Clinical impact ratings: ★★★★★☆ ★★★★★☆

Question
In patients who have had short-term urinary catheterization, does antibiotic prophylaxis on catheter removal reduce risk for symptomatic urinary tract infections (UTIs)?

Review scope
Included studies compared antibiotic prophylaxis with placebo or control on removal of transurethral urinary catheters after catheterization ≤ 14 days. Outcome was symptomatic UTI (≥ 1 symptom or sign of UTI plus measurable bacteriuria).

Review methods
MEDLINE, EMBASE/Excerpta Medica, Scopus, Cochrane Library (CENTRAL) (all to Nov 2012), clinicaltrials.gov, Google, abstracts from 2006 to 2012 annual meetings of the Infectious Diseases Society of America and other professional meetings, and reference lists of relevant studies were searched for published and unpublished randomized and nonrandomized controlled trials. 7 studies (n = 1520), including 5 published randomized controlled trials (RCTs), 1 unpublished RCT, and 1 non-RCT (n = 713) met the selection criteria. Sample sizes ranged from 48 to 713 patients, and follow-up ranged from 4 days to 6 weeks. 2 studies assessed ciprofloxacin, 2 assessed trimethoprim/sulfamethoxazole (TMP/SMX), 1 assessed ciprofloxacin or TMP/SMX, and 1 each assessed nitrofurantoin and cefotaxime. 1393 patients were enrolled in studies that only included surgical patients. Randomization and allocation concealment were inadequate in 4 studies.

Main results
Meta-analysis showed that prophylaxis reduced risk for symptomatic UTI more than control (Table).

 Conclusion
In patients who have had short-term urinary catheterization, antibiotic prophylaxis on catheter removal reduces risk for symptomatic urinary tract infections.

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For correspondence: Dr. J. Marshall, Washington University School of Medicine, St. Louis, MO, USA. E-mail jmarscha@dom.wustl.edu.

Commentary
The meta-analysis by Marshall and colleagues was limited by the weak and skewed studies it included: The largest was not a randomized trial, another was not a test of prophylaxis at catheter removal, the second largest study had a large disparity in median duration of catheterization in the 2 treatment groups, and 3 trials had < 100 patients. Moreover, follow-up was short in all of the trials, randomization and allocation were judged to be inadequate in 4, and attrition bias was a concern in 5. Finally, > 95% of patients were postsurgical, a population with shorter catheter durations than the far larger population of catheterized nonsurgical and intensive care unit patients.

It is not surprising that a short course of antimicrobial prophylaxis (1 to 3 doses) might reduce symptomatic postcatheterization UTIs, since prophylaxis reduces bacteriuria after short-term catheterizations for urodynamic studies (1) and reduces catheter-associated bacteriuria with indwelling urinary catheters (2). The challenge is how to deploy preemptive postcatheterization prophylaxis to maximize efficacy and minimize antibiotic pressure that drives antimicrobial resistance and the risk for Clostridium difficile-associated diarrhea worldwide.

Although treating all patients at catheter removal may reduce subsequent symptomatic UTIs, it failed 28% to 72% of the time; failures are likely to result in recurrent symptomatic UTIs or even urosepsis. The number needed to treat of 17 (95% CI 12 to 30) seems unnecessarily high. Moreover, most catheter-associated UTIs in 2013 are caused by multiple-drug-resistant pathogens, including enterococci, Pseudomonas aeruginosa, and Candida species (3), and it is hard to believe that empiric prophylaxis with a fluoroquinolone, nitrofurantoin, or TMP/SMX, the agents studied in 6 of the 7 trials, will be effective in most patients with postcatheterization nosocomial bacteriuria.

Up to 20% of catheterized patients have bacteriuria at catheter removal (4), and approximately 10% of such patients develop symptomatic UTIs after catheter removal. Culturing all patients at catheter removal and only treating those with bacteriuria, relying on susceptibility testing to ensure the use of agents likely to be effective, could reduce the number needed to treat to 2 and reduce antibiotic pressure up to 80%.

Prophylactic treatment of all catheterized patients on removal cannot be recommended at this time. Alternative strategies, such as routinely obtaining a urine culture at removal and only treating those with bacteriuria or only treating postcatheterized patients who develop symptomatic UTIs, warrant study for efficacy and cost-effectiveness.

Dennis G. Maki, MD, MACP
University of Wisconsin School of Medicine and Public Health
Madison, Wisconsin, USA

References