

It's Okay to Blink and Miss It

Kayla Ryan McManus, DO,^{a,b} Matthew David Garber, MD,^{a,b} Kuo Yun Chen, MD^{a,b}

A previously healthy 9-year-old boy presented to his pediatrician for his annual well-child check. During this encounter, the physician noted repetitive eye blinking. The patient stated that he was aware that he recently started blinking more often; however, it did not bother him. A new-onset tic disorder was suspected. The pediatrician explained that new-onset tics can be caused by pediatric autoimmune neuropsychiatric disorder associated with group A streptococci (PANDAS) and performed a rapid strep test. The child denied sore throat or fever and stated he was feeling well. The rapid strep test returned positive, and the patient was started on a 10-day course of cefdinir.

Six days into the cefdinir course, the child began having profuse nonbloody watery diarrhea. On day 8 of cefdinir, he returned to the pediatrician's office for multiple episodes of diarrhea. The pediatrician stopped the cefdinir and recommended a probiotic. The patient started an over-the-counter probiotic without relief. Over the course of the next week, the patient was seen twice by his pediatrician and once in the emergency department (ED) for continued diarrhea. A stool culture and stool for ova and parasites were sent from the pediatrician's office. Another test for ova and parasites was sent from the ED. The pediatrician started the patient on nitazoxanide, an antiprotozoal. A few days later, the child visited the ED for continued symptoms. Stool for ova and parasites and stool culture had negative test results. The patient was noted to be doubled over in pain, so an abdominal ultrasound was ordered to rule out appendicitis and intussusception. Thickened bowel loops and inflammation in the right lower quadrant were demonstrated in the ultrasound, prompting a computerized tomography (CT) scan. Diffuse colonic wall thickening and mucosal hyperenhancement extending from the cecum to rectum was shown in the CT scan, concerning for infectious colitis versus inflammatory bowel disease. The patient was then transferred to the local children's hospital for inpatient admission. During initial assessment by the inpatient team, a complete metabolic panel, complete blood count, and inflammatory markers were ordered, along with a gastroenterologist consult. *Clostridium difficile* polymerase chain reaction was also added to the stool studies. The laboratories were normal, except for an elevated white blood cell count with neutrophilic predominance. Because the colonic wall thickening extended from cecum to rectum, the gastroenterologist had a higher suspicion for ulcerative colitis than for infectious diarrhea. Therefore, an inpatient endoscopy and colonoscopy were scheduled for the following day. The *C difficile* polymerase chain reaction resulted positive the next morning before the procedure was done. The patient was sent home on a 10-day course of metronidazole to treat the *C difficile*. The patient's diarrhea resolved a few days later.

In review of this case, we can focus on 3 areas in which the value of care could have been improved: (1) testing for streptococcal pharyngitis without symptoms of sore throat, (2) lack of awareness of *C difficile* as an emerging

www.hospitalpediatrics.org

DOI: <https://doi.org/10.1542/hpeds.2019-0022>

Copyright © 2019 by the American Academy of Pediatrics

Address correspondence to Kayla Ryan McManus, DO, PGY-2, Department of Pediatrics, Wolfson Children's Hospital, 800 Prudential Dr, Jacksonville, FL 32207. E-mail: kayla.mcmanus@jax.ufl.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.

Dr McManus was the first author of the manuscript, helped with the literature review, and wrote the first draft of the manuscript; Dr Garber had the initial idea to formulate the manuscript and helped with the literature review and editing the manuscript; Dr Chen helped with the literature review and editing the manuscript; and all authors approved the final manuscript as submitted.

^aWolfson Children's Hospital, Jacksonville, Florida; and ^bUniversity of Florida College of Medicine—Jacksonville, Jacksonville, Florida

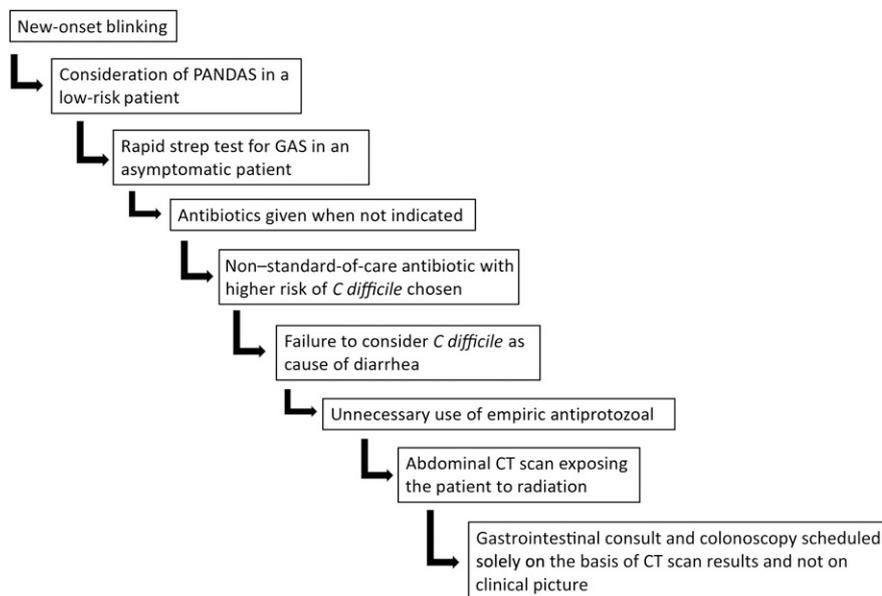


FIGURE 1 Cascade of iatrogenic events.

agent in antibiotic-associated diarrhea in children, and (3) proceeding with additional workup before necessary results were back.

WHY TEST FOR STREPTOCOCCAL PHARYNGITIS?

Traditionally, many suspected that an association existed between the sudden onset of tic disorders, obsessive compulsive behavior, and perhaps other unexplained acute neurologic changes with group A streptococcal (GAS) infection. In the only published clinical trial of prophylactic antibiotics in children with new-onset tics and symptoms of pharyngitis with evidence of GAS infection, researchers demonstrated no conclusive evidence that antibiotics reduced clinical exacerbations.¹ In one unblinded, uncontrolled case series of 12 patients, researchers claimed improvement of new-onset tics with antibiotic treatment.² The 2018 Red Book does not recommend routine testing for GAS in patients who are lacking clinical signs of pharyngitis. Therefore, in the case of new-onset tics or obsessive compulsive behavior, there is no evidence for rapid strep testing or treatment without the presence of symptomatic pharyngitis. In addition, there is insufficient evidence to support the use of antibiotics in the management of patients with symptoms suggestive of PANDAS.

There are many causes for new-onset tics or obsessive compulsive behavior, including use of stimulant medications or medications with dopamine agonist effects, provisional tic disorder, and Tourette's syndrome.³ As physicians, we should focus on taking a thorough history, including recent stressors, medication history, or other psychiatric comorbidities. Most cases of new-onset tic disorder are in fact due to provisional tic disorder, which research demonstrates is likely to resolve spontaneously within a few months.⁴ Specifically, blinking is frequently transient without a clear etiology. Therefore, we should refrain from searching for a rare cause of new-onset tics, such as PANDAS, especially without symptoms of streptococcal pharyngitis. More studies are needed to determine the effectiveness of antibiotic treatment in the case of new-onset neuropsychiatric symptoms in correlation with symptomatic pharyngitis and a positive strep culture result.⁵

Indiscriminate diagnostic testing can cause unnecessary treatment and possible harm. Ten to twenty-five percent of the general population is an asymptomatic carrier of GAS.⁶ GAS carriers are at risk for unnecessary treatment with antibiotics and all the potential harms inherent to such treatment, including *C difficile* diarrhea and

antibiotic resistance. In fact, the incidence of antibiotic-associated *C difficile* in children has increased. In multiple studies, researchers have shown that antibiotic use is an independent risk factor for developing *C difficile*.^{7,8} In one case control study, researchers suggested the development of *C difficile* was highest after the first month of antibiotic use.⁹ Limiting testing to at-risk populations of patients with symptoms consistent with GAS pharyngitis reduces the risk of treating noninfected carriers. Consistent use of the Centor criteria has been shown to help eliminate overtesting for GAS pharyngitis.¹⁰ These criteria award one point each for exudate on tonsils, tender anterior cervical lymph nodes, fever, and absence of cough. In this case, the patient scored a 1 on the Centor criteria (for absence of cough). If a patient has fewer than 3 points, testing or treatment of GAS pharyngitis is not recommended.

WHY NOT CONSIDER *C DIFFICILE*?

Although *C difficile* is a known complication of antibiotic therapy and more likely than a parasitic infection in this scenario, the providers caring for this patient repeatedly overlooked this possibility. This demonstrates the asymmetry in physicians' recognition and tolerance for errors of omission (failure to act when acting is warranted) and commission (acting when no action is warranted). Although failure to test for *C difficile* is an error of omission, we hypothesize that the psychology underlying this error results from the hesitancy to consider harms from medical interventions (the GAS testing and treatment). Although the physicians were quick to order batteries of tests and interventions, some of them invasive, to avoid missing an opportunity to diagnose or treat, they were less likely to consider potential harms of their interventions.¹¹

WHY ORDER ADDITIONAL TESTS BEFORE NECESSARY RESULTS ARE OBTAINED?

The acute presentation of mucousy diarrhea makes acute infectious enterocolitis the most likely diagnosis. Appropriate stool studies and a tincture of time should have

been the appropriate management in this clinical scenario. Unfortunately, multiple visits by an appropriately anxious family prompted a CT scan of the abdomen rather than reassurance. Given the presentation of abdominal pain with diarrhea in the setting of recent antibiotics, an abdominal CT scan was not indicated. In a retrospective review of patients who received abdominal CT scans, it was shown that in patients presenting with abdominal pain and concurrent diarrhea, the results of the CT scan rarely changed management.¹² In this case, the inability of the CT scan to differentiate inflammatory colitis from infectious colitis generated more anxiety for the family and the urge to proceed to more invasive testing. Finally, the results of the CT scan were not taken in context of this patient's presentation. The decision to schedule the colonoscopy was made because the CT scan was concerning for inflammatory changes and the physician was suspecting inflammatory bowel disease. However, infectious colitis can cause these inflammatory changes, as well. Considering the patient's recent antibiotic use together with the lack of inflammatory markers and the presence of leukocytosis, infectious colitis was a more likely diagnosis.

This example demonstrates how low-value care can actually be harmful care. Nonindicated testing led to unnecessary antibiotics and a *C difficile* infection. That infection resulted in radiation from a CT scan, and the CT scan results almost led to an endoscopy and colonoscopy. This simple office-based test culminated in a total of 3 pediatrician visits, 2 ED visits, hospital admission, a gastroenterology consult, expenditure of unnecessary resources, increased health care costs, and considerable harm to the patient (Fig 1).

And this odyssey began at a well-child check, in which the pediatrician, not the parents or the patient, noted new-onset blinking. Easily accessible technology and the temptation of diagnosing a rare disease may prompt excessive investigation. Providers may succumb to the pressure of a busy schedule or parental anxiety and proceed to invasive interventions, such as hospital admission and endoscopies, when the first-tier workup is still pending or the natural course of the illness has not had time to provide an answer. In our desire to help patients, we should not skip the first item on our Hippocratic checklist, "do no harm."

REFERENCES

1. Leslie DL, Kozma L, Martin A, et al. Neuropsychiatric disorders associated with streptococcal infection: a case-control study among privately insured children. *J Am Acad Child Adolesc Psychiatry*. 2008;47(10):1166–1172
2. Murphy ML, Pichichero ME. Prospective identification and treatment of children with pediatric autoimmune neuropsychiatric disorder associated with group A streptococcal infection (PANDAS). *Arch Pediatr Adolesc Med*. 2002;156(4):356–361
3. Althoff RR. Child psychiatric consult, "new onset of tics". Available at: <https://www.mdedge.com/pediatrics/article/108552/mental-health/new-onset-tics>. Accessed July 9, 2019
4. Black KJ, Black ER, Greene DJ, Schlaggar BL. Provisional Tic Disorder: what to tell parents when their child first starts ticcing. *F1000 Res*. 2016;5:696
5. Garvey MA, Perlmutter SJ, Allen AJ, et al. A pilot study of penicillin prophylaxis for neuropsychiatric exacerbations triggered by streptococcal infections. *Biol Psychiatry*. 1999;45(12):1564–1571
6. Choby BA. Diagnosis and treatment of streptococcal pharyngitis [published correction appears in *Am Fam Physician*. 2013;88(4):222]. *Am Fam Physician*. 2009;79(5):383–390
7. Nicholson MR, Crews JD, Starke JR, Jiang ZD, DuPont H, Edwards K. Recurrent *Clostridium difficile* infection in children: patient risk factors and markers of intestinal inflammation. *Pediatr Infect Dis J*. 2017;36(4):379–383
8. Nicholson MR, Thomsen IP, Slaughter JC, Creech CB, Edwards KM. Novel risk factors for recurrent *Clostridium difficile* infection in children. *J Pediatr Gastroenterol Nutr*. 2015;60(1):18–22
9. Hensgens MP, Goorhuis A, Dekkers OM, Kuijper EJ. Time interval of increased risk for *Clostridium difficile* infection after exposure to antibiotics. *J Antimicrob Chemother*. 2012;67(3):742–748
10. Razai M, Hussain K. Improving antimicrobial prescribing practice for sore throat symptoms in a general practice setting. *BMJ Qual Improv Rep*. 2017;6(1):u211706.w4738
11. White F, Nanan D. Clinical decision making Part I: errors of commission and omission. *J Pak Med Assoc*. 2003;53(4):157–159
12. Aisenberg GM, Grimes RM. Computed tomography in patients with abdominal pain and diarrhoea: does the benefit outweigh the drawbacks? *Intern Med J*. 2013;43(10):1141–1144

It's Okay to Blink and Miss It

Kayla Ryan McManus, Matthew David Garber and Kuo Yun Chen

Hospital Pediatrics 2019;9;736

DOI: 10.1542/hpeds.2019-0022 originally published online August 7, 2019;

Updated Information & Services	including high resolution figures, can be found at: http://hosppeds.aappublications.org/content/9/9/736
Supplementary Material	Supplementary material can be found at:
References	This article cites 11 articles, 0 of which you can access for free at: http://hosppeds.aappublications.org/content/9/9/736#BIBL
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): Administration/Practice Management http://www.hosppeds.aappublications.org/cgi/collection/administration:practice_management_sub Infectious Disease http://www.hosppeds.aappublications.org/cgi/collection/infectious_diseases_sub Quality Improvement http://www.hosppeds.aappublications.org/cgi/collection/quality_improvement_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

It's Okay to Blink and Miss It

Kayla Ryan McManus, Matthew David Garber and Kuo Yun Chen

Hospital Pediatrics 2019;9;736

DOI: 10.1542/hpeds.2019-0022 originally published online August 7, 2019;

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/9/9/736>

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 © 2019 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®

