Spotting the Zebras: Cognitive Bias and Case Analysis on Primary Care Presentations with Severe Diagnoses
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Speaker Introduction
• Dr. Becky Carson is a certified pediatric nurse practitioner in primary and acute care and has spent a majority of her PNP career in emergency medicine. Dr. Carson credits her clinical experiences in resource-limited medicine in Tanzania and Haiti early in her career with her ability to use history and physical exam to guide medical decision making. She currently works at Cincinnati Children’s in the emergency department and is the director of Catholic University of America’s online PNP acute care post master’s certificate program.

Disclosures
I have no disclosures.

Learning Objectives
• Define cognitive bias and how it may impact the nurse practitioner in the clinical setting.

• Review red flags of common presentations as they may relate to more severe diagnoses.

• Test your knowledge and rationale on case-based management of common presentations that may require a higher level of care.

Hindsight is 20/20

Cognitive Bias

Objective Facts
What Confirms Your Beliefs
What you see
Background
• 1999: To Err is Human
• 2001: Crossing the Quality Chasm
• 2015: Improving Diagnosis in Health Care

• Diagnostic error exists and is underappreciated
  • Sparse data
  • Poor measurability
  • Identified retrospectively
• Patients are the answer
  • Partnerships with pt/family
• Dx is a collaborative effort
  • Inter-professional teamwork is essential

The Diagnostic Process

MALPRACTICE RISKS IN THE DIAGNOSTIC PROCESS
4,000 were diagnostic errors
73% of those listed “failure in judgement”
3% attributed to a knowledge deficit
$631 million in losses

CRICO, 2014; Royce et al., 2019

Leading Causes of Malpractice Claims

How we make decisions: 2 Systems

SYSTEM 1
- Intuitive
- Rapid
- Pattern-based

SYSTEM 2
- Analytic
- Logical reasoning
How we make decisions: Dual Process Theory

System 1, then system 2

How we make decisions: Metacognition

System 1, self-reflection, system 2

How we make decisions: Adaptive Expertise

Dual Process Theory + expert practice*
*requires reflection

Why We Do What We Do

• We NEED habit for our daily lives

The Habit Loop

• "The cue and reward become neurologically intertwined until a sense of craving emerges"

What impacts decisions?

• The way/order information is presented
• Inclusion/exclusion of certain info
• Prioritization
• Knowledge deficit

Why?

• Most errors derive from flaws in cognitive processes
• Not knowledge gaps
• Often multiple errors (Berkwitt & Grossman, 2014)
• Clinical context matters
• Blame
• Decision fatigue
• Salient distracting cues
• Suggestive of disease that seems plausible at first sight, but is not the correct dx

(Barrack Obama Presidential Library, 2015)
Case: 14 yo M with Abd pain & vomiting

- 14 yo M previously healthy
- Acute onset of abdominal pain and vomiting since yesterday evening
- Achy abd pain, worse on left with moving/walking
- No fever
- No diarrhea
- Ate at fast food restaurant 1 day prior to onset

PHYSICAL EXAM:

General: A&O x 3, calm, in NAD
HEENT: Nml
Resp: Nml
CV: Nml

Abd: Soft, flat, diffuse lower quadrant pain, no McBurney's point tenderness, negative Rovsing/psoas

MSK: Moves all extremities in bed. FROM

Skin: Nml

Dx: Acute gastroenteritis

Vitals

36.9 100 17 118/72 100%

Patient returned 12 hrs later...

Dx: Acute Gastroenteritis

With a swollen, necrotic testis

Dx: Testicular torsion

Dx: Testicular Torsion

Hx: Acute onset pain, vomiting

PE:

Testicular exam: Penis & urethra
- Symmetry
- Lie
- Cremasteric reflex

Inguinal folds
- Hernia

Hernia
- Lymph nodes

Pitfall: Premature Closure

- Failure to
  - Obtain history
  - Adequate physical exam
  - Order diagnostic testing
  - Refer patients
Pitfall: Confirmation Bias
Looking for confirming evidence to support a hypothesis, while ignoring information that is not consistent with the diagnosis.

Pitfall: Unacceptability Bias
- Avoidance of questions that may embarrass or invade privacy
  - Sex
  - Drug/substance abuse
  - Parental presence in the room
  - Genital/rectal exam

Complete Physical Exam
- Balance between focused and complete PE
- Keep your Ddx broad during PE
- Respect privacy, get a chaperone, reassure insecurities

Case: 4 mo F referral: Constipation
- From the PCP:
  - 4 days without BM
  - Refusing to eat
  - Lost 1 lb since yesterday
  - Looks dehydrated on exam, refusing bottle
  - First time parents
    - Per mom, patient has been “fussy and lethargic lately”

Case: 4 mo F referral: Constipation
- From the ED Provider:
  - Abd and chest pain
  - No fever, diarrhea, cough, or rash
  - Crying more, is less active
  - “Over the past 2 days does not seem to want to swallow”
  - No sick contacts or daycare

Unremarkable PMH, PSH, FH

AXR:
Moderate gaseous distention of colon which can be seen in ileus. Small amount of stool in the colon

“Due to history of groaning yesterday and today, will check single quadrant US for intussusception
Will check BMP, glucose POCT, UA/cx, blood cx
Will give IVF bolus
Ordered glycerin suppository”
Reassessment

<table>
<thead>
<tr>
<th>Vitals</th>
<th>PE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.5</td>
<td>AF soft and sunken</td>
</tr>
<tr>
<td>137</td>
<td>Pooling secretions in the OP</td>
</tr>
<tr>
<td>29</td>
<td>CTAB, no increased WOB, tachycardic, +2 central pulses, weak peripheral pulses, clammy</td>
</tr>
<tr>
<td>117/56</td>
<td>Abdomen soft, NT, distended but not taut, digital rectal exam with poor rectal tone, no flush of stool upon removing finger</td>
</tr>
<tr>
<td>100%</td>
<td>Hypotonia, irritable and lethargic, weak cry, eyes closed and open spontaneously to noise, +2 DTR in U/L ext</td>
</tr>
<tr>
<td>4-5 sec cap refill</td>
<td></td>
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</tbody>
</table>

Vitals 36.5 137 29 117/56 100%

Remember the Acute Care Ddx

What We Know

- Infant female, afebrile, poor intake
- Weak cry, hypotonia, facial weakness, poor suck, decreased appendicular & axial tone
- Pooling secretions, no resp distress
- Infrequent BM, but nonsurgical abd
- Poor rectal tone

DDx

- Sepsis/meningitis/ADEM
- Infection
- ICH/mass
- Botulism
- Inborn error of metabolism
- ENT infection
- SMA, congenital myasthenia, Guillan Barre syndrome

Dx: Infantile Botulism

SOURCE: Honey, canned foods, soil

CLASSIC RED FLAGS:

- Absence of fever
- Symmetric neurologic deficits
- Descending or global muscle weakness
- Infants typically present with constipation and poor feeding
- Drooling, anorexia, irritability, weak cry

Pitfall: Framing

- Decisions are made based on the way information is presented, rather than the facts themselves.
- “He had alcohol on his breath.”

Pitfall: Search Satisficing

- We stop the search once any diagnosis has been found...
- Even if the dx doesn’t fit
- Caution with radiology reads
- “Clinical correlation required”
Objective Handoffs

Present patients with exam or investigation findings, rather than with a possible diagnosis or via symptoms alone.

(O’Hagan et al., 2019)

Strategize a Thorough Differential Diagnosis

- Individual systems
- Head to Toe
- Multi-system
- Rule In/Rule Out
  - SPRINT
- VITAMINS ABCDEK (Zabbidi-Hussin, 2016)

Cognitive Checklists

Types of Checklists
1. The General Checklist
2. Differential Diagnosis Checklist
3. Cognitive Forcing Checklist for specific diseases
4. The CARE Approach
   - Communicate
   - Assess for Biased Reasoning
   - Reconsider the DDx
   - Enact a Plan

(Ely et al., 2011; Rush et al., 2017)

Case: 17 yo F with arm pain

- 17 yo previously healthy obese AA female
- Right arm pain, neck pain, and headache for 1 week
- 4 prior ED visits, treated as MSK pain, d/c home with NSAIDS and PCP f/u
- No fever
- No known injury
- VSS

Exam

<table>
<thead>
<tr>
<th>Vitals</th>
<th>37.1</th>
<th>88</th>
<th>16</th>
<th>125/82</th>
<th>98%</th>
</tr>
</thead>
<tbody>
<tr>
<td>R Arm</td>
<td></td>
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</table>

HEENT: NCAT, PERRL, papilledema bilaterally, 20/60 OD, 20/80 OS, 20/60 OU
Resp/CV: Nml
MSK: FROM all extremities
Neuro: CN II-XII intact, normal coordination, normal visual fields, strength 5/5 in U/L extremities, reported paresthesia R arm, normal sensation to touch, DTR 2+ throughout

Acute Care Differential Diagnosis

What We Know
- Obese teenage female
- Vision difficulty, never needed glasses
- Paresthesias in arm
- Treating with ibuprofen only helps temporarily
- Headache and neck pain

Acute Care DDx
- Intracranial abnormality
  - Space occupying lesion, CVA, sinus thrombosis
- Hydrocephalus
- Infection
  - Encephalitis, meningitis, ADEM
- AVM
- Spinal chord lesion
  - Radiculopathy- Dorsal root ganglion dysfunction
- Diabetes
- Neuropathy, retinopathy
- ...Musculoskeletal injury
**Workup**

- CT to r/o intracranial pathology
- LP with opening pressure
- MRI
- Ophthalmology consult

**Dx: Pseudotumor Cerebri/Idiopathic Intracranial Hypertension**

- Presentation
  - Female, obese, visual loss/diplopia/papilledema
- Risk factors
  - Obesity, hypernatremia, certain medications*
- Management
  - Therapeutic LP, diamox, surgery
  - Goal: Prevent/reverse visual loss

**Pitfall: Anchoring**

Fixation on specific features of a patient's initial presentation, failure to adjust with new information

Increased difficulty with:
- Unusual presentations of common illnesses
- Comorbidities

**Pitfall: Availability Bias**

Tendency to inflate or deflate the likelihood of a diagnosis based on the ease of retrieving from memory

**Case: 19 yo obese female with “foot burning”**

- 3-4 months chronic & intermittent R and L foot pain
- Podiatry: Tx for ingrown toenail + walking boot
- Now pain at proximal toenails, at joints, and between toes, unable to walk
- 4 other visits in 2 weeks- Dx: Athlete’s foot
  - Negative extremity Xray, normal CBC
  - Tx: 20 mg prednisone, clotrimazole (neither used)

**Repeat Hx & PE**

Use prior knowledge from previous providers to guide hx. Be concerned about patients who re-present within a short period of time.
Case: Obese female with “foot burning”

PMH
- Morbid obesity
- Migraines
- Allergic rhinitis
- Oral tongue cancer s/p radical neck dissection

MEDS
- albuterol 90 mcg/inh prn
- amitriptyline 12.5 mg qhs
- loratadine 10 mg daily
- montelukast 10 mg daily
- naproxen sodium 440 mg bid
- propranolol ER 60 mg daily
- rizatriptan 10 mg at onset of headache

Focused Exam:
Constitutional: She appears well-developed and well-nourished. She is active. NAD

Musculoskeletal: Normal range of motion. She exhibits no tenderness or deformity. R foot with no swelling, no pain with foot squeeze. NV intact with normal flexion/extension and ROM at all toe IP joints and ankle. Skin without erythema or lesions. L great toe with absent great toenail, dried blood and well healed granulation tissue over nailbed.

Neurological: She is alert.

Skin: Skin is warm and dry. No rashes.

Reviewed prior workup:
- Normal CBC
- Normal foot XR

Rationale:
Dx: Tinea pedis
Tx: - Take Rx clotrimazole (previously prescribed)
- Discussed foot hygiene and well fitting shoes
- Rest, ice, elevate, use walking boot prn
- F/u podiatry
- Return for yellow discharge, inability to walk, concern

The next day...
- Woke with severe pain, blue and numb toes
- US: R popliteal artery thrombus, 50-99% stenosis of artery
- “3 month hx of b/l toe pain may have been due embolization to the feet.”

DX: R Popleiteal Artery Thrombosis

Arterial Thrombosis
- Obstructs blood to organs resulting in pain (angina)
- Myocardial infarction
- Stroke
- Often caused by atherosclerosis
- Tx: meds or surgical intervention (angioplasty or bypass graft)

Deep Vein Thrombosis
- Obstructs blood returning to heart resulting in swelling, pain
- Pulmonary embolism
- May be caused by sitting for long periods, medications, FHx
- Tx: medications, heat packs, catheter-directed thrombolysis
Pitfall: Premature Closure

- Acceptance of an early impression as the diagnosis without adequate verification or consideration of other explanations.

Pitfall: Teenage Female in the ED

- The tendency to attribute symptoms of adolescent females in the emergency department to psychosomatic etiologies based on vague or perceived dramatic presentations.

Pay attention to zebras in plain sight

- Significant PMH, SHx, Fx, or social situation
- Listen to parents who express concern
- Multiple healthcare visits in a short period of time

Provide Specific Return Criteria

- List specific return criteria for worsening symptoms
- “Concern”

Ongoing Cognitive De-biasing

Teach Critical Thinking
Workplace Strategies
Forcing Functions

Debiasing Strategies:

- Ask “What else could it be?”
- Point out “what doesn’t fit”
- Personal accountability
- Slow down/call a diagnostic timeout
- Pose a question to the team to avoid blind obedience and expand the differential diagnosis

(O’Hagan et al., 2019; Croskerry et al., 2013)
Debiasing Strategies:

Workplace Strategies

Decision support

Avoid deep, dehydrating, & fatigue

Standardized pathways

Debiasing Strategies:

Forcing Functions

Standing Rules

Rule Out Worst Case Scenario

Checkslls

Cognitive Forcing Strategies

(Croskerry et al., 2013)

What to do?

• Don’t worry
  • If it looks like a duck, walks like a duck, quacks like a duck ... it is not a zebra.

• Understand clinical reasoning and cognitive processes that lead to diagnosis

• Structured reflective approach

• Develop critical thinking and metacognitive skills – beginning as students

Other Strategies

• M & M

• Algorithms/protocols

• Standardized evaluation

• Consult on difficult cases

• Humble yourself

• Embrace uncertainty

• Partner with families

References


Questions?