A Vision for the Systematic Monitoring and Improvement of the Quality of Electronic Health Data

Brian E. Dixon, MPA, PhD, FHIMSS

MEDINFO
August 22, 2013
A Vision of the Future

Image Source: Ivyarchenland
Agenda

• The Quality of Electronic Health Data

• A Novel Framework for Measuring and Monitoring Electronic Health Data Quality

• Future Directions
  – We need / want your input and feedback
Image Source: Archetypical Blog
QUALITY CONTROL
Sometimes falling asleep on the job results in... awesomeness.

Image Source: Scenic Reflections
What is Data Quality?

- Data are high quality if they are fit for their intended use in operations, decision-making, and planning
  - Fit-for-use

- Composed by a set of dimensions
  - Accuracy,
  - Completeness,
  - Consistency, and
  - Timeliness
Examples of Poor Data Quality

• Comparison of electronic pharmacy (Rx) data with meds actually taken by patients
  – 1-in-20 (5%) perfect agreement
  – Kaboli et al., Am J Managed Care, 2004

• Completeness and accuracy of EDIS data for chronically ill patients
  – Missing in 11-20% of cases
  – Discharge summaries could only confirm 61% of chronic illness diagnoses
  – Liaw et al., Emer Med Aus, 2012
ICD9 Lag Time Variation

A Lag

B Lag

C Lag

D Lag

Days from Visit
## Completeness of ELR Data

<table>
<thead>
<tr>
<th>Key Data Element</th>
<th>Corresponding HL7 Field</th>
<th>Percent Complete Raw</th>
<th>Percent Complete Enhanced</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Attending Physician or Hospital or Clinic or Submitter</td>
<td>Ordering Provider (OBR-16)</td>
<td>57.4%</td>
<td>66.5%</td>
<td>+8.9%</td>
</tr>
<tr>
<td>Telephone Number of Attending Physician or Hospital or Clinic or Submitter</td>
<td>Callback Number (OBR-17) Staff Phone (STF-10)</td>
<td>0.15%</td>
<td>73.3%</td>
<td>+73.2%</td>
</tr>
<tr>
<td>Address of Attending Physician or Hospital or Clinic or Submitter</td>
<td>Staff Office/Home Address (STF-11)</td>
<td>N/A</td>
<td>84.6%</td>
<td>+84.6%</td>
</tr>
</tbody>
</table>

So What Should We Do?

• Data quality is heterogeneous and often poor
  – Impacts patient and population outcomes

• How do we improve data quality?
  – Multiple frameworks and methods available from outside health care
  – Inspired by Total Quality Management (TQM) theory in manufacturing from late 80s/90s
  – Will this work in health care?
A NOVEL FRAMEWORK FOR ELECTRONIC HEALTH DATA QUALITY
The Health Data Stewardship Framework

- **Analyze**
  - Define use cases
  - Enumerate DQ problems and dimensions

- **Assess**
  - Strategy for assessing DQ
  - Measure DQ Quantitatively and Qualitatively

- **Monitor**
  - Implement strategies to improve DQ
  - Monitor progress

- **Improve**
  - Demonstrate outcomes on DQ and populations
  - Disseminate findings, lessons
Step 1 – Analyze

• Define use cases
  – PH reporting, syndromic surveillance
  – Community assessment
  – Immunization registries

• Enumerate DQ problems
  – Completeness, Timeliness
  – Bias
Step 2 - Assess

• Assessment Strategy
  – Evaluation plan tailored to use case

• Quantitative and Qualitative Assessment
  – Individual or mixed methods
  – Important to ask end users what they need and include some aspect of business process into the analysis

Source: Dixon BE, Grannis SJ. Why asking questions about data and their sources is important to public health informatics practice and research. Online Journal of Public Health Informatics. 2011 Dec 22; 3(3).
Step 3 - Monitor

• Implement interventions to improve DQ
  – Changes to information systems or business processes
  – Adding new sources of data to improve completeness or validate self-reported data

• Monitor progress towards DQ improvements
  – Tools to monitor incoming data feeds
  – Tools to assess content of various feeds
Step 4 - Improve

• Measure impact on population outcomes
  – Monitor throughput, time to close cases, reduced incidence of disease in community

• Disseminate findings and lessons
  – Journals, conferences, whitepapers
  – Best practices for data stewardship
  – Open source tools for measuring DQ
  – Integration with surveillance systems
Acknowledgements and Disclaimer

• Thank you to my co-authors!
  – Grannis, Rosenman, Xia

• The work presented was supported, in part, by a grant from the U.S. Agency for Healthcare Research and Quality (5R01HS020209).

• My comments are my own and do not represent the views of the VA, AHRQ or the U.S. Federal Government
Brian E. Dixon, MPA, PhD, FHIMSS
Assistant Professor, Health Informatics, Indiana University;
Research Scientist, Regenstrief Institute;
Investigator in Residence, Department of Veterans Affairs

http://soic.iupui.edu/people/brian-dixon/
Twitter: @dpugrad01