Cognitive Errors: How Great Clinicians Reach Wrong Conclusions

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Overview of Dx Errors

Cognitive Biases

Dual-Process Theory

Prevention Strategies
# What is Diagnostic Error?

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Trauma</th>
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<tbody>
<tr>
<td>Mark Graber, MD</td>
<td>James Reason, PhD</td>
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<tr>
<td>Missed, Delayed, or Wrong Diagnosis</td>
<td>The failure of a planned action to achieve its desired goal</td>
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<td>Hardeep Singh, MD</td>
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<td>Missed opportunities to make a timely or correct diagnosis</td>
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An Analysis of Errors Causing Morbidity and Mortality in a Trauma: A Guide for Quality Improvement

- 122,577 patients admitted to six trauma centers
- Significant preventable errors in 4% of patients
- 5.9% preventable or potentially preventable trauma deaths
  - 1,295 total deaths

Davis et al., Journal of Trauma, 1992
Guidelines for preventability of complications and death classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Guidelines</th>
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<tbody>
<tr>
<td>Nonpreventable</td>
<td>1. Injuries and sequelae nonsurvivable with optimal management</td>
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<td>2. Evaluation and management appropriate to ATLS guidelines</td>
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<td>3. $Ps^* &lt; 0.25$</td>
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<td>4. Suspect care does not affect classification of death but is treated as morbidity</td>
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<tr>
<td>Potentially preventable</td>
<td>1. Injuries or sequelae severe but survivable</td>
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<td>2. Evaluation and management generally appropriate</td>
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<td>3. $0.50 &gt; Ps^* &gt; 0.25$</td>
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<td>4. Error(s) in care directly or indirectly implicated in patient’s death</td>
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<tr>
<td>Preventable</td>
<td>1. Injuries or sequelae considered survivable</td>
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<td>2. Evaluation and management suspect</td>
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<td>3. $Ps &gt; 0.50^*$</td>
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<td>4. Error(s) directly or indirectly caused patient’s death</td>
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Phases of Care

Errors

- CC: 21%
- OR: 26%
- Resus: 53%

Preventable Deaths

- OR: 14%
- CC: 50%
- Resus: 36%

Errors

- CC: 21%
- OR: 26%
- Resus: 53%

Preventable Deaths

- OR: 14%
- CC: 50%
- Resus: 36%
Failure to appropriately evaluate abdomen
   Most common

Errors in neurologic resuscitation
   33% resuscitative and 12% overall preventable death

Critical Care
   unrecognized intra-abdominal sepsis, ventilator/pulmonary management, head injury management, hemodynamic monitoring failures
Patterns of Errors Contributing to Trauma Mortality
Lessons Learned from 2594 Deaths

1996-2004
44, 401 trauma patient admissions
5.8 % deaths
2.5% deaths had contributing errors

Gruen et al., Annals of Surgery, 2006
Major Patterns of Error Contributing to Mortality

- Hemorrhage Control
  - Abdomen/Pelvic (16%)
  - Intrathoracic (9%)
- Airway management (16%)
- Inappropriate management of unstable patient (14%)
  - Lengthy initial operative procedure (8%)
- Procedure complication (12%)
- Inadequate prophylaxis (11%)
- Missed or delayed diagnosis (11%)
- Overresuscitation with fluids (5%)
How common is diagnostic error?

**US**
- Up to 80,000 deaths/year
- 1/1000 outpatient encounters
- 1/20 adult outpatient, 12 million adults/yr

**Your Hospital**
- 10 deaths/year
- 1 diagnostic harm/day

Adapted from Dr. Mark Graber’s MD, FACP webinar on 12/3/13: “Preventing Diagnostic Error: Where do I start?” Sponsored by National Patient Safety Foundation
Diagnostic Error in Internal Medicine

Mark L. Graber, MD; Nancy Franklin, PhD; Ruthanna Gordon, PhD

Figure. The categories of factors contributing to diagnostic error in 100 patients.
Diagnostic Error in Internal Medicine

Mark L. Graber, MD; Nancy Franklin, PhD; Ruthanna Gordon, PhD

Cognitive Errors

- Faulty Knowledge
- Faulty Data Gathering
- Faulty Synthesis: Verification
- Faulty Synthesis: Info Processing

Overview of Dx Errors

Dual-Process Theory
Dual-Process Reasoning

Unconscious

Rapid

System 1
Non-analytical

System 2
Analytical

Conscious

Deliberate

Metacognition

Quirk M. Intuition and Metacognition in Medical Education: Keys to Developing Expertise. 2006.
System 1: **Intuition**

**NON-ANALYTIC**

- Relies heavily on **EXPERIENCE**
- **FAST**
- **[Thinking without thinking]**
- **Pattern Recognition**
- **LOW** cognitive load
System 2: **Metacognition**

**ANALYTIC**

- Deductive reasoning
- "Thinking about one’s own thinking"
- Logical
- SLOW
- HIGH cognitive load
System 1: **Intuition**

**PITFALLS**

- Strongly influenced by ambient conditions
- Atypical presentations
- Pattern mistaken for something else
System 2: **Metacognition**

**PITFALL**

**IMPRactical SLOW**
DUAL PROCESS THEORY

Context
- Ambient conditions
- Task difficulty
- Task ambiguity
- Affective state
- Modular responsivity

System 1
- Recognised
- Pattern recognition
- Rational override
- Dysrationalia override
- Calibration

System 2
- Not recognised
- Repetition

Patient presentation
- Pattern processor

Intellectual ability
- Education
- Training
- Critical thinking
- Logical competence
- Rationality
- Feedback

Broken lines indicate significant interactions between System 1 and System 2
Source: Adapted from Crosbbery (2009) with permission

Overview of Dx Errors

Cognitive Biases

Dual-Process Theory

Overview of Dx Errors
Cognitive Biases

**Anchoring**
Tendency to lock onto initial impressions or pieces of information early in the decision-making process. Once an anchor is set, it can be difficult to move away from and new information is interpreted around it.

**Courthouse Daiquiri**
"Uncooperative"

Confirmation
Tendency to look for and weight confirming evidence to support a diagnosis rather than evidence that refutes it

Attempted to hit nurse “Leave me alone”
Cognitive Biases

Premature closure
Tendency to shut down the decision-making process prematurely, accepting a diagnosis before it has been fully verified

Vomiting and Uncooperative d/t alcohol consumption

Cognitive Biases

**Diagnosis momentum**

Once diagnostic labels are attached to patients they tend to stick

He’s drunk

Cognitive Biases

**Availability Heuristic**
Judge things as being more likely, or frequently occurring, if they more readily come to mind

Alcohol as opposed to head bleed as cause of vomiting

Cognitive Biases

Gambler’s fallacy
The belief that if a coin is tossed ten times and is heads each time, the 11th toss has a greater chance of being tails

“We can’t have 3 kids w/ appy in 1 shift”

Cognitive Bias

Inherited Thinking

Prevalence/Estimation

Alternative/2nd Diagnosis

Patient Context

Overattachment

Physician Attributes

CATEGORIES

Overview of Dx Errors

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Overview of Dx Errors
# CHECKLISTS/PROTOCOLS

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<td>Interhospital transfer of unstable pt</td>
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<td>Complications of feeding tubes</td>
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<td>Retained foreign body in OR</td>
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<td>Failure to warm +/- correct coagulopathy</td>
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<td>Airway loss during oro-tracheal intubation</td>
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<td>Unprotected airway in vulnerable patient</td>
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<td>Lengthy operation in unstable patient</td>
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<td>Unstable patient to CT scanner</td>
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<td>Complications of procedures</td>
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<td>Inadequate VTE prophylaxis</td>
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Cognitive Debiasing Strategies

Mental strategies to avoid cognitive error

Forced Thinking
THE DIAGNOSTIC TIME OUT
Forced Thinking

- What else could it be?
- Is there anything that doesn’t fit?
- Is it possible that I have more than one problem?
Diagnostic Verification
Criteria of Validity

• Adequacy
  • Are all the patient's findings (abnormal or normal) accounted for by the diagnostic hypothesis?
  
  Have I explained all the patient’s findings?

• Coherency
  • Is the diagnostic hypothesis pathophysiologically consistent with all the clinical findings?
  
  Is there a non-fit?
Life Threats
Adequacy
Consistency/Coherency
Else (What else could it be?)
Second Problem
When should we take a time out?

- Unexplained Symptom(s)
- Return visit
- At-risk patient population
- Critical condition
- End of shift
WHEN... U nexplained Complaint R eturn Visit A t-risk patient C ritical Condition E nd of Shift

TIE YOUR...

L ife-threats addressed? A nything else it could be? C oherent explanation? E verything explained? S econd problem present?
Milestones

“NOT YET DIAGNOSED”

RAPID SEQUENCE INTUBATION

TX TIMES FOR INVASIVE INFECTONS

FIBRINOLYTIC FOR ACUTE MI

NOT YET DIAGNOSED
Admission Tags

- CHEST PAIN – NYD
  Not Yet Diagnosed
- SHORTNESS OF BREATH – TPD
  Trying to Prevent Death
- VOMITING – PD
  Parental Distress
FEEDBACK LOOP
“Closing the Loop”

Team → Patient → Night Float → ED
Challenges

Classification

Epidemiology

FUTURE DIRECTIONS


