Use of Data and Measurement in Improving Diagnostic Safety

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MEASUREMENT METHODS
SAFETY DOMAINS

Burden

Patient, Provider Surveys
Concordance, Spectrum (OverDx)
Surveillance for Unplanned Events

Methods ('Meta')

Simulations, Experiments
Qualitative (RCA, process)
Case-Control, Cohort

Cause

Solution

Opportunity for...
Quality Assurance
Safety

Pre-Post, Stepped Wedge
Diagnostic Strategy RCT
Meta-Analysis, Modeling

Newman-Toker, Academy Health 2016
NUMERATOR-ONLY METHODS

1. Incident Reporting by Providers
   - M&M rounds within patient safety framework
   - Traditional incident reporting
   - Facilitated incident reporting or periodic surveys

2. Patient Complaints or Legal Actions
   - Patient complaints
   - Malpractice claims
   - Risk management reports

MAY IDENTIFY NEW OR SERIOUS PROBLEMS, CAUSES
NUMERATOR-DENOMINATOR METHODS

1. Calibration Procedures (Limited Scope)
   - Standardized (laboratory) reagents
   - Standardized images (radiology/pathology) or patients

2. Independent Review Verification (Effortful)
   - Direct observation (e.g., videotaped diagnostic encounters)
   - Independent second reads (esp. pathology, radiology, others)
   - Chart audits (+/- stimulated by trigger tools)

HELP MEASURE & TRACK PROBLEMS
NUMERATOR-DENOMINATOR METHODS

3. **Systematic Diagnostic Ascertainment (Pricey)**
   - Routine autopsy (or radiographic autopsy) diagnoses
   - Sampled or census ‘gold standard’ testing for specific diseases
   - Systematic patient follow-up (including automated phone calls)

4. **Electronic Performance Monitoring (?Validity)**
   - Electronic triggers (e.g., labs not followed/acted on; corrected lab results or reports, monitoring pathologic discrepancies, e-autopsies)
   - Performance indicators from administrative data or clinical data warehouses (+/- supported by NLP)

**HELP MEASURE & TRACK PROBLEMS**
**Look Back Approach:** Stroke patients more likely to have been discharged from ED with “benign” dizziness prior ~14 days (N = ~180,000 strokes).

**Look Forward Approach:** ‘Benign’ dizziness sent home from ED more likely to return with a stroke within ~30 days, but not heart attack (N = ~30,000 ED dizzy discharges).

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**Complaint-Specific ED Treat-and-Release Visits Preceding an Inpatient Stroke Admission**

- probable misdiagnoses (dizziness & headache ED diagnoses)
- controls (abdominal & back pain ED diagnoses)

**Rate of return to Hospital with a Stroke or Heart Attack after being sent home from ED with “Benign Dizziness or Inner Ear Problems”**

- strokes (rate of readmission peaks early on)
- heart attacks (rate of return is a flat ‘base rate’)

- minor strokes initially misdiagnosed as ‘benign dizziness’ returning with major stroke (~26,000 per year in the US)

**95% confidence intervals**

*Newman-Toker et al., 2014*  
*Kim et al., 2010*  
*California OSHPD database analysis*
OVERVIEW CURRENT LANDSCAPE

1. No single measurement method will address the full spectrum of diagnostic errors
2. Barriers include lack of chief complaint reporting, problem-oriented records, routine follow-up
3. Unsystematic measures available but incomplete picture
4. Systematic measures mostly restricted to use in research (autopsies not ideal “gold standard”; second reads only for image-based disciplines; chart reviews missing key data)
6. Electronic surveillance inexpensive and promising but need thoughtful analysis and access to out-of-network f/u
7. Within 10 years, it should be possible to have routine surveillance for misdiagnosis, esp. of dangerous disorders