



Measuring patient safety

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Learning points

- Develop the 'sniff test' for patient safety measures
- Measurement is difficult and costly (10% rule)
- Measurement takes leadership



Task: Report to the Board

- You are in charge of safety for your hospital
- The Board wants you to report quarterly on safety
- They do not tell you what to measure (they expect you to report the most important indicators)
- What do you do?



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Safety measures selected

- Preventable adverse events
- Mortality
- 'Patient safety indicators'
 - In-hospital hip fractures
- Nosocomial infections
 - Post operative wounds
- Medication errors



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Two wards

Indicator	No. Events	No. Events
	1 (Med)	Ward 2 (Ortho)

Congratulate ortho for its fine reporting culture

Criticize you for presenting a naive and uninformative report on patient safety

... on ... rates of ... medicine ... times ... greater



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Interpreting the results

- Importance of rates
- Not all outcomes are created equal
- Validity and reliability of some patient safety measures are poor

Take home message: No measure will be perfect. You need to understand the major limitations of your measurement in order to interpret the findings, the feasibility of your approach, and your communication strategy.



Counts versus rates

- Population at risk can vary
 - Number of patients
 - Types of patients
 - Types of exposures
 - Duration of exposure to risk
- Rates can be used to control for these factors
 - Simplest method is to divide the number of events by the person-time at risk
- Possible to adjust for other factors (as long as they are measured)
 - ~~Basic~~ epidemiological methods to perform adjustment

The failure to use rates in report to the Board seriously undermines its importance



Not all outcomes are created equal

- Measuring safety is difficult
 - It represents a 'concept' not a 'thing'
- Donabedian's framework for quality can be used for safety:
 - Outcomes
 - Processes
 - Structures



Do 'outcomes' make 'good' safety indicators?

- Patients are most interested in outcomes
 - Death, Disability, Distress
- Outcomes may depend on factors other than safety:
 - The disease
 - The severity
 - The availability
- If outcomes are used as safety indicators:
 - Choose outcomes carefully
 - Case mix adjustment
 - Can use rates

By definition, AEs and preventable AEs account for

Case mix adjustment works if:

- all important factors for predicting outcomes are included in the model; and,
- adequate numbers of events occur



Are 'process' measures better?

- Based on action
 - Generally not influenced by case-mix
- Often based on explicit criteria
 - If disease x, then treatment b
- More direct link to quality improvement
- Drawbacks
 - Exceptions to the rule
 - Processes may not be directly associated with outcomes

X= Myocardial infarction
B= ASA



Structures – seductively simple

- The human and physical resources required to provide care
 - Number of ICU beds
 - Nurse to patient ratio
 - Accessible hand washing stations
- Very easy to measure
 - Easy to count
- Necessary but not sufficient
- Drawback
 - Can be used politically

Despite accessible hand washing stations, providers wash their hands only 60% of the time.



What is better?

- Do outcomes always trump other measures of safety?
 - Outcome measures may tell you more about the patients treated than about the safety (risk adjustment is often imperfect)
 - Studying outcomes can lead to perverse incentives: Avoidance of high risk procedures.
- Process and structure measures more informative about the environment and practices
 - More easily influenced
 - More easily interpreted
- In all situations, the choice needs to make sense clinically
 - Mortality rates for a hospice is a non-sensical measure of safety

In our scenario – no process or structures studied!

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Validity and Reliability

Validity: does the reading accurately reflect the true arterial pressure

Reliability: is the reading consistent between successive readings (by the same or different individual)

Reasons why possible unreliable: Technique; Equipment

To understand the degree of reliability: Multiple ratings by the same and different rater

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What are discharge abstracts?

- For each hospital inpatient encounter, generation of a document called a hospital discharge abstract
- Assignment of ICD-10 and CCI codes by health records analysts at the time of hospital discharge
- Coding accuracy is poor or unknown for many diagnoses and procedures
 - Diagnostic uncertainty
 - Poor documentation
 - Complicated coding rules
- DAD is used by CIHI as quality indicators

For example, 'in hospital hip fractures'. Coding errors lead to a decrease in validity of this and other patient safety measures

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Incident reporting

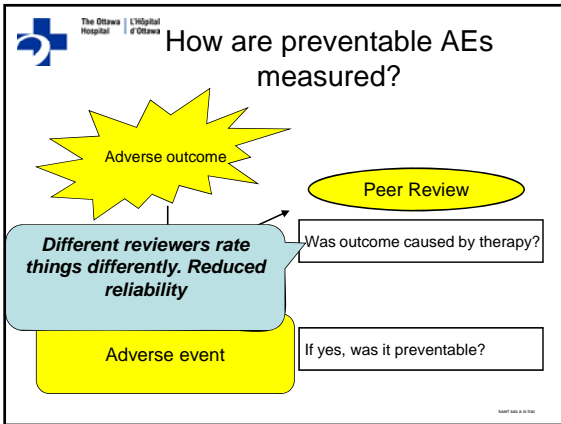
Medical Error

•No peer review

Database

Lack of peer review and underreporting lead to decreased validity

•Strong incentives not to report
•No explicit criteria to guide what to report



The Reliability of Medical Record Review for Estimating Adverse Event Rates

Eric J. Thomas, MD, MPH; David M. Sheddert, LLR, ScD, MPH; and Troyee A. Brennan, MD, JD, MPH

Background: The data used by the U.S. Institute of Medicine to estimate deaths from medical errors come from a study that relied on nurse and physician reviews of medical records to detect the errors.

Objective: To measure the reliability of medical record review for detecting adverse events and negligent adverse events.

Design: Medical record review.

Setting: Hospitalizations in Utah and Colorado in 1992.

Measurements: After three independent reviews of 500 medical records, the following were measured: reliability and the effect of varying criteria for reviewer confidence in and reviewer agreement about the presence of adverse events.

Results: For agreements in judgments of adverse events among the three sets of reviewers, the κ statistics ranged from 0.40 to 0.41 (95% CI ranged from 0.30 to 0.51) for adverse events and from 0.19 to 0.23 (CIs, 0.05 to 0.37) for negligent adverse events. Rates for adverse events and for negligent adverse events varied substantially depending on the degree of agreement and the level of confidence that was required among reviewers.

Conclusion: Estimates of adverse event rates from medical record review, including those reported in the Institute of Medicine's 2000 report on medical errors, are highly sensitive to the degree of consensus and confidence among reviewers.

Ann Intern Med. 2002;136:812-817. www.ama-assn.org

Reviews for AEs varied dramatically between reviewers:

- R1-64 (13%)
- R2-95 (19%)
- R3-80 (16%)

Criteria for AEs influenced AE rate:


At least one review: 37.7; Two of three: 19.2; All three: 7.6

Three independent determine adverse events

Charts from UTC who were screened by HRA

Implications of poor validity and reliability:

- Poor validity
 - Clinician buy-in will be a major challenge
 - Impossible to determine causes/implications of the measure
 - Difficult to compare across time or providers
- Poor reliability
 - Increased sample size is required (as the variation is due to Validity and reliability of our measures not described.)

 **Back to our scenario**


Indicator	No. Events	No. Events
Preventable AEs	Wa	
Mortality		
In-hospital fractures		
Post-operative wound infections		
Medication errors		

Counts.com


Reliability? Who did the

What about some measurements of PROCESS and STRUCTURE?

these errors have the potential to cause harm

 **A few words on...**

- The material to be used for measurements
- The cost of measurement
- The challenge of measurement

 **Measurement methods**

- Chart review Adverse events
Did patient with MI get treated with ASA?
- Survey Culture
Patient experiences
- Direct (prospective) obs Hand washing practices
- Database analysis Patient safety indicators
Outcomes (readmission status, mortality)
Denominators

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Explicit vs Implicit Criteria?

Objective

- **Explicit criteria**
 - Did physician prescribe ASA for AMI patient?
 - Did patient survive to hospital discharge?
 - Did diabetic see a foot care specialist?

Subjective

- **Implicit criteria**
 - Did care meet the expected standard?
 - Was this outcome caused by an error?

Implications:
Objective criteria will have a lower potential for measurement bias. They will generally be more reliable. However, outcomes measured by objective criteria may provide a more limited scope so may need to be combined.

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Consideration - Cost

- **Cost**
 - Can be significant contributor to any attempts for measurement

Implications:
Get it done! If you want to evaluate properly, then you need to complete the assessment. If you cannot commit to completing the assessment, then don't bother.

Rules of thumb:
Survey: > 75% completion rate
All else: Loss to follow-up <15%
Expect to spend: 10% of any implementation budget on evaluation

- Increasing missingness

Ganymede: One of Galileo's 4 moons

Adverse events: 19% of patients

- Measurement is not easy
- Despite 80% success many aspects of scientific method are quite boring and tedious
- Perseverance and discipline required
- 67% Medication related
- 25% very important

(Background text from slide: Annals of Internal Medicine, The Incidence and "Ameliorability" of Adverse Events from Discharge from a Tertiary Care Academic General Medical Service, Alan J. Fuster, MD, FRCP, MS, etc.)



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