

Telemedicine and Antibiotic Use: One Click Forward or Two Steps Back?

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The use of telehealth services in general, and direct-to-consumer (DTC) telemedicine visits in particular, is growing rapidly.^{1,2} DTC telemedicine (access to a physician via videoconference for a fee) provides obvious benefits for families, including convenience and, for some, lower out-of-pocket costs. A substantial proportion of DTC telemedicine services for children are for respiratory tract infections (RTIs). We applaud the careful and dispassionate analysis of diagnosis, antibiotic prescribing, and patient satisfaction related to RTI treatment that was published in this month's *Pediatrics* by Foster et al.³ This study, along with that of Ray et al⁴ in a previous issue of *Pediatrics*, reveals the promise of DTC telemedicine, along with attendant risks of antibiotic overuse in pediatric outpatient settings.

By using data on 12 842 completed RTI encounters with 560 physicians from a large, national DTC telemedicine provider, Foster et al³ were able to assess factors associated with antibiotic prescribing as well as parents' satisfaction with the encounters. Their well-executed study includes a broad cross-section of patients across the country, increasing generalizability. The "headline" is that 55% of the visits resulted in antibiotic prescribing, consistent with other recent research on DTC treatment and more than what is suggested in other studies for in-person visits for similar conditions.^{5,6} Prescribing was higher among family medicine and internal medicine physicians compared with pediatricians. Broad-spectrum

antibiotics (such as amoxicillin-clavulanate, cefdinir, and azithromycin) made up more than one-third of antibiotics prescribed.

The diagnoses of otitis media, sinusitis, and pharyngitis were associated with antibiotic prescribing, in keeping with previous research. It is, therefore, more instructive to examine the pattern of diagnoses than to consider the antibiotic prescribing rates for those diagnoses. Physicians in this study appeared loath to diagnose acute otitis media (only 4% of encounters) without visualizing the tympanic membrane. The relatively low incidence of diagnosis of bronchitis (5%) also suggests judicious use of a diagnosis that often drives unnecessary prescribing.⁷ However, DTC physicians frequently diagnosed pharyngitis (29%) and treated 76% of these cases as a bacterial infection without evident confirmation by culture or rapid antigen test.⁸ They also frequently diagnosed sinusitis (23%) and almost always (92%) treated it with an antibiotic. Diagnosis and treatment of sinusitis based on elements of history alone can meet national guidelines,⁹ but judgment about the severity of symptoms may be more difficult in telehealth encounters.

One strength of the study was the combination of data on diagnosis and prescribing with data on parent satisfaction and visit duration. Providers who prescribed antibiotics were 3.4 times more likely to receive a 5-star satisfaction rating, with similar findings among pediatricians. For visits not resulting in antibiotics, longer visit

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DOI: <https://doi.org/10.1542/peds.2019-1585>

Accepted for publication Jun 11, 2019

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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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.

COMPANION PAPER: A companion to this article can be found online at www.pediatrics.org/cgi/doi/10.1542/peds.2019-0844.

To cite: Sprecher E and Finkelstein JA. Telemedicine and Antibiotic Use: One Click Forward or Two Steps Back?. *Pediatrics*. 2019; 144(3):e20191585

length was associated with higher odds of a 5-star physician rating. Previous work on meeting parents' concerns while maintaining judicious antibiotic prescribing practices has primarily been in the context of in-person visits¹⁰; it remains to be seen whether these strategies can be effective in the telemedicine environment.

This study provides important information about this new technology and raises some important issues about acute care for children. The high rates of antibiotic prescribing (calculated as a fraction of encounters) may be the result of real or perceived desires of parents,¹¹ differences in the cases, or different decisions by physicians who use physical examination to reject a diagnosis of bacterial illness. We believe all are likely at play. The differential prescribing rates between pediatricians and other physicians suggest that there may be a comfort level with not treating that comes with pediatric experience. Understanding what drives patient satisfaction may guide the development of best practices for clinicians of all specialties working in the digital environment.

Despite general excitement about new technologies, we read these data with some concern about the quality of diagnosis for specific conditions and about antibiotic use that may not always be consistent with evidence-based standards. To be clear, antibiotic overuse continues to exist in all care settings. However, until telemedicine providers have access to a positive test result for group A streptococcus before prescribing antibiotics, they cannot adhere to current guidelines. We believe that DTC providers are appropriately wrestling with what diagnoses can be reliably made by telemedicine, as evidenced by the low rate of otitis media diagnosis on the basis of history alone.

Incentives for antibiotic overprescribing remain strong, so antibiotic stewardship efforts aimed at DTC telemedicine providers are warranted. The past 3 decades have seen decreased antibiotic use for children in community settings. Interventions must now be tailored for the digital world in which we will practice increasingly. We do not underestimate the benefit to families and children of immediate access to expert care through digital interfaces. And we do not question that DTC clinicians are providing the best care possible given the clinical data at hand. We do wonder if this technology will be more safe and effective (or at least guideline adherent) if telemedicine is provided by practices or integrated delivery systems that have a relationship with the family, access to the electronic health record, capacity to make appointments, and ability to serve as a safety net if the child's symptoms change. Such a model has been put into practice at Intermountain Healthcare, where antibiotic prescribing for RTI appears lower than traditional urgent care settings in their system. Although sinusitis and pharyngitis were still common diagnoses, the possibility exists in this system to have group A streptococcus testing at an outpatient laboratory, and, most importantly, patients first "seen" by telemedicine could be referred for an in-person encounter without additional charge.¹² This later, triaging role for telemedicine has been suggested by Gerber.¹³ Then, families may be able to have their cake and eat it too: maintaining convenience and parent satisfaction while reducing the health risks to both the individual and population that come with inappropriate antibiotic prescribing.

ABBREVIATIONS

DTC: direct-to-consumer
RTI: respiratory tract infection

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Pediatrics 2019;144;

DOI: 10.1542/peds.2019-1585 originally published online August 1, 2019;

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