TREATMENT OF BLOODSTREAM INFECTIONS CAUSED BY CEFTRIAXONE-RESISTANT E. COLI, P. MIRABILIS AND KLEBSIELLA SPECIES: REVIEW OF EXTENDED-SPECTRUM BETA-LACTAMASE PRODUCTION AND PATIENT OUTCOMES IN A LOW PREVALENCE SETTING

Shawn Smith[1] | Hilal Al Sidairi[2,3] | Emma K Reid[4] | Carolyn Smith[5] | Glenn Patriquin[5] | Paul Bonnar[4,3] | Ross Davidson[5]

(1) IWK Health Centre, Halifax, NS, Canada. (2) Laboratory Services Department, Ibri Referral Hospital, Ibri, Oman. (3) Dalhousie University, Halifax, NS, Canada. (4) Nova Scotia Health, Halifax, NS, Canada. (5) Dept. of Pathology and Laboratory Medicine, Div. of Microbiology, Nova Scotia Health, Halifax, NS, Canada

nova scotia health

DALHOUSIE UNIVERSITY

Nova Scotia Health Antimicrobial Stewardship

INTRODUCTION

- Invasive infections due to extended-spectrum beta-lactamase (ESBL) producing Enterobacterales may have reduced susceptibility to beta-lactam / beta-lactamase inhibitor (BLBLI) antibiotics.
- IDSA guidelines recommend using carbapenem or non-BLBLI antibiotics preferentially in the treatment of non-cystitis ESBL infections.
- The incidence and impact of ESBL production in Nova Scotia (central zone) is not well described.

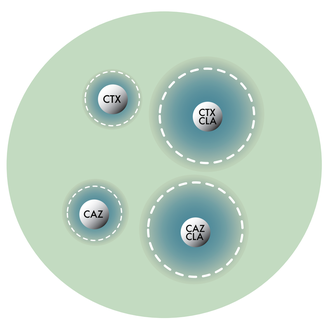
OBJECTIVES

1. Determine the incidence of ESBL production among ceftriaxone-resistant *E. coli, K. pneumoniae, K. oxytoca* and *P. mirabilis* during the study period.
2. Characterize clinical outcomes for patients with ESBL producing bacteremia based on treatment type (BLBLI vs non-BLBLI)

METHODOLOGY

- Ceftriaxone-resistant *E. coli, K. pneumoniae, K. oxytoca* and *P. mirabilis* specimens were obtained from frozen adult inpatient blood cultures between March 2016 and June 2020.
- Isolates obtained were regrown and ESBL status was confirmed with disc diffusion testing.
- For piperacillin/tazobactam-sensitive isolates, charts were reviewed for treatment details and outcomes (death, bacteremia relapse, and hospital readmission).

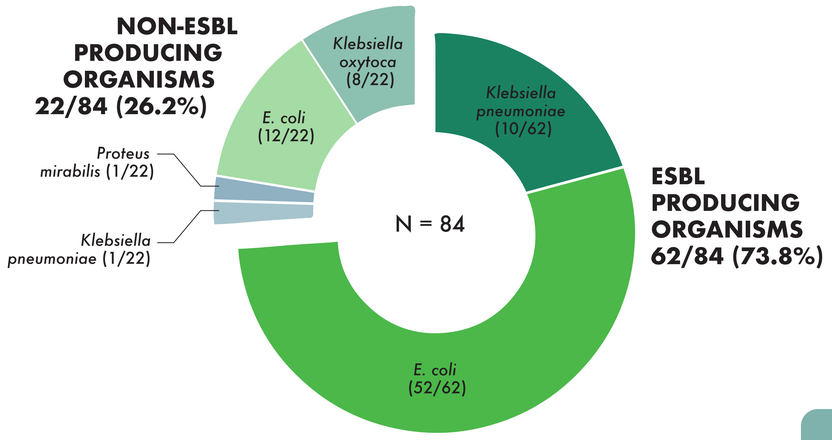
Phenotypic Confirmatory Disc Diffusion Test
ESBL production confirmed by increase in zone of inhibition ≥ 5 mm for ceftazidime(CAZ) and ceftazidime/clavulanic acid(CLA) and cefotaxime(CTX) and cefotaxime/clavulanic acid(CLA).



RESULTS - OBJECTIVE 1

FIGURE 1-A OVERALL ESBL PREVALENCE

Adult inpatients with Gram-negative *E. coli, K. pneumoniae, K. oxytoca, P. mirabilis* bacteremia reported as ceftriaxone-resistant from March 2016 to June 2020, screened population n = 84.



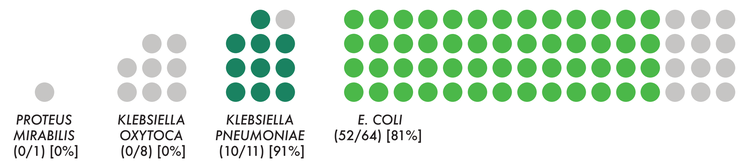
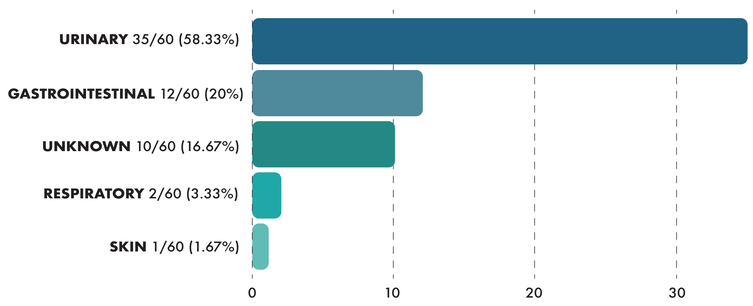


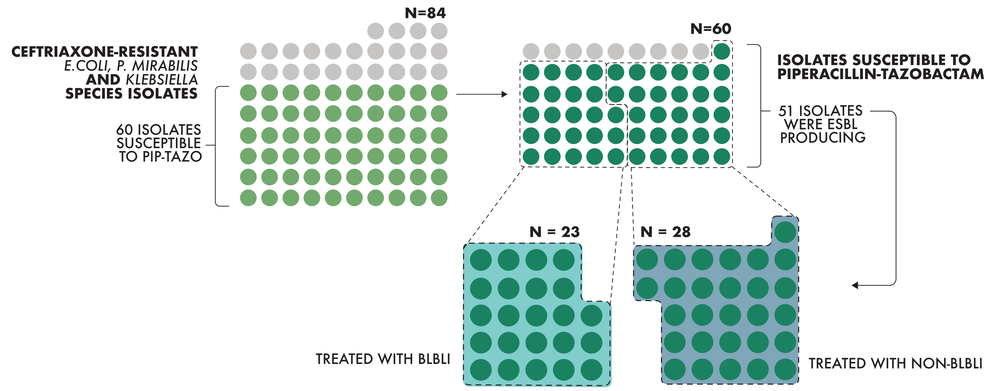
FIGURE 1-B PATHOGEN SOURCE

Two (2) patients were excluded at this phase due to palliation before antibiotics sensitivity testing was complete.



RESULTS - OBJECTIVE 2

PIPERACILLIN/TAZOBACTAM SENSITIVE: DEFINITIVE ANTIMICROBIAL THERAPY FIGURE 2-A



OUTCOMES OF DEATH, BACTEREMIA RELAPSE & HOSPITAL READMISSION FIGURE 2-B

OUTCOME	BLBLI (n=23)	Non BLBLI (n=28)	OR*	95% CI LL	p
Death within 30 days	4 (17.4%)	3 (10.7%)	1.74	(0.26, 13.29)	0.77
Death within 90 days	4 (17.4%)	6 (21.4%)	0.78	(0.14, 3.85)	1
Readmission within 30 days	3 (13.0%)	7 (25.0%)	0.45	(0.07, 2.36)	0.48
Readmission within 90 days	3 (13.0%)	9 (32.1%)	0.32	(0.05, 1.56)	0.20
Relapse within 30 days	2 (8.7%)	2 (7.1%)	1.23	(0.08, 18.35)	1
Relapse within 90 days	2 (8.7%)	4 (14.3%)	0.58	(0.05, 4.51)	0.87

*Unadjusted, Non BLBLI as reference group

CONCLUSIONS

- Approximately 74% of ceftriaxone-resistant Enterobacterales blood isolates were ESBL positive.
- Ceftriaxone resistance can act as a proxy for ESBL positivity.
- Clinical outcomes were similar among treatment groups, but small numbers limit generalizability.
- Implementing modified BLBLI sensitivity reporting in ceftriaxone-resistant isolates in favour of carbapenems should only impact 1-2 patients per month in our centre.

BOTTOM LINE

1. **LOCAL BLOOD ISOLATES CONTAINING CEFTRIAXONE-RESISTANT ENTEROBACTERALES ARE LIKELY TO BE ESBL PRODUCERS, ESPECIALLY *E.COLI* AND *K. PNEUMONIAE* ISOLATES**
2. **CLINICAL OUTCOMES FOR PATIENTS WITH ESBL PRODUCING BACTEREMIA DID NOT DIFFER SIGNIFICANTLY AMONG TREATMENT GROUPS**

#149