

Background

- Bacteremia in the setting of a urinary tract infection (UTI) is associated with prolonged hospitalization and higher rates of complications and mortality compared with non-bacteremic UTIs.
- Early recognition of risk factors that point toward bacteremia developing in patients with urosepsis could allow rapid management to improve outcomes and patient care.
- Few studies have investigated the potential risk factors for bacteremia in the setting of patients with urosepsis and positive urine cultures.
- While it is known that sodium-glucose co-transporter-2 inhibitors (SGLT2-I) increase the risk of a patient developing a UTI, there is little information on their potential risk of a patient developing bacteremia.

Objectives

Primary

- Receipt of SGLT2 inhibitors prior to admission in uroseptic patients with or without bacteremia

Secondary

- Assessment of risk factors for the development of bacteremia in patients with urosepsis

Study Design

Admitted to Jackson Hospital with positive urine culture, meeting criteria for urosepsis

Bacteremia present

No bacteremia present

With SGLT2 inhibitor

With SGLT2 inhibitor

Without SGLT2 inhibitor

Without SGLT2 inhibitor

Statistical Analysis

- Chi-square, student's t-test, and binary logistic regression via SPSS® version 15 (SPSS Inc., Chicago, IL).
- Variables were included in the regression if $P \leq 0.2$ in the chi-square analysis.
- Power: 81 patients per each group were needed to meet 80% power to detect a difference of 20% in patients receiving SGLT2-I with $\alpha = 0.05$.

Methods

- Single-center, retrospective cohort study
- Patients identified by ICD-10 codes for sepsis and urinary tract infections on patients admitted from January 1st, 2018 to December 31st, 2018 at Jackson Hospital

Inclusion Criteria

- Positive urine culture
- ≥ 2 signs of systemic inflammatory response syndrome (SIRS)

Exclusion Criteria

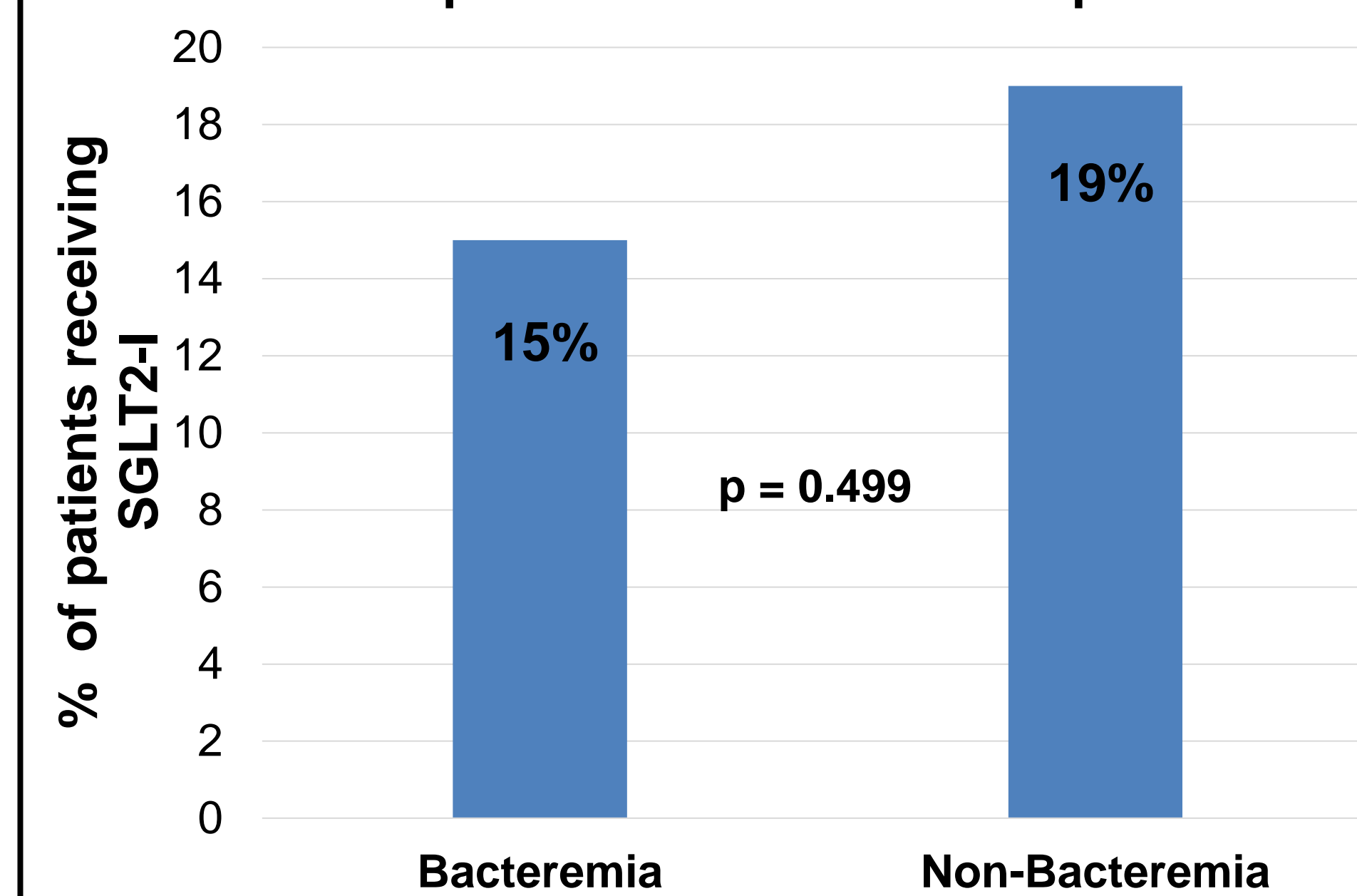
- Confirmed pregnancy
- Age ≤ 18 years of age
- Concomitant source of infection outside the urogenital tract

Results

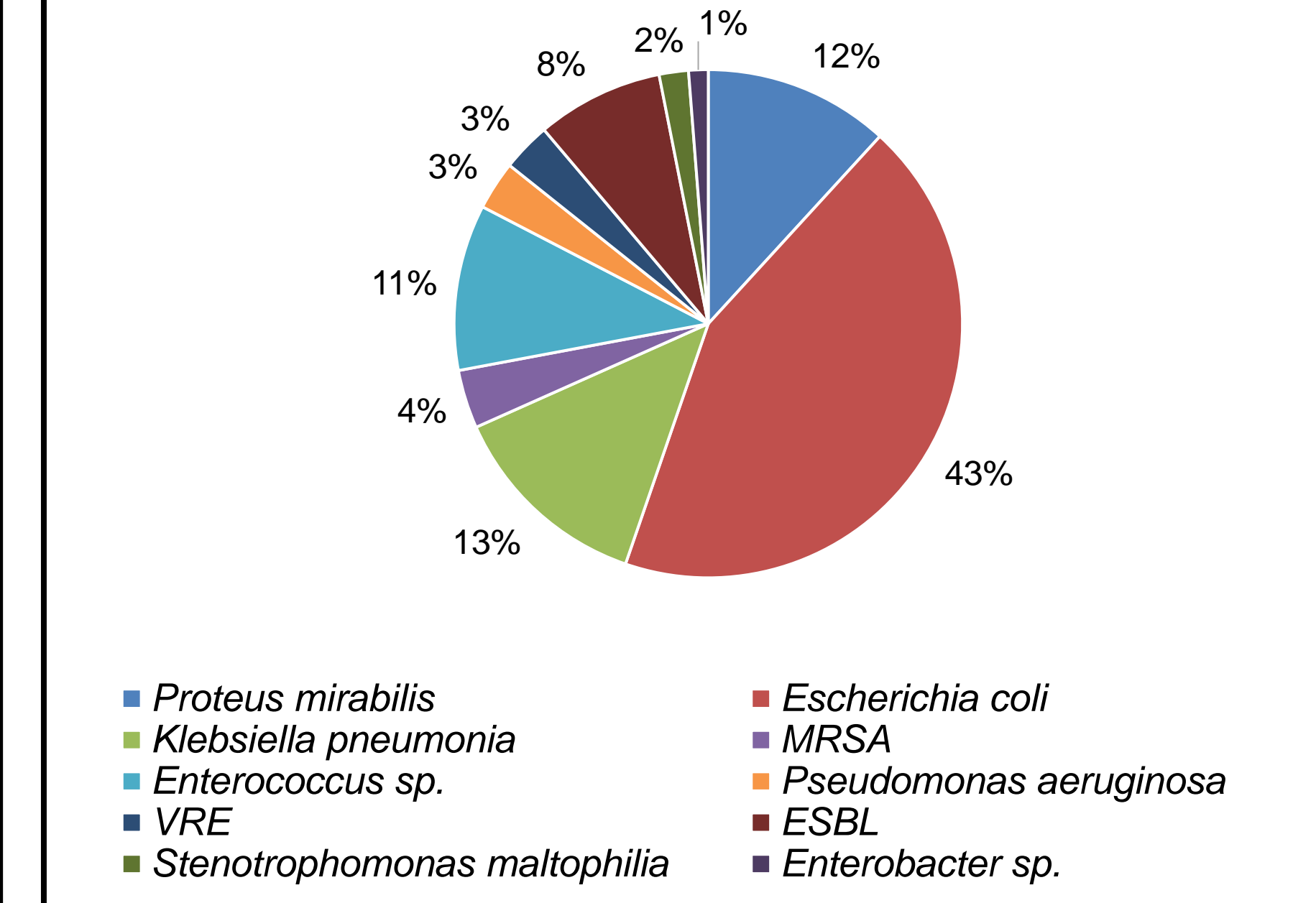
Patient Demographics

Characteristics	Bacteremia (n=81)	No Bacteremia (n=81)	P-Value
Average age, years (SD)	73.4 (12.1)	66 (19.1)	0.004*
Male gender, no. (%)	43 (53)	25 (31)	<0.0001*
Race, no. (%)			
African American	41 (51)	38 (47)	0.612
Caucasian	39 (48)	43 (53)	0.526
Hispanic	1 (1)	0 (0)	0.368
Residence, no. (%)			
Independent	47 (58)	44 (56)	0.798
Home Health	3 (4)	5 (6)	0.56
Nursing Home	16 (20)	15 (19)	0.873
Rehabilitation Facility	10 (12)	5 (6)	0.184
Comorbidities, no. (%)			
Benign prostatic hyperplasia	8 (10)	6 (7)	0.495
Chronic kidney disease	16 (20)	14 (17)	0.624
Chronic obstructive pulmonary disease	8 (10)	13 (16)	0.258
Cirrhosis	10 (12)	3 (4)	0.061
Diabetes mellitus	38 (47)	29 (36)	0.157
Hypertension	71 (88)	65 (80)	0.166
Prior cerebrovascular accident	11 (14)	11 (14)	1.000
Immunocompromised	18 (22)	21 (26)	0.552
Chronic urinary catheter	6 (7)	12 (15)	0.105

Comparison of SGLT2-I Receipt



Urine Culture Isolates



Results

Binary Logistic Regression Analysis

Variables Included in Regression	Odds Ratio	P-Value (95% CI)
Lab Values		
Bicarbonate < 22 mmol/L	11.413	<0.0001 (3.137-41.514)*
Blood glucose > 180 mg/dL	3.901	0.0015 (1.315-11.571)*
Blood urea nitrogen (BUN) > 20	3.087	0.061 (0.947-10.061)
Creatinine > 1.2 mg/dL	2.418	0.093 (0.862-6.779)
White blood cells (WBC) > 12,000/uL	1.046	0.943 (0.304-3.601)
Bands > 10%	1.744	0.364 (0.525-5.795)
Vitals		
Heart rate > 90 bpm	0.711	0.611 (0.191-2.646)
Temperature ≥ 100.4 F	4.148	0.014 (1.504-11.437)*
Demographics		
Age > 65 years	1.034	0.95 (0.357-2.996)
Chronic indwelling catheter	0.301	0.14 (0.061-1.483)
Community acquired infection	0.579	0.403 (0.161-2.086)
Presented from rehabilitation institution	3.626	0.141 (0.654-20.110)
Comorbidities		
Cirrhosis	0.728	0.748 (0.105-5.052)
Diabetes mellitus	1.256	0.650 (0.468-3.371)
Hypertension	1.015	0.982 (0.285-3.610)
Organisms		
Extended-spectrum beta-lactamases (ESBL)	5.319	0.090 (0.770-36.765)
Methicillin-resistant <i>staphylococcus aureus</i> (MRSA)	6.583	0.326 (0.153-282.545)
<i>Proteus sp.</i>	1.331	0.729 (0.263-6.742)

Conclusion/Discussion

- SGLT2-I were not shown to be a risk factor for bacteremia in this analysis.
- The analysis identified independent factors associated with the increased risk of bacteremia in patients with urosepsis:
 - Bicarbonate < 22 mmol/L
 - Blood glucose > 180 mg/dL
 - Temperature ≥ 100.4 F
- Notable limitations of the present study include: single center, retrospective design; SGLT2-I were held upon admission; patients in the non-bacteremia group did not always have a blood culture present for analysis.
- Future studies should verify these findings on a larger scale, perhaps when SGLT2-I are not held upon admission.

References

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- Wagenlehner F, Pilatz A, Weidner W. Urosepsis—from the view of the urologist. *International Journal of Antimicrobial Agents*. 2011;38(Supplement):51-57.2011.09.007.
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- van Nieuwkoop C, Bonten TN, van't Wout JW, et al. Procalcitonin reflects bacteremia and bacterial load in urosepsis syndrome: a prospective observational study. *Critical Care*. 2010;14:1-14.