

**Recurrent Urinary Tract Infections in Children
Risk Factors and Association With Prophylactic Antimicrobials**

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FROM ABSTRACT

Context

The evidence regarding risk factors for recurrent urinary tract infection (UTI) and the risks and benefits of antimicrobial prophylaxis in children is scant.

Objectives

To identify risk factors for recurrent UTI in a pediatric primary care cohort, to determine the association between antimicrobial prophylaxis and recurrent UTI, and to identify the risk factors for resistance among recurrent UTIs.

Design, Patients, and Setting

From a network of 27 primary care pediatric practices in urban, suburban, and semirural areas spanning 3 states, a cohort of children aged 6 years or younger who were diagnosed with first UTI between July 1, 2001, and May 31, 2006, was assembled. Time-to-event analysis was used to determine risk factors for recurrent UTI and the association between antimicrobial prophylaxis and recurrent UTI, and a nested case-control study was performed among children with recurrent UTI to identify risk factors for resistant infections.

Main Outcome Measures

Time to recurrent UTI and antimicrobial resistance of recurrent UTI pathogens.

Results

Among 74,974 children in the network, 611 had a first UTI and 83 had a recurrent UTI.

Antimicrobial prophylaxis was a risk factor for antimicrobial resistance among children with recurrent UTI [by a factor of 650%].

Conclusion

Among the children in this study, antimicrobial prophylaxis was associated with increased risk of resistant infections.

THESE AUTHORS ALSO NOTE:

“Estimates of cumulative incidence of urinary tract infection (UTI) in children younger than 6 years (3%-7% in girls, 1%-2% in boys) suggest that 70,000 to 180,000 of the annual US birth cohort will have experienced a UTI by age 6 years.”

"The 1999 American Academy of Pediatrics practice guideline for management of children after first UTI recommends an imaging study to evaluate for the presence and degree of vesicoureteral reflux (VUR), a condition present in approximately 30% to 40% of children with UTI."

"If the child has VUR, daily antimicrobial prophylaxis is recommended to prevent recurrent UTIs." **[WOW!]** This is thought to reduce the risk of recurrent UTI and renal scarring.

However, "concerns have been raised about the potential harm of antimicrobial prophylaxis because of its potential to breed resistant organisms that can cause recurrent UTIs."

RESULTS

Antimicrobial prophylaxis "had no significant effect on the risk of recurrent UTI in multivariable analysis."

"Analyses stratified by propensity score quintile also demonstrated no significant effect of antimicrobial prophylaxis."

Antimicrobial prophylaxis did not decrease the risk of recurrent UTI.

"Exposure to prophylactic antimicrobials significantly increased the likelihood of resistant infections" by 650% with a range between 60% - 3,417%.

"A nonwhite child younger than 2 years who has VUR and is exposed to antimicrobial prophylaxis has the highest probability of resistance, 98.0%." "In contrast, a white 2- to 6-year-old child who does not have VUR and is not exposed to prophylaxis has only a 40.4% probability of a resistant recurrent UTI."

"If this same white, 2- to 6-year-old child without VUR is exposed to prophylaxis, our data predict an increased absolute probability of resistance of more than 30% to 73.3%, demonstrating that exposure to antimicrobial prophylaxis has a major impact on risk of resistance in recurrent UTIs."

COMMENT FROM AUTHORS:

"To our knowledge, this study is the first large primary care pediatric cohort study to evaluate risk factors for recurrent UTI and the association with antimicrobial prophylaxis. We found that antimicrobial prophylaxis was not associated with lower risk of recurrent UTI but was associated with increased risk of resistant infection."

"Exposure to antimicrobial prophylaxis was associated with significantly increased risk of resistant infections."

CONCLUSIONS

“Antimicrobial prophylaxis was not associated with lower risk of recurrent UTI, but prophylaxis was associated with increased risk of resistant infections.”

KEY POINTS FROM DAN MURPHY

- 1) Of the children born each year in the US, 70,000 to 180,000 will have experienced a urinary tract infection by age 6 years.
- 2) In 1999, the American Academy of Pediatrics practice guideline for management of children after first urinary tract infection recommended an imaging study to evaluate for the presence and degree of vesico-ureteral reflux. Vesico-ureteral reflux is present in 30% to 40% of children with urinary tract infections.
- 3) “If the child has vesico-ureteral reflux, daily antimicrobial prophylaxis is recommended to prevent recurrent urinary tract infections.” **[WOW!]** This means that they are putting these young children on daily antibiotics in an effort to reduce the risk of recurrent urinary tract infections and renal scarring.
- 4) “Concerns have been raised about the potential harm of antimicrobial prophylaxis because of its potential to breed resistant organisms that can cause recurrent urinary tract infections.”
- 5) This study clearly shows that children put on daily prophylaxis antibiotics do not have a reduced incidence of recurrent urinary tract infections, but rather have an increased incidence of recurrent antibiotic resistant urinary tract infections. The increased incidence of antibiotic resistant urinary tract infections averaged 650% with a range between 60% to 3,417%.
- 6) Antimicrobial prophylaxis was a risk factor for antimicrobial resistance among children with recurrent UTI [by a factor of 650%].
- 7) Among the children in this study, antimicrobial prophylaxis was associated with increased risk of resistant infections.
- 8) “A nonwhite child younger than 2 years who has vesico-ureteral reflux and is exposed to antimicrobial prophylaxis has the highest probability of resistance, 98.0%.”
- 9) “A white 2- to 6-year-old child who does not have vesico-ureteral reflux and is not exposed to prophylaxis has only a 40.4% probability of a resistant recurrent urinary tract infection.”
- 10) “Exposure to antimicrobial prophylaxis was associated with significantly increased risk of resistant infections.”