Cognitive Bias

A Critical Source of Diagnostic Medical Error

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Disclosures

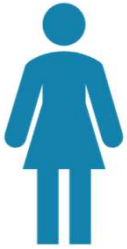
I have no relevant financial relationships to disclose

Learning Objectives

- Discuss the effects of cognitive biases on patient care.
- Describe types of cognitive bias as they relate to patient care.
- Identify practices which reduce the risk of cognitive bias in patient interactions.
- Recognize personal biases when treating patients to improve quality of care.





Who is your “One”?

The Cost of Medical Error

- Up to 100,000 unnecessary deaths annually
- Up to one million injuries
- Estimated $20 billion annually
- Average cost of a single event: $4,685
- Average increased length of stay: 4.6 days[19]

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Sources of Medical Error

- System errors
- Diagnostic errors
  - Missed diagnoses
  - Delayed diagnoses
  - Wrong diagnoses

Cognitive Error

- Large portion of diagnostic errors result from cognitive bias
- 75% of diagnostic errors are cognitive errors[15]
- Most prevalent in:
  - Internal medicine
  - Family medicine
  - Emergency medicine[11]
- Occur in all steps of the diagnostic process

Cognitive Error

- To err is human, even in medicine
- Lack of open discussion and analysis
- “Cognitive Revolution”[4]
- Field of medicine lags behind
- Over 100 cognitive biases in the literature
  - At least 38 in medical literature

Cognitive Processing

TYPE 1

- Intuitive
- Fast
- Sub-conscious
- Pattern-recognitive
- Low cognitive burden
- Lacks executive censorship

TYPE 2

- Analytic
- Slower
- Methodical/systematic
- Critical evaluation data
- High cognitive burden
- Complex problem solving

Cognitive Processing

- Dual Process Theory[22]
- Type 1 “always on”, automatic, difficult to control
- Switch to type 2 requires time and effort
- We spend about 95% of our time in type 1 thinking[15]
  - Efficient, time effective
  - More susceptible to cognitive bias

Cognitive Bias and Heuristics

- Heuristics: cognitive shortcuts used to aid decision-making[5,15]
  - Applied subconsciously
  - Intuitive, automatic
  - Easier and more efficient decision-making
- Daily decision-making
- Correct majority of the time
- More vulnerable to error/bias
- Cognitive bias when heuristics fail

Cognitive Bias

- Ubiquitous
- Very difficult to override
- Does not correlate with intelligence
- Experience does not confer immunity[16]

Types of Cognitive Bias

- Anchoring
- Availability
- Confirmation
- Diagnostic momentum
- Framing effect
- Hindsight
- Premature closure
- Search satisfaction
- Visceral bias

Anchoring Bias

- Lock onto diagnosis early
- Failure to adjust impression
- Exclude relevant clinical facts
- Neglect thorough investigation (premature closure)
- “First impressions” or “jumping to conclusions”
- Incorrect diagnosis difficult to remove

Reference: 1, 3, 4, 8, 18, 22

Availability Bias

- Diagnoses considered more likely if they readily come to mind
- Recent experience may inflate likelihood of diagnosis
- Less available = underdiagnosed
- “Recency effect” vs. “out of sight, out of mind”
- Recent or memorable events seem more likely to occur again
- Novices more vulnerable

Reference: 3, 4, 18

Confirmation Bias

- Look for confirming evidence
- Assigning preference to findings that support a diagnosis or decision
- Failure to seek out (or ignoring) disconfirming information
- Asking “yes” questions
- Stronger when information presented sequentially
- Longer = stronger[17]

Diagnostic Momentum

- A diagnosis becomes established without adequate evidence
- Diagnostic labels become “sticky”
- Gathers momentum without verification
- Other possibilities are no longer considered
- Suppresses further thinking
- Use caution:
  - Continuing clinical course of action
  - Patient volunteers own diagnosis[3]

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Framing Effect

- The way in which the problem is framed strongly influences clinician's view
- Reaction based on how the information is presented
- Potential gain vs potential loss[13]
- Presenting evidence in a way that supports a diagnosis

Hindsight Bias

- Knowing the outcome influences perception of past events
- Distorts perception of previous decision making
- Prevents a realistic appraisal of what occurred
- Decision errors seem transparent in hindsight
- Complexity and conditions
- Illusion of failure vs illusion of control

Premature Closure

- Inquiry ceases once a possible solution is found
- Incomplete evaluation and incorrect conclusions
- Accepting a diagnosis before fully verified
- Accounts for a high proportion of missed diagnoses
- “When the diagnosis is made, the thinking stops”

Search Satisfaction

- Call off a search once something is found
- Commonly missed:
  - Comorbidities
  - Second foreign bodies
  - Other fractures
  - Co-ingestants in poisoning[4]
- More likely to miss subtle abnormality
- ???

Visceral Bias

- Clinical decisions should be objective and consistent
- Positive and negative feelings toward patients impact decision quality
- Positive countertransference[3]
  - Underinvestigation (outcome bias, value bias)
  - Overinvestigation (fear of missing something)
- Negative countertransference

Causes of Cognitive Bias

- Patient-provider relationship
- Resource depletion theory[22]
- Time constraints
- Overconfidence
- Absence of timely feedback
- Lack of differential diagnoses
- Burnout / fatigue / cognitive overload
- Dual task phenomenon[12]
- Blind-spot bias

Reference: 1, 8, 12, 14, 15, 20, 21, 22

Debiasing Strategies

- Education
  - Cognitive biases
  - Evidence-based medicine
- Simulation
- Differential diagnosis
  - Software
  - Consider alternatives
  - Balanced testing

Reference: 4, 7, 12, 22

Image source: freeimages.com

Debiasing Strategies

- Second opinions
- Decrease reliance on memory[4]
  - Mnemonics
  - Clinical practice guidelines
  - Algorithms
- Cognitive forcing strategies[15]
  - Demands ordered thinking
  - Forces cognition onto certain topics
  - Checklists

Debiasing Strategies

- Minimize time pressures
- Slow down
  - Taking your own history
  - Diagnostic time out
- Reflection[14]

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Where do we start?

- Knowledge is power
- Be skeptical and insightful
- Be humble
- Work together
- Doing something is better than nothing
- Overcoming challenges

Remember your “One”

References

1. Bhatti A. Cognitive bias in clinical practice - nurturing healthy skepticism among medical students. Advances in Medical Education and Practice. 2018;Volume 9:235-237. doi:10.2147/amep.s149558
2. Confirmation bias. Dental Abstracts. 2017;62(5):248. doi:10.1016/j.denabs.2017.05.001
3. Croskerry P. Achieving quality in clinical decision making: Cognitive strategies and detection of Bias. Academic Emergency Medicine. 2002;9(11):1184-1204. doi:10.1197/aemj.9.11.1184
4. Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. Academic Medicine. 2003;78(8):775-780. doi:10.1097/00001888-200308000-00003
5. Elia F, Aprà F, Verhovez A, Crupi V. “First, know thyself”: Cognition and error in medicine. Acta Diabetologica. 2016;53(2):169-175. doi:10.1007/s00592-015-0762-8
6. Elston DM. Cognitive bias and medical errors. Journal of the American Academy of Dermatology. 2019;81(6):1249. doi:10.1016/j.jaad.2019.06.1284
7. Elston DM. Confirmation bias in medical decision-making. Journal of the American Academy of Dermatology. 2020;82(3):572. doi:10.1016/j.jaad.2019.06.1286
8. Hansen K. Cognitive bias in emergency medicine. *Emergency Medicine Australasia*. 2020;32(5):852-855. doi:10.1111/1742-6723.13622

References

9. Kaban LB, Posnick JC. Cognitive bias hazards after an operative complication. *Journal of Oral and Maxillofacial Surgery*. 2022;80(1):4-5. doi:10.1016/j.joms.2021.06.008

10. Langford BJ, Daneman N, Leung V, Langford DJ. Cognitive bias: How understanding its impact on antibiotic prescribing decisions can help advance antimicrobial stewardship. *JAC-Antimicrobial Resistance*. 2020;2(4). doi:10.1093/jacamr/dlaa107

11. Li P, Cheng Zyan, Liu Glin. Availability bias causes misdiagnoses by physicians: Direct evidence from a randomized controlled trial. *Internal Medicine*. 2020;59(24):3141-3146. doi:10.2169/internalmedicine.4664-20

12. Miles RW. Cognitive bias and planning error: Nullification of evidence-based medicine in the nursing home. *Journal of the American Medical Directors Association*. 2010;11(3):194-203. doi:10.1016/j.jamda.2009.08.007

13. Molony DA. Cognitive bias and the creation and translation of evidence into clinical practice. *Advances in Chronic Kidney Disease*. 2016;23(6):346-350. doi:10.1053/j.ackd.2016.11.018

14. Norman GR, Monteiro SD, Sherbino J, Ilgen JS, Schmidt HG, Mamede S. The causes of errors in clinical reasoning. *Academic Medicine*. 2017;92(1):23-30. doi:10.1097/acm.0000000000001421

15. O'Sullivan ED, Schofield SJ. Cognitive bias in Clinical Medicine. *Journal of the Royal College of Physicians of Edinburgh*. 2018;48(3):225-232. doi:10.4997/jrcpe.2018.306

16. O'Sullivan ED, Schofield SJ. A cognitive forcing tool to mitigate cognitive bias – a randomised control trial. *BMC Medical Education*. 2019;19(1). doi:10.1186/s12909-018-1444-3

References

17. Pines JM. Profiles in patient safety: Confirmation bias in emergency medicine. *Academic Emergency Medicine*. 2006;13(1):90-94. doi:10.1197/j.aem.2005.07.028

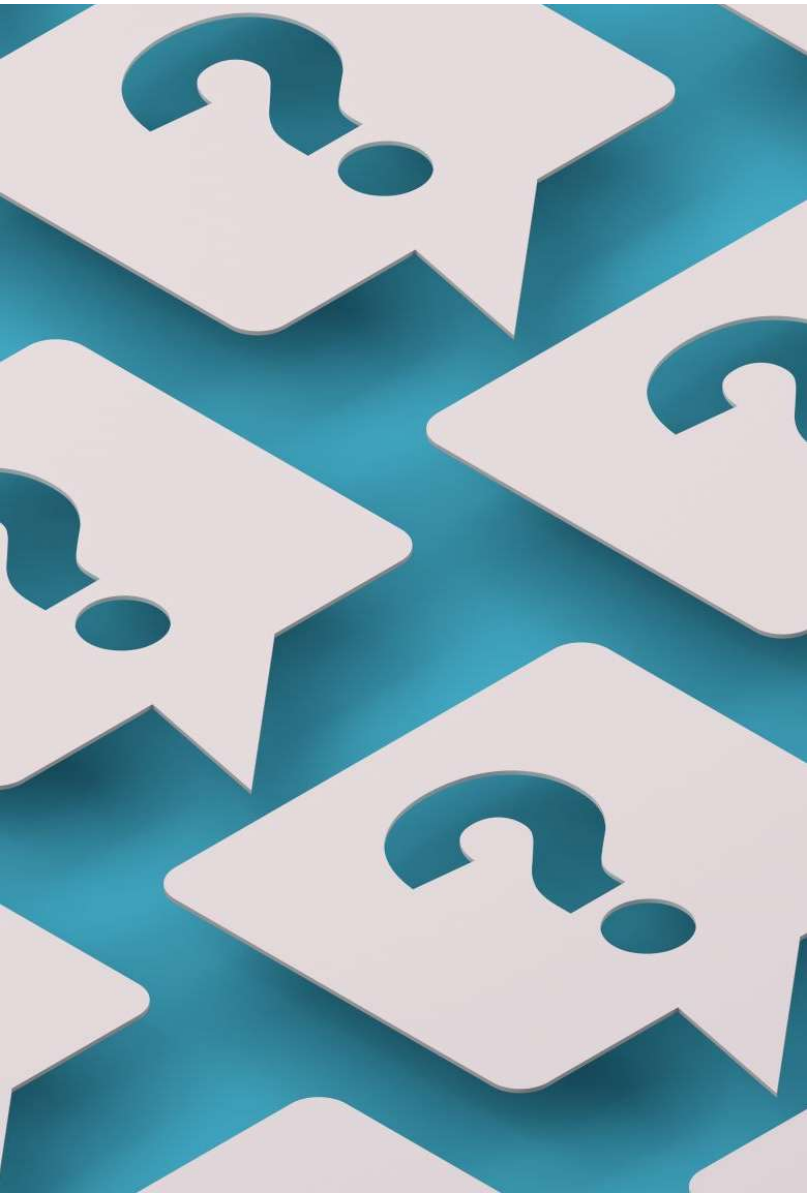
18. Richie M, Josephson SA. Quantifying heuristic bias: Anchoring, availability, and representativeness. *Teaching and Learning in Medicine*. 2018;30(1):67-75. doi:10.1080/10401334.2017.1332631

19. Saposnik G, Redelmeier D, Ruff CC, Tobler PN. Cognitive biases associated with medical decisions: A systematic review. *BMC Medical Informatics and Decision Making*. 2016;16(1). doi:10.1186/s12911-016-0377-1

20. Singh H, Giardina TD, Meyer AN, Forjuoh SN, Reis MD, Thomas EJ. Types and origins of diagnostic errors in primary care settings. *JAMA Internal Medicine*. 2013;173(6):418-425. doi:10.1001/jamainternmed.2013.2777

21. Wellbery C. Flaws in Clinical Reasoning: A Common Cause of Diagnostic Error. *American Family Physician*. 2011;84(9):1042-1044.

22. Yuen T, Derenge D, Kalman N. Cognitive bias: Its influence on clinical diagnosis. *The Journal of Family Practice*. 2018;67(6):366-372.



Thank you!

Questions?

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