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Neonatal Blood Stream Infections in a Pediatric Hospital in Vietnam: A cohort study

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INTRODUCTION

Septicemia is a major cause of neonatal (<29 days of age) morbidity and mortality in developing countries. The pattern of septicemia and Blood Stream Infections (BSI) varies depending on setting and patient population.

Vietnam is a populous country in economic transition with high health care coverage. Few studies are published on neonatal morbidity and mortality in Vietnam. No studies on neonatal BSIs are available.

The present study describes all confirmed BSIs among neonates in a tertiary paediatric hospital in Vietnam.

Hypothesis

We hypothesized, that Vietnam would resemble other resource poor settings with a high incidence of BSI, mainly Gram-negative bacteria, and emerging empiric antibiotic resistance among our study population.

AIM

The aim of this study was to describe BSIs - incidence, isolate distribution, antibiotics susceptibility, and septicemia related mortality in a tertiary paediatric hospital in Vietnam

MATERIALS AND METHODS

Study population

All neonates admitted to the study hospital in a 12 month period in 2009-2010 were included prospectively.

The indication for blood culture sampling in the hospital is severe clinical symptoms of septicemia.

Data collection

Blood culture results were obtained from the registres of the department of microbiology.

From the central hospital registry basic demographic and clinical data was collected, including outcome at 28 days of age, for all neonates.

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Table 1 Distribution of Blood Stream Infections (n=399) in 385 neonates
(14 neonates had two samples drawn at different times with different isolates)

Pathogenicity	Isolate		Onset (early/late)*
Known	Klebsiella spp	78	9 | 69
	Acinetobacter spp	58	11 | 47
	E Coli	21	7 | 14
	Enterobacter spp	16	4 | 12
	Morganella spp	8	1 | 7
	Pseudomonas spp	6	1 | 5
	Proteus spp	3	0 | 3
	Burkholderia spp	2	1 | 1
	Staphylococcus Aureus	11	1 | 10
	Enterococcus spp	5	2 | 3
	Streptococus spp	3	1 | 2
	Candida spp	13	3 | 10
Potential	Staphylococcus CN**	175	19 | 156
Total		399	60 | 339

*Onset (=< / > 3 days of age at sampling)
**Staphylococcus Coagulase Negative

Table 2 **Empiric antibiotics and susceptibility among 399 BSI isolates** (% (sens/total cultured))

	Gram-negative species						Gram-positive species			
	Klebs n=78	Acinetob n=58	E Coli n=21	Enterob n=16	Morgan n=8	Pseudom n=6	Staph CN n=175	Staph A n=11	Enteroc n=5	Strep n=3
1 line										
Ampicillin	0	15	14	7	13	0				
Cefotaxime	14	18	42	38	48	17				
Gentamicin	15	50	43	38	25	52	34	72	0	0
2. line										
Ceftazidime	29	29	58	50	50	67				
Ciprofloxacin	29	78	52	38	25	67				
Pefloxacin	12	73	52	44	14	17	37	86	0	0
2-3. line										
Vancomycin							99	100	100	100
Cefepime	19	42	40	47	43	67				
Timentine	18	41	48	38	29	67				
3. line										
Meropenem	98	57	100	100	100	100				
Imipenem	96	59	100	88	100	83				
Staph A suspicion										
Oxacillin							16	45	0	67
Rifampicin							84	100	60	100

Analysis

Neonatal deaths among patients with BSIs were audited to classify septicemia related deaths according to ICD 10 classification of death causes.

Chi square trend test was performed to examine associations between isolate group and septicemia related mortality

Table 3 Isolate and septicemia related mortality

Isolate	OR	CI
No confirmed BSI	**1.00**	
Staphylococcus CN	**1.54**	**0.84-2.83**
Acinetobacter spp	**3.95**	**1.93-8.09**
Other Gram-negative	**6.26**	**3.96-9.89**

p<0.001

RESULTS

5763 neonates were admitted in the study period, 2202 blood cultures were performed, of which 399 (18%) were positive (BSI) in 385 patients. Table 1 shows the distribution of isolates and table 2 shows their antibiotics susceptibility. Among neonates with BSIs, 62 septicemia related deaths occurred (16%).
Table 3 shows isolate group associated mortality.

CONCLUSION

BSIs were mostly late onset and the majority of isolates was known pathogenic, Of these, Gram-negative bacteria constituted the vast majority and showed widespread resistance against empiric antibiotics. Septicemia related mortality was highest among Gram-negative bacteria.

Systematic surveillance of neonatal BSIs is recommended. Meropenem could be considered as prompt treatment of suspected late BSI with severe clinical signs of septicemia.

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