REVIEW

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Asymptomatic Bacteriuria: Prevalence, Diagnosis, Management, and Current Antimicrobial Stewardship Implementations

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ASBTRACT

Asymptomatic bacteriuria is a common clinical condition that often leads to unnecessary treatment. It has been shown that incidence of asymptomatic bacteriuria increases with age and are more prominent in women than men. In older women, the incidence of asymptomatic bacteriuria is recorded to be more than 15%. This number increased up to 50% for those who reside in long-term care facilities. In most scenarios, asymptomatic bacteriuria does not lead to urinary tract infections, and therefore, antibiotic treatment of asymptomatic bacteriuria has not been shown to improve patient outcomes. In 2019, the Infectious Disease Society of America (IDSA) updated its asymptomatic bacteriuria management guidelines, which emphasized on the risks and benefits of treating the condition. Women who are pregnant should be screened for asymptomatic bacteriuria in the first trimester and treated, if positive. Individuals who are undergoing endoscopic urologic procedures should be screened and treated appropriately for asymptomatic bacteriuria as well. Treating asymptomatic bacteriuria in individuals with diabetes, neutropenia, spinal cord injuries, indwelling urinary catheters, and so on has not been found to improve clinical outcomes. Furthermore, unnecessary treatment is often associated with unwanted consequences including but not limited to increased antimicrobial resistance, *Clostridioides difficile* infection, and increased health care cost. As a result, multiple antibiotic stewardship programs around the US have implemented protocols to appropriately reduce unnecessary treatment of asymptomatic bacteriuria. It is important to appropriately screen and treat asymptomatic bacteriuria only when there is evidence of potential benefit.
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KEYWORDS: Antibiotic stewardship; Asymptomatic bacteriuria; Diagnosis; Screening; Treatment; Urinary tract infection

INTRODUCTION

Asymptomatic bacteriuria is common in the elderly, especially among long-term care residents.[1] Risk factors for having asymptomatic bacteriuria include advanced age, diabetes mellitus, impaired cognition, structural urinary tract abnormalities, and indwelling catheters.[2,3] Asymptomatic bacteriuria is defined when voided urine specimens have at least 10^5 colony-forming units per millimeter (cfu/ml) of an uropathogen isolated in the absence of signs or symptoms of urinary tract infection.[4] The 2019 guideline from the Infectious Diseases of America (IDSA) has outlined its recommendations to approach asymptomatic bacteriuria. In brief, asymptomatic bacteriuria should be screened for and treated only in pregnant women or in an individual prior to undergoing invasive urologic procedures. Treating asymptomatic bacteriuria in patients with diabetes, older persons, patients with or without indwelling catheters, or patients with spinal cord injuries has not been found to improve outcomes.[5]

EPIDEMIOLOGY

In previous data, asymptomatic bacteriuria is found in 2.7% of women aged between 15 and 24 years and increases to

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20% to 50% in women older than age 80.[6] In men, the prevalence of asymptomatic bacteriuria is considerably lower but increases from 6% to 20% older than age 80.[6] Asymptomatic bacteriuria is also particularly common in long-term care facilities with a reported prevalence of 25%-50% in the residents.[7] In recent asymptomatic bacteriuria guidelines published by the *American Family Physician* journal in 2016, the prevalence across selected populations was reported to be similar (Table 1). In this study, it was reported that the incidence of asymptomatic bacteriuria in older women in the general population is greater than 15%. This number increased to 25%-50% for female residents of long-term care facilities. In addition, asymptomatic bacteriuria prevalence was estimated to be as high as 27% in women with diabetes, compared with 1% in men with diabetes. Asymptomatic bacteriuria prevalence increased to a staggering 23%-89% in patients with spinal cord injuries who practice intermittent catheterization. In individuals with long-term indwelling urinary catheter, the prevalence of asymptomatic bacteriuria was reported to be 100%.[8]

CLINICAL SIGNIFICANCE

- Asymptomatic bacteriuria is a common clinical condition that often leads to unnecessary treatment.
- Asymptomatic bacteriuria should be screened for and treated only in pregnant women or in individuals prior to undergoing invasive urologic procedures.
- Unnecessary treatment is associated with consequences including symptomatic *Clostridioides difficile* infection, increased antimicrobial resistance, and health care cost.
- Many interventions have shown effectiveness in reducing the rate of unnecessary asymptomatic bacteriuria treatment.

Table 1 Asymptomatic Bacteriuria Prevalence Across Selected Populations*

Population	Prevalence (%)
Healthy women (<50 years old)	1.0 to 5.0
Healthy women (> 50 years old)	2.8 to 8.6
Pregnant women	1.9 to 9.5
Older long-term care residents	
*Men	15.0 to 40.0
*Women	25.0 to 50.0
Older community-dwelling patients	
Men	3.6 to 19.0
Women	>15.0
Patients with diabetes	
Men	0.7 to 1.0
Women	9.0 to 27.0
Patient with spinal cord injury	
Intermittent catheter	23.0 to 89.0
Patients on hemodialysis	28.0
Patients with indwelling catheter	
Short-term	9.0 to 23.0
Long-term	100

*Data adopted from the *American Family Physician*.

EVALUATION AND DIAGNOSIS

The IDSA defines asymptomatic bacteriuria as having urine specimen that yields an isolation of a single organism in quantitative counts of $\geq 10^5$ cfu without symptoms specifically referable to a urinary tract infection.[5] These symptoms are dysuria, urinary frequency or urgency, or suprapubic pain in patients with simple cystitis, and fevers with cystitis symptoms, flank pain, or costovertebral angle tenderness in patients with acute complicated urinary tract infections. It is also noted per IDSA guidelines that "observations of cloudy or smelly urine by themselves should not be interpreted as indications of symptomatic infection."[4]

Table 2 summarizes the diagnostic criteria for asymptomatic bacteriuria according the updated IDSA guidelines. For both voided clean catch and catheterized specimen, the threshold for asymptomatic bacteriuria is an isolation of a single organism in quantitative counts $\geq 10^5$ cfu. Specimens collected through straight catheterization (or a newly placed catheter) are less likely to have urethral contamination than voided specimens, but the significance of positive cultures in asymptomatic catheterized adults is unclear. Patients with long-term indwelling catheters often have low-level bacteriuria, often with multiple organisms reflecting colonization of the catheter. In such patients, the threshold for significant bacteriuria in asymptomatic patients is higher than in those with symptoms to increase specificity and reduce overuse of antimicrobials. There have been no comparisons of culture yields from urethral catheterized specimens and suprapubic aspiration specimens.[5]

PATHOGENS

Like urinary tract infections, the infecting organisms are diverse. The microbe most frequently involved in asymptomatic bacteriuria is *Escherichia coli*. Others include *Enterobacteriaceae, Pseudomonas aeruginosa, Enterococcus* species, and group B *streptococcus*.[9] It is also worth noting that organisms isolated in patients with asymptomatic bacteriuria will be influenced by patients' conditions. Healthy individuals will likely have *E. coli*, whereas individuals with comorbidities such as diabetes and those with a long-term indwelling urinary catheter who reside in a long-term care facility are more likely to be colonized by multidrug resistant microbes such as *P. aeruginosa*. In men, *Enterococcus* species are more common.[10,11]

Table 2 Asymptomatic Bacteriuria Diagnostic Criteria

Lack of signs and symptoms of urinary tract infection (includes dysuria, urinary frequency or urgency, or suprapubic pain, etc.)
PLUS one of the following:
Midstream clean-catch urine specimen:
- For asymptomatic men: single voided urine specimen with 1 bacterial species isolated in quantitative count ≥100,000 CFU/mL
- For asymptomatic women: 2 consecutive voided urine specimens with isolation of same bacterial strain in quantitative counts ≥100,000 CFU/mL

Catheterized urine specimen:
- For men or women: single catheterized urine specimen with 1 bacterial species isolated in quantitative count ≥100 CFU/mL

CFU = colony forming unit; IDSA = Infectious Disease Society of America.
*Data adopted from *American College of Physicians* and IDSA.

MANAGEMENT

Table 3 summarizes the IDSA guidelines for screening and treatment of asymptomatic bacteriuria in selected populations.

Antibiotic Stewardship Initiatives

Multiple trials have been conducted to study the effectiveness of various interventions in reducing unnecessary antimicrobial treatment of asymptomatic bacteriuria (Table 4).

DISCUSSION

Asymptomatic bacteriuria is common, especially in the elderly population, long-term care facility residents, and those living with indwelling urinary catheters.[6-8] Asymptomatic bacteriuria is defined as having urine specimen that yields an isolation of a single organism in quantitative counts of $\geq 10^5$ cfu without urinary symptoms suggestive of a urinary tract infection, such as dysuria, urinary frequency or urgency, or suprapubic pain, flank pain, fever, and chills.[5] Treating asymptomatic bacteriuria with antibiotics in most circumstances has not shown to benefit clinical outcome. However, unwarranted treatments of asymptomatic bacteriuria occur as high as 90% without antibiotic stewardship program interventions, in both inpatient and long-term care facility setting.[13-15] There are many current guidelines on asymptomatic bacteriuria management.[5,8] In brief, asymptomatic bacteriuria should be screened for and treated only in pregnant women or in an individual prior to undergoing invasive urologic procedures. For kidney transplant recipients with asymptomatic bacteriuria, the IDSA guidelines do not recommend treatment because the risk of complications from asymptomatic bacteriuria is probably negligible. The American Society of Transplantation Infectious Diseases Community of Practice further consolidates the recommendations due to the lack of benefits of antibiotics for treatment of asymptomatic bacteriuria in kidney transplant recipients more than 2 months after transplant.[20] For patients with high-risk neutropenia, defined as having absolute neutrophil count less than 100 cells/mm^3 for duration of equal to or more than 7 days following chemotherapy, the IDSA however does not have concrete recommendations on asymptomatic bacteriuria treatment due to inadequate research evidence. Treating asymptomatic bacteriuria in patients with diabetes, older persons, patients with or without indwelling catheters, or patients with spinal cord injuries has not been found to improve outcomes. Yet, clinicians have not been strictly adhering to these guidelines. In this review, we summarize the recommendations proposed by IDSA into reader-friendly tables. A flowchart was also constructed to help clinicians identify and treat asymptomatic bacteriuria when indicated (Figure). The management of asymptomatic bacteriuria is often not simple because it requires comprehensive clinical judgment. One of the challenging notions in managing asymptomatic bacteriuria include cognitively impaired older adults with delirium and altered mental status because these symptoms are often thought to be associated with infections. In the elderly, nearly 10% to 25% of hospitalized patients will have delirium at the time of admission. Etiologies of altered mental status include stroke, drug-drug interactions, alterations in the living environment, and infection.[21] It is crucial to obtain a thorough history and physical, both from patient and collateral sources, before initiating empiric antimicrobial therapy to avoid unnecessary antibiotics that can lead to untoward adverse effects.[5] Providers can consider the options of not ordering urine testing in patient without urinary tract reasons for their acute care, avoiding catheterization in stable patients who cannot provide urine sample, or withholding antimicrobial therapy in stable nonfebrile individuals who do not have acute urinary tract symptoms while investigating another diagnosis.[22]

Consequences of treating asymptomatic bacteriuria include but are not limited to increased frequency of adverse events from antibiotics, antibiotic resistance, and health care cost.[23] Rotjanapan et al[24] focused on antibiotic use in 172 nursing home residents with abnormal urinalysis in the absence of Foley catheter. A total of 85% were diagnosed with asymptomatic bacteriuria and did not meet criteria for treatment, yet 41% of these patients were treated with antibiotics. As a result, 12% of the patients who received inappropriate treatment for asymptomatic bacteriuria developed *Clostridioides difficile* infections within 3 weeks, an 8-fold increase when compared with those who did not receive antibiotic treatment. Furthermore, according to the Centers for Disease Control and Prevention (CDC) in April 2021, there are more than 35,000 people who die

Table 3 IDSA guidelines for Screening and Treatment of ASB in Selected Populations.

Management of asymptomatic bacteriuria (ASB)*

Population	Screen	Treat	Recommendation	Quality of Evidence	Rationales
Pediatrics	No	No	Strong	Moderate	ASB in children is rare and often does not cause significant harm in those with normal urinary tract as it occurs about 1%-3% in healthy girls and uncommon in healthy boys. There is no clear evidence of higher risk for sequela such as renal insufficiency and scarring as a result.
Healthy nonpregnant women	No	No	Strong	Moderate	Women with ASB may have increased risk for UTI; however, ASB is not associated with other adverse outcomes. Furthermore, there is high-quality evidence that treating ASB with antibiotics in this population have increased risk of adverse effects including antimicrobial resistance.
Pregnant women	***Yes***	***Yes***	Strong	Moderate	Antimicrobials in ASB reduces risk of pyelonephritis, preterm labor, and low birth weight. Recommendations include 1 urine culture collected early in pregnancy. There is insufficient evidence to inform a recommendation for or against repeat screening during the pregnancy for a woman with an initial negative screening culture or following treatment of an initial episode of ASB. Once diagnosed with ASB, duration of antimicrobial therapy is recommended for 4-7 days based on lower-quality evidence. Optimal duration will be antimicrobial-specific. Nitrofurantoin and β-lactam antimicrobials (usually ampicillin or cephalexin) are preferred secondary to their safety profiles in pregnancy.
Functionally impaired older adults with bacteriuria and AMS, without fever and hemodynamic instability, with or without a fall	No	No	Strong	Low	In older patients who have cognitive impairment, delirium including active altered mental status and confusion and bacteriuria without focal urinary symptoms, it is recommended for comprehensive assessment for other causes of altered mental status before starting antimicrobial treatments.
Long-term care residents	No	No	Strong	Moderate	Antimicrobial treatment for long-term care residents have not shown to reduce sepsis or mortality.
Older patients with functional or cognitive impairment with bacteriuria and delirium	No	No	Strong	Very low	Similar to functionally impaired older adults with bacteriuria and altered mental status without fever, this recommendation emphasizes on the high value of avoiding unwanted outcomes such as *Clostridioides difficile* infection, adverse drug effects, and so on from unnecessary antimicrobial therapy. However, patients with persistent fever and hemodynamic instability that is suggestive of sepsis without localizing source should be initiated on broad-spectrum antimicrobial therapy while source of infection should be thoroughly investigated.
Diabetes	No	No	Strong	Moderate	Antimicrobial treatment in diabetic adults with ASB may not reduce the risk of UTI including pyelonephritis. Furthermore, based on high-quality evidence, treating ASB with antimicrobials increases risks for adverse effects.
Kidney transplant	No	No	Strong	High	In nonrenal solid organ transplants, the risk of complications from ASB is probably negligible.
Nonrenal solid organ transplant	No	No	Strong	Moderate	UTIs are rare and their serious complications are extremely rare in nonkidney solid organ

Table 3 (*Continued*)

Management of asymptomatic bacteriuria (ASB)*

Population	Screen	Treat	Recommendation	Quality of Evidence	Rationales
					transplantations. Serious adverse complication of ASB in these populations are even less common than UTIs, and therefore, negligible.
High-risk neutropenia (ANC <100 cells/mm^3, ≥7 days' duration following chemotherapy)	—	—	No recommendations	N/A	The urinary tract is not a frequent source for bacteremia in high-risk neutropenic individuals (defined as having neutropenia more than 7 days, ANC <100 cells/mm^3). In addition, individuals with lower risk neutropenia (defined as having neutropenia less than 7 days, ANC >100 cells/mm^3 and clinically stable) have lower risk of infections and therefore assumed to have similar risks to those of non-neutropenic. Further research is needed on the prevalence of ASB in both low-risk and high-risk neutropenic patients.
Spinal cord injury	No	No	Strong	Low	Due to lower quality evidence, the efficacy of treating ASB with antimicrobials in individuals with spinal cord injury is not as certain. However, there is high-quality evidence that demonstrates antimicrobials causing adverse effects, increased cost, and risk for antimicrobial resistance.
Indwelling Foley (<30 days) or long term	No	No	Strong	Low	Considerations are likely to be similar for patients with indwelling suprapubic catheters, and it is reasonable to manage these patients like patients with indwelling urethral catheters, for both short-term and long-term suprapubic catheterization.
Elective nonurologic surgery	No	No	Strong	Low	No association between preoperative ASB and postoperative outcomes
Undergoing endoscopic urologic procedures	***Yes***	***Yes***	Strong	Moderate	Bacteriuria may be an important cause of serious postoperative infectious complications in patients undergoing transurethral surgery due to higher chance of surgical field contamination. Perioperative antimicrobials probably reduce the risk of sepsis by approximately 6% and of UTIs by approximately 9% based on moderate certainty evidence. High-quality evidence from other surgical procedures shows that perioperative antimicrobial treatment or prophylaxis for contaminated or clean-contaminated procedures confers important benefits. Urine cultures obtained prior to procedures and targeted antimicrobial therapy prescribed rather than empiric. Short course (1 to 2 doses) of therapy is recommended 30 -60 minutes before procedure.
Undergoing urologic device implantation or living with urologic devices	No	No	Weak	Very low	ASB, though common in this population, is not found to be associated with increased risk for device infection following surgical procedure. The use of perioperative prophylactic antimicrobials is adequate for most ASB resolution. Therefore, all individuals should receive standard perioperative antimicrobial prophylaxis prior to device implantation.

AMS = altered mental status; ANC = absolute neutrophil count; ASB = asymptomatic bacteriuria; IDSA = Infectious Disease Society of America; UTI = urinary tract infection.

*Data adopted from the 2019 IDSA ASB Guidelines.

Table 4 Current Interventional Implementations in Combating Unnecessary Antimicrobial Treatment of ASB

Type of intervention	Reference	Study Type	Study Setting	Number of subjects (N)	Initiatives	Outcomes
Educational Intervention	Loeb, 2005[12]	Cluster randomized controlled trial	Long-term care facilities	Study looked at 1655 antimicrobial courses prescribed for suspected UTI (664 in the intervention group, 991 in the control group)	Small group interactive sessions for nurses, videotapes, written material, and outreach visits with academic detailing for prescribing physicians	Fewer antimicrobial treatment was prescribed for suspected UTI per 1000 resident days in the intervention group compared to control group
	Hartley, 2016[13]	Prospective, interventional trial	Inpatient medical wards at a tertiary academic center and 2 community hospitals	191 subjects were studied (99 subjects with ASB in the before intervention phase and 92 subjects with ASB in the after-intervention phase)	1-hour lecture that highlights the unnecessary treatment of ASB Webcast of presentations were provided for providers who were unable to attend educational sessions Distribution of pocket cards for ASB diagnosis and treatment	Unnecessary antimicrobial treatment for ASB decreased from 76.8% to 53.3% ($P = .001$)
	Lee, 2018[14]	Prospective trial	Long-term care facilities	83 subjects included (50 subjects in preintervention phase and 35 subjects in the postintervention phase)	15-minute educational sessions on the harms of unnecessary antimicrobial use and the diagnostic criteria for UTI were given to long-term care providers	Unnecessary antimicrobial treatment for ASB decreased from 90% to 62.9% postintervention ($P = .003$)
	James, 2019[15]	Retrospective, single-center cohort trial	Emergency department	268 subjects were studied	Distribution of handouts and algorithms regarding ASB diagnosis and treatment recommendations In-person discussions that were tailored specifically to targeted audience including emergency department physicians and advanced practice professionals	Rate of unnecessary antimicrobial treatment for ASB was reduced by 16.5% ($P = .004$), followed interventions
	Narayanan, 2019[28]	Single-center prospective trial	Inpatient medical wards	270 urine samples were examined	Information technology interventions include providing messages outlining criteria for appropriately ordering UC and prescribing antimicrobial treatment Educational interventions include providing presentations summarizing the appropriate indications for ordering UC and distinguishing between ASB and UTI	Rate of unnecessary antimicrobial treatment for ASB was reduced from 42% to 35% in the posteducation intervention group

Table 4 (*Continued*)

Type of intervention	Reference	Study Type	Study Setting	Number of subjects (N)	Initiatives	Outcomes
Antibiotic stewardship Intervention	Shah, 2021[16]	Quasi-experimental trial	Inpatient medical wards	142 subjects were studied (65 subjects in the preintervention phase and 77 subjects in the postintervention phase)	The clinical pharmacist classified the patient as either ASB or UTI and made stewardship interventions to stop unnecessary antimicrobial therapy for ASB Clinical pharmacists provided informative sessions regarding ASB to multiple hospitalist groups	Unnecessary antimicrobial treatment for ASB decreased from 18% to 6% ($P = .003$) followed pharmacist interventions
	Kelley, 2014[17]	Controlled before and after trial	Inpatient wards, including emergency medicine, internal medicine, and hospitalist medical services	1646 urine samples were studied (725 samples collected before interventions and 921 samples collected after interventions)	Antimicrobial stewardship educational quality-initiative implementations including in-service presentation on ASB to targeted providers and pharmacists Recommendations posted in common places such as provider offices and conference rooms Distribution of ASB algorithm pocket cards Electronic memorandums to hospitalists for ASB management Daily review of common antimicrobial treatment of UTI by the members of the ASP	Unnecessary antimicrobial treatment for ASB decreased from 62% in the before-education phase to 26% in the after-education phase ($P < .0001$)
Laboratory intervention	Leis, 2014[18]	Controlled before and after trial	Inpatient medical and surgical wards	636 urine samples were studied (415 samples from noncatheterized patients and 231 samples from catheterized patients)	Positive results from noncatheterized specimens were no longer reported automatically. Providers are encouraged to contact the microbiology laboratory if they strongly suspect the patients have UTI	The rate of antimicrobial therapy for ASB decreased from 48% to 12% among noncatheterized patients for an absolute risk reduction of 36% ($P = .002$) The treatment rates among catheterized group did not change (42% to 41% postintervention).
	Sarg, 2016[19]	Retrospective, quasi-experimental trial	Medical ICU	47,129 ICU patient days in the preintervention phase and 48,589 ICU patient days in the postintervention	Reflex-to-microscopy approach criteria was implemented where only urinalysis with more than 10 wbc/hpf: generates an order for urine culture	There was 30% decrease in the rate of urine cultures performed following the intervention ($P < .01$), and a 28% decrease in bacteriuria rate occurred immediately following the intervention ($P < .001$)

ASB = asymptomatic bacteriuria; ASP = antimicrobial stewardship program; ICU = intensive care unit; UA = urinalysis; UC = urine culture; UTI = urinary tract infection; wbc/hpf = white blood cells per high power field.

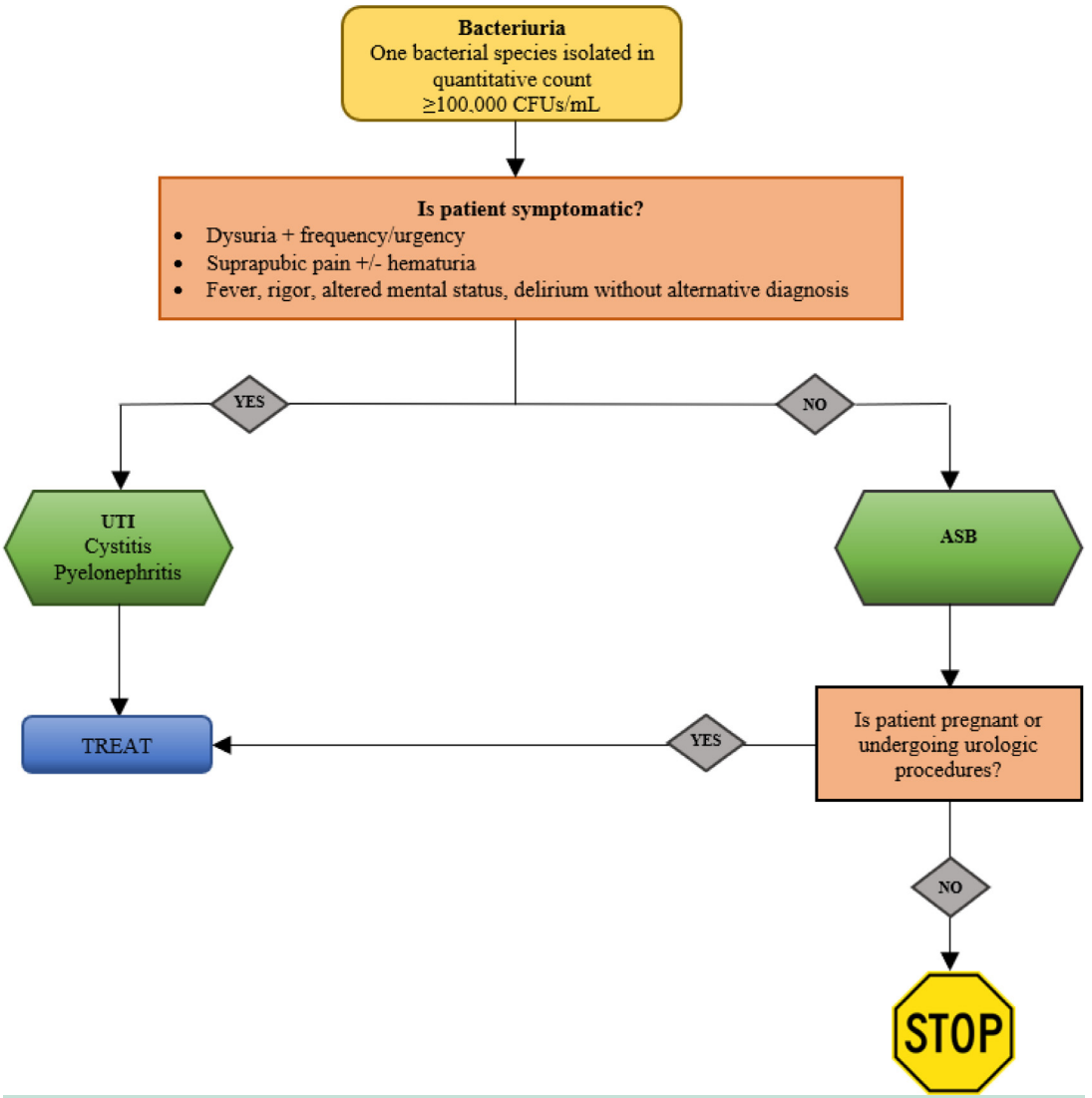

Figure Clinical approach to management of asymptomatic bacteriuria. ASB = asymptomatic bacteriuria; CFU: colony forming units; UTI = urinary tract infection.

each year due to antibiotic-resistant infections, with more than 2.8 million of those infections occurring in the US. The annual cost of battling these infections is $4.6 billion.[25]

Multiple interventions were described in the literature to have positive impacts on reducing unnecessary treatment of asymptomatic bacteriuria, from creating quality improvement team, education, audit, and feedback, to withholding urine culture results as well as engaging stakeholders.[26] Table 4 summarizes these implemented initiatives and their perspective outcomes. Three major interventional categories, educational, antimicrobial stewardship program, and laboratory have demonstrated success in decreasing asymptomatic bacteriuria treatment. Educational interventions have been implemented broadly in multiple trials. Their strategies included lecture presentation, in-person discussion, and algorithm pocket card distribution, which have shown to be highly effective.[15,17] Antimicrobial stewardship program interventions, such as frequent review of antimicrobial treatment of asymptomatic bacteriuria and urinary tract infection also demonstrated significant impact. The practice of ordering urinalysis, urine cultures, and treating positive urine cultures, even in the setting of low urinary tract infection suspicion has remained long-standing perceptions.[18] A urine culture can be ordered on its own, or in a bundle with urinalysis, for which the latter is referred to as a reflex-to-microscopic approach.[27] Reflex-to-microscopic criteria often include positive protein, positive leukocyte esterase, and most commonly pyuria, that is defined as either having more than 5 or 10 wbc/hpf.[27] Reinforcing the criteria that only reflex a urine culture from having >10 wbc/hpf on a urinalysis, as part of the laboratory stewardship intervention, has shown to significantly decrease the rate of urine cultures performed and a decrease in bacteriuria rate.[19] In addition, withholding routine positive urine cultures has shown to reduce the rate of antimicrobial therapy for asymptomatic bacteriuria and absolute risk reduction as well.[18] By implementing the initiatives, health care programs

can make a positive impact in reducing the rate of unwarranted asymptomatic bacteriuria treatment, which in turn decreases the risk of *C. difficile* infections, drug reactions, antimicrobial resistance, and associated health care cost.

CONCLUSION

The management of asymptomatic bacteriuria is often challenging because it requires comprehensive clinical judgment. In most scenarios, asymptomatic bacteriuria will not predispose patients to urinary tract infection and, therefore, does not require treatment. In addition, asymptomatic bacteriuria has higher prevalence in advanced-age women, adults with diabetes, indwelling urinary catheters, and spinal cord injuries. However, treating asymptomatic bacteriuria in these populations has not been shown to improve clinical outcome. In contrast, pregnant women and patients who are undergoing invasive urinary procedures should be screened for asymptomatic bacteriuria and treated if found positive due to the high likelihood of adverse effects from asymptomatic bacteriuria. In other circumstances, unnecessary antimicrobial treatment could potentially cause devastating consequences, which put great burdens on the health care system. Several interventional strategies have shown evidence in reducing the rate of unnecessary treatment of asymptomatic bacteriuria. Health care systems are encouraged to thoroughly review and use these strategies to increase adherence to the asymptomatic bacteriuria screening, diagnosis, and treatment guidelines.

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