



Innovative Quality Tracking Platform Promotes Proper Prescribing of Antibiotics and Steroids Through Targeted Interventions



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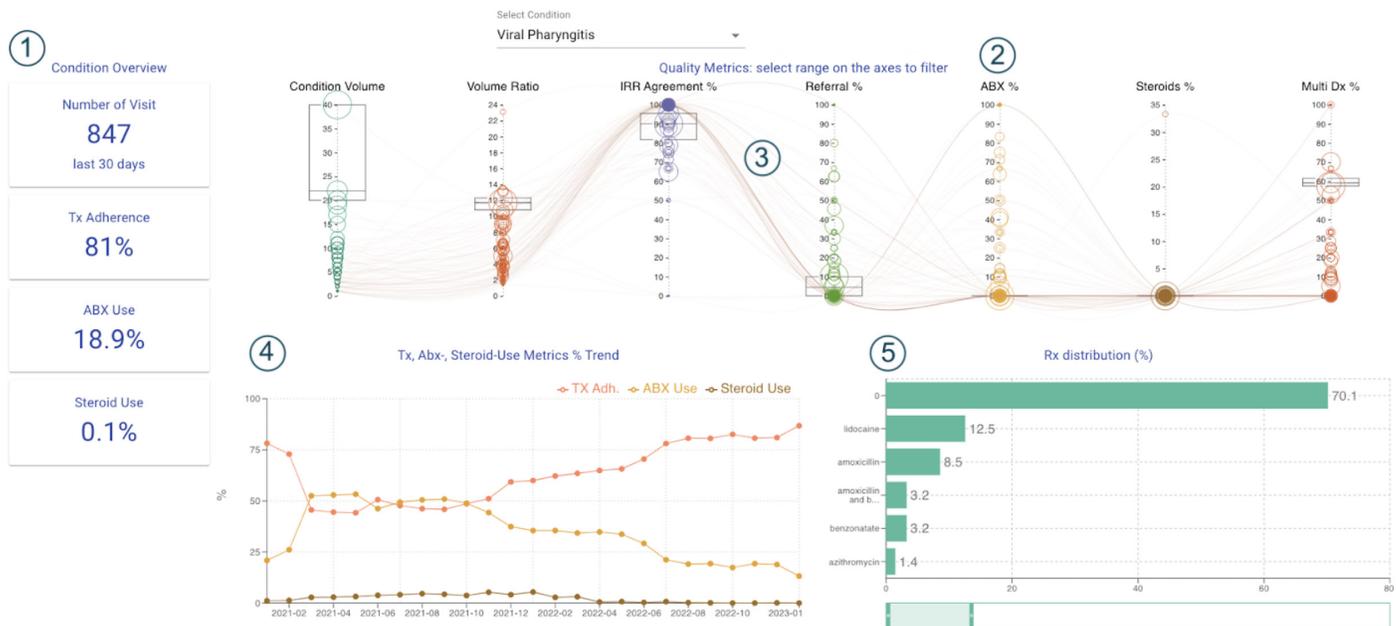
Innovative Quality Tracking Platform Promotes Proper Prescribing of Antibiotics and Steroids Through Targeted Interventions

Healthcare Quality Continues To Be a Challenge

One of the major challenges with maintaining quality in healthcare is that decisions are often left to independent providers with limited oversight or feedback. Over the years, there has been continuing evidence of gaps between the care patients actively receive and the care that they should actually receive. However, efforts to improve this have continued to be inconsistent—and ineffective¹.

For example, despite there being well-established guidelines against the use of antibiotics and steroids to treat viral conditions, providers continue to overprescribe. The CDC estimates that at least 30% of U.S. outpatient antibiotic prescriptions are unnecessary². This contributes to the widely dangerous issue of antibiotic resistance, which often leads to increased illness and death³. Similarly, the prescribing of systemic steroids for respiratory tract infections like laryngitis has been proven to be medically unnecessary—and comes with lasting side effects like sepsis, blood clots, and fractures^{4, 5, 6}. However, like with antibiotic prescriptions, it's still incredibly common.

Figure 1: An Example of Quality Tracking Dashboard



Note: Dashboards like this one provide detailed information about multiple aspects of practice. This example is based on actual data on 671 visits with a diagnosis of strep pharyngitis over a 30-day period. The panel (1) summarizes key statistics, such as overall antibiotics use. At the top plot, each performance metric is mapped to one of the vertical axes (e.g. average antibiotics rate (2)). Each provider's performance is mapped to every axis and represented as a circle. The circles' size corresponds to the providers' volume of visits. Circles of the same provider are connected by a thin line across all axes (e.g. (3)) to observe correlation patterns. Time trends in key metrics are shown in (4). The most common treatments for the conditions are shown in (5). Data can be sliced in different ways, such as for different conditions. All panels can be shown for different conditions and periods, and data can be narrowed down to the individual provider's list of cases and individual treatment patterns.

K Health, an artificial intelligence (AI)-powered virtual primary care company, built K Visual Analysis, an innovative digital tracking platform to improve the quality of healthcare for millions of people, with an initial focus on reducing medically unnecessary prescriptions. The platform tracks the treatment decisions of all 100+ virtual providers practicing in K Health's virtual medical practice. Access to the full medical chart, detailed intake information, and the full transcripts of patient-doctor communication provides context specific statistics and allows analysis at the level of condition, treatment, and clinician. Advanced visualizations facilitate quick comparisons across multiple dimensions (Figure 1).

K Visual Analysis provides practicing providers and K Health's Medical Quality Assurance team with detailed information about treatment decisions, including if they adhered to the standard of care and how it compared to other providers. K Visual Analysis enables the use of EMR data to improve performance in real-time.

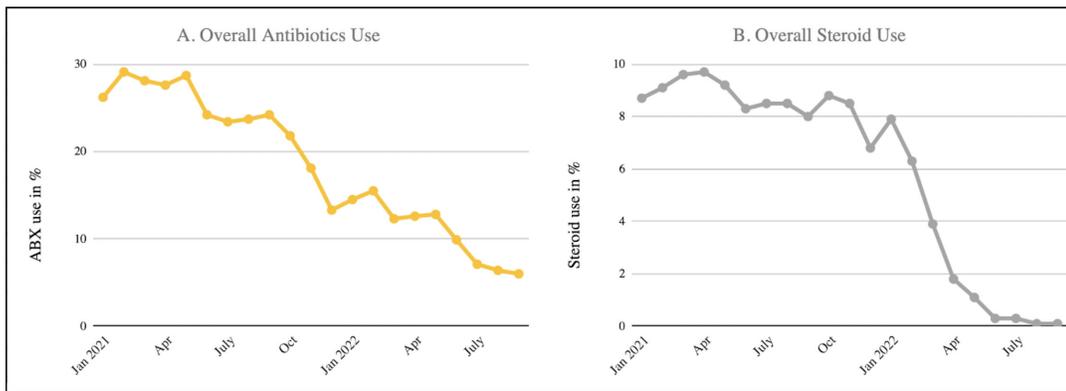
Using this information, K Health developed and implemented an intervention program to ensure higher-quality care for its millions of patients. As a result, between January 2021 and mid-2022, the amount of K Health users receiving antibiotics for viral conditions was reduced by over 83%—from 30% to 5%—a level far better than the national average (Figure 2). Patients being prescribed steroids inappropriately (which started at 10%, a rate close to the national average) was virtually eliminated, reaching 0% by August 2022⁷. By conditioning on detailed case information, these interventions targeted only providers who may have prescribed inappropriately.

The intervention program includes:

- **Providing** physicians with feedback on their adherence to practice guidelines and treatment standards, and the alignment of their practice choices with those of other clinicians faced with similar cases.
- **Highlighting** when a treatment decision is not standard (after accounting for specific case characteristics), and flagging to a provider at the point of care that their decision may deviate from either the guidelines or common practices.
- **Detecting** real-time shifts in practice norms that may be driven by local or systemic factors, such as medication shortages.

Being able to detect non-adherence to established treatment guidelines, like prescribing an antibiotic for a viral infection, K Health has been able to intervene quickly to ensure proper treatment and provide actionable feedback to increase the quality of its providers moving forward. K Health trains physicians to use this system as an ally that enables them to provide better medicine.

Figure 2: Antibiotics and Steroid Use for Selected Viral Conditions

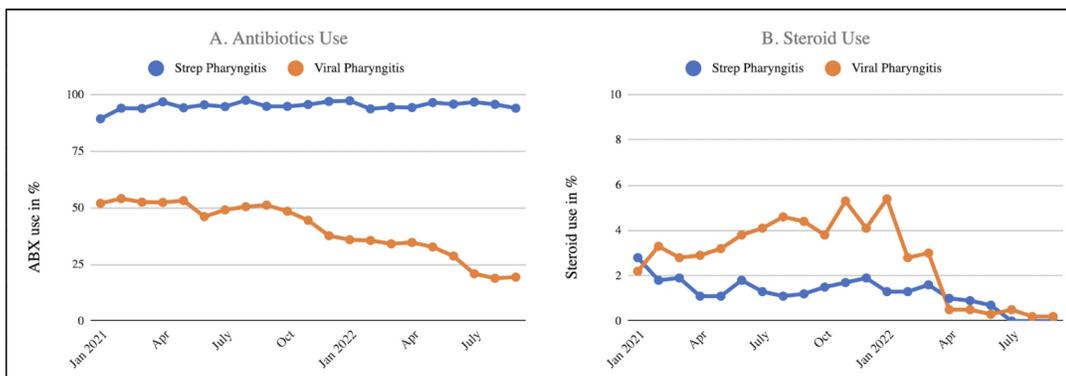


Notes: The figure shows rates of antibiotics (A) and steroid (B) use for selected viral upper respiratory infections, for which they are typically considered inappropriate. The sample includes all 95,965 cases diagnosed with such conditions during the period between January 2021 and September 2022.

K Health Significantly Reduced Inappropriate Antibiotics and Steroid Prescriptions

A key challenge in targeting inappropriate prescribing of antibiotics is that some prescriptions are, of course, appropriate. Therefore, a quality-increasing intervention must not promote arbitrary prescribing targets but rather provide precise feedback that accounts for each case’s characteristics and leave scope for physician discretion in each individual case. The platform provides exactly such feedback, which resulted in the reduction being concentrated in inappropriate prescribing. Figure 3 shows an example of the success in reducing inappropriate prescriptions for two conditions: viral pharyngitis (for which antibiotics aren’t appropriate) and strep throat (for which they are appropriate). While appropriate prescription rates for strep throat remained unchanged, inappropriate prescriptions for viral pharyngitis decreased from 52% to 19% (Figure 3A). Steroid prescriptions for strep and viral pharyngitis, which are also inappropriate for both conditions, decreased from 5% and 3%, respectively, to 0% for both (Figure 3B).

Figure 3: Antibiotics and Steroid Use for Strep and Viral Pharyngitis



Notes: The figure compares prescription rates for two specific conditions: viral pharyngitis (for which antibiotics are appropriate) and strep (for which they are). While appropriately prescription rates for strep remained high throughout the period, inappropriate prescriptions for viral pharyngitis decreased from 52% to 19% (Figure 3A). Steroids prescriptions for strep and viral pharyngitis, which are inappropriate for both conditions, decreased from 5% and 3%, respectively, to 0% for both conditions (Figure 3B). The sample includes 9,800 cases diagnosed with strep pharyngitis and 23,615 cases diagnosed with viral pharyngitis in the period between January 2021 and September 2022.

These improvements are greater than any previously reported efforts to reduce the inappropriate use of antibiotic and steroid prescriptions. A wide-ranging report by the Infectious Disease Society of America shows how various attempts were unsuccessful. For example, a 2019 multisite effort to decrease inappropriate antibiotic prescriptions in urgent care centers only saw a 28% reduction.^{8,9,10,11} While methods like prior authorization and clinician education were somewhat effective, nothing has been able to reduce the use of antibiotics to acceptable levels—until now. To our knowledge, there hasn't been any similar effort for steroids.

By building a platform capable of giving real-time personalized feedback to providers and Quality Assurance leaders, K Health has surpassed existing efforts.

Mitigating Inappropriate Prescriptions Is Just the Beginning

KHealth has been able to significantly reduce inappropriate prescriptions of antibiotics and steroids for viral conditions while continuing to prescribe appropriately for bacterial conditions. Using K Visual Analysis, a novel tracking platform, and targeted interventions have resulted in:

- patients receiving better care
- providers being able to see and learn from their clinical performance
- societies benefiting from a long-awaited successful approach to mitigating antibiotic resistance

The platform's potential to improve other areas of healthcare delivery, as well as medical outcomes for patients across a wide range of conditions and treatments, is limitless. In addition to real-time tracking and intervention, K Health is continuing to leverage AI to build more data-driven decision support tools and clinical automation. Their goal is to create a healthcare system that delivers consistently better care that keeps improving over time.

The Intervention

Starting in April 2021, K Health has leveraged its quality platform to initiate an intervention to reduce inappropriate prescribing of antibiotics and steroids in patients diagnosed with upper respiratory infections, a group of conditions known from prior research to be prone for overprescribing. The intervention included:

- **Disseminating Physician Education Materials**
Documentations of details the differential diagnosis of viral versus bacterial conditions, and provides clear guidelines for antibiotic appropriate and inappropriate conditions.
- **Providing Data-Driven Targeted Feedback To High Prescribers (from Jan 2022)**
Based on the universe of data collected through the digital platform, a dashboard was developed that highlights providers that substantially deviate from guidelines for appropriate prescribing. These prescribers were shown their prescription rates compared to the rates of all other providers on the platform.

K Health, headquartered in New York, is the clinical primary care company on a mission to get everyone access to high quality, affordable healthcare. K Health built an app and web platform that uses AI to empower clinicians practicing on its platform, and its millions of users, with real-time personalized information to optimize diagnoses and treatment. It also partners with leaders in the healthcare space, including Mayo Clinic Platform and Maccabi Healthcare Services, to develop models and create solutions using clinical data to tackle the most dire health issues. K Health offers virtual care for less than a copay, no insurance needed, and can remotely treat hundreds of urgent and chronic conditions, as well as anxiety and depression. K Health members can establish care completely online, and get everything from remote wellness visits to custom treatment plans, medical weight loss support, 24/7 Urgent Care, mail-order prescriptions, and more.

K Health has helped over six million people get access to higher quality and affordable care. It's available in all U.S. states, except Alaska and Hawaii.

For more information, please visit www.khealth.com or download the app.

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References

- ¹ Dixon-Woods, Mary, Sarah McNicol, and Graham Martin. "Ten challenges in improving quality in healthcare: lessons from the Health Foundation's programme evaluations and relevant literature." *BMJ quality & safety* 21.10 (2012): 876-884.
- ² Choosing Wisely, "Avoiding Antibiotics Overuse". March 6, 2014, <https://www.choosingwisely.org/resources/updates-from-the-field/avoiding-antibiotics-overuse/>
- ³ Centers for Disease Control and Prevention, "Core Elements of Outpatient Antibiotic Stewardship", <https://www.cdc.gov/antibiotic-use/core-elements/outpatient.html>
- ⁴ Waljee AK, Rogers MA, Lin P, Singal AG, Stein JD, Marks RM, Ayanian JZ, Nallamothu BK. Short term use of oral corticosteroids and related harms among adults in the United States: population based cohort study. *BMJ*. 2017 Apr 12;357:j1415. doi: 10.1136/bmj.j1415. PMID: 28404617; PMCID: PMC6284230.
- ⁵ Shulman ST, Bisno AL, Clegg HW, et al. Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America. *Clin Infect Dis* 2012; 55:1279.
- ⁶ Hay AD, Little P, Harnden A, et al. Effect of Oral Prednisolone on Symptom Duration and Severity in Nonasthmatic Adults With Acute Lower Respiratory Tract Infection: A Randomized Clinical Trial. *JAMA*. 2017;318(8):721-730. doi:10.1001/jama.2017.10572
- ⁷ Lin, Kueiyu Joshua, Evan Dvorin, and Aaron S. Kesselheim. "Prescribing systemic steroids for acute respiratory tract infections in United States outpatient settings: a nationwide population-based cohort study." *PLoS medicine* 17.3 (2020): e1003058.
- ⁸ McDonagh, M. S., Peterson, K., Winthrop, K., Cantor, A., Lazur, B. H., & Buckley, D. I. (2018). Interventions to reduce inappropriate prescribing of antibiotics for acute respiratory tract infections: summary and update of a systematic review. *Journal of International Medical Research*, 46(8), 3337-3357.
- ⁹ Uscher-Pines, L., Mulcahy, A., Cowling, D., Hunter, G., Burns, R., & Mehrotra, A. (2015). Antibiotic prescribing for acute respiratory infections in direct-to-consumer telemedicine visits. *JAMA internal medicine*, 175(7), 1234-1235.
- ¹⁰ Ray, K. N., Shi, Z., Gidengil, C. A., Poon, S. J., Uscher-Pines, L., & Mehrotra, A. (2019). Antibiotic prescribing during pediatric direct-to-consumer telemedicine visits. *Pediatrics*, 143(5).
- ¹¹ Nedved, A., Fung, M., Bizune, D., Liu, C. M., Obremesky, J., Fleming-Dutra, K. E., ... & Montalbano, A. (2022). A multisite collaborative to decrease inappropriate antibiotics in urgent care centers. *Pediatrics*, 150(1).