Medical Errors and Patient Safety

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Medical Errors and Patient Safety

- History of Patient Safety
- Overview of Medical Errors
- Cost of Medical Errors
- Handling Medical Errors
- Types of Errors
- National Patient Safety Goals and Patient Safety Standards
- Patient Safety and the RT
- Building a Culture of Safety
History of Patient Safety

- 460 BC, Greek physician, Hippocrates, “First, no harm”
- 1857, Ignaz Semmelweis, demonstrates value of hand disinfection
- 1863, Florence Nightingale
- 1906, President Roosevelt signed Food and Drugs Act
- 1911, Ernest Codman, “End Result Theory”
- 1918, American College of Surgeons begins program of hospital inspection and certification
History of Patient Safety

- 1924, First medical specialty board founded (ophthalmology)
- 1926, First quality manual published
- 1951, Joint Commission on Accreditation of Hospitals established
- 1959, Robert Moser, “Diseases of Medical Progress”
- 1964, Elihu Schimmel, 20% of patients experience “untoward event”
- 1965, Social Security Act conferred “deemed status” for accredited organizations
History of Patient Safety

- 1966, Avedis Donabedian, MD published “Evaluated the Quality of Medical Care”
- 1970, Institute of Medicine (IOM) founded
- 1977, Ivan Illich, “Limits of Medicine”
- 1985, Anesthesia Patient Safety Foundation established
- 1989, Agency for Healthcare Research and Quality (AHRQ) created
- 1991, Harvard Medical Practice studies completed
- 1991 Institute for Healthcare Improvement (IHI) founded
History of Patient Safety

- 1996, National Patient Safety Foundation established.
- 1996, The Joint Commission Sentinel Event Policy established

BEGINNING OF MODERN PATIENT SAFETY MOVEMENT

- 1999, IOM report, “To Err is Human”
- 2000, IOM report, “Crossing the Quality Chasm”
History of Patient Safety

- 2001, Agency for Healthcare Research and Quality receives $50M from Congress, begins aggressive patient safety research
- 2001, The Joint Commission establishes specific patient safety standards
- 2005 IHI 100K Lives Campaign
- 2006 IHI 5 Million Lives Campaign
Institute of Medicine

- “To Err is Human”, report released by IOM in 1999
- Estimated 44,000 to 98,000 deaths annually due to medical errors
- Equal to commercial airliner crashing EVERY DAY
Faces of Medical Errors
Medical Errors
Patient Safety Terminology

All Healthcare Encounters

Near Misses

All Errors

All Adverse Events

Preventable Adverse Events

Negligent Adverse Events

Non-preventable Adverse Events
Medical Errors

Some holes due to active failures

Other holes due to latent conditions

SUCCESSIVE LAYERS OF DEFENSES
Medical Errors

The diagram illustrates the concept of successive layers of defenses in preventing medical errors. It shows a cheese-like structure with holes, representing different layers of defense. The holes are categorized into:

- Some holes due to active failures
- Other holes due to latent conditions

These layers are designed to stop errors from occurring, with the final layer represented by the "Accident." The diagram emphasizes the importance of understanding the various layers to improve safety in healthcare.
Medical Errors

“Most errors are made by good but fallible people working in dysfunctional systems, which means that to make care safer depends on buttressing the systems to prevent or catch the inevitable lapses of mortals”

Robert M. Wachter, MD, *Internal Bleeding*
Medical Errors

- Preventing errors from being made in the first place
- Detecting and reversing error before it causes harm
- Repairing or minimizing the damage caused by errors that cannot be prevented or reversed

ERROR → ADVERSE EVENT
Improvements since “To Err is Human”

Risk Adjusted Mortality: Pre- and Post-IOM Study
Improvements since “To Err is Human”

- Small improvements at margins
  - Reduced accidental injections of KCl
  - Reduced infections

- Progress frustratingly slow

- Impact on attitudes regarding medical errors

- Advanced the cause of patient safety
Improvements since “To Err is Human”

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer physician order entry</td>
<td>81% ↓ in medication errors</td>
</tr>
<tr>
<td>Pharmacist rounding with team</td>
<td>66% ↓ preventable ADE</td>
</tr>
<tr>
<td>Rapid response teams</td>
<td>15% ↓ cardiac arrests</td>
</tr>
<tr>
<td>Team training in L &amp; D</td>
<td>50% ↓ adverse outcomes</td>
</tr>
<tr>
<td>Medication reconciliation</td>
<td>90% ↓ in medication errors</td>
</tr>
<tr>
<td>Ventilator bundle</td>
<td>62% ↓ in VAP</td>
</tr>
</tbody>
</table>
Cost of Medical Errors

- Avoidable medical errors - $19.5 billion (2008)
  - $17 billion to provide in-patient and out-patient care, and prescription drugs to those affected
  - $1.4 billion related to increased mortality
  - $1.1 billion lost productivity
- Total cost per error = $13,000
- 7% of hospital admissions result in some type of injury
Cost of Medical Errors

1. Pressure ulcers ($3.858 B)
2. Post-op infections ($3.676 B)
3. Mechanical complications of device, implant, or graft ($1.123 B)
4. Post-laminectomy syndrome ($1.123 B)
5. Hemorrhage complicating a procedure ($960 M)
6. Infection following infusion, injection, transfusion, vaccination ($691 M)
7. Pneumothorax ($617 M)
8. Infection due to central venous catheter ($589 M)
9. Other complications of internal prosthetic device, implant ($462 M)
10. Ventral hernia ($440 M)
Where we’re going?

“You’ve got to be very careful if you don’t know where you’re going, because you might not get there.”

Yogi Berra
Where we’re going?

- Incident reporting
- Quality Assessment/ Improvement
- Peer review
- Competency assessment
This report says medical errors such as indecipherable prescriptions cause the deaths of 98 patients a year, or is that 98,000? It's hard to read this. In any case, we're supposed to report them, or is that repeat them?

How about repress them? Does that work for you?
Why Do Errors Happen?

- Inadequate training
- Failure of medical technologies
- Inappropriate use of technologies
- Physiologic and psychological factors of practitioners
- IT inadequacy and failure
- Deficient skills in execution
- System failures
- Communication errors and breakdowns
- Rule-based errors
- Errors in reasoning and decisions
Why don’t we report?

- Lack of awareness of need to report, what to report, and why
- Lack of understanding how to report
- Too busy to report
- Too much paperwork to report
- No patient harm, no urgency
- Fear of retribution, discipline, litigation
- Someone else will report
- No timely feedback and/or corrective action
After a Medical Error

- Secure the area and preserve evidence
- Notify Risk Management/Human Resources (injuries, loss of life, criminal acts)
  - External reporting (law enforcement, regulatory agencies)
- Gather information about area before, during, and after incident
  - Visit and inspect incident site
After a Medical Error

- Gather information about area before, during, and after incident (cont.)
  - Identify and interview key healthcare workers, patients, and witnesses
  - Photograph/sketch pertinent aspects of site
  - Collect physical evidence
    - Position of injured patient/worker
    - PPE
    - Position of equipment
    - Evidence of equipment tampering
After a Medical Error

- Gather information about area before, during, and after incident (cont.)
- Collect physical evidence (cont.)
  - Materials being used at scene
  - Condition of environment
    - Lighting
    - Noise level
    - Smoke, dust, fumes, vapor
    - Odor
    - Housekeeping, maintenance, sanitation conditions
After a Medical Error

- Gather information about area before, during, and after incident (cont.)
  - Collect physical evidence (cont.)
    - Background information
      - Employee records (license, certification, orientation, competency, performance evaluations)
      - Equipment records (maintenance and service records, operators manuals)
      - Policies and procedures
      - Previous incident reports
      - Safety data sheets (MSDS), if applicable
After a Medical Error

- Analyze facts, determine root cause and contributing factors
- Report findings and make recommendations for corrective actions
- Develop plan to evaluate effectiveness of corrective actions
- Alter corrective actions as determined by ongoing monitoring
Root Cause Analysis (RCA)

- Structured method to analyze serious adverse events
- Systems approach to identify:
  - Active errors (interface between humans and a complex system)
  - Latent errors (hidden problems within healthcare systems)
- Includes data collection, reconstruction of the event, and analysis
Scope of RCA

- Behavioral assessment process
- Physical assessment process
- Patient identification process
- Patient observation procedures
- Care planning process
- Continuum of care
- Staffing levels
- Orientation and training of staff
- Competency assessment
- Supervision of staff
Scope of RCA

- Communication with patient/family
- Communication among staff members
- Availability of information
- Adequacy of technological support
- Equipment maintenance/management
- Physical environment
- Security systems and processes
- Control of medications (storage/access)
- Labeling of medications
IHI Global Trigger Tool

- Care Module Triggers
  - Any code or arrest
  - Abrupt drop of 25% or greater in Hematocrit
  - Patient fall
  - Readmission within 30 days
  - Transfer to a higher level of care
IHI Global Trigger Tool

- **Surgical Module Triggers**
  - Return to surgery
  - Intubation/reintubation in PACU
  - Intra- or postoperative death
  - Operative time greater than 6 hours

- **Medication Module Triggers**
  - Narcan use
  - Abrupt medication stop
IHI Global Trigger Tool

- **Intensive Care Module Triggers**
  - Pneumonia onset
  - Readmission to intensive care
  - Intubation/reintubation

- **Perinatal Module**
  - Apgar less than 7 at 5 minutes

- **ED Module**
  - Readmission to ED within 48 hours
  - Time in ED greater than 6 hours
Types of Errors

- Medication errors
- Surgical errors
- Diagnostic errors
- Human factors
- Transition and handoff errors
- Teamwork and communication errors
- Nosocomial infections
Medication Errors

- **Strategies to decrease medication errors:**
  - Standardization and decreasing ambiguity
  - Independent double checks
  - Unit dosing
  - Removal of medications from certain settings
  - Use of clinical pharmacists
  - Addressing look alike, sound alike drugs
Medication errors

Medication Errors, by stage in process

- Ordering stage, 56%
- Transcribing stage, 6%
- Dispensing stage, 4%
- Administration stage, 34%
Surgical Errors

- Volume/outcome relationships
- Anesthesia safety
- Wrong site, wrong patient
- Retained sponges and instruments
<table>
<thead>
<tr>
<th>Treatment or Procedure</th>
<th>Hospital volume</th>
<th>MD volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary Artery Bypass Graft</td>
<td>450</td>
<td>100</td>
</tr>
<tr>
<td>Percutaneous coronary intervention</td>
<td>400</td>
<td>75</td>
</tr>
<tr>
<td>Aortic valve replacement</td>
<td>120</td>
<td>22</td>
</tr>
<tr>
<td>Bariatric surgery</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>Abdominal aortic aneurysm repair</td>
<td>50</td>
<td>22</td>
</tr>
<tr>
<td>Esophagectomy</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Pancreatic resection</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>High risk delivery</td>
<td>NICU ADC of 15</td>
<td></td>
</tr>
</tbody>
</table>
Diagnostic Errors

Missed Myocardial Infarction

A 68 year old African American woman, with diabetes, high blood pressure, and elevated Cholesterol, presented to ED after 30 minutes of squeezing chest discomfort. EKG was performed and showed some non-specific ST changes. While not normal, ST elevations were not classical AMI. On exam, she had mild tachycardia, clear lungs, and mild tenderness over the lower sternum. Troponin was ordered and was mildly elevated, but not in AMI range. MD diagnosed costrochondritis, prescribed an anti-inflammatory agent, bed rest, and she was discharged from the ED. Several hours later, the patient returned to the ED, CPR in progress. She was pronounced DOA.
Diagnostic Errors

- Why did this happen?
  - Female symptoms vs. male symptoms?
  - Lack of attention to patient history?
  - Underestimated EKG and Troponin?
  - Overestimated sternal discomfort?
  - ED volume?
  - Physician fatigue?

- Nearly 1 in 25 Acute MI patients are mistakenly sent home from EDs
Human Factors

- Human Factors Engineering
  - Interplay among humans, machines, and the work environment
  - Minimize the likelihood of error
  - Optimize safety
  - Recognizes that humans overestimate their abilities, underestimate their limitations
  - Strive to understand human physical and mental strengths and weaknesses
Human Factors

- Forcing functions
  - Pin Index Safety System
  - Patient Controlled Analgesia (PCA)
  - Bar coding medications
- Usability testing
- Heuristic evaluations
Transition and Handoff Errors

- One of the most common and consequential errors in healthcare
- Two types of transition and handoff
  - Patient movement
  - Stationary patient, caregivers change
- Focus of The Joint Commission’s 2006 NPSG
- Person-to-person handoff essential
## Transition and Handoff Errors

ANTICipate, highlighting elements of a safe and effective handoff.

<table>
<thead>
<tr>
<th>Administrative</th>
<th>Accurate information, such as name and location.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New information</td>
<td>Clinical update, including brief history and dx., updated medication and problem list, current baseline status, recent procedures, and significant events.</td>
</tr>
<tr>
<td>Tasks</td>
<td>The “to do” list, best expressed in “if/then” statements</td>
</tr>
<tr>
<td>Illness</td>
<td>The primary provider’s assessment of the patient’s severity of illness</td>
</tr>
<tr>
<td>Contingency plans</td>
<td>Statements of things that have and have not worked in the past.</td>
</tr>
</tbody>
</table>
Teamwork and Communication Errors

- Teamwork importance has increased over time
- Emulate aviation model (Crew Resource Management)
- Fixed vs. fluid teams
- Communication errors are top root cause of sentinel events
Teamwork and Communication Errors

Root Causes of Sentinel Events

<table>
<thead>
<tr>
<th>Root Cause</th>
<th>% of 2,966 events reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>60%</td>
</tr>
<tr>
<td>Orientation/training</td>
<td>50%</td>
</tr>
<tr>
<td>Patient assessment</td>
<td>40%</td>
</tr>
<tr>
<td>Staffing</td>
<td>30%</td>
</tr>
<tr>
<td>Availability of info</td>
<td>20%</td>
</tr>
<tr>
<td>Competency/credentialing</td>
<td>10%</td>
</tr>
<tr>
<td>Procedural compliance</td>
<td>5%</td>
</tr>
<tr>
<td>Environmental safety/security</td>
<td>5%</td>
</tr>
<tr>
<td>Leadership</td>
<td>5%</td>
</tr>
<tr>
<td>Continuum of care</td>
<td>5%</td>
</tr>
<tr>
<td>Care planning</td>
<td>5%</td>
</tr>
<tr>
<td>Organization culture</td>
<td>5%</td>
</tr>
</tbody>
</table>
Teamwork and Communication Errors

- SBAR
  - Situation
  - Background
  - Assessment
  - Recommendations
You are the evening shift RT in a community hospital. You are called to see a patient in a Medical unit who is in respiratory distress. Hx. of COPD, RR 40, P 140, SO2 74%, Absent breath sounds on right, diminished on left. Patient is diaphoretic and cyanotic.

How do you report to the physician using **SBAR**?
Dr. Jones, this is Paul the RT. Mr. Smith is in severe respiratory distress. He has COPD and is increasingly SOB since 4 PM. His RR is 40, P 140, SO2 74%, breath sounds are absent on right, diminished on left, and is diaphoretic and cyanotic. I think we need to get a stat CXR and ABG.
Teamwork and Communication Errors

- CUS words
  - “I’m concerned about…..
  - “I’m uncomfortable with…..
  - “This is a safety issue…..
Nosocomial Infections

- Debate continues about classifying as medical error
- Failure to adhere to evidence-based practices
- Surgical site infections
- Ventilator-associated events (VAE)
- Catheter-related bloodstream infections (CLABSI)
- Catheter-associated urinary tract infections (CAUTI)
Nosocomial Infections

- VAP Bundle
  - Elevate head of bed 30 to 45 degrees
  - Daily “sedation vacation” and assessment of readiness to extubate
  - Peptic Ulcer Disease prophylaxis
  - DVT prophylaxis
National Patient Safety Goals

- Released by The Joint Commission, starting in 2003
- Based on sentinel events identified and reported
- Applicable to all sites of care, as appropriate
- Reviewed annually
- Some goals become embedded in TJC standards
National Patient Safety Goals

- Identify patients correctly
  - Use at least two forms of identification
  - Must be performed for all medication administration and testing/treatments
  - Room number cannot be used
  - Specific procedure for blood transfusion
  - Labeling of patient specimens
National Patient Safety Goals

- Improve staff communication
  - Critical tests/critical values
  - Identify critical tests
  - Specify critical values (panic values)
  - Establish appropriate timeframe for MD to be notified
  - Document MD notification
  - Monitor compliance
National Patient Safety Goals

- Medication safety
  - Label all medications
  - Includes syringes, basins, cups
  - Anticoagulation therapy
National Patient Safety Goals

- Prevent infections
  - Comply with hand hygiene guidelines
  - Implement guidelines for resistant infections, central line infections, and surgical site infections
National Patient Safety Goals

- Medication reconciliation
  - Document medications on admission
  - Assess for therapeutic duplication
  - Prevents missed doses
  - Provide list to next caregiver upon transfer
  - Provide list to patient/family on discharge
National Patient Safety Goals

- Wrong site procedures (Universal protocol)
  - Site marking
  - Time out
  - Respiratory specific
    - Chest tube insertion
    - Bronchoscopy
    - Chest percussion
National Patient Safety Goals

- Identify patient safety risks in the environment
  - Suicide risk (Hospital)
  - Home fires with oxygen (Home care)
National Patient Safety Goals

- Clinical alarm safety (effective 7/1/14)
  - Identify most important clinical alarms

- RT considerations:
  - Ventilator alarms
    - 22% of vent deaths due to alarm issues
  - Monitoring alarms (cardiac, oximeter)
  - Typical ICU has more than 40 alarm sources
  - Adequately audible, distance and competing noises
  - Desensitization (“alarm fatigue”)

- Establish policies (effective 1/1/16)
Additional Patient Safety Standards

- **Patient falls**
  - Assessed initially and ongoing reassessment
  - Identify falls risks
  - Provide patient education
  - Respiratory risks
    - Power cords
    - Oxygen tubing
    - Equipment
Additional Patient Safety Standards

- Patient involvement in their care
  - Patient/family are partners in care
  - Patient education
  - Inform of patient safety measures
  - Smoking cessation
Additional Patient Safety Standards

- Patient deterioration
  - Rapid Response Teams
    - Identification of patient deterioration
    - Response by appropriate personnel
    - Treat urgent issues
    - Provide staff education and support
    - Reduce “codes” outside critical care

The rapid response team at Henry Ford Hospital, in Detroit, Michigan, provides 24-hour on-call assistance to the hospital’s 22 medical-surgical units.

DCH Regional Medical Center in Tuscaloosa, Alabama, implemented SWAT, its rapid response team, in June 2005.

The Joint Commission
Improve recognition & response to changes in a patient’s condition
Additional Patient Safety Standards

- Read back of verbal/telephone orders
  - Write order down when provided by MD
  - Read back to MD to verify accuracy
Patient Safety and the RT

Oxygen use and safety

- Cylinder safety
  - Secure cylinders
- Gas mix-ups
  - Segregate cylinders
- Managing delivery
  - Monitoring device and flow
- Tubing misconnections
Patient Safety and the RT

- Ventilator care
  - Prevention of VAP
    - VAP bundle
  - Elevation of head of bed (30-45 degrees)
  - Daily sedation vacation & assess readiness to wean
  - Peptic ulcer disease prophylaxis
  - Deep vein thrombosis (DVT) prophylaxis
  - Daily oral care

- Alarms
- Tubing disconnect
- Dislodged ET/trach tube
Patient Safety and the RT

- Intubation
  - Training
  - Competency
  - Difficult airway
  - Timeliness
  - Complications
    - Failed intubation
    - Trauma
    - Cardiac effects
    - Airway perforation
Patient Safety and the RT

- **CPR**
  - **Timeliness**
    - Long Island infant case ($7.3M settlement)
    - 3.5 minute delay in resuscitation
  - **Competency**
  - **Certification**
  - **Do Not Resuscitate (DNR)**
  - **Family presence during CPR**
  - **Documentation**
Patient Safety and the RT

- OSA
  - Prevalence
    - 23 million Americans symptomatic
    - 12 million – moderate to severe OSA
  - Identification of non-diagnosed patients
    - In-patients
    - Post op patients
  - Treatment
    - Pt’s own CPAP
    - Pressure ulcers
Building a Culture of Safety

- Recognize that people are human and will make mistakes
- Systems are designed to catch mistakes before they become errors
- The need to review “near misses” to further reduce opportunities for error
Building a Culture of Safety

- Leadership driven – must guide every decision
- Acknowledge that our systems are most likely to cause errors, not our people
- No healthcare decision is removed from patient safety
- Need to recognize and correct at-risk behavior
Building a Culture of Safety

“The single greatest impediment to error prevention in the medical industry is that we punish people for making mistakes.”

Dr. Lucian Leape
Professor, Harvard School of Public Health
Testimony before Congress on Health Care Quality Improvement
Building a Culture of Safety

- Human error - inadvertent action; inadvertently doing other than what should have been done; slip, lapse, mistake.
- At-risk behavior – behavioral choice that increases risk where risk is not recognized or is mistakenly believed to be justified.
- Reckless behavior - behavioral choice to consciously disregard a substantial and unjustifiable risk.
<table>
<thead>
<tr>
<th>Just Culture: The Three Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal Error</strong></td>
</tr>
<tr>
<td>Inadvertent action: slip, lapse, mistake</td>
</tr>
<tr>
<td>Manage through changes in:</td>
</tr>
<tr>
<td>• Processes</td>
</tr>
<tr>
<td>• Procedures</td>
</tr>
<tr>
<td>• Training</td>
</tr>
<tr>
<td>• Design</td>
</tr>
<tr>
<td>• Environment</td>
</tr>
</tbody>
</table>

| **At-Risk Behavior**              |
| A choice: risk not recognized or believed justified |
| Manage through:                   |
| • Removing incentives for At-Risk Behaviors |
| • Creating incentives for healthy behaviors |
| • Increasing situational awareness  |

| **Reckless Behavior**             |
| Conscious disregard of unreasonable risk |
| Manage through:                   |
| • Remedial action                  |
| • Punitive action                  |

| **Support**                       |
| **Coach**                         |
| **Sanction**                      |
HOSPITAL MEDICAL ERRORS KILL 98,000 AMERICANS EACH YEAR. -- HEARST NEWS INVESTIGATION
“Second Victim”

- Caregivers and staff involved in medical errors that harm patients
- Staff can sustain complex psychological harm
- Healthcare practitioners repeatedly exposed to emotional turmoil
- Equivalent to post-traumatic stress disorder
- Staff feel sadness, fear, anger, shame, panic, horror, apprehension
- Effective support needed for practitioners
“Second Victim”

- Five rights of second victims: T R U S T
  - Treatment that is just
  - Respect
  - Understanding and compassion
  - Supportive care
  - Transparency and opportunity to contribute
IOM Aims for Quality Healthcare

- Healthcare must be safe
- Healthcare must be effective
- Healthcare must be patient-centered
- Healthcare must be timely
- Healthcare must be efficient
- Healthcare must be equitable
References

- Institute of Medicine, *To Err is Human*, 1999
- Institute of Medicine, *Crossing the Quality Chasm*, 2000
- Institute of Medicine, *Patient Safety: Achieving a New Standard for Care*, 2004
Conclusion and Questions

Knowing is not enough, we must apply,
willing is not enough, we must do.
Johann Wolfgang von Goethe

We will not become safe until we chose to become safe.
Lucian Leape and Donald Berwick