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Management of Bacteriuria in Veterans Affairs Hospitals

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Age, y, mean ± SD	72.9 (12.1)
Gender, (male), n (%)	2065 (92.8)
Antibiotic allergy, n (%)	580 (26.1)
Meeting SIRS criteria, i.e., ≥ 2 positive responses, n (%)	762 (34.0)
Comorbidities, n (%)	
Diabetes mellitus	1039 (46.7)
Renal disease	696 (31.3)
Liver disease	128 (5.8)
Congestive heart failure	592 (26.6)
Cerebrovascular accident or Transient ischemic attack	563 (25.3)
Neoplastic disease (not including skin cancers)	670 (30.1)
UTI risk factors, n (%)	
Urolithiasis	54 (2.4)
Benign prostatic hyperplasia	717 (32.2)
Urinary flow obstruction (e.g., ureteral or bladder outlet obstruction)	180 (8.1)
Prostate cancer undergoing radiation and/or chemotherapy	68 (3.1)
Neurogenic bladder	153 (6.9)
Bladder cancer	66 (3.0)
Nephrostomy tubes	14 (0.6)
Dementia	333 (15.0)
Hospital location, n (%)	
Medicine	1411 (63.4)
Surgery	95 (4.3)
Medicine-Surgery	258 (11.6)
ICU	315 (14.2)
ICU step-down	100 (4.5)
Not specified	46 (2.1)
Urinary catheter at index date, n (%)	
Condom catheter	103 (4.6)
Suprapubic catheter	54 (2.4)
Intermittent catheterization	134 (6.0)
Indwelling catheter	580 (26.1)
Not specified	24 (1.1)
Urinalysis done, n (%)	2109 (94.8)
Urinalysis result, n (%)	
Positive leukocyte esterase and/or > 5 WBC/hpf	1882 (84.6)
Positive nitrite	661 (29.7)
Lack of documented rationale for urine culture, n (%)	521 (23.4)

Table 1.
Demographics and other characteristics of the bacteriuria cohort (n = 2225)

Abbreviations: SD, standard deviation; SIRS, systemic inflammatory response syndrome [temperature < 36°C (96.8°F) or > 38.3°C (100.9°F), heart rate > 90 beats per minute, respiratory rate > 20 breaths per minute or PaCO₂ < 32mmHg, and white blood cell count < 4,000/mm³ or > 12000/mm³ or > 10% bands]; UTI, urinary tract infection; ICU, intensive care unit; WBC, white blood cells; hpf, high power field; CA-UTI, catheter-associated urinary tract infection.

Table 2. Characteristics of patients with asymptomatic bacteriuria without evidence of other infection (n = 961)

Characteristic	Asymptomatic bacteriuria With ≥ 2 SIRS criteria (n = 232)		Asymptomatic bacteriuria With < 2 SIRS criteria (n = 729)	
	No antibiotic Treatment (n = 35)	Antibiotic Treatment (n = 197)	No Antibiotic Treatment (n = 235)	Antibiotic Treatment (n = 494)
Age, years, mean \pm SD	71.3 (9.8)	73.4 (12.4)	72.4 (12.0)	75.8 (11.6)
Gender (male), n (%)	33 (94.3%)	186 (94.4)	216 (91.9%)	453 (91.7%)
Urinalysis done, n (%)	33 (94.3%)	189 (95.9%)	210 (89.4%)	461(93.3%)
Positive leukocyte esterase and/or > 5 WBC/hpf, n (%)	22 (62.9%)	172 (87.3%)	146 (62.1%)	426 (86.2%)
Positive nitrite, n (%)	3 (8.6%)	59 (30.0%)	42 (17.9%)	152 (30.8%)
Signs and symptoms, n (%)				
Dysuria	0 (0%)	3 (1.5%)	1 (0.4%)	6 (1.2%)
Frequency	0 (0%)	2 (1.0%)	1 (0.4%)	1 (0.2%)
Urgency	0 (0%)	0 (0%)	2 (0.9%)	1 (0.2%)
Suprapubic pain on examination	1(2.9%)	0 (0%)	0 (0%)	0 (0%)
Acute gross hematuria	0 (0%)	10 (5.1%)	8 (3.4%)	16 (3.2%)
Flank pain	0 (0%)	1 (0.5%)	3 (1.3%)	14 (2.8%)
Costovertebral tenderness	0 (0%)	2 (1.0%)	2 (0.9%)	5 (1.0%)
Rigors	1 (2.9%)	25 (12.7%)	5 (2.1%)	12 (2.4%)
Fever (T $>38^{\circ}\text{C}$ or $>100.4^{\circ}\text{F}$)	4 (11.4%)	78 (39.6%)	10 (4.3%)	29 (5.9%)
Altered mental status	7 (20.0%)	69 (35.0%)	35 (14.9%)	142 (28.7%)
Malaise	4 (11.4%)	29 (14.7%)	23 (9.8%)	63 (12.8%)
Nausea	6 (17.1%)	33 (16.8%)	28 (11.9%)	46 (9.3%)
Lethargy	4 (11.4%)	46 (23.4%)	25 (10.6%)	85 (17.2%)
Pelvic discomfort	1 (2.9%)	9 (4.6%)	7 (3.0%)	11 (2.2%)
Vomiting	4 (11.4%)	28 (14.2%)	21 (8.9%)	33 (6.7%)
Urine Pathogens, n (%)				
<i>Escherichia coli</i>	11 (31.4%)	81 (41.1%)	65 (27.7%)	189 (38.3%)
<i>Pseudomonas aeruginosa</i>	2 (5.7%)	15 (7.6%)	9 (3.8%)	34 (6.9%)
<i>Enterococcus spp.</i>	15 (42.9%)	41 (20.8%)	75 (31.9%)	102 (20.6%)
<i>Klebsiella spp.</i>	5 (14.3%)	31 (15.7%)	36 (15.3%)	91 (18.4%)
<i>Enterobacter spp.</i>	2 (5.7%)	10 (5.1%)	14 (6.0%)	24 (4.9%)
<i>Proteus spp.</i>	1 (2.9%)	21 (10.7%)	25 (10.6%)	47 (9.5%)
<i>Providencia spp.</i>	1 (2.9%)	5 (2.5%)	2 (0.9%)	5 (1.0%)
<i>Citrobacter spp.</i>	0 (0%)	6 (3.0%)	8 (3.4%)	16 (3.2%)
<i>Morganella spp .</i>	1 (2.9%)	4 (2.0%)	3 (1.3%)	8 (1.6%)
<i>Serratia spp.</i>	1 (2.9%)	1 (0.5%)	6 (2.6%)	6 (1.2%)
Complications, n (%)				
<i>Clostridium difficile</i> within 28 days	1 (2.9%)	5 (2.5%)	1(0.4%)	4 (0.8%)
Readmission within 28 days	3 (8.6%)	26 (13.2%)	14(6.0%)	40 (8.1%)

All-cause mortality within 28 days	2 (5.7%)	13 (6.6%)	11 (4.7%)	35 (7.1%)
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Abbreviations: SIRS, systemic inflammatory response syndrome [temperature < 36°C (96.8°F) or > 38.3°C (100.9°F), heart rate > 90 beats per minute, respiratory rate > 20 breaths per minute or PaCO₂ < 32mmHg, and white blood cell count < 4,000/mm³ or > 12000/mm³ or > 10% bands]; SD, standard deviation; WBC, white blood cells; hpf, high power field; T, temperature; C, Celsius; F, Fahrenheit.

Table 3. Antibiotic choice and duration of therapy for patients receiving antibiotics for a UTI indication alone (n = 1219)*

	Asymptomatic Bacteriuria		Symptomatic UTIs		
Empiric antibiotic choice on day 1, n (%)[^]	(n = 691)		(n = 528)		
Antipseudomonal penicillin	91 (13.2)		96 (13.1)		
Non-antipseudomonal cephalosporin	231 (33.4)		230 (43.6)		
Fluoroquinolone	245 (35.5)		195 (37.1)		
Other	201 (29.0)		122 (23.1)		
Antibiotics given at discharge, n (%)[^]	(n = 485)		(n = 458)		
Non-antipseudomonal penicillin	71 (14.6)		61 (13.3)		
Non-antipseudomonal cephalosporin	86 (17.7)		84 (18.3)		
Fluoroquinolone	246 (50.7)		256 (55.9)		
Other	91 (18.8)		60 (13.1)		
Duration of Therapy	Asymptomatic Bacteriuria (n = 691)		Cystitis (n = 339)	CA-UTI (n = 139)	Pyelonephritis (n = 50)
	≥ 2 SIRS Criteria (n = 197)	< 2 SIRS Criteria (n = 494)			
Total duration of therapy in days (mean, SD)	11.2, 3.9	9.5, 4.6	11.4, 4.7	12.0, 6.1	13.6, 5.3
Duration of therapy > 7 days, n (%)	494 (71.5)		287 (84.7)	114 (82.0)	42 (84.0)
Duration of therapy > 7 days in patients without SIRS on index date, n (%)	333/494 (67.4)		250/305 (82.0)		
Duration of therapy > 14 days, n (%)	94 (13.6)		68 (20.1)	39 (28.1)	26 (52.0)
Duration of therapy > 14 days with SIRS criteria on index date, n (%)	38/197 (19.3)		78/223 (35.0)		

*Non-antipseudomonal penicillins: penicillin, ampicillin, amoxicillin, amoxicillin/clavulanate, dicloxacillin, oxacillin, nafcillin, ampicillin/sulbactam; Antipseudomonal penicillin: piperacillin/tazobactam; Non-antipseudomonal cephalosporin: cephalexin, cefazolin, cefotaxime, ceftriaxone, cephadrine, cefpodoxime, cefuroxime, cefoxitin, cefprozil, cefdinir; Fluoroquinolone: moxifloxacin, ciprofloxacin, levofloxacin;

[^]Categories are not mutually exclusive.

Abbreviations: SD, standard deviation; CA-UTI, catheter-associated urinary tract infection; SIRS, systemic inflammatory response syndrome [temperature < 36°C (96.8°F) or > 38.3°C (100.9°F), heart rate > 90 beats per minute, respiratory rate > 20 breaths per minute or PaCO₂ < 32mmHg, and white blood cell count < 4,000/mm³ or > 12000/mm³ or > 10% bands].

