

Partnership of the Minds

How your brain can referee the Murphy vs.
Ockham title fight

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Disclosure

o None

Overview

- Walk through an improbable case
- Introduce causes of common medical errors
- Highlight its importance for IPAC
- Outline mitigation strategies

Prologue - Cautionary Notes

- o Retrospectroscope works well to spot errors
- o Thoughts/intent inferred from written record
 - o Incomplete
 - o Highlight teaching points
- o My last names are not Skinner or Freud
- o I am guilty as charged

Case Presentation

- o Patient
 - o HTN/PCKD → CRF (Cr 250)
 - o Orchiectomy (2 yr. prior)
 - o “Florid granulomatous disease”
 - o Necrotizing/abscess formation
 - o Negative stains/no culture performed
 - o Ex smoker
 - o From the Middle East (left >10 yr.)
 - o No known history/contact with TB
 - o Unknown TST status/HIV neg.
 - o Worked in healthcare

Case Presentation

- o Respiriology consult (Jan)
 - o 4 weeks of dyspnea/dry cough/weight loss
 - o Underwhelming “Infectious” symptoms
 - o R sided pleural effusion (moderate)
 - o Volume overload vs. other (malignancy)
 - o Pleural fluid
 - o Bloody
 - o Slight elevated WBC (0.7 with 64% lymphocytic)
 - o Borderline exudative
 - o Cytology & cultures x 2 neg.

Case Presentation

- o Follow up (1 week later)
 - o “Better” but dry cough
 - o CXR improved R effusion
 - o Volume overload vs. malignancy
 - o Echo (nil)
 - o CT chest/abdomen ordered
 - o Thoracentesis as needed
 - o Given diuretics
 - o Effusion further improved 2 wks. later

Case Presentation

- o CT chest (March)
 - o Bilateral large effusions
 - o Faint tree in bud pattern (upper lobes)
 - o Collapse/consolidation of multiple lobes
 - o Stranding/congestion small bowel mesentery
- o No immediate clinical follow up

Case Presentation

- o ER (3 weeks post CT)
 - o Enlarged/painful irregular testicle
 - o U/S = complex avascular mass
 - o Worsening L >> R pleural bloody effusion
 - o Airspace dz on L sided better post thoracentesis
 - o CT chest - minimized (lack of classic features)
 - o Urine culture for TB
 - o Orchiectomy for TB culture as outpatient

Case Presentation

- o Outpatient (1 week later)
 - o 2 + AFB seen in urine
 - o AMTD + → M. tuberculosis in culture
 - o Pleural fluid (ER visit)
 - o No AFB
 - o M. tuberculosis in culture (pan S)
 - o Quad TB therapy started (INH/RIF/PZA/ETH)
 - o Pulmonary TB not suspected

Case Presentation

- o ER (Day 2 of TB meds)
 - o ICU admission for hemorrhagic shock
 - o Duodenal ulcer
 - o Respiratory deterioration
 - o New/sudden airspace disease
 - o Query aspiration
 - o Airborne isolation

Case Presentation

- o CT chest/abdo/pelvis (vs. March)
 - o Progression of pulmonary nodules
 - o Ca²⁺ hilar/mediastinal LN
 - o Missed on prior CT
 - o Diffuse colitis
 - o Fat stranding/ascites/irregularities in omentum and mesentery

Case Presentation

- o April 18 sputum 1+ AFB pos = TB
- o April 19 pleural fluid TB + culture
 - o AFB stain neg
- o 5 sputum samples (May 1-7) negative for TB
 - o 4 wks. of therapy
- o Airborne isolation D/C Day 26 of therapy

Case Presentation

- o ICU stay (8 weeks)
 - o *Pseudomonas aeruginosa* CR-BSI (May)
 - o +/- VAP from trach colonization
 - o *C. albicans* CR-BSI (May)
 - o MRSA CR-BSI (June)
 - o Colonization from May 4
 - o Positive BC x8 days despite line changes & IV Abx
- o IV steroids for sepsis

Case Presentation

- o Vesicular rash noted by resident
 - o Active MRSA bacteremia
 - o Purulence to the fluid
 - o MRP not notified x 72hrs
- o Reviewed by ID
 - o Primary VZV vs. disseminated shingles
 - o Airborne isolation & IV acyclovir
 - o Viral culture = VZV
- o Patient expired day 5 of rash

Epilogue

- o 18 days later...
 - o Patient's adult offspring x2 – primary VZV
 - o Prior immunity for any adult case unknown
 - o No known ill family prior to index case
 - o Unknown if pediatric vaccinations or exposure to mild case in patient's grand children
- o Summary
 - o Extrapul. → pulmonary disseminated TB
 - o Nosocomial VZV in ICU with transmission

“Clinical” Decision Making

- o Diagnostic errors are estimated at 10-15%
 - o Missed, incorrect or delayed
 - o Undifferentiated syndromes
 - o ICU/ER, Family/Internal Medicine
- o Systems and/or individual causes
- o Downstream effects on therapeutic decisions
- o Raise risk for adverse outcomes

Individual Decision Making

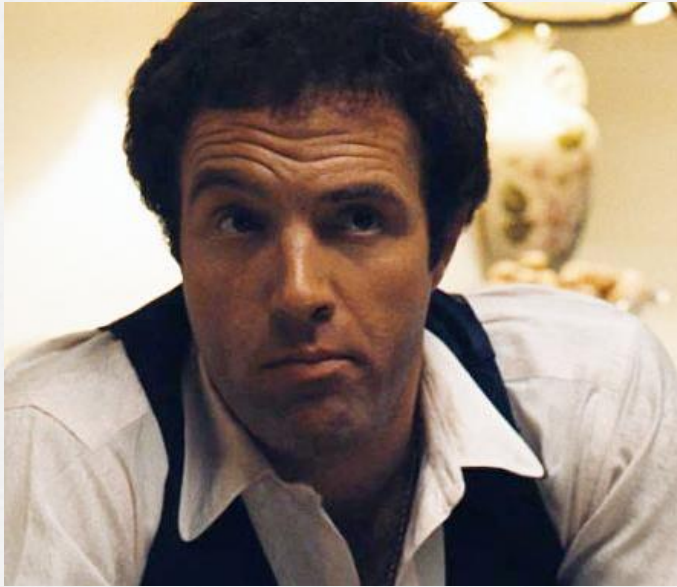
- o Various process errors with info stream
 - o Availability → assimilation → cognitive analysis
- o Common scenarios are mishandled
 - o Errors due to reasoning process > knowledge
 - o Different than rare events (missed/delayed)
- o Freq. association with overconfidence
 - o Little insight with one's own error rate/magnitude

Thinking Deconstructed

- o Reasoning based on cognitive processes
- o Psychological research – 2 speed motor
- o Involve different areas of brain
 - o MRI can visualize unique processes
- o Different pros/cons
 - o Healthcare is probability heavy
 - o Proper application needed
 - o Dictated by complexity/experience/personality

Mob Mentality

Type 1



Type 2



Type 1 – Caveperson Circuitry



- o Heuristic/intuitive
- o Quick & reflexive
- o Subconscious process
- o Hard wired *or* from repetitive exposure
- o Ubiquitous usage
- o Indispensable
- o Pattern recognition

Croskerry. N Engl J Med. 2013; 368(26):2445-8

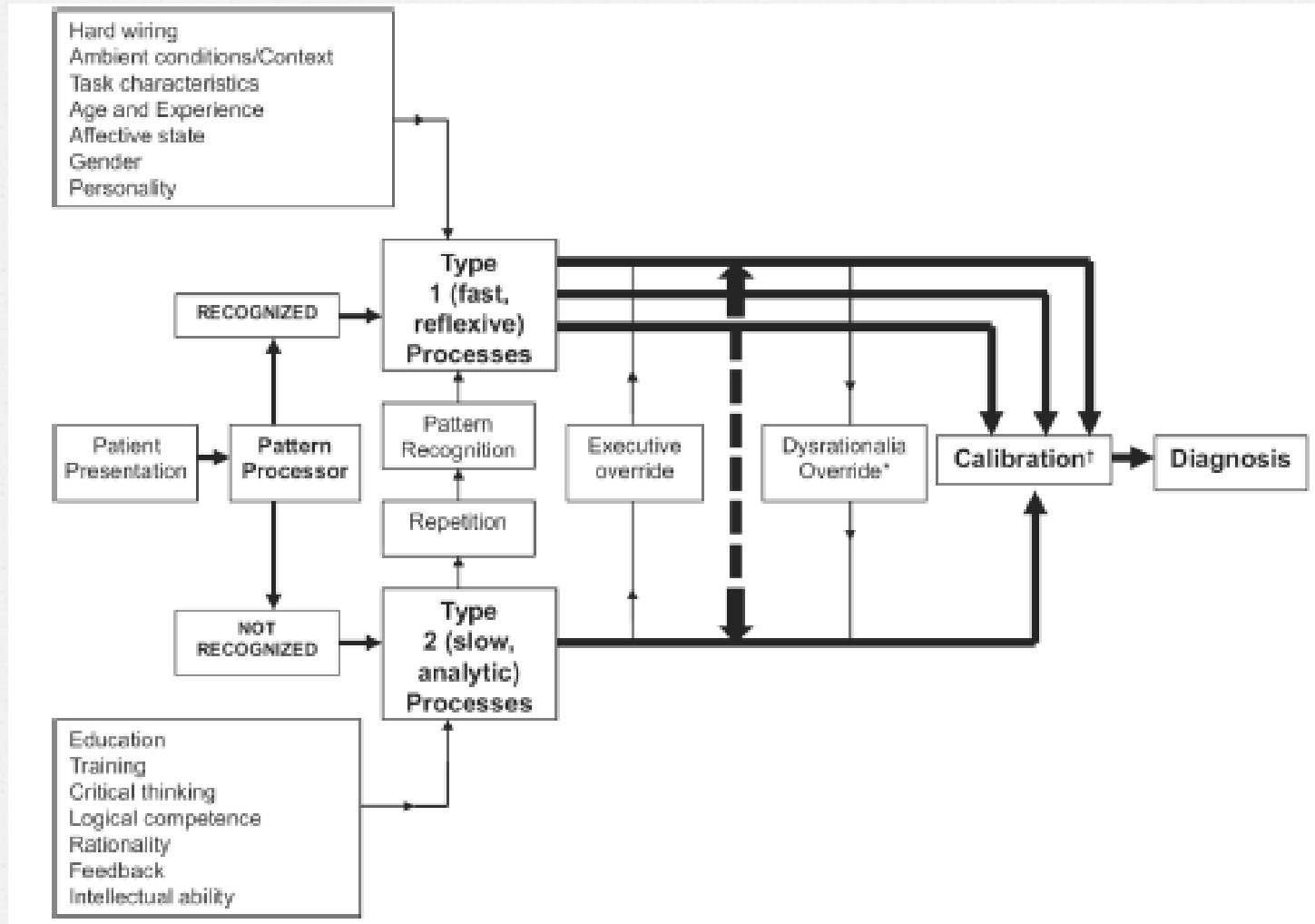
Pennsylvania Patient Safety Advisory. 2010; 7(3):73-86

Type 2 – Modern Day Marvel

- o Controlled/analytic
- o Slow/deliberate
- o Conscious process
- o Requires practice & active engagement
- o Limited use in daily life
- o Logical & reliable
- o Probability based “fits”



Croskerry. N Engl J Med. 2013; 368(26):2445-8
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Diarrhea Plus *C. difficile* toxin B PCR +

Type 1

- o It is *C. difficile* colitis

Type 2

- o Disease vs. colonization
 - o Other causes of diarrhea
 - o Duration in hospital
 - o Abxs
 - o Stooling pattern
 - o Supporting lab/clinical features
- o Pre test probability

Type 1 – Downsides



- o Most error prone
 - o Cognitive biases
 - o Fallacies
 - o False assumptions
- o Error rate magnified
 - o Time pressure
 - o Perceived simplicity
 - o Personality traits
- o “Gambling”

Croskerry. N Engl J Med. 2013; 368(26):2445-8
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Type 1 – Downsides



- Outdated ancient tool
 - Complex risk assessments
 - Information heavy
- Primitive roots makes it hard to “turn off”
- Unaware of when it errors

Croskerry. N Engl J Med. 2013; 368(26):2445-8

Pennsylvania Patient Safety Advisory. 2010; 7(3):73-86

Type 2 – Downsides

- o Takes too much “CPU time”
 - o Not the primary tool
- o Fails differently
 - o Wrong logic paradigm
 - o Too much throughput
 - o Tired/sleep deprivation
 - o Emotions
 - o Communication error



Croskerry. N Engl J Med. 2013; 368(26):2445-8
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Cognitive Bias

- o Heuristics = simple decision making rules
- o Periodic faulty application of heuristics
 - o Over-utilized Type 1
 - o Overrides Type 2
 - o Differs from systematic effect of personality
- o Occurs at any point in reasoning process
 - o Commonly > 1 involved
- o Type 2 tends to be protective

Anchoring Bias

- o Focusing on 1 possibility & failing to consider others
- o Despite contradictory information
- o Thought that effusion/case was not TB
 - o Renal failure/improvement on diuretics
 - o Age = cancer
 - o Bloody lymphocytic pleural fluid
 - o Prior pathology result (testicle)

Representation Heuristic

- o Match current to past patterns
- o Limits 'differential diagnosis' created
- o Probability of fit \neq probability of diagnosis
 - o Insuff. pattern recognition for rare diagnosis
- o CHF/cancer was more likely with a mild chronic outpatient presentation

Premature Closure Bias

- o Abrupt narrowing of possibilities too early
- o True answer removed from consideration

- o Rash in ICU discounted as persistent MRSA bacteremia related – no swab/action taken
- o TB culture (pleural) negative initially

Search Satisfaction Bias

- o Incomplete assessment once 1 abnormality is found
- o Abnormality may not be germane to the problem

- o Orchitis vs. big picture
- o AFB seen in urine but sputum not re tested
 - o To determine contagiousness

So Why Am I Boring You...

- o Clinical assessment - 2nd most common error
 - o Linked to cognitive misfires
- o Analysis of 100 errors in Internal Medicine
 - o 65% - system factors
 - o 75% - cognitive factors
 - o 50% - both
 - o Average of 6 factors per error
- o Harm is associated with some errors

Schiff *et al.* Arch Intern Med. 2009; 169(20):1881-7
Graber *et al.* Arch Intern Med. 2005; 165(13):1493-9

Slow Adoption

- o Growing recognition to explain human errors
- o Historic emphasis on fixing systems
- o Other professions more aware (i.e. aviation)
 - o Reduce human error
 - o Redesigning training/processes
- o Literature for medicine not robust
- o CMPA alerting members

So Why Am I Boring You...

- o ICPs rely on MDs for crucial information
 - o MDs are not perfect
 - o Spot the trouble/discordance
 - o Clinical vs. IPAC “diagnosis”
 - o Avoid/minimize propagation of errors
 - o Maintain standardized approach

Physician Scouting Report

- o Limited data
- o Most common causes of errors
 - o Cognitive bias – anchoring, framing, info
 - o Tolerance to uncertainty
 - o Aversion to ambiguity

Physician Scouting Report

- o Diagnostic inaccuracies/overconfidence
 - o Anchoring, availability, information bias
- o Management errors
 - o Anchoring, premature closure, confirmation, representation bias
- o Overutilization of resource
 - o Less comfort to uncertainty
- o Optimal management
 - o More tolerance to ambiguity

Confirmation Bias

- Find/utilize data that supports one's idea
- Ignore data that refutes one's idea

- Use of insensitive (pleural) fluid AFB stain or culture to r/o TB
 - Despite TB risk factors

Aggregation Bias

- o Data/recommendations derived from the “average case” do not apply to a specific situation
- o Despite the clear fit
- o “Anti generalizability”

- o “My patient is sicker”
- o Hand hygiene
- o Droplet/contact when NPS ordered for ARI

So Why Am I Boring You...

- o ICPs make “surveillance diagnosis”
 - o Clinical history
 - o Risk factor examination
 - o Diagnostic/laboratory test ordering
 - o Decision on IPAC measures (“therapy”)
- o Parallels to the physician
- o Forced onto Yes or No outcomes
 - o Despite probabilities

Bias Prone Areas

- o Battle consistency for scrutinized decisions
 - o Sensitivity – outbreaks
 - o Specificity – outcome reporting
- o Not blinded – normally a safe guard
 - o Assess outcomes → assign consequences
 - o Standardization hard maintain with human factors alone
 - o Do we solve outbreaks or judge their resolution?

Bias Prone Areas

- o Reproducibility of definitions (i.e. HAI-ESBL)
- o Constraints on accuracy
 - o Yes/No outcomes in complex world
 - o Case finding when no easy flag
- o Desirability
 - o Consequences of public reporting
 - o Case assessment when results were criticized
 - o Excessive specificity in future
 - o Belief that one's intervention have worked

Affective Bias

- o Unconscious emotional reaction to situation
- o Interferes with proper decision making
 - o Esp. during periods of uncertainty
- o Not a cognitive bias

- o Reverse isolation
- o Excessive response given aversion to outbreaks

Framing Effect

- o The context of how an event was presented can result in different decisions
- o Without changing the facts
- o Heightened during uncertainty or when emotionally charged

- o Minimizing the infraction around device reprocessing affects risk assessment

Clustering Illusion

- o Overestimating the value/significance of small blips in large random data sets
 - o Esp. with small time frames
- o Sensitivity at the cost of specificity
 - o Cluster by chance or by design
- o Can affect resource utilization

- o SSI or CR-BSI rates
- o Two nosocomial cases

The Fix In Is

- o We are all guilty – insight needed
 - o Impeded by personality traits/overconfidence
- o Recognize risky situations
 - o Actively promote a switch back to Type 2
 - o Probability not perception
- o Awareness of thought processes
 - o “Decouple” from improper Type 1
 - o Engage anti-bias strategies

Personal Goals

- o Difficult to develop de biasing strategies
 - o No single fix
 - o Constant editing and re enforcement
 - o Self customized solutions
- o Learn to “engage purposeful self-regulatory judgment”
 - o Efficient use of Type 2
 - o Override misapplied Type 1
- o Possible but lifelong project

Personal Goals

- o Requires support environment
 - o Raise awareness/educate
 - o Introduce skills early in training
 - o Embrace critical thinking
 - o Work cognitive error prevention into processes
 - o Review errors to create de biasing strategies
 - o Avoid burnout for reflective decision review

System Fix

- o Standardized tools/checklists
 - o Concrete definitions/discrete data elements
 - o Objective criteria (easy to extract)
 - o Readily (externally) audited for deviations
- o External expert/group appraisal of bias prone events
 - o Hand hygiene
- o Separate surveillance & prevention tasks
 - o Blinding
- o Set realistic goals & action thresholds *a priori*

Exclusively for IPAC

- o Zero Risk Bias
 - o Reducing a small risk further (to zero) vs.. greater reduction with a large risk
- o “Bundled” interventions



*Association with the caption is purely coincidental

Exclusively for IPAC

- Availability Bias
 - Easily recalled (weird/unusual) diagnosis
 - Distorts the true probability of the current event
 - How are rashes and testicular lesions to be viewed now?



*Association with the caption is purely coincidental

Exclusively for IPAC

- o Sunk Cost Fallacy
 - o Continued commitment/investment in an idea that is increasingly likely to be wrong
 - o Not wanting to abandon prior investment
 - o “Doubling down”
 - o *<fill in example>*



*Association with the caption is purely coincidental

Summary

- Weird cases sets the scene for trouble
- Humans have 2 unique thought processes
- Type 1 thinking leads to medical errors
 - Cognitive bias
- IPAC departments can fall into these traps
- Remedies need to be sustained & multi faceted