

It Is Time for a Gastroenteritis Guideline

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In this month's issue of *Hospital Pediatrics*, there are 2 articles that directly address overdiagnosis and low-value care in infants and children with acute gastroenteritis. Nabower et al¹ contributed an assessment in variation of care and resource use in 38 hospitals in the United States. Some of the findings in this article are encouraging. For instance, over time, these hospitals have witnessed a mild decrease in some unnecessary resource use such as computed tomography scans. However, many of these advances were tempered by remarkable increases in other forms of costly, and often unnecessary, care. Indeed, whereas computed tomography scans were reduced from 7.8% of cases to 6.3% of cases (a small but significant reduction), unnecessary imaging skyrocketed from 18.6% to 27.4% because of an increase in ultrasound use. Likewise, whereas some laboratory testing was reduced, overall laboratory testing was far higher than recommendations the Centers for Disease Control and Prevention (CDC) guideline would suggest are appropriate.² The authors conclude, appropriately, that there remains significant unnecessary resource use in children with gastroenteritis, which might be effectively addressed by having future guidelines on acute gastroenteritis and quality initiatives.

One key hidden problem with this article is that the authors were forced to use, as a standard of care, a guideline that was promulgated before our modern care of acute gastroenteritis was refined. Molecular testing, a finer understanding of necessary tonicity of intravenous fluids (IVFs), and an understanding of how to prevent hospitalization were not fully understood at the time of the CDC guideline, which was published almost 17 years ago.

In addition to this, there are several important areas that were not addressed by this article, not through any fault of the authors, but through limitations in the database they used. For example, although the authors noted a remarkable predominance of IVFs in infants with gastroenteritis, they were not able to determine what type of oral rehydration fluid was attempted, nor were they able to determine if it was attempted. Since the publication of the aforementioned CDC guideline, a reasonably strong prospective randomized controlled trial has revealed that oral rehydration with diluted apple juice, rather than Pedialyte, can significantly reduce use of IVFs.³

Furthermore, although the authors could grapple with cost using the data from the database, there are further hidden costs that could drive up the cost of care. One popular stool study that has arisen in the last few years is a rapid multiplex polymerase chain reaction (PCR) test for multiple stool organisms. Although these new systems are superior to old culturing methods for detecting organisms, they are expensive, their use has expanded, and the costs and benefits for testing infants and children with nonbloody diarrhea are unclear at best.⁴ Outside of patients with immunocompromise or young infants, most bacterial causes of gastroenteritis do not require antimicrobial therapy. The risk of testing patients is also nonzero because almost 25% of healthy patients will have a positive

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multiplex PCR test result, many for *Salmonella*, which might be erroneously treated under certain clinical circumstances.⁵

In another outstanding article in this month's issue, Pahud et al⁶ drill down even further on the validity of the use of PCR testing in the stool of children with symptoms of acute gastroenteritis. They reported on *Clostridioides difficile* testing in children <2 years of age with acute gastroenteritis and examined rates of positivity with healthy controls. Using stool specimens collected for a prospective surveillance study of pediatric hospitalizations at 4 health centers for acute gastroenteritis, authors were able to compare 247 stool samples from healthy children with 250 stool samples from children with acute gastroenteritis. Remarkably, *C difficile* was found to be twice as prevalent in healthy children <2 as in children with symptoms of acute gastroenteritis. Although there were some differences at baseline between these 2 groups, those differences were not clinically noteworthy. The authors concluded that rapid PCR cannot distinguish the diagnosis of *C difficile* in children <2 years of age. In addition, they demonstrated that the number of cycles of PCR required to distinguish *C difficile* DNA from background signal (the count threshold) was the same in the 2 groups. Additionally, among infants with gastroenteritis symptoms, lactoferrin levels did not distinguish children who did and did not have *C difficile*. The authors appropriately concluded that PCR testing for *C difficile*, in addition to other laboratory testing such as lactoferrin testing, is not useful in children <2 with diarrhea.

The risks of PCR testing in infants and children with symptoms of acute gastroenteritis are clear, and yet this practice is common in the United States. There are no current American Academy of Pediatrics guidelines, active policies, technical reports, clinical reports, and consensus statements specifically about pediatric acute gastroenteritis. The Infectious Diseases Society of America has published a guideline that applies to all age

groups; however, there are substantial problems with using these recommendations in a pediatric age group.⁷ For instance, the guideline recommends stool cultures for enteropathogenic bacteria in all individuals who are febrile, which likely would not be cost-effective in children. The British have promulgated a guideline; however, it misses the opportunity to discuss a variety of issues, including the expense of multiplex PCR testing.⁸ Industry is already working to ensure that physicians use these tests, promoting the product with a methodologically flawed article on cost savings in adults, an article that was entirely supported by the company selling the test.⁹ An independent study revealed that at 1 center, although the PCR technology yielded better results, the costs more than doubled conventional methods of stool testing.¹⁰ Given the likely staggering quantities needed to render a positive impact on patients and the high risk of inappropriate treatment among healthy patients, a guideline addressing testing in children with acute gastroenteritis would be extremely helpful to physicians. Even beyond PCR testing, there are numerous areas in which a modern guideline could set the stage for comprehensive quality improvement.

In recent years, the American Academy of Pediatrics' Value in Inpatient Pediatrics Network has had remarkable success in implementing national, evidence-based pediatric guidelines via national collaborative projects.¹¹ Acute gastroenteritis would appear to be a topic that checks many of the boxes necessary for a successful Value in Inpatient Pediatrics project: a common disease, clear evidence, and the potential for reliable metrics. Hence, within the time line of a couple of years, we could have such a guideline crafted, published, and nationally implemented.

This issue of *Hospital Pediatrics* represents a call to action. If we are to improve the cost efficacy of our care and shorten the duration of length of stay for these vulnerable patients, a modern pediatric guideline is needed. In addition, we should begin comprehensive quality improvement on a national scale to improve areas of care

that we know to be suboptimal. Although the cost of guideline production is not insubstantial, that cost is dwarfed by the amount of money we are senselessly spending because of mismanagement of this disease.

REFERENCES

1. Nabower AM, Hall M, Burrows J, et al. Trends and variation in care and outcomes for children hospitalized with acute gastroenteritis. *Hosp Pediatr*. 2020;10(6)
2. King CK, Glass R, Bresee JS, Duggan C; Centers for Disease Control and Prevention. Managing acute gastroenteritis among children: oral rehydration, maintenance, and nutritional therapy. *MMWR Recomm Rep*. 2003;52(RR-16):1–16
3. Freedman SB, Willan AR, Boutis K, Schuh S. Effect of dilute apple juice and preferred fluids vs electrolyte maintenance solution on treatment failure among children with mild gastroenteritis: a randomized clinical trial. *JAMA*. 2016;315(18):1966–1974
4. Leli C, Di Matteo L, Gotta F, et al. Evaluation of a multiplex gastrointestinal PCR panel for the aetiological diagnosis of infectious diarrhoea. *Infect Dis (Lond)*. 2020;52(2): 114–120
5. Tilmanne A, Martiny D, Quach C, et al. Enteropathogens in paediatric gastroenteritis: comparison of routine diagnostic and molecular methods. *Clin Microbiol Infect*. 2019;25(12):1519–1524
6. Pahud BA, Hassan F, Harrison CJ, et al. Detection of *Clostridioides difficile* by real-time PCR in young children does not predict disease. *Hosp Pediatr*. 2020; 10(7)
7. Shane AL, Mody RK, Crump JA, et al. 2017 Infectious Diseases Society of America clinical practice guidelines for the diagnosis and management of infectious diarrhea. *Clin Infect Dis*. 2017; 65(12):1963–1973
8. Khanna R, Lakhanpaul M, Burman-Roy S, Murphy MS; Guideline Development Group and the technical team. Diarrhoea

- and vomiting caused by gastroenteritis in children under 5 years: summary of NICE guidance. *BMJ*. 2009;338:b1350
9. Beal SG, Tremblay EE, Toffel S, Velez L, Rand KH. A gastrointestinal PCR panel improves clinical management and lowers health care costs. *J Clin Microbiol*. 2017;56(1):e01457-17
10. Beatty N, Nix D, Matthias K, Al Mohajer M. Efficacy and cost comparison between a rapid multiplex polymerase chain reaction gastrointestinal pathogen panel versus conventional stool analysis techniques in suspected cases of infectious diarrheal disease at a tertiary medical center. *Open Forum Infect Dis*. 2016;3(suppl 1):214
11. Parikh K, Biondi E, Nazif J, et al; Value in Inpatient Pediatrics Network Quality Collaborative For Improving Care in Community Acquired Pneumonia. A multicenter collaborative to improve care of community acquired pneumonia in hospitalized children. *Pediatrics*. 2017; 139(3):e20161411

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