



# A simple way to reduce catheter-associated UTIs

The administration of a prophylactic antibiotic when a surgical patient's urinary catheter is removed can cut the rate of urinary tract infections in half.

## PRACTICE CHANGER

Ensure that antibiotics are administered to surgical patients when their urinary catheter is removed to reduce the risk of urinary tract infections (UTIs).<sup>1</sup>

## STRENGTH OF RECOMMENDATION

**A:** Based on a meta-analysis.

Marschall J, Carpenter CR, Fowler S, et al; CDC Prevention Epicenters Program. Antibiotic prophylaxis for urinary tract infections after removal of urinary catheter: meta-analysis. *BMJ*. 2013;346:f3147.

## ILLUSTRATIVE CASE

A 49-year-old man was admitted to the hospital for resection of a vertebral mass. He is almost ready for discharge, and his urinary catheter soon will be removed. Should he be given an antibiotic when his catheter is removed to prevent a UTI?

Approximately 15% to 25% of hospitalized patients receive a urinary catheter, typically during the perioperative period.<sup>2</sup> UTIs are the most common hospital-acquired infections, and virtually all of these UTIs are caused by instrumentation of the urinary tract, primarily by catheters.<sup>2</sup> Although the mortality rate among patients with catheter-associated UTIs (CAUTIs) is just 2.3%, CAUTIs are the leading cause of hospital-acquired bacteremia, which increases morbidity and length of stay.<sup>2</sup> The most common pathogens for CAUTIs are *Escherichia coli* (21.4%), *Candida* species (21%), and *Enterococcus* species (14.9%).<sup>2</sup> *Pseudomonas ae-*

*ruginosa*, *Klebsiella*, and *Enterobacter* species make up the bulk of the remainder.<sup>2</sup>

## Support for antibiotic prophylaxis has historically been equivocal

Until now, no data clearly supported routine use of prophylactic antibiotics after urinary catheterization. Centers for Disease Control and Prevention (CDC) guidelines published in 2009 outline which patients are appropriate for catheterization, but do not recommend routine use of antibiotics to prevent CAUTIs.<sup>2</sup> The 2014 Infectious Diseases Society of America guidelines, which came out before the study reported on here was published, state the benefit of antibiotics at the time of catheter removal is an unresolved issue.<sup>3</sup>

## STUDY SUMMARY

### Meta-analysis shows prophylactic antibiotics reduce UTI risk

Marschall et al<sup>1</sup> searched multiple databases for studies published between 1947 and 2012 that evaluated prophylactic use of antibiotics at the time of urinary catheter removal. The endpoint for their analysis was symptomatic UTI, which they defined as bacteriuria plus at least one clinical symptom. Trials were excluded if patients had suprapubic catheters or if antibiotics were started shortly after the catheter was inserted.

The authors analyzed 7 studies. Six were randomized controlled trials, of which one was unpublished. The seventh trial was a non-

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**> This meta-analysis suggests that prophylaxis for 3 days or less can reduce the risk of catheter-associated UTIs.**

randomized study that compared outcomes of patients of 2 surgeons, one of whom used prophylactic antibiotics and one who did not. Five studies enrolled surgical patients exclusively, including 2 that focused on urology patients. In all of the studies, patients had a urinary catheter in place for fewer than 15 days. The duration of antibiotic treatment varied from a single dose to 3 days. The antibiotics used included trimethoprim/sulfamethoxazole, nitrofurantoin, ciprofloxacin, and a cephalosporin.

**Antibiotic prophylaxis significantly reduced the rate of CAUTIs.** The absolute risk reduction was 5.8%; the rate of CAUTIs was 4.7% in the group treated with antibiotics vs 10.5% in the control group. The number needed to treat to prevent one CAUTI was 17 (95% confidence interval [CI], 12-30), with a risk ratio (RR) of .45 (95% CI, .28-.72). The RR varied only slightly (.36) when the researchers repeated their analysis but excluded the unpublished trial, and remained at .45 when they analyzed only studies of surgical patients.

The reduction in CAUTIs remained consistent despite varying lengths of antibiotic administration and choice of antimicrobial agents. However, when the authors looked at pooled results just from the 2 studies that included both surgical and medical patients, they found no decrease in CAUTIs.

**WHAT'S NEW**

**We now have an effective way to reduce CAUTIs**

Prophylactic use of antibiotics when a urinary catheter is removed appears to reduce the rate of CAUTIs by more than 50% in surgical patients. The 2009 CDC guidelines on CAUTI prevention emphasize the use of appropriate infection control measures and limiting the duration of urinary catheter use.<sup>2</sup> Now there are data showing a reduction in the incidence of CAUTIs when prophylactic antibiotics are given during catheter removal.

**CAVEATS**

**Results may not apply to nonsurgical patients**

This meta-analysis does not provide enough information to identify which patients are

most likely to benefit from antibiotic prophylaxis. Most patients (92%) in this analysis had undergone surgery, but urinary catheterization is common among medically hospitalized patients. Studies of antibiotic prophylaxis at the time of catheter removal in nonsurgical patients are needed to strengthen the recommendation of this practice for all patients.

**Some of the studies analyzed may have been biased.** The authors determined that most of the studies in their meta-analysis were at high risk of attrition bias because there was potential for systematic differences in withdrawals between the treatment and control groups. In addition, in most studies, the randomization and allocation appeared to be inadequate, which increased the risk for selection bias.

**CHALLENGES TO IMPLEMENTATION**

**Which antibiotics to use, and for how long, remains unclear**

Antibiotic choice depends upon institutional policies and local resistance patterns, which complicates making universal recommendations. The optimal duration of treatment also is unknown, although this meta-analysis suggests that prophylaxis for 3 days or less can reduce CAUTI risk.

Catheters impregnated with antimicrobials or with microbial resistance barriers may be an alternative to administering antibiotics at catheter removal, but in preliminary studies, these devices have not been shown to reduce the incidence of CAUTIs.<sup>4,5</sup> Increasing antimicrobial resistance also complicates the widespread use of prophylaxis. **JFP**

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**References**

- Marschall J, Carpenter CR, Fowler S, et al; CDC Prevention Epicenters Program. Antibiotic prophylaxis for urinary tract infections after removal of urinary catheter: meta-analysis. *BMJ*.

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- 2013;346:f3147.
2. Gould CV, Umscheid CA, Agarwal RK, et al. Guideline for prevention of catheter-associated urinary tract infections 2009. Available at: <http://www.cdc.gov/hicpac/pdf/cauti/cautiguide-line2009final.pdf>. Accessed April 15, 2014.
  3. Lo E, Nicolle LE, Coffin SE, et al. Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2014 update. *Infect Control Hosp Epidemiol*. 2014;35:464-479.
  4. Pickard R, Lam T, MacLennan G, et al. Types of urethral catheter for reducing symptomatic urinary tract infections in hospitalised adults requiring short-term catheterisation: multicentre randomised controlled trial and economic evaluation of antimicrobial- and antiseptic-impregnated urethral catheters (the CATHETER trial). *Health Technol Assess*. 2012;16:1-197.
  5. Pickard R, Lam T, MacLennan G, et al. Antimicrobial catheters for reduction of symptomatic urinary tract infection in adults requiring short-term catheterisation in hospital: a multicentre randomised controlled trial. *Lancet*. 2012;380:1927-1935.