about generalizability and models


Privacy – continued concern, for some


Privacy – also be careful what you post in public forums!

Information retrieval (IR) – needs and sources


CONCLUSIONS AND RELEVANCE Clinicians frequently raise questions about patient care in their practice. Although they are effective at finding answers to questions they pursue, roughly half of the questions are never pursued. This picture has been fairly stable over time despite the broad availability of online evidence resources that can answer these questions. Technology-based solutions should enable clinicians to track their questions and provide just-in-time access to high-quality evidence in the context of patient care decision making. Opportunities for improvement include the recent adoption of electronic health record systems and maintenance of certification requirements.
IR – accuracy


Table 1. Reporting and Comparison of Results Information on ClinicalTrials.gov and in Corresponding Publications (N = 96)

<table>
<thead>
<tr>
<th>Results Information</th>
<th>Trials Reporting</th>
<th>Information Reported in Both Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ClinicalTrials.gov</td>
<td>Publication</td>
</tr>
<tr>
<td>Cohort characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrollment No.</td>
<td>96 (100)</td>
<td>96 (100)</td>
</tr>
<tr>
<td>Completion rate</td>
<td>90 (94)</td>
<td>90 (94)</td>
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<tr>
<td>Sample age distribution</td>
<td>96 (100)</td>
<td>96 (100)</td>
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<td>Sample sex distribution</td>
<td>96 (100)</td>
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<tr>
<td>Trial intervention</td>
<td>96 (100)</td>
<td>96 (100)</td>
</tr>
<tr>
<td>Efficacy end points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primarya</td>
<td>91 (95)</td>
<td>91 (95)</td>
</tr>
<tr>
<td>Secondaryb</td>
<td>89 (93)</td>
<td>94 (98)</td>
</tr>
</tbody>
</table>

Results: For commonly identified assertions, there was statistically significant discordance between 9 of the 10 selected Wikipedia articles (coronary artery disease, lung cancer, major depressive disorder, osteoarthritis, chronic obstructive pulmonary disease, hypertension, diabetes mellitus, back pain, and hyperlipidemia) and their corresponding peer-reviewed sources ($P<.05$) and for all assertions made by Wikipedia for these medical conditions ($P<.05$ for all 9).

IR – new tools

• Text mining

• Watson

• Ontologies
Health information exchange (HIE) – participation lags EHE adoption


HIE – emerging evidence for value


Telemedicine – growing evidence base


The preponderance of evidence from studies using rigorous research methods points to beneficial results from telemonitoring in its various manifestations, albeit with a few exceptions. Generally, the benefits include reductions in use of service: hospital admissions/re-admissions, length of hospital stay, and emergency department visits typically declined. It is important that there often were reductions in mortality (decreases ranging from 15% to 56%). Some studies reported neutral or mixed findings. For example, there may have been no decrease in hospital admissions, but a reduced length of stay or a corresponding increase in outpatient visits. Some investigators reported little change in health services utilization but reductions in mortality. One study⁶¹ reported an increase in mortality among frail elderly patients but no increase in use of services. These findings and explanations for them are reported in detail in the main body of the report. In totality, however, the findings provide useful insight and notable trends in telemedicine interventions in the management of three major chronic diseases.

Health IT implementation – systematic reviews of finance and leadership

Results: A total of 57 articles met our inclusion criteria, including 43 articles (75%) reporting financial benefits to a stakeholder associated with HIT. These included 26 articles (46%) reporting cost savings, 6 articles (11%) reporting revenue gains, and 11 articles (19%) reporting a mixture of cost savings and revenue gains. Among articles with experimental study designs, 22 of 34 (65%) reported financial benefits; and among articles explicitly measuring costs and benefits, 19 of 21 (90%) reported financial benefits. The most prevalent mechanisms were savings on administrative goods and/or personnel, savings on pharmaceuticals, and revenue gains through improved billing. Overall there is a dearth of articles on this topic, especially ones with strong study designs and financial analyses.


The results demonstrate important associations between the attributes of clinical leaders and IT adoption. Clinical leaders who have technical informatics skills and prior experience with IT project management are likely to develop a vision that comprises a long-term commitment to the use of IT. Leaders who possess such a vision believe in the value of IT, are motivated to adopt it, and can maintain confidence and stability through the adversities that IT adoptions often entail. This leads to proactive leadership behaviours and partnerships with IT professionals that are associated with successful organisational and clinical outcomes.
Health IT workforce


Education

• New clinical informatics subspecialty

• Outside of healthcare but interesting nonetheless
Informatics education for clinicians

Conclusions

• Good informatics research is not easy
  – Reinhold Haux
    • Medical informatics has also an engineering side, designing, and constructing new tools and actively participating in changing institutions and their processes for these purposes.
  – Clement McDonald
    • Informatics is a journey, not a destination.

• Do good
  – Octo Barnett’s last commandment (of 10)
    • Be optimistic about the future, supportive of good work that is being done, passionate in your commitment, but always be guided by a fundamental skepticism.
Top 10 events for the year

• Outside of scientific publication, what else important happened over the last year?
• Input from ACMI members for this list
Top 10 events

10. Federation of State Medical Boards telemedicine licensing template
9. ICD-10 delay – third time in four years
8. Reproducibility of research
7. SAFER Guides – for safer EHR implementation
6. Big Data/Data Analytics – Health Affairs issue, NIH Big Data to Knowledge (BD2K) funding
Top 10 events

5. Fast Health Interoperability Standard (FHIR) – achieving the goals for interoperability?
4. ONC meaningful use – delays and difficulties with Stage 2
3. PCORI Clinical Data Research Network (CDRN)/Patient-Powered Research Network (PPRN) funding – JAMIA issue
2. ONC interoperability roadmap and JASON Report and Task Force
1. Clinical informatics certification – board exam, ACGME accreditation rules, AMIA AIIC task force
What would you add or change?

• References and slides at http://skynet.ohsu.edu/~hersh//yearinreview2014.html

• Open mic session to make your comments today

• And either
  – Email hersh@ohsu.edu for possible inclusion on Web site, or
  – Tweet to #informaticsyearinreview