Learning from Patient Safety Events: A Shift from Quantity to Quality

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Conflict of Interest

Yang Gong, MD, PhD

Has no real or apparent conflicts of interest to report.
Agenda

• What are patient safety events
• Challenges of reporting patient safety events
  – Quantity v.s. Quality of the reports
• The role of clinical informatics in improving patient safety
• Our approaches
• Initial results
• Discussion of future steps
Learning Objectives

1. Describe the benefits of quality event reporting for patient safety/healthcare quality improvement

2. Identify the barriers of event reporting and applicable informatics approaches for turning reports into actionable knowledge

3. Discuss how data representation and knowledge management in incident reports can facilitate quality improvement towards a better and safer healthcare system
Patient Safety: Pressures and Incentives

Medical error. (Makary & Daniel, 2016)

A track of patient safety study from NIH. (Liang, Miao & Gong, unpublished)
Deaths due to Patient Safety Event (PSE)

In America, PREVENTABLE:
- hospital errors lead to:

50 DEATHS EVERY HOUR

- 1,200 DEATHS A DAY  X 24
- 8,400 DEATHS A WEEK  X 168
- 34,000 DEATHS A MONTH  X 680

TWICE as many people die of preventable hospital errors weekly as the servicemen that died throughout THE ENTIRE IRAQ WAR.
Patient Safety Event Reporting

- Patient safety event (PSE) reporting
  - a mainstay of efforts to detect PSE and quality problems from the frontline practitioners
  - collected from a broad range of practitioners
  - generate a summary and feedback toward
    - actionable knowledge
    - shared learning
Patient Safety Event Reporting

• 1999 Institute of Medicine (IOM) report
  – To Err is Human

• Patient Safety and Quality Improvement Act of 2005 (PSQIA)
  – Federal privilege and confidentiality protections for PSE
    • Agency for Healthcare Research and Quality (AHRQ)
    • Patient safety organizations (PSOs)
  – Analyze near misses and incidents
  – Identify underlying factors
  – Generate actionable knowledge
Reporting Quantity and Quality

• Quantity
  – an increase in reports → an improved reporting culture
  – a reduction in reports → an indication of a safer environment

• Quality
  – underreporting
  – low quality and fragmented reports
Self-Perceived Barriers

- Voluntary reporting
  - No feedback
  - Lengthy reporting forms
    - competing with other priorities
  - Observed event seemed “trivial”
    - A trivial tip --> a large ‘iceberg’ under water
Goal

• Develop a user-centered, knowledge-based reporting and learning system
  – Help healthcare practitioners better report events
  – Connect with relevant reports
  – Learn how to address causes of errors
  – Improve the behavior at work
Our Solution

• user-centered design (UCD) and knowledge-based (KB) design

• advancing from simply counting events into a new era of understanding, trending, integrating, and resolving the events
  – a synchronous and collaborative platform

• UCD & KB features
  – improving user acceptance and satisfaction
  – promoting user engagement for
    • shared learning
    • quality underreporting
Data, User, and System

• Data consistency
  – >30% labelled under ‘other’ and “miscellaneous”
  – 66% reports created by nurses
  – 75% reports created <48 hours
  – Quality of reports is just as significant as the number of submissions

Data, User, and System

• Various terminologies in use
  – AHRQ Common Formats
    • Common definitions and reporting formats
• Underreporting can occur
  – Unable to identify a proper classification or definition
Data, User, and System

• Survey and interview users
  – Language difficulties on describing events & selecting terms
  – Competing priorities
• Retrospective think-aloud
  – Recall difficulties reported by inexperienced reporters
  – Prolonged completion time on questions

Predictive Text Entry

- To support reporting
  - Cueing list, auto-suggestion
- By two-group randomized test
  - Improved text generation
  - Improved data consistency and quality

Managing PSE Knowledge

- Ontology
  - Interoperability among
    - home-grown systems
    - patient safety organization (PSO) systems
  - Data integration
    - organizing prevailing classifications
  - Decision making

Classifying PSE Reports

- Identify multiple categories -- term frequency
  - Reveal details of complex cases
  - Reduce manual review workload
  - Detect systems failure

- Liang C, Gong Y. Predicting Harm Scores from Patient Safety Event Reports. Stud Health Technol Inform. 2017
Knowledge Support

• Identify similar cases based on query
  – Web M&M (PSNet)
  – Patient Safety Organization (PSO) data
  – Data from home-grown system

• Provide solution and suggestion
Prototype

Innovative Design

Knowledge Support (e.g., Solutions)

Feedback / Preferences

Current Frames
• Reports are stored entry by entry
• Reporters learn nothing
• No feedback for systems

Proposed Frames
• Reports are annotated on the same feature tree
• Provide solutions for reporters
• The system can learn from user feedback and preferences

A New Workflow

• To improve data quality of PSE reporting system
  – Seven key modules:

  - Data Collection
  - Algorithm Implementation
  - Reporting System
  - User Feedback
  - Statistical Test
  - Expert Review
  - Agreement Analysis

References:
Identifying Relevant Cases

1. Individual Review
   - Query case
     - Relevant
     - Other cases
   - 4-point Likert Scale

2. Calculate Agreement Ratio Among Experts
   - Agreement
   - Disagreement
   - AR = \frac{Agreements}{All}

3. Group Discussion
   - Reach an agreement or submit to the majority

4. Evaluate the Distance Measurement
   - Far distance
   - Close distance

References:
Providing Targeted Solutions

Q6. Prior to the fall, what was the patient doing or trying to do?

**Answer:** *b. Ambulating with assistance and/or with an assistive device or medical equipment.*

**Specific Solutions**
- Re-evaluate types of assistive devices used by the facility to prevent falls.
- Provide training to staff on the use and maintenance of assistive devices.

Exploring Event Connections

Developing a PSE Knowledge Base

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• Complete online session evaluation