INTRODUCTION TO
PATIENT SAFETY FOR
RESIDENTS

Farbod Raiszadeh MD PhD FACC
Director, QI Innovation Institute
CIR Policy and Education Initiative
And
Cardiology Attending Physician
Bronx Lebanon Hospital Center
Goals & Objectives

1. Introduce residents to basic tools used in practice to understand the causes behind near misses and adverse events.

2. Learn to identify care delivery failures and potential system fixes through a root cause analysis.

3. Identify the role that bias plays in medical errors (Workshop session after lecture).

4. Introduce a new vocabulary to communicate about patient safety and begin to develop a culture of patient safety.
Definitions

• Is there a difference??
  – Adverse Event
  – Near miss
  – Medical Error
Adverse events

• Anytime a patient suffers a negative outcome from an interaction with the healthcare system
• Adverse events can both be preventable and unpreventable
• Examples of preventable adverse events include
  – Medication errors
  – Diagnostic errors
  – Procedural errors
Near Miss

• An event or situation that did not produce patient injury, but only because of chance.
• Can be due to patient factor or can be “caught” by system
• Close call or near “hit”
To illustrate the differences . . . .

Medical Error

Adverse Events
- Unpreventable
- Preventable

Near Misses
Types of Adverse Events
Not all errors are the same

• Errors of Commission
• Errors of Omission
• Errors of Communication
• Errors of Context
• Diagnostic Errors
Scope of the Problem

• The IOM report, To Err is Human: Building a Safer Health System in 1999 motivated intense efforts to improve patient safety in the US. Their report found that
  – Adverse events occur in 3-4% of hospitalizations
  – Between 44,000-98,000 people die each year from medical errors making it the sixth leading cause of death in the US
  – More people die in a given year from medical errors than MVAs, breast cancer, or AIDS
  – Report was a bombshell. . .
    Now widely seen as an under-estimation
Revised estimates of Deaths due to Medical Mistakes in US Hospitals

- Review published in the Journal of Patient Safety 2013 states number is much higher than IOM report
- Estimates 210,000-440,000 patients suffer preventable harm in the hospital contributing to their deaths
- This estimate makes adverse events the 3rd leading cause of death behind heart disease and cancer
- What’s the right number?

Despite the number of national initiatives, the existing evidence suggests we have made little progress in reducing the incidence of preventable harm.

James JT J Patient Safety: 2013
The scope of the problem shown graphically….

Revised data suggests up to 250K deaths annually in US

2.9-3.7% of hospitalizations

↓

8.8-13.6% of these lead to death

↓

44-98,000 people could die annually as a result of medical error

Medical Error

Adverse Events

Near Misses

Preventable

Unpreventable

Harvard medical practice study, 1991
Utah and Colorado, 1992
How do adverse events get reported at your hospital?

• How often do you report?
• Who do you report to?
• What happens after reports?
How do we analyze what when wrong?

• Adverse Event Review or Root Cause Analysis
  – Process for identifying the multiple contributing factors that underlie adverse events or near misses
  – “Defect analysis” or “systems analysis” may be better

  – 3 Questions
    • What happened?
    • Why did it happen?
    • How can we prevent it from happening again?

*Root cause analysis goes beyond the traditional Morbidity and Mortality approach to case reviews*
Rationale – why do this?

• The reporting and analysis of adverse events are crucial to redesigning safer systems.

• Easy to miss the point
  – Blame the individual
  – Draw the wrong conclusion

• Systematic approach
  – Takes you from the sharp end (the individuals) and takes you up to the blunt end (the organizational processes)
Why Involve Residents in Safety?

• They have frontline insights into the organizational problems of hospital care
  – Process issues
  – Barriers to good care
• Their “buy-in” is crucial to system improvements
• Safety is a hook for learning
• Formative part of their career -> opportunity to make a lasting change in their practice
Let’s review an example of a Patient Safety Case Review from EHMC:

• 50 y/o woman with morbid obesity; had elective bariatric weight loss surgery 3 weeks ago then readmitted with post op complications that include an anastomotic leak and abdominal abscess. She’s been receiving IV antibiotics following a surgical revision for the last 2 weeks.

• RRT is called for new complaints of dyspnea and tachycardia.
Case Continued. . . .

- On her initial physical exam, Vitals were: T103, HR 140s RR 30s, O2 91% on 100% NRB. Waiting for a large cuff to get BP.
- Patients appears to be in some respiratory distress but was on the phone with family when RRT resident arrived. AAOX3, Lungs with scattered rales and decreased air entry; RRR but tachy; abdomen morbidly obese + drains and feeding tube, no rebound or guarding. LE with no edema b/l calf tenderness SCDs on the floor.
Case Continued . . .

- ACP, CBC almost the same from prior labs
- EKG showed Sinus tach @ 139 bpm, no ST Changes, + Left Axis Deviation.
- ABGs: 7.38/47/\textbf{60}/28/90 on 50% FiO2 Venti.
- CXR: Persistent moderate left pleural effusion, right basilar opacity. No significant change
Bedside Discussion: PGY3 IM resident and surgical attending caring for patient . . .

• Surgical Attending:
  – attributed findings to sepsis
  – hypoxemia 2/2 chronic obesity hypoventilation
  – asked for ID re-evaluation, pt needs ICU transfer

• PGY3 Resident:
  – ABG has no comparison; only one in EMR
  – MAR revealed LMWH not continued when pt transferred from ICU to post op floor 10 days ago
  – SCDs were ordered but pt wasn’t wearing them
Further discussion: Surgeon agrees to suggested CT Chest PE Protocol
Next Steps and Remainder of Clinical Course

• CT Chest PE Protocol: Acute Saddle B/L Pulmonary Embolism in Both Main Pulm Arteries, extending to both upper right and left branches.
• ICU team was called again, pt was transferred immediately to MSICU.
• High dose Heparin drip was started stat.
• CT surgery on board
• IV tPA given, No Embolectomy.
• Pt remains hospitalized for more than another month then dc to SAR.
What went wrong???
Case Review: Root Cause Analysis

• What happened?
  – Did medical errors contribute to this adverse event?
• Why did the event happen?
• What can be done to prevent future errors?

Let’s use a systematic process or a root cause analysis to go beyond our initial impression of this case . . .
Case Review: Steps of RCA

1. Decision to Review
2. Select People and Gather Data
3. Determine Incident Chronology
4. Identify Care Delivery Problems
5. Identify Contributory Factors
Case Review: Steps of RCA
Back to the case..

1. Decision to Review
   - Patient Safety Officer

2. Select People and Gather Data
   - Chart/order reviews, review patient data and conduct interviews

3. Determine Incident Chronology
   - Flow charts, time line

4. Identify Care Delivery Problems
9/13: Sleeve gastrectomy

9/15: Dced home

9/20: Abd pain, OSH CT: free air under diaphragm

9/20 @1745: Arrives at EHMC ER, OR for dx laparotomy (subacute perf distal sleeve), gastric plication & peritoneal lavage, sealed omentum

Hypoxic 89% on high flow, no ABG done

9/21-9/24: in ICU

Pt started refusing SCDs on 9/30, ? Surgeon Notified, No DVT Chemo PPx

Brief ICU stay- febrile & septic, leukocytosis; ID consulted, pip/tazo & fluconazole started

10/6 @ 0230: surgery at bedside, HR 140s, T 103 F, 90% on CPAP 100%, UA, ACP, CBC, CXR ordered

0745: RRT, HR 150s, RR 30s, T 103 F, 91% on 100% high flow, ABG ordered

0900: CT chest PE protocol ordered, saddle embolus

10/7: IV tPA

0930: ICU admission

No ABG ordered

10/7: IV tPA

0930: ICU admission

PO2 60, PCO2 47

Hypoxic, no ABG, LMWH at 40 mg qd

9/24: On floor, UGI series, leak, ex lap (washout, abscess drainage, 2 drains, J tube for feeding)

10/6:

IV tPA

0930: ICU admission

Hypoxic, no ABG, LMWH at 40 mg qd

9/20:

Abd pain, OSH CT: free air under diaphragm

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Who should be interviewed as part of this case review?
Surgical Attending

We don’t like using UH or LMWH on bariatric surgery patients, the risk of bleeding is huge and we had multiple major bleeds in this pt population—a few of them fatal. We usually use mechanical DVT PPx, and the guidelines are not compelling towards using chemoPPx.

LMWH and UH both have the same risk of bleeding.

I am not sure if we were ever notified that pt was refusing SCDs.

We could just as easily be here having a patient safety case because she bled.
The case was complicated, pt was definitely septic and her vitals could be easily interpreted as sepsis only, we were fortunate to have caught the PE.

The dx of hypoxia was chronic for sure and she was always hypoxic, it is very interesting to notice that the pt went in and out the ICU and floors multiple times and she never had an ABG done.
RR Team, PGY 3

It was definitely a complicated case, and sepsis was high on my ddx given the leak, high WBC and multiple surgeries. It was really helpful having all of her MDs together at the bedside. The moment I saw the ABG I started having flashbacks of a similar case of a young bariatric surgery pt who presented the same way and a PE was missed and he expired. The case ended up in a PS conference. This is why I purposefully looked in MAR for DVT PPx meds and when I saw that she was not on any DVT PPx, my suspicion was higher -
Case Review: Steps of RCA

Back to the case..

1. Decision to Review
   - Patient Safety Officer

2. Select People and Gather Data
   - Chart/order reviews, review patient data and conduct interviews

3. Determine Incident Chronology
   - Flow charts, time line

4. Identify Care Delivery Problems

5. Identify Contributing Factors
Case Review: Contributory factor framework

- Described by Charles Vincent (see homework readings) is useful in analyzing system failures; the framework examines each of the following factors:
  - Patient Factors
  - Task & Technology Factors
  - Individual Factors
  - Team Factors
  - Work Environmental Factors
  - Organizational & Management Factors
  - Institutional Factors
Identifying Contributory Factors

- Task & Technology
- Individual
- Team
- Work Environment
- Organizational & Management
- Institutional Factors

Patient → Sharp

Blunt
## Determining Contributing Factors

<table>
<thead>
<tr>
<th>Category</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient</strong></td>
<td>Complexity and seriousness of condition</td>
</tr>
<tr>
<td></td>
<td>Language and communication; personality and social factors</td>
</tr>
<tr>
<td><strong>Task</strong></td>
<td>Availability and use of protocols</td>
</tr>
<tr>
<td></td>
<td>Availability and accuracy of test results</td>
</tr>
<tr>
<td><strong>Individual</strong></td>
<td>Knowledge and skills; motivation and attitude</td>
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<tr>
<td></td>
<td>Physical and mental health</td>
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<tr>
<td><strong>Team</strong></td>
<td>Verbal and/or written communication</td>
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<td></td>
<td>Supervision and willingness to seek help</td>
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<td></td>
<td>Team leadership</td>
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<tr>
<td><strong>Work environment</strong></td>
<td>Staffing levels and mix of skills; patterns in workload and shift</td>
</tr>
<tr>
<td></td>
<td>Design, availability, and maintenance of equipment</td>
</tr>
<tr>
<td></td>
<td>Administrative and managerial support</td>
</tr>
<tr>
<td><strong>Organizational</strong></td>
<td>Financial resources and constraints</td>
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<tr>
<td></td>
<td>Policy standards and goals</td>
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<tr>
<td></td>
<td>Safety culture and priorities</td>
</tr>
<tr>
<td><strong>Institutional</strong></td>
<td>Regulatory context; medicolegal environment</td>
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Vincent C, NEJM 2003, 348;11
## Contributing factors: Case Example

<table>
<thead>
<tr>
<th></th>
<th>Negatively contributed</th>
<th>Positively contributed</th>
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<tbody>
<tr>
<td><strong>Patient</strong></td>
<td>Obesity; bariatric pt at high risk for VTE</td>
<td></td>
</tr>
<tr>
<td><strong>Task &amp; Tech</strong></td>
<td>No standard protocol for DVT PPx doses in obese/ bariatric pts</td>
<td>CT performed quickly on weekends</td>
</tr>
<tr>
<td><strong>Individual</strong></td>
<td>Surgeon believes risk of bleeding outweighs risk of VTE</td>
<td>RRT team pushed for alternate dx</td>
</tr>
<tr>
<td><strong>Team</strong></td>
<td></td>
<td>Nurse called RRT; Both surgery and IM at the bedside evaluating patient</td>
</tr>
<tr>
<td><strong>Work/Environment</strong></td>
<td></td>
<td>ICU beds were available</td>
</tr>
<tr>
<td><strong>Organiz. Management</strong></td>
<td></td>
<td>Adverse event was reported and reviewed in patient safety conference</td>
</tr>
<tr>
<td><strong>Institutional</strong></td>
<td></td>
<td>Positive culture of Patient Safety; team agreed to work towards evidence based protocols</td>
</tr>
</tbody>
</table>
Adverse Events are not always from the system

(focus of small group discussion after lecture)
Fishbone Diagram for Case Example

SYSTEMS BASED FACTORS

- **Individual**
  - Surgeon believed risk of bleeding outweighed risk of VTE

- **Task**
  - No standard protocol for DVT prophylaxis in post-op bariatric pt

- **Patient**
  - Obese Bariatric patient at high risk for DVT

- **HOSPITAL ACQUIRED VTE**
  - Looked for data to "confirm diagnosis"

COGNITIVE FACTORS

- **Diagnosis Momentum**
  - "chart lore" of obesity
  - Hypoventilation to explain hypoxia

- **Anchoring Bias**

- **Confirmation Bias**
  - Premature closure on diagnosis of sepsis
The Swiss Cheese Model of How Accidents Occur

• The swiss cheese model emphasizes our need to consider how teams of individuals work within systems of care.

• There are barriers, defenses, and safeguards at each step within a process but each layer is imperfect and allows some hazards to pass through to the next stage. That is the barriers have holes, like swiss cheese.

• Normally a hazard passing through one layer of defense will be trapped by a subsequent layer.
Swiss Cheese Model

Some holes due to active failures

Other holes due to latent conditions

HAZARDS

SUCCESSIVE LAYERS OF DEFENSES
Swiss Cheese Model

Some holes due to active failures

Other holes due to latent conditions

Accident

HAZARDS

SUCCESSIVE LAYERS OF DEFENSES

HOSPITALISTS. TRANSFORMING HEALTHCARE. REVOLUTIONIZING PATIENT CARE.
It’s never just one thing that goes wrong.

The Swiss Cheese Model

DEFENCES
- Procedures
- Physical barriers
- Information
- Decisions

THE HOLES
- Poor protocols
- Faulty equipment
- Missing information
- Inadequate supervision

Patient harmed

Adapted from Professor James Reason

Reason, J. BMJ 2000;320:768-770
System (latent) failures

• Arise from decisions that are made when systems are designed or evolve.

• Examples:
  • information or policies
  • environment or equipment design
  • communication failures
  • human resources including staffing and training

• Can lie dormant for years and become evident when local circumstances conspire with an active failure and an accident occurs. Also referred to as “accidents waiting to happen”
Making Recommendations & Developing an Action Plan continued.

What do we need to think about here?

-Resources
-Feasibility
-Timeliness
-Effectiveness

From Case Example: Collaborative group was formed to standardize a VTE protocol for management of bariatric surgical patients based on an evidence based risk assessment model.
Ranking the Effectiveness of Error-Reduction Strategies

Most Effective (Strong)

- Forcing functions and constraints
- Automation and computerization
- Standardization and protocols
- Checklists and double-check systems
- Rules and policies
- Education and information
- Exhortation: “Be more careful. Be vigilant.”

Least Effective (Weak)

IMPROVING POST DISCHARGE FOLLOW-UP OF PEDIATRIC ASTHMA PATIENTS AT HARLEM HOSPITAL
A RESIDENT - LED QI PROJECT
BHUVANA SUNIL, MD 1, NKEIRUKA ORAJIKA, MD, MPH 1, ILUONDOSE AMONI, MD 1, KARLENE WILLIAMS, MD 2, FARBOD RAISZADEH, MD PhD 1, SUNDARI PERIASAMY, MD 1
1- Department of Pediatrics, Harlem Hospital Center, New York, NY; 2- Department of Medicine, Englewood Hospital and Medical Center, Englewood, NJ. and 3- QI Innovation Institute, CIR Policy Education Initiative, New York, NY

BACKGROUND
• Asthma is a major public health problem in the pediatric population with medical, environmental and social implications
• In 2010, the number of children with asthma in New York was 315,000, or one in fourteen children, according to CDC
• New York has one of the highest prevalence – approximately 14% versus 9.3% nationwide
• South Bronx and Harlem have the highest rates of asthma in all of New York City

PRE-INTERVENTION DATA
PRE-INTERVENTION
Percentage of patients with clinic follow up within 1 week of discharge

PROJECT DESIGN
• The QI project team consisted of
  • two pediatric residents
  • three supervising faculty, and
  • two QI experts involved via the Resident QI Clinic (collaboration of QI Innovation Institute and Society of Hospital Medicine)
• Our QI project started with a retrospective chart review of pediatric discharges from the Pediatric intensive care unit and inpatient floor.
• Our aims
  • To find out the percentage of children that followed up within 1 week of discharge
  • To identify causes for failed post discharge follow-up
  • To evaluate re-visits to the ER or readmission to hospital
  • To implement processes that would improve the smooth transition of all pediatric asthma patients discharged from inpatient to outpatient care.

AIM STATEMENT
To increase post-discharge follow up within 1 week of discharge for pediatric asthma patients admitted at Harlem Hospital from 37%-75% over the next year

PROBLEM AREAS

INTEVENTIONS
• Scheduled and confirmed follow up appointments for all asthma patients discharged from inpatient units.
• All residents were trained to emphasize the importance of outpatient follow-up and consider patient-family constraints when scheduling appointments.
• Posters and cards were handed out as a reminders to the residents, who are the front line in discharges.
• Nurses were involved in confirming that all patients had appointments made on discharge.
• Patient care coordinators were given a specific follow-up questionnaire to remind the patients of their appointments.
• Post-discharge, all patients were to be recalled if they missed their follow-up.

RESULTS
• Data over 4 months shows 87.5% compliance for post discharge follow up.
• Since intervention, every discharge from our pediatric unit had a confirmed follow up appointment.
• Of all the discharges, there were no re-visits to the emergency room, or readmissions within a month of discharge.

CONCLUSION
• By building a multidisciplinary project team including residents, faculty, administration, nursing and registration staff, we redesigned and improved our discharge process and improve follow up compliance in our system.
• The project has been successful thus far with the residents leading the redesigned discharge process and a challenge will be to include and train clerical staff to sustain the initiative.

IMPLICATIONS
• This ongoing project has long term implications for compliance with the comprehensive asthma care model.
• It revisits the importance of re-education of all the stakeholders to improve health outcomes for our pediatric asthma patients.

LIMITATIONS
• Our results are impressive, however, we realize that our PDSA cycle is not inclusive of the peak asthma season.

REFERENCES
(1) Akhtari, L. Asthma Prevalence, Health Care Use and Mortality: United States, 2010 NCHS, Office of Analysis and Epidemiology, CDC November 2010
Questions or Discussions???

Email: fraiszad@gmail.com