2021 Best Research Poster Award

Barwon Health

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Trends and outcomes of Enterobacterale bloodstream infections in cancer patients: experience of a large regional centre

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INTRODUCTION

Bloodstream infections due to Enterobacterale species remain a significant cause of morbidity and mortality amongst patients with cancer, particularly in haematology patients undergoing haematological stem cell transplantation (HSCT). This is further complicated by increasing antimicrobial resistance, leading to delays to appropriate antibiotic therapy and subsequently mortality.[1-7] While much has been described in allograft stem cell transplant patients and high-risk chemotherapy patients in large cancer services, less is known about the trends in lower risk groups and in regional cancer services.

OBJECTIVES

- Review risk factors and outcomes in mortality in blood stream infections in a large regional cancer service in Geelong, Victoria, Australia
- Compare outcomes in oncology and haematology blood stream infections
- Review empiric antibiotic practices and their adequacy of coverage in haematology and oncology
- Review resistance trends over 12 years
- Review and compare to reported trends locally and globally

METHOD

A retrospective observational study of all gram negative isolates between 1st October 2006 and March 31st 2018 extracted from laboratory records.

Enterobacterales isolates were then extracted and then haematology and oncology inpatient admissions were reviewed. Data collected on:

- Demographics
- Disease type, management and status at time of blood culture
- Bacteraemia event details
- Outcome

DISCUSSION

- Increase in resistance with an associated increased mortality was not seen, in contrast to other centres[3,5]
- Commencement of empiric inactive therapy was rare; current antibiotic guideline recommendations are appropriate
- Mortality in solid tumors is higher than in haematology patients, particularly tumours of GI origin. This is associated with a lower rate of ICU admission, and a narrower empiric antibiotic regimen
- Limited by inconsistent availability of data to provide comorbidity scores and single centre data only

RESULTS

- 439 gram negative isolates from 315 patients in 396 admissions
- 39 deaths (12.6%) within 7 days of blood culture. 61.5% occurred in solid tumour patients
- 62.2% of haematology patients were commenced on piperacillin-tazobactam as empiric therapy; however only 45.3% of oncology patients
- Most common resistance mechanism was Amp-C production (15.5% of isolates). No carbapenem resistance was detected.
- Minimal fluoroquinolone resistance (4.3%) or piperacillin-tazobactam resistance (6.2%)
- 25 patients (5.7%) commenced on inactive empiric therapy: not significantly associated with mortality
- Mortality was associated with age, neutropenia and the absence of indwelling vascular devices on multiple regression analysis
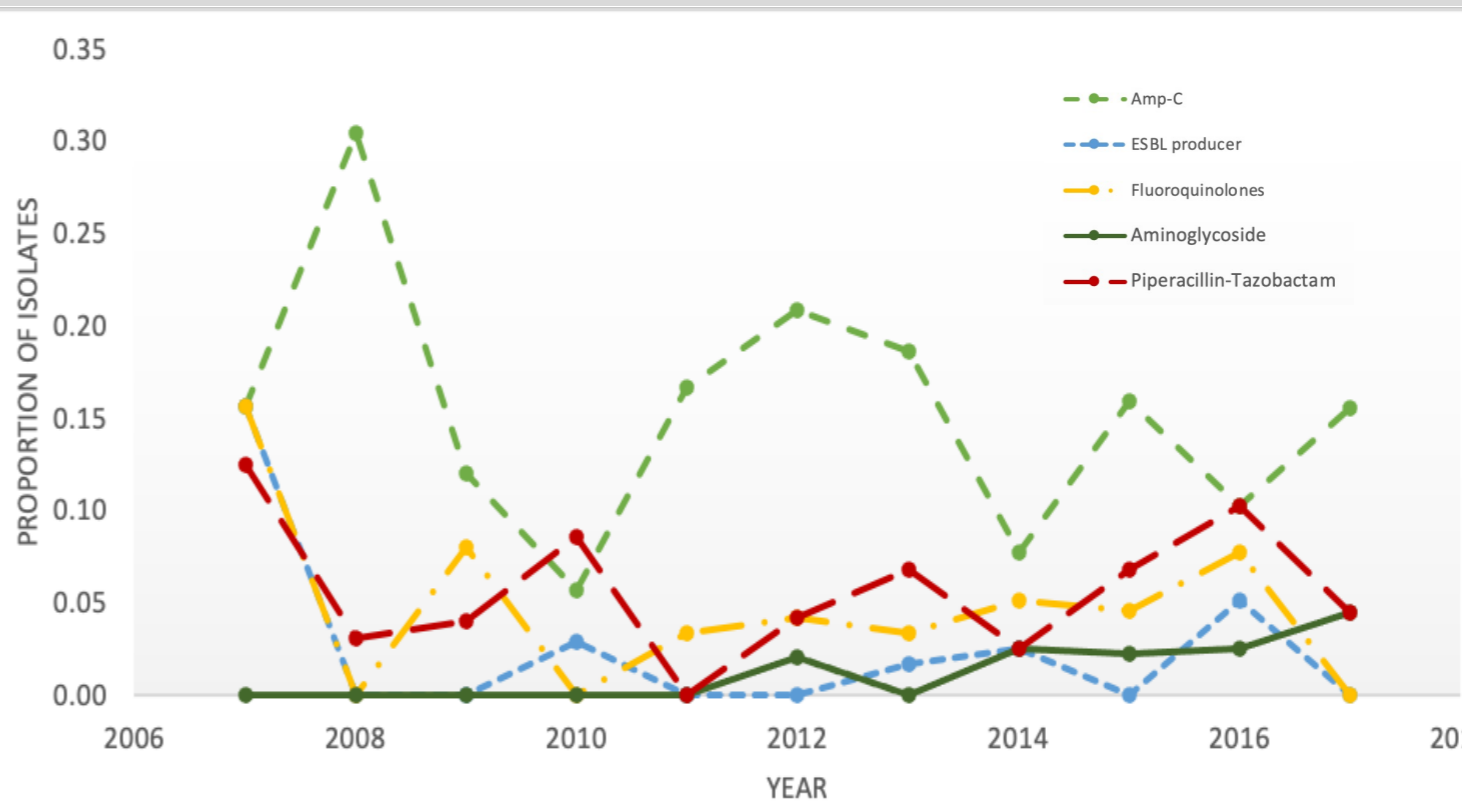

Figure
Proportion of Enterobacterales isolates with detected antimicrobial resistance profiles between 2007 and 2017, with trend line
{Test for trend p>0.05 for all profiles}

Table
Associations of Mortality† within 7-days of positive blood culture.
† Vital status is unknown for five episodes.
* In the adjusted model, bone marrow transplant status at the time of the episode was used.
# Variables used in multiple regression were selected if the p-value in the unadjusted model was <0.1

	Number of deaths (row %)	Unadjusted results from Logistic regression		Results adjusted for age, cancer type, bone marrow transplant, VRE colonisation and use of indwelling catheter #	
		OR (95% CI)	p-value	OR (95% CI)	p-value
Overall mortality (N=310)	39 (12.6)				
Relationship with:					
Age at admission	---	1.07 (1.03 – 1.11)	<0.001	1.05 (1.01 – 1.09)	0.009
Gender					
Female	12 (9.4)	Ref		Ref	
Male	27 (14.8)	1.68 (0.82 – 3.47)	0.157	1.33 (0.61 – 2.90)	0.476
Cancer Type					
Oncology	24 (17.4)	Ref		Ref	
Haematology	15 (8.7)	0.46 (0.23 – 0.92)	0.028	0.65 (0.28 – 1.49)	0.310
Steroid use					
No	18 (13.1)	Ref		Ref	
Yes	21 (8.3)	0.60 (0.30 – 1.18)	0.139	1.04 (0.46 – 2.35)	0.917
Current line of chemotherapy	---	0.80 (0.52 – 1.21)	0.289	1.10 (0.77 – 1.56)	0.598
Years since chemotherapy commenced	---	1.04 (0.84 – 1.29)	0.709	1.17 (0.89 – 1.54)	0.253
Ever had a bone marrow transplant*					
None	37 (10.9)	Ref		Ref	
Allo and/or autograft	2 (3.7)	0.29 (0.07 – 1.24)	0.094	0.97 (0.19 – 4.91)	0.967
Presence of neutropenia					
Not neutropenic	17 (9.2)	Ref		Ref	
Neutropenic	22 (10.6)	1.17 (0.59 – 2.30)	0.653	5.65 (1.89 – 16.86)	0.002
At least 1 resistance pattern at episode of admission					
No	26 (9.0)	Ref		Ref	
Yes	13 (12.7)	1.43 (0.70 – 2.93)	0.322	1.54 (0.71 – 3.36)	0.279
VRE colonisation					
None	20 (7.4)	Ref		Ref	
Yes	3 (8.8)	1.21 (0.33 – 4.47)	0.775	1.56 (0.41 – 5.95)	0.517
Use of indwelling intravascular catheter					
No	34 (17.1)	Ref		Ref	
Yes	5 (2.6)	0.13 (0.05 – 0.34)	<0.001	0.20 (0.06 – 0.72)	0.014
Inadequate empirical antibiotic coverage					
No	37 (10.1)	Ref		Ref	
Yes	2 (8.0)	0.78 (0.18 – 3.43)	0.737	0.90 (0.15 – 5.31)	0.906

CONCLUSION

- Mortality from Enterobacterale blood stream infection is more common in medical oncology patients
- Inactive empiric therapy was uncommon and not associated with mortality
- No trend toward resistance over 12 years
- Vigilant ongoing monitoring is important to inform local management protocols, given the observations of this study are contrary to global trends

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