

COMMENTARY

Walking a Tightrope: Balancing the Risk of Diagnostic Error in Inpatient Pediatrics

Adam Berkwitt, MD, Rachel Osborn, MD, Matthew Grossman, MD

Dual process theory describes 2 opposing systems that affect how we approach decisions.^{1–6} System I thinking enables us to make quick decisions and requires a limited number of cues and information to reach immediate conclusions. These thought processes are typically effortless, mostly correct, and allow us to function efficiently within day-to-day life; we don't need to spend any energy thinking about turning the faucet off when the glass is full. System II thinking involves deliberate, rational thought; it is effortful and requires us to be reflective and methodical—it is what we use when thinking through detailed dilemmas.

In applying this theory to diagnostic decision-making, clinicians aim to achieve a healthy balance between their fast, intuitive System I thinking and their slow, analytical System II thinking. When we overly rely on System I processes, we become vulnerable to the many cognitive biases that can affect diagnostic accuracy.^{4–10} On the other hand, when we spend too much time in our System II processes, we end up struggling with routine decisions that require timely answers to meet the needs of a rapid-paced medical environment. In this commentary, we present a case that highlights the dangers associated with overreliance on System I thinking and illustrates some of the factors that can impact our ability to maintain this balance in today's inpatient climate.

CASE

A 10-year-old female with a history of obesity presented to the emergency department (ED) with a 1-week history of low-grade fever associated with cough and left-sided chest pain. Physical exam was notable for diminished breath sounds overlying the left lower lung and a chest radiograph revealed a left lower-lobe infiltrate with a small effusion. The patient was diagnosed with community-acquired pneumonia (CAP), given intravenous antibiotics, and admitted to the short stay unit, an inpatient unit for patients with anticipated lengths of stay of <48 hours. On arrival to the short stay unit, the patient's heart rate was 106 beats per minute, blood pressure was 152/100 mm Hg, oxygen saturation was 95% on room air, and she complained of 3 out of 10 chest pain. Overnight, she remained afebrile, did not require oxygen, and tolerated oral intake. Given these clinical parameters, the inpatient team planned for an early morning discharge to complete outpatient treatment of CAP. The medical team noted that the patient remained hypertensive overnight, but attributed this hypertension to her chest pain.

www.hospitalpediatrics.org

DOI:10.1542/hpeds.2016-0043

Copyright © 2016 by the American Academy of Pediatrics

Address correspondence to: Adam Berkwitt, MD, Department of Pediatrics, Yale University School of Medicine, 333 Cedar St, LMP 4086, New Haven, CT 06520. E-mail: adam.berkwitt@yale.edu

HOSPITAL PEDIATRICS (ISSN Numbers: Print, 2154-1663; Online, 2154-1671).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

Opinions expressed in these commentaries are those of the author and not necessarily those of the American Academy of Pediatrics or its Committees.

Dr Berkwitt conceptualized and authored the original essay; Drs Osborn and Grossman each contributed significantly to the final manuscript; and all authors approved the manuscript as submitted.

*Hospitalist Division, Yale
University School of
Medicine, New Haven,
Connecticut*

At the conclusion of family-centered rounds, the nurse again noted that the patient remained significantly hypertensive even with improvement in chest pain, prompting additional conversation of alternative etiologies for the patient's hypertension. Further review of the patient's medical record confirmed normal blood pressures in the preceding months and showed multiple clinic visits for vague complaints of unclear etiology, including color changes of extremities and intermittent, bilateral hip pain. Repeat physical exam noted 2+ pitting edema of the lower extremities and subtle facial edema that was previously overlooked by the ED and inpatient teams.

Despite meeting discharge criteria for CAP and having a reported phobia of blood draws, the medical team decided to obtain a urinalysis and basic metabolic panel. The results revealed a creatinine of 2.6 mg/dL and 3+ proteinuria with large hematuria. Additional laboratory work revealed 3+ Coombs positive anemia, albumin of 1.5 g/dL, and low complement components 3 and 4 levels. A renal biopsy displayed stage IV lupus nephritis, and double stranded DNA antibody testing returned positive. On further review, initial chest radiograph findings were deemed more likely associated with active lupus disease. Her Ampicillin was discontinued, and she had no additional fevers or infectious complications during her hospitalization.

DISCUSSION

This case report illustrates a near miss diagnostic error and highlights the dangers associated with overreliance on System I thinking. When we depend too heavily on heuristics, or mental shortcuts (ie, fever, cough, and infiltrate = CAP), we become susceptible to the many cognitive biases that can influence objective decision-making.⁷⁻¹⁰ In the first half of the case, the inpatient team committed a context error when they allowed the ED providers to frame the patient as having CAP. They subsequently anchored onto this diagnosis and found information that confirmed CAP, while downplaying and overlooking important information that pointed away from this straightforward diagnosis. The stated history of obesity also likely

decreased their index of suspicion for edema, as it was much easier to simply attribute the patient's appearance to that history. The second half of this case exemplifies a switchover to effective System II thinking, because the medical team, with the astute and assertive input from the patient's nurse, reanalyzed the patient's presentation to consider alternative explanations and uncover key information from the history and physical that significantly changed the diagnostic odds. This analytical thinking triggered a timely workup for other potential etiologies.

There are many factors that make it especially difficult for pediatricians to achieve an effective balance between System I and II processes. In general, the field of pediatrics, with a high degree of benign, viral processes, is at risk for tipping the scales toward System I thinking. In the winter months, it is easy to automatically label every infant with work of breathing a "bronchiolitic" without fully considering other potential etiologies for respiratory distress. Eventually, one of these presumed "bronchiolitics" will have a cardiomyopathy, foreign body, or anatomic variant. The clinicians who bank excessively on System I thinking without carefully analyzing alternative diagnoses may be at risk for missing one of these less common presentations. At some point, a patient with lupus nephritis will be admitted with the diagnosis of CAP, and it is the hospitalist's duty to maintain cognitive defenses to pick these needles out of the haystack.

There are other aspects of today's inpatient climate that further affect a hospitalist's ability to maintain a healthy balance between System I and II thinking. The push for rapid patient turnover and creation of hospital units geared toward shorter lengths of stay has the potential to drastically affect how we view our patients. Simply stepping into a short stay/observation unit can push us toward Type I thinking, because it is difficult to slow down one's thought processes and strengthen cognitive defense mechanisms while practicing in this fast-paced, turnstile like environment. On admission, patients are potentially viewed as less sick, and

physicians and staff feel the pressure of assuring rapid admission–discharge cycles. In this case report, this patient was marked as a potential early discharge at our early morning huddle. Once this occurred, the wheels were set in motion to optimize discharge timeliness. Stopping this process once it gathers momentum can be a surprisingly difficult task, particularly given the unit's lofty expectations for early morning discharges. We wonder if the approach to this patient would have been different had she been admitted to another unit where patients do not carry the "short stay" label.

The current emphasis on value-based medicine also has the potential to sway a hospitalist's Type II thinking. In *Hospital Pediatrics'* "Bending the Value Curve" articles, the authors highlight opportunities for limiting superfluous testing, and many hospitalists rightly strive to limit costly workups that do not impact inpatient management.¹¹⁻¹⁴ Given this emphasis within our field, the pendulum can easily swing toward erring on the side of less is more. For many in our field, the sin of commission seems almost greater than the sin of omission, and although the importance of value-based practice is undeniable, we must remain aware of how our desire to do less can potentially affect our biases in determining the necessity of inpatient workups. Essentially, it's getting harder to pull the trigger on a diagnostic workup in this day of value-based care.

Finally, patient satisfaction has become more important in the evaluation of physicians and can impose a strong influence on diagnostic testing decisions. Some parents bristle at the potential side effects of procedures and laboratory draws, whereas others desire additional, unwarranted testing "just to be sure." The pressure to appease a "demanding" family can encourage far-fetched Type II thinking, in which we either lower or raise our threshold for what is considered to be medically necessary.

CONCLUSION

Balancing these stressors in hospital-based pediatrics challenges us to develop eloquently narrow, yet still complete,

diagnostic approaches. Every child with an infiltrate does not need an antinuclear antibodies and creatinine checked, but we must recognize our System I thinking when it's in place and force ourselves to consistently step back and look at every case from a System II approach.^{15–18} Beyond simply listing differential diagnoses, we must thoroughly analyze how the available data affects the likelihood of disease for each particular case.^{19,20} Lower probability disease processes still must receive scrutiny to counter the natural frequency-gambling that occurs in a field where benign, viral processes dominate the landscape.^{7,8} Listening to and considering input from all team-members, including nursing staff and families, can prevent essential information from being missed. Finally, the multiple performance measures we face can impact our ability to balance System I and II processes and/or affect the efficacy of our System II thinking. Applying additional countermeasures in these situations should help reduce the amplitude of effect that these stressors have on our day-to-day decision-making.

RESOURCES

1. Kahneman D. *Thinking Fast and Slow: Part I*. New York, NY: Farrar, Straus and Giroux; 2011
2. Croskerry P. Clinical cognition and diagnostic error: applications of a dual process model of reasoning. *Adv Health Sci Educ Theory Pract*. 2009;14(suppl 1):27–35
3. Pelaccia T, Tardif J, Tribby E, Charlin B. An analysis of clinical reasoning through a recent and comprehensive approach: the dual-process theory. *Med Educ Online*. 2011;16:1–9
4. Lucchiari C, Pravettoni G. Cognitive balanced model: a conceptual scheme of diagnostic decision making. *J Eval Clin Pract*. 2012;18(1):82–88
5. Marcum JA. An integrated model of clinical reasoning: dual-process theory of cognition and metacognition. *J Eval Clin Pract*. 2012;18(5):954–961
6. Norman GR, Eva KW. Diagnostic error and clinical reasoning. *Med Educ*. 2010;44(1):94–100
7. Groopman J. *How Doctors Think*. New York, NY: Houghton Mifflin Company; 2007
8. Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. *Acad Med*. 2003;78(8):775–780
9. Croskerry P. Achieving quality in clinical decision making: cognitive strategies and detection of bias. *Acad Emerg Med*. 2002;9(11):1184–1204
10. Berkowitz A, Grossman M. Cognitive bias in inpatient pediatrics. *Hosp Pediatr*. 2014;4(3):190–193
11. Mills DM, Bundy DG, Teufel RJ II. Overuse in pediatrics: time to “pull the trigger”? *Hosp Pediatr*. 2015;5(1):42–43
12. Ralston SL. “Nobody does nothing better than a hospitalist”. *Hosp Pediatr*. 2014;4(1):62–64
13. Johnson DP, Lind C, Parker SE, et al. Toward high-value care: A quality improvement initiative to reduce unnecessary repeat complete blood counts and basic metabolic panels on a pediatric hospitalist service. *Hosp Pediatr*. 2016;6(1):1–8
14. McMurray K, Garber M. Taking chances with strep throat. *Hosp Pediatr*. 2015;5(10):552–554
15. Croskerry P. The cognitive imperative: thinking about how we think. *Acad Emerg Med*. 2000;7(11):1223–1231
16. Croskerry P. Cognitive forcing strategies in clinical decisionmaking. *Ann Emerg Med*. 2003;41(1):110–120
17. Graber M. Metacognitive training to reduce diagnostic errors: ready for prime time? *Acad Med*. 2003;78(8):781
18. Ely JW, Graber ML, Croskerry P. Checklists to reduce diagnostic errors. *Acad Med*. 2011;86(3):307–313
19. Halkin A, Reichman J, Schwaber M, Paltiel O, Brezis M. Likelihood ratios: getting diagnostic testing into perspective. *QJM*. 1998;91(4):247–258
20. Paulo S, Mendes S, Vizinho R, Carneiro AV. Diagnostic testing, pre- and post-test probabilities, and their use in clinical practice. *Rev Port Cardiol*. 2004;23(9):1187–1198

Walking a Tightrope: Balancing the Risk of Diagnostic Error in Inpatient Pediatrics

Adam Berkwitt, Rachel Osborn and Matthew Grossman

Hospital Pediatrics 2016;6;566

DOI: 10.1542/hpeds.2016-0043 originally published online August 25, 2016;

Updated Information & Services	including high resolution figures, can be found at: http://hosppeds.aappublications.org/content/6/9/566
Supplementary Material	Supplementary material can be found at:
References	This article cites 18 articles, 5 of which you can access for free at: http://hosppeds.aappublications.org/content/6/9/566#BIBL
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): Evidence-Based Medicine http://www.hosppeds.aappublications.org/cgi/collection/evidence-based_medicine_sub Hospital Medicine http://www.hosppeds.aappublications.org/cgi/collection/hospital_medicine_sub
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.hosppeds.aappublications.org/site/misc/Permissions.xhtml
Reprints	Information about ordering reprints can be found online: http://www.hosppeds.aappublications.org/site/misc/reprints.xhtml

Hospital Pediatrics®

AN OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Walking a Tightrope: Balancing the Risk of Diagnostic Error in Inpatient Pediatrics

Adam Berkwitt, Rachel Osborn and Matthew Grossman

Hospital Pediatrics 2016;6;566

DOI: 10.1542/hpeds.2016-0043 originally published online August 25, 2016;

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://hosppeds.aappublications.org/content/6/9/566>

Hospital Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Hospital Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 345 Park Avenue, Itasca, Illinois, 60143. Copyright © 2016 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®

