Creating A Culture of Quality And Safety in Radiology

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The Hand-off
Disclosures

• Neither I nor my immediate family members have a financial relationship with a commercial organization that may have a direct or indirect interest in the content.

• Member:
  – NQF Safety Committee
  – NCRP, ICRP
  – FDA Medical Imaging Drug Advisory Committee
Outline

• What is Safety?
• What is Quality?
• Methods for Culture Change
  – Quantitative
  – Qualitative
• Resources for QA and QI
• Examples
  – Image Gently
  – Projects from Emory
• “The system is designed perfectly to get the results it gets.”

• - Paul Bataldin, MD
SAFETY: Institute of Medicine

• Defines Patient Safety as “freedom from accidental injury due to medical care or medical errors.”

• 2010 estimate of up to **440,000** Americans die annually from medical errors in US Hospitals (DHHS Office of Insp General)

…or, several 747 airplane crashes per day. So, yes we are all responsible
Quality

Quality in radiology is defined as “a timely access to and delivery of integrated and appropriate radiological studies and interventions in a safe and responsive facility and a prompt delivery of accurately interpreted reports by capable personnel in an efficient, effective, and sustainable manner”.

Quality in Short

• “The Right Exam for the Right Patient, at the Right Time, for the Right Reason.”
How Hazardous Is Health Care?

- **DANGEROUS** (>1/1000)
  - Health Care
  - Mountain Climbing
  - Bungee Jumping

- **REGULATED**
  - Driving
  - Chemical Manufacturing
  - Chartered Flights

- **ULTRA-SAFE** (1/100K)
  - Scheduled Airlines
  - European Railroads
  - Nuclear Power

Total lives lost per year:
- 100,000
- 10,000
- 1000
- 100
- 10

Number of encounters for each fatality:
- 10,000,000
- 1,000,000
- 100,000
- 10,000
- 1000
- 100
- 10

Lucian Leape, MD, IOM
### To Err is Human: Nominal Human Error Rates for Selected Activities

<table>
<thead>
<tr>
<th>Activity (Assume no undue time pressure or stresses)</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error of <em>commission</em>, e.g. misreading a label</td>
<td>.003</td>
</tr>
<tr>
<td>Error of <em>omission</em> without reminders</td>
<td>.010</td>
</tr>
<tr>
<td>Error of <em>omission</em> when item is embedded in a procedure</td>
<td>.003</td>
</tr>
<tr>
<td>Simple arithmetic errors with self checking</td>
<td>.030</td>
</tr>
<tr>
<td>Monitor or inspector fails to recognize an error</td>
<td>.100</td>
</tr>
<tr>
<td>Personnel on different shifts fail to check the condition of hardware unless directed by a checklist</td>
<td>.100</td>
</tr>
<tr>
<td>Error rate under very high stress when dangerous activities are occurring rapidly</td>
<td>.250</td>
</tr>
</tbody>
</table>

What About in Radiology Errors?

- Medical misidentification errors are a major problem in Radiology
  - 2007-’09, 313 patient identification errors at Mayo Clinic (0.011%)
  - 2007-’09, 10 near-miss misidentification events at MSK
  - Perceptual (60-80%)>> Cognitive Errors
  - Typical Error Rates: 4%
  - Prevention: CAD, structured reporting, communication
Key Patient Safety Events That Resulted in Massive Media Attention, Impacted Safety Policy

1. Libby Zion, 1984, Cornell NY Hospital
2. Betsy Lehman, 1994, Dana Farber
3. Willie King, 1995, Univ Hosp Tampa
4. Jessie Gelsinger, 1999, UPenn
   Ellen Roche, 2001, J Hopkins
5. Josie King, 2001, J Hopkins
7. ...stroke CT overdoses 2009, Cedars-Sinai
   (and one toddler at Mad River Hospital, California)
Example of Changing Safety Culture: Radiation Safety Team Work

• Increase awareness about radiation safety of patients, and health care workers

• The Core Team: Radiologist, Radiographer, and Medical Physicist
Adverse Radiation Events

- Using Sentinel Event/Adverse Event review, QA to improve policies, perform PQI, present, publish--AND LEARN

- Examples (The Joint Commission): must report events in radiology
  - Skin dose of >=15 Gray
  - Wrong site surgery/procedure
Barriers to Success

Acceptance of limitations on maximum performance
Sharing of professional autonomy
...Patient advocacy and education
Develop a culture of safety (foundational)
Simplify professional rules and regulations

Adapted from--Amalberti R, Berwick D, Barach P. Annals of Internal Medicine 2005;142:756-764
Barriers—Lack of:

• Time for HC workers to do this work?
• Training in systems thinking, quality and safety culture?
• Bridges across our silos of care?
More Safety Culture Tools

• Latent Errors:
  – Anonymous incident reporting (TJC required)
  – Malpractice claims analysis

• Active Errors Analysis:
  – Chart reviews & admin data analysis (REGISTRIES!)
  – IT software

• Adverse Events:
  – Clinical and direct observations
Key Safety Culture Attributes

• Decreased authority gradients
• Use of structured language (SBAR)
  – Situation, Background, Assessment,
  – Recommendation
• Team briefings and debriefings
  – Immediate learning, Team building tools
• Tools like checklists and audits
• Process/Quality improvement

*How are you doing? AHRQ survey will tell you

from Weick and Sutcliffe: High Reliability Organizations
Peter Pronovost (NEJM 2006): Teamwork Climate Across Michigan ICUs

The strongest predictor of clinical excellence: caregivers feel comfortable speaking up if they perceive a problem with patient care.

No BSI = 5 months or more w/ zero

No BSI 21%  
No BSI 31%  
No BSI 44%
Coordinated Care

• We’ve celebrated cowboys, but what we need is more pit crews.”

The Opportunity for Process Improvement: Worldwide “Insatiable Appetite” for Imaging

3.6 billion exams/year
(UNSCEAR 2008)
Examples of Appropriate Decreased Use of Imaging in Children

- CT/US follow up of body trauma (solid organ)
- Multi-phase CT in children (any body part)
- ‘Some’ use of abdominal radiographs for pyloric stenosis, intussusception, appendicitis ultrasound
- Small Bowel Follow Through studies (especially for IBD) MRE
American Academy of Pediatrics
Guideline on Sinusitis

• No imaging for uncomplicated sinusitis
• Ellen Wald, K Applegate, et al, 2013
• http://pediatrics.aappublications.org/content/early/2013/06/19/peds.2013-1071
AAP Guideline for UTI

• Limited role for VCUG (MCU), especially if normal renal ultrasound
• 2011
• http://pediatrics.aappublications.org/content/early/2011/08/24/peds.2011-1330
CT/MRI most important innovation in medicine in the 20th century*
Value of Imaging? (Justification)

Ottawa Ankle Rules

Image courtesy C Blackmore
Value of Imaging?

Image courtesy C Blackmore
Resources—Keys to Quality and Safety

- Radiation Protection
  Transnational and regional organizations web, mtgs
- IAEA, WHO
- ACR and most of the radiology organizations now hold conferences, provide QA/PQI
- Others with free web:
  - Institute for Healthcare Improvement (IHI)
Summary of Quality and Safety Culture

- Errors occur (commonly) in complex systems
- Checklists, reminders
- Policies, audits of practice
- Investigation of events and QI
- Commitment to lifelong learning
- Teamwork
Thank You!

keapple@emory.edu
1. Association of University Radiologists 2016
   RASHR/RRA online statistical training webinars: www.aur.org
Adverse Events and Practical Ways to Decrease Them: Awareness, Education, and Advocacy
1. Use the ACR and other organizational tools
2. Align with your HC organization goals
3. Market your Quality and Safety
Airport Scanners: Safety versus Privacy?

Natural Tensions Analogous to Safety versus Efficiency…

• Patient Safety
• Worker Burnout
Patient Identification

Statement of Problem and Impact:
Throughout the health-care industry, the failure to correctly identify patients continues to result in medication errors, transfusion errors, testing errors, wrong person procedures, and the discharge of infants to the wrong families. Between November 2003 and July 2005, the United Kingdom National Patient Safety Agency reported 236 incidents and near misses related to missing wristbands or wristbands with incorrect information (1). Patient misidentification was cited in more than 100 individual root cause analyses by the United States Department of Veterans Affairs (VA) National Center for Patient Safety from January 2000 to March 2003 (2). Fortunately, available interventions and strategies can significantly reduce the risk of patient misidentification.
Patient Misidentification in the Neonatal Intensive Care Unit: Quantification of Risk

James E. Gray, MD, Guesthna Suresh, MD, Robert Ursprung, MD, Robert A. Edwards, MD, Juliana Nickerson, MSW, Pat H. Shlome, PhD, Paul Pilak, MS, Donald A. Goldman, MD, Jeffrey Horbar, MD

ABSTRACT

RESULTS. During the 1-year study period, 12,186 days of patient care were provided to 1,260 patients. The unit’s average daily census was 33.4; the maximum census was 48. Not a single day was free of risk for patient misidentification. The mean number of patients who were at risk on any given day was 17 (range: 5–35), representing just over 50% of the average daily census. During the entire calendar year, the risk ranged from 20.6% to a high of 72.9% of the average daily census. The most common causes of misidentification risk were similar-appearing MRNs (44% of patient days). Identical surnames were present in 34% of patient days, and similar sounding names were present in 0.7% of days. Twins and triplets

CONCLUSIONS. NICU patients are frequently at risk for misidentification errors as a result of similarities in standard identifiers. This risk persists even after exclusion of multiple births and is substantially higher than has been reported in other hospitalized populations.
Use of Temporary Names for Newborns and Associated Risks

Jason Adelman, MD, MS, Judy Aschner, MD et al. Pediatrics 2015 (Montefiore)

• “We conducted a 2-year before/after implementation study to examine the effect of a distinct naming convention that incorporates the mother’s first name into the newborn’s first name (eg, Wendysgirl) on the incidence of wrong-patient errors.”
• Multiples were coded: 1Wendysboy and 2Wendysgirl
• “The reduction in RAR* (retract and reorder) events post- versus preintervention was 36.3%.”
Background

• All Joint Commission (JC) accredited facilities must have anonymous reporting systems to capture and study medical errors and near-misses.
  – Estimated 10% of real events

• 652 radiology medical event voluntary reports in 2009 in Pennsylvania; 30% due to wrong-patient events.

• In addition, JC requires use of two patient identifiers when performing any intervention (e.g., imaging) on a patient.
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  – 2007-'09, 10 near-miss misidentification events at MSK

• RadioGraphics review (Oct 2015) by M Bruno, E Walker, H Abujudeh
  – Perceptual (60-80%)>> Cognitive Errors
  – Typical Error Rates: 4%
  – Prevention: CAD, structured reporting, communication
Emory QA to PQI Examples

- All 11 clinical divisions have published performance or quality improvement papers in past 5 years
- Presentations and/or posters at ACR, ARRS, ASNR, AUR, RSNA, SCBT, SIIM, SPIE, SPR
- Using Sentinel Event/Adverse Event review, QA to improve policies, perform PQI, present, and publish
PQI Examples Include


- **Herr K**, **Moreno, CC**, Mittal P, Small W, Murphy F, Fantz C, Applegate KE. **Rate of detection of unsuspected pregnancies after implementation of mandatory point of care urine pregnancy testing prior to hysterosalpingography**. JACR 2013


- **Villarreal M**, Rostad B*, Wright R, Applegate KE. Improving procedure start times in interventional radiology through the application of CQI principles. Acad Radiol, 2016
Examples of PQI


PQI Examples 3

- Peter A. Harri, MD, Courtney C. Moreno, MD, Rendon C. Nelson, MD, Negar Fani, PhD, William C. Small, MD, PhD, Anh Duong, MD, Kimberly E. Applegate. Variability of Multi-Detector CT Dose Due to Technologist Performance: Impact of PA vs AP localizer image and table height with use of Automated Tube Current Modulation. AJR 2014


Examples of Variation Studies


• Graves JM, Kanal KN, Vavilala MS, Applegate KE, Jarvik JG, Rivera FP. Hospital level factors associated with use of pediatric radiation dose reduction protocols for head CT: results from a national survey. JACR 2014

• Kanal KN, Graves JM, Vavilala MS, Applegate KE, Jarvik JG, Rivera FP. Variation in computed tomography pediatric head exam radiation dose: results from a national survey. AJR 2015

• Razavi SA*, Johnson JO, Kassin M*, Applegate KE. The impact of the introduction of a no oral contrast abdominopelvic CT examination (NOCAPE) pathway on radiology turnaround times, emergency department length of stay, and patient safety. Emerg Radiol 2014

Summary

• Real examples of real events that lead to positive change
• Improvement can happen using both near misses and real misses when people work together in teams to make patient care better
Teams come in all sizes
Example of Coordinated Care:
Virginia Mason

- Quality: Incorporate the perspective of the health plan and employer (cost, employee's return to work function), not just the health system provider (EBM) and patient (outcomes, satisfaction, access, and return to function)
- Focus: Common conditions

Blackmore C et al. Health Affairs, Sept 2011
Uncomplicated Headache:
- Decreased imaging 23%
- Same day appts 95%
- Patient satisfaction 91%

Health Affairs 2011; C Blackmore