

Screening for Asymptomatic Bacteriuria: A Brief Evidence Update for the U.S. Preventive Services Task Force

Methods

The search strategy for this brief evidence update included a review of English-language articles published between 1994 and 2002 on new direct evidence of the benefits, harms, and costs of screening and treating asymptomatic bacteriuria. The literature search yielded 271 articles. We used the references for these articles to identify pertinent trials relevant to key questions. We also searched the Cochrane Library, the National Guideline Clearinghouse, and PreMEDLINE. We searched for reviews, editorials, guidelines, commentaries, and Abridged Index Medicus (AIM) journals focusing on screening for asymptomatic bacteriuria.

Among the articles identified, there was 1 study on a new screening test, 4 studies (2 based on a randomized controlled trial [RCT]) on the health outcomes of treating asymptomatic bacteriuria in pregnant and in elderly women, and 1 cost-benefit analysis of screening and treatment during pregnancy to prevent pyelonephritis. The MEDLINE® database was searched using *bacteriuria* as an exploded MeSH term and *asymptomatic bacteriuria* as a text word, combining terms for *bacteriuria* separately with various other terms (eg, *RCT*, *meta-analysis*, *mass screening*).

Key Questions and Results

1. Is there new direct evidence that screening for asymptomatic bacteriuria reduces morbidity or mortality?

We identified no RCTs addressing whether screening for asymptomatic bacteriuria reduces morbidity or mortality.

2. Is there new evidence that tests other than urine culture are more accurate than urine culture, and less expensive or more convenient for screening pregnant women for asymptomatic bacteriuria?

We identified no studies that met eligibility criteria for this key question, although we found one study of interest. This study, however, did not meet eligibility criteria because the study population, an outpatient population of a clinic in Israel, might not be comparable to a primary care population in the United States. Hagay et al³ conducted a study to assess the accuracy and reliability of a new enzymatic urine-screening test (Uriscreen™) for the detection of asymptomatic bacteriuria. Urine culture was used

Systematic Evidence Reviews serve as the basis for U.S. Preventive Services Task Force (USPSTF) recommendations on clinical prevention topics. The USPSTF tailors the scope of these reviews to each topic. The USPSTF determined that a brief evidence update was needed to assist in updating its 1996 recommendations on screening for asymptomatic bacteriuria.¹ This brief evidence update was written by Gerald Gartlehner, Leila Kahwati, Linda Lux, and Sue West.

To assist the USPSTF, the Research Triangle Institute-University of North Carolina (RTI-UNC) Evidence-based Practice Center, under contract to the Agency for Healthcare Research and Quality (AHRQ), performed a targeted review of the literature published on this topic from 1994 to 2002. This brief evidence update and the updated recommendation statement² are available through the AHRQ Web site (www.preventiveservices.ahrq.gov) and in print through subscription to the *Guide to Clinical Preventive Services, Third Edition: Periodic Updates*. The subscription costs \$60 and can be ordered through the AHRQ Publications Clearinghouse (call 1-800-358-9295, or e-mail ahrqpubs@ahrq.gov). The recommendation is also posted on the Web site of the National Guideline Clearinghouse™ (www.guideline.gov).

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as the gold standard. The study enrolled 313 consecutive pregnant patients. Each voided urine sample was tested by routine laboratory culture, the Uriscreeen test, microscopic examination, and nitrite and leukocyte esterase dipstick. The Uriscreeen test showed the highest sensitivity (100%) and negative predictive value (100%), with urine culture as the gold standard. Specificity was 81%. The authors concluded that the Uriscreeen test could not replace urine culture as a screening test, but that a policy of performing a urine culture only in pregnant women with a positive Uriscreeen test could save as much as 80% of unnecessary urine cultures. The Uriscreeen test would also be feasible as a mass screening test with respect to time requirement, cost, and technical handling.

3. Does treatment of asymptomatic bacteriuria improve health outcomes for those diagnosed by screening?

Abrutyn et al⁴ conducted a prospective cohort study and a controlled clinical trial to examine the effect of asymptomatic bacteriuria on the survival of ambulatory elderly women. For the observational study, they followed 1,491 enrollees (318 culture-positive) up to a maximum of 9 years. The main outcome measure was survival. No relation was found between ever having had asymptomatic bacteriuria during the course of follow-up and a higher mortality after adjusting for covariates (hazard ratio, 1.10; 95% confidence interval [CI], 0.78–1.55).

The controlled clinical trial was designed to assess whether antimicrobial therapy for asymptomatic bacteriuria decreased mortality. Patients with asymptomatic bacteriuria were assigned to either a treatment group (n = 192) or a control group (n = 166) based on the last digit of an identification number unrelated to the study. No differences in baseline characteristics were detected. Urine cultures were read by personnel blinded to the assignment group. The survival curves of treated and untreated participants did not show a statistically significant difference ($P > 0.2$; relative rate of mortality, 0.92; 95% CI, 0.57–1.47).

An additional study used data from the controlled clinical trial mentioned above to determine whether treatment of asymptomatic bacteriuria affects the subsequent development of symptomatic urinary tract infections in ambulatory elderly women.⁵ The sample size of this study was reduced to a convenience sample of 50 culture-positive participants (treatment group, n = 23; placebo group, n = 27). Results showed that the relative risk (RR) for having a positive culture 6 months after treatment was 0.59 ($P = 0.052$; 95% CI, 0.33–1.04) for the treatment group (34.5% positive cultures at 6 months) compared with the placebo group (63.6% positive cultures at 6 months). However, the relative risk for developing symptomatic urinary tract infection in forms of dysuria was higher in the treatment group (RR, 1.76; 95% CI, 0.57–5.49), although the result lacked statistical significance.

The Cochrane Collaboration conducted a meta-analysis of 14 RCTs assessing the effect of antibiotic treatment for asymptomatic bacteriuria or persistent bacteriuria during pregnancy, the risk for preterm delivery, and the development of pyelonephritis.⁶ Antibiotic treatment compared with placebo or no treatment demonstrated effectiveness in clearing asymptomatic bacteriuria (odds ratio [OR], 0.07; 95% CI, 0.19–0.32). The incidence of pyelonephritis was reduced (OR, 0.24; 95% CI, 0.19–0.32). The incidence of preterm delivery and low birth weight was also reduced (OR, 0.60; 95% CI, 0.45–0.80). There was no statistically significant heterogeneity in the results. Despite methodological weaknesses, there was highly consistent evidence for the reduction in the incidence of pyelonephritis (n = 7; 95% CI, 6–9). Results on preterm delivery and low birth weight should be viewed cautiously because of the poor methodological quality of the studies included.

The Cochrane Collaboration conducted a meta-analysis to assess the effects of different durations of antibiotic treatment (single dose vs 4–7 days) on asymptomatic bacteriuria during pregnancy.⁷ Outcome measures were health outcomes (eg, preterm birth, pyelonephritis, and low birth weight) as well as laboratory measures (recurrent and persistent asymptomatic bacteriuria). Eight studies involving more than 400 women were included. Results showed

no differences in persistent (RR, 1.13; 95% CI, 0.82–1.54) or recurrent asymptomatic bacteriuria (RR, 1.08; 95% CI, 0.70–1.66) between single dose and short course (4–7 days) treatment. No differences for preterm birth and pyelonephritis were detected (RR, 0.81; 95% CI, 0.26–2.57). However, the results showed significant heterogeneity. Furthermore, there was not enough evidence to evaluate whether a single dose or longer duration doses (14 days) are more effective in treating asymptomatic bacteriuria. This study did not meet eligibility criteria because the effects of the duration of treatment were not the primary focus of our key question.

A randomized, double-blind, placebo-controlled trial by Avorn et al examined the effect of the regular intake of cranberry juice on bacteriuria and pyuria in elderly women (mean age 78.5 years).⁸ The outcome measure was a change in bacteriuria and pyuria; the follow-up was 6 months. The study enrolled 153 elderly women from a long-term care facility (n = 44) and housing complexes for elderly residents (n = 109). The enrollees were randomly assigned to drink 300 ml/day of either cranberry juice or a placebo drink, indistinguishable in taste and appearance. No differences in baseline characteristics were detected. Starting 1 month after randomization, the OR for bacteriuria with pyuria was 0.42 (95% CI, 0.23–0.76; $P = 0.004$) for women randomized to cranberry juice compared with the control group. Subjects in the treatment group also showed a trend toward less bacteriuria irrespective of pyuria (34% in the control group vs 28% in the cranberry group) although this difference was not statistically significant ($P = 0.09$). Antibiotic uses for urinary tract infections included 16 instances for the control group and 8 instances for the experimental group during follow-up. This study did not meet eligibility criteria because we did not consider the occurrence and recurrence of asymptomatic bacteriuria to be health outcomes.

For pregnant women only (Key Questions 4–7):

4. What are the harms of screening?

We identified no studies on the harms of screening for asymptomatic bacteriuria in pregnant women.

5 and 7. What are the costs of screening? and What are the costs of treatment?

Rouse et al conducted a cost-effectiveness and cost-benefit analysis on screening and treating pregnant women for asymptomatic bacteriuria to prevent pyelonephritis.⁹ A decision analytic model compared 2 screening strategies to detect asymptomatic bacteriuria during pregnancy—leukocyte esterase dipstick and urine culture. Sensitivity analyses were performed over a wide range of probabilities and cost estimates. Under baseline assumptions, no screening resulted in 23.2 cases of pyelonephritis per 1,000 pregnancies, versus 16.2 cases in those screened with the dipstick, and 11.2 cases in those screened with urine culture. The cost of screening and treating 1,000 pregnant women for asymptomatic bacteriuria was \$1,968 with the dipstick and \$19,264 with urine culture. The cost of treating pyelonephritis in the absence of screening was \$57,562; the cost of treatment was \$40,257 when the dipstick was used to screen and \$27,832 when urine culture was used. Screening and treatment based on dipstick analysis prevented 7 cases of pyelonephritis per 1,000 pregnancies, at a cost of \$279 per case prevented. Screening with urine culture prevented 12 cases per 1,000 pregnancies at a cost of \$1,605 per case prevented. The incremental cost of each additional case of pyelonephritis prevented by screening with urine culture, but not prevented by screening with dipstick, was \$3,492. Other possible benefits of screening for asymptomatic bacteriuria in pregnant women, like a reduction of preterm deliveries, were not considered in this analysis.

6. What are the harms of treatment?

We identified no studies on the harms of treating asymptomatic bacteriuria in pregnant women.

Summary

There is no new direct evidence that screening for asymptomatic bacteriuria reduces morbidity or mortality. There is evidence from a prospective cohort and a controlled clinical trial showing that treatment of asymptomatic bacteriuria does not lead to decreased urinary tract infections or survival benefit in ambulatory elderly women. Evidence for the efficacy of screening and treating asymptomatic bacteriuria to prevent pyelonephritis and preterm delivery is limited by poor methodological quality of available studies. There is no new evidence on the harms of screening or treating asymptomatic bacteriuria in pregnant women. Cost studies of screening and treatment of asymptomatic bacteriuria in pregnant women to prevent pyelonephritis showed that the cost to prevent one case of pyelonephritis based on dipstick screening is \$279, versus \$1,605 per case prevented based on screening with urine culture. The incremental cost for each additional case prevented with urine culture but not prevented by dipstick is \$3,492. We identified no ongoing research on screening for asymptomatic bacteriuria.

Recommendations of Professional Organizations

The American Academy of Family Physicians (AAFP) recommendation can be accessed at: <http://www.aafp.org/PreBuilt/PHErev54.pdf>.

The American Academy of Pediatrics (AAP) guidelines can be accessed at: <http://www.aap.org/policy/periodicity.pdf>.

The American College of Obstetricians and Gynecologists (ACOG) and AAP's joint recommendation is available in text form.¹⁰

The Canadian Task Force on Preventive Health Care recommendations can be accessed at: <http://www.ctfphc.org>.

References

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