

# Urosepsis due to Extended Spectrum Beta-Lactamase Producing *E. coli*: Risk Factors and Clinical Outcomes

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## Background

- In Canadian hospitals, the prevalence of ESBL-producing organisms is ~4.9%.<sup>1</sup>
- Carbapenems are regarded as the drug of choice for the management of severe infections with ESBL-producing organisms
- Travel to an endemic area is known to be a risk factor for colonization by ESBL organisms; however, the magnitude of this effect has not been evaluated in comparison to other known risk factors.<sup>2</sup>

## Objectives

- To determine the cumulative incidence of ESBL-producing organisms at Surrey Memorial Hospital (SMH)
- To characterize the risk factors for developing urosepsis secondary to ESBL-producing organisms and to estimate the magnitude of effect
- To compare the clinical outcomes between patients with ESBL-producing vs. non-producing enterobacteriaceae in the cohort of urosepsis patients

## Methods

- Retrospective nested case-control study between January 2011 - June 2013 of all patients at SMH with bloodstream infections due to presumed urinary sources.
- Isolates were identified via the Vitek 2 system; controls selected by a random number generator based on the year

## Inclusion

- Age ≥ 19
- Physician diagnosis of urosepsis on presentation
- Positive blood cultures for *E. coli* and *K. pneumoniae*, presumably from a urinary source

## Statistical Analysis

- Descriptive statistics was used to characterize patients with urosepsis
- Multivariate logistic regression was used to estimate the magnitude of effect for developing urosepsis secondary to an ESBL-producing organism

Figure 1: Study Design

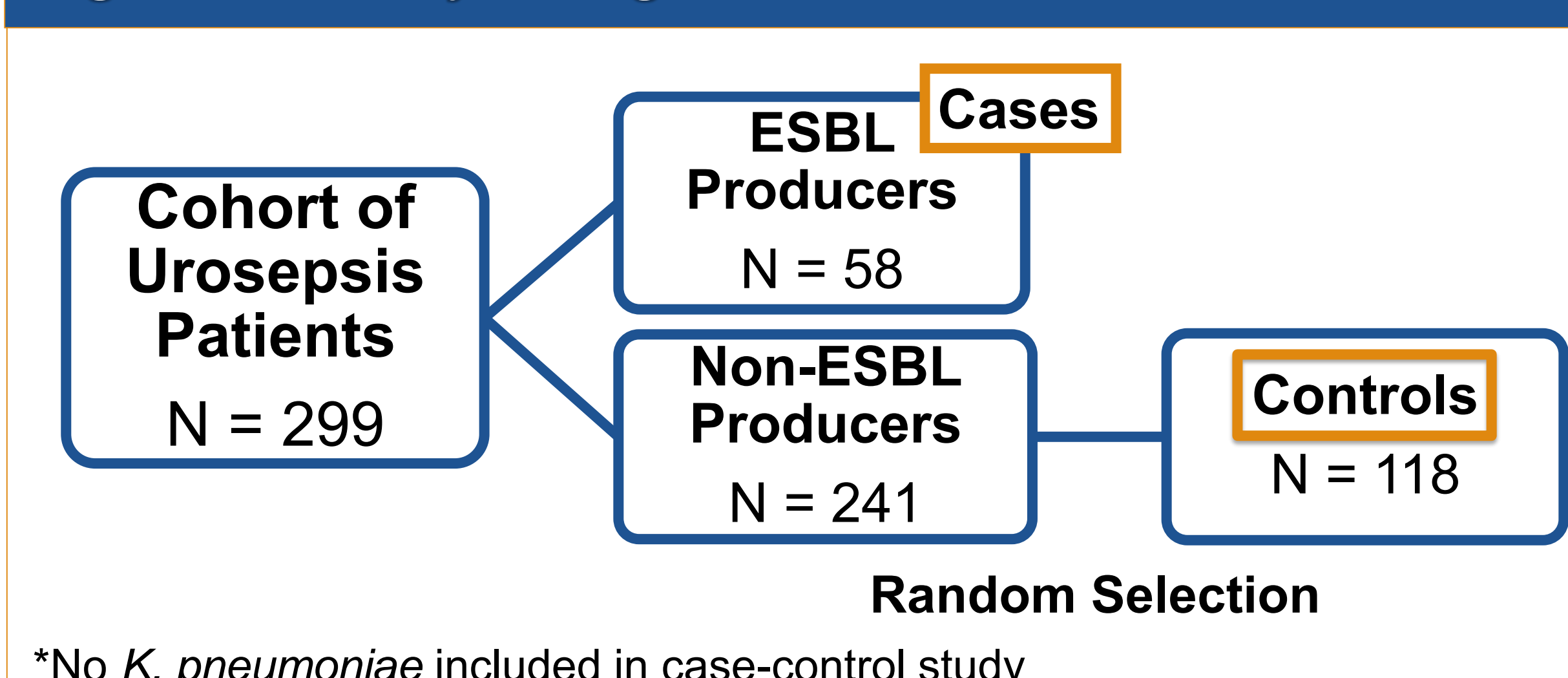


Table 1: Patient Characteristics

	ESBL- Producers (n = 58) (%)	Non-ESBL Producers (n = 118) (%)	P-value
Age; Mean ± SD	69.6 ± 16.1	66.2 ± 18.7	NS
Sex (Male)	33 (56.9)	39 (33.1)	0.003
Residence			
Home	48 (82.8)	99 (83.9)	NS
Long term care facility	7 (12.1)	12 (10.2)	
Assisted living	3 (5.2)	6 (5.1)	
Primary Language			
English	19 (32.7)	75 (63.6)	<0.001
Punjabi/Hindi	33 (56.9)	26 (22.0)	
Other	1 (1.7)	7 (5.9)	
Unknown	5 (8.6)	10 (8.5)	
Travel to endemic location in past 6 mo.	12 (20.7)	8 (6.8)	0.010
Nosocomial	10 (17.2)	21 (17.8)	NS
Hospitalization past 12 mo.	32 (55.2)	38 (32.2)	0.005
Septic on presentation	45 (77.6)	82 (69.5)	NS
Co-morbidities on Admission			
Diabetes	27 (46.6)	42 (35.6)	NS
Chronic Renal Insufficiency (CrCl<60mL/min)	27 (46.6)	18 (15.3)	<0.001
Recurrent UTIs (>3/year)	22 (37.9)	19 (16.1)	0.002
Active Cancer	4 (6.9)	10 (8.5)	NS
Stroke/TIA	14 (24.1)	17 (14.4)	NS
Structural Malformation	12 (20.7)	5 (4.2)	0.002
Urinary Retention	4 (6.9)	9 (7.6)	NS
Active Kidney Stones	4 (6.9)	13 (11.0)	NS
BPH	14 (24.1)	13 (11.0)	0.028
Indwelling Catheter	8 (13.8)	14 (11.9)	0.809

Table 2: Multivariate Regression Analysis

Variable	Sig.	Adjusted OR	95% CI
Renal insufficiency (CrCl <60mL/min)	<0.001	<b>4.66</b>	1.96 – 11.08
Travel to endemic region prior 6 mo.	0.029	<b>4.62</b>	1.17 – 18.19
Primary language (Punjabi/Hindi)	0.004	<b>3.25</b>	1.45 – 7.29
Sex (Male)	0.015	<b>2.65</b>	1.21 – 5.81

Hosmer-Lemeshow Goodness-of-Fit Test: p-value = 0.961

Table 3: Clinical Outcomes

	ESBL- Producers (n = 58)	Non-ESBL Producers (n = 118)	P-value
Hospital length of stay (days), Median (IQR)	11 (6-27)	7 (3-13)	0.003
Total duration of treatment (days), Median (IQR)	14 (9-28)	13 (9-17)	0.048
Time to appropriate treatment (h), Median (IQR)	4 (1.5-18)	2.5 (1-7.8)	NS
Received appropriate treatment within 24 h (%)	48 (82.8)	112 (94.9)	0.012
All-cause death or PMO on Discharge	7 (12.1)	4 (3.4)	0.042

## Conclusions

- The cumulative incidence of ESBL-producers among patients with enterobacteriaceae urosepsis is **19.4%** over **2.5 years**
- This is the first study we are aware of to estimate the magnitude of travel to endemic regions as a risk factor for developing ESBL urosepsis
- Chronic renal insufficiency (CrCl <60mL/min) and travel to a region endemic for ESBL-producing organisms** in the past 6 months are the strongest predictors for developing urosepsis from an ESBL-producing organism with odds ratios of **4.66** and **4.62**, respectively.
- Urosepsis with ESBL-producing organisms correlated with longer hospital length of stay and worse prognosis at discharge

## References:

- Zhanel GG, et al. Antimicrobial Agents and Chemotherapy 2010;(54):4684-93.
- Laupland KB, et al. Journal of Infection 2008;57(6):441-8.

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