

Machine learning for predicting the best treatment for vesicoureteral reflux in kids

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The result of abnormal formation of the normal valve between the kidney and bladder, vesicoureteral reflux (VUR) can lead to recurrent febrile urinary tract infections (UTIs) and kidney scarring in children. Previous research has shown that when taken continuously, prophylactic antibiotics can reduce the risk of recurrent UTI in about half of this population. However, this approach can also pose potential problems, such as antibiotic resistance.

Predicting recurrent UTIs

Using data from the Randomized Intervention for Children with Vesico-Ureteral Reflux (RIVUR) and Careful Urinary Tract Infection Evaluation (CUTIE) trials, pediatric urologist Hsin-Hsiao Scott Wang, MD, MPH, MBAn, and his colleagues in the Department of Urology at Boston Children's Hospital previously developed a [machine learning model](#) aimed at predicting recurrent UTIs associated with VUR. The novel machine learning algorithm showed very robust performance in determining which patients with UTIs required further testing for VUR.

"With our predictive algorithm, we can provide personalized care with much better quality for our VUR patients to assign diagnostic imaging and treatments to only those who need them, and spare the adverse effects for those who don't," says

Building on that work, the team recently sought to predict to determine

whether a similar model could predict the probability of recurrent UTIs. Based on data from 607 [pediatric patients](#) who were part of the RIVUR trial, the researchers created a model to predict recurrent UTI risk with and without continuous [antibiotic prophylaxis](#).

Targeted antibiotic prophylaxis

The model's ability to predict recurrent UTIs was strong, with an "area under curve" of 0.82. Wang and his colleagues found that giving continuous antibiotic prophylaxis to 40 percent of patients with VUR—instead of giving them to all VUR patients—could result in minimal recurrent UTIs. These findings were published in the April 2021 issue of the *Journal of Urology*.

This machine learning model could allow physicians to identify the patients who would benefit most from antibiotic prophylaxis, so those who don't need it will be spared any adverse drug effects. Such a tool could also achieve optimal outcomes while minimizing unnecessary treatments and saving costs.

"We are very excited about the prospects of marrying machine learning with challenging decision-making processes to elevate patient care," says Wang.

More information: Dimitris Bertsimas et al. Selecting Children with Vesicoureteral Reflux Who are Most Likely to Benefit from Antibiotic Prophylaxis: Application of Machine Learning to RIVUR, *Journal of Urology* (2020). [DOI: 10.1097/JU.0000000000001445](https://doi.org/10.1097/JU.0000000000001445)

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