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An observational study about the performance of the blood enteroviral polymerase chain reaction test in the management of young febrile infants

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Background

➢ young febrile infants with confirmed viral infections, such as influenza, present a low risk of a concomitant invasive bacterial infection (IBI).

➢ several studies have confirmed a low prevalence of IBI in young febrile infants with a positive enteroviral protein chain reaction in cerebrospinal fluid (CSF). A positive test is related with shorter hospitalization and antibiotic treatment.

➢ little is known about the value of the blood enteroviral polymerase chain reaction (be-PCR) test in the emergency department (ED) management of these patients.

Objectives

✓ to analyze the prevalence of IBI and non-IBI in infants with fever without source (FWS) and a positive or negative be-PCR.
✓ to compare the length of stay and the length of antibiotic treatment in hospitalized infants.

Patients & Methods

• **Secondary analysis of a prospective** unicenter registry developed in a University Teaching Hospital
• **Inclusion criteria in the registry**: infants ≤90 days old attended with FWS in the Pediatric ED
• Our **protocol of management** includes a urine sample by a sterile method (urine dipstick and urine culture) and performing the following blood tests: procalcitonin, C-reactive protein, white blood cell count, blood culture and be-PCR (since 2015 during the whole year; previously only during enteroviral season).
• Samples of be-PCR are processed every working day in the morning ⮕ result available in <24 hours except when patient is attended on Friday afternoon or Saturday.
• **Inclusion criteria for this subanalysis**: infants attended between 2015 September and 2018 August with at least blood and urine cultures and a urine dipstick performed
• **Definitions**:
  ▪ **IBI:** isolation of a bacterial pathogen in blood or CSF. Isolation of a classically considered contaminant (such as *S. epidermidis*, *P. acnes*, *S. epidermidis* or *Diphtheroides*) was not considered as an IBI.
  ▪ **Non-IBI**: UTI (growth of ≥10,000 CFU/mL in a urine culture collected by a sterile method with leukocyturia associated) and bacterial gastroenteritis.

Results

664 infants ≤90 days old attended with FWS

638 infants included in the analysis (96.0%)
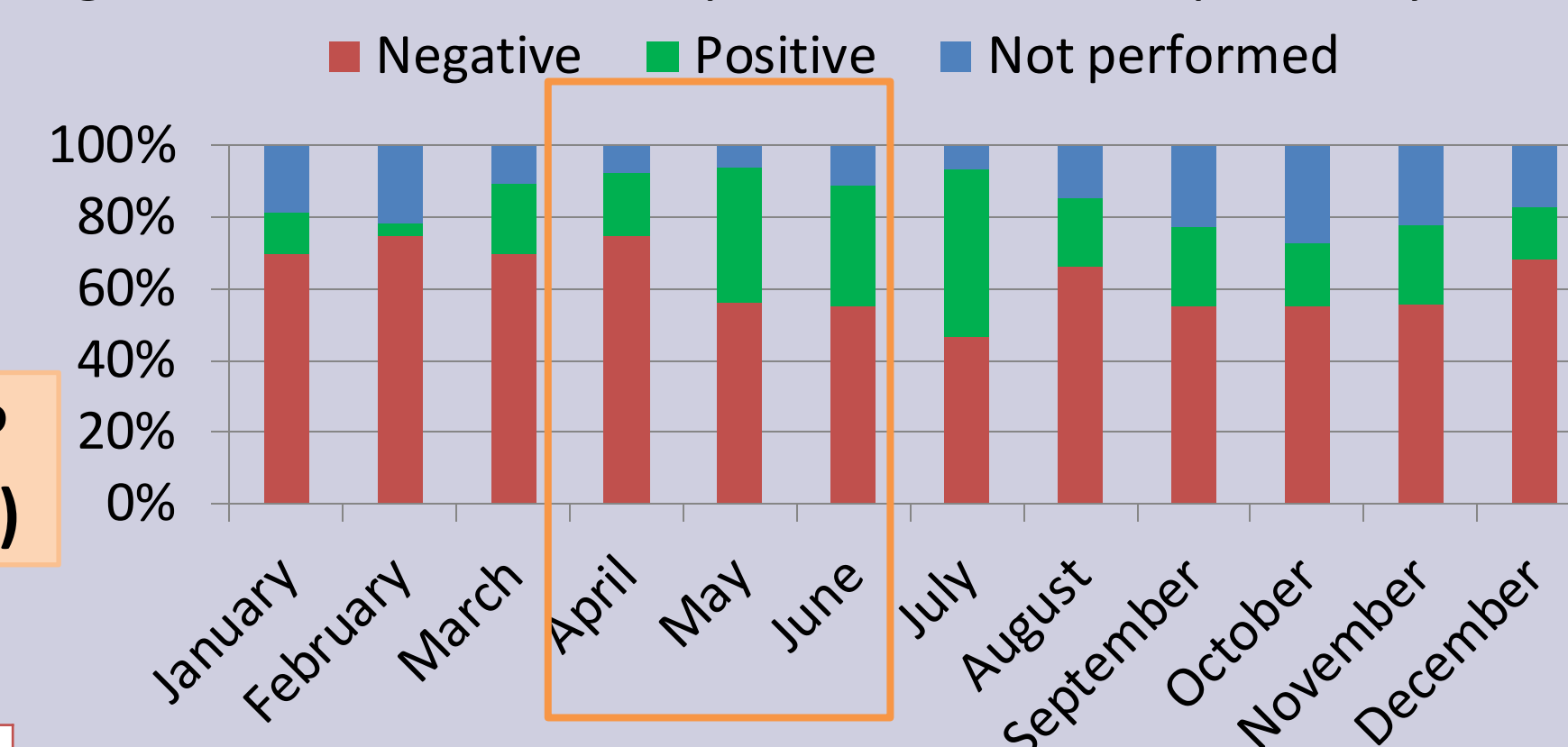
545 in whom a be-CRP was performed (85.4%)

Table 1: Epidemiological characteristics and management of included patients

Male (%)	387 (60.7%)
Age (median)	53 days (IQR 32-68 days)
Evolution of fever (median)	2 hours (IQR: 1-8 hours)
Well-appearing(%)	627 (98.3%)
PCT, CRP and WBC count performed (%)	609 (95.4%)
Lumbar puncture performed (%)	123 (19.2%)
Admitted in ward (%)	245 (38.4%)
Antibiotic received on admission (%)	178 (72.6% of those admitted)
IBI (%)	7 (1.1%; 95% CI: 0.3-1.9%)
Non IBI (%)	108 (16.9%; 95% CI: 14.0-19.8%)

3 occult bacteremias
3 UTIs+ bacteremia
1 bacterial meningitis

104 UTIs
4 bacterial gastroenteritis

Figure 1: rate of be-PCR performance and positivity rate for each month

■ Negative ■ Positive ■ Not performed

January February March April May June July August September October November December

APRIL – JUNE:
e-PCR performed: 91.6%
(vs 82.3% during the rest of the year)
Positive results: 42.1%
(vs 20.1% during the rest of the year)
p<0.01

Table 2: Prevalence of bacterial infections according to the be-PCR result

PREVALENCE OF...		Blood enteroviral PCR		
		Not performed (n=93)	Negative (n= 392)	Positive (n= 153)
Bacterial infection	Overall	40 (43.0%) [95% CI: 32.9-53.1%]	72 (18.3%) [95% CI: 14.5-22.2%]	3 (2.0%) [95% CI: 0-4.2%]
			p<0.01	
	IBI	1 (1.1%) [95% CI: 0-3.2%]	6 (1.5%) [95% CI: 0.3-2.7%	0
			p=0.19	
	Non-IBI	39 (41.9%) [95% CI: 31.9-52.0%]	66 (16.8%) [95% CI: 13.1-20.5%]	3 (2.0%) [95% CI: 0-4.2%]
			p<0.01	

Two other infants diagnosed with a clinical sepsis (no microbiological confirmation); both had a negative be-PCR.

Table 3: Length of stay and of antibiotic treatment among admitted patients according to the be-PCR result

ADMITTED PATIENTS			
	Blood enteroviral PCR		
OVERALL	Not performed (n=93)	Negative (n= 392)	Positive (n= 153)
Admission rate	39 (41.9%)	135 (34.4%)	71 (46.4%)
Length of stay	4.74 ± 1.72	4.90 ± 3.81	3.23 ± 1.16
		p<0.01	
Antibiotic received	35 (89.7%)	104 (77.0%)	39 (54.9%)
Days of antibiotic	4.88 ± 1.58	4.74 ± 3.01	2.17 ± 1.48
		p<0.01	
INFANTS WITHOUT LEUKOCYTURIA	Blood enteroviral PCR		
	Not performed (n=48)	Negative (n= 314)	Positive (n= 148)
Admission rate	10 (20.8%)	87 (27.7%)	67 (45.2%)
Length of stay	4.20 ± 1.75	4.56 ± 4.04	3.18 ± 1.15
		p<0.01	
Antibiotic received	6 (60.0%)	58 (66.6%)	36 (53.7%)
Days of antibiotic	4.00 ± 1.41	4.15 ± 2.97	1.97 ± 1.35
		p<0.01	

Conclusion

The be-PCR identifies a group of infants ≤90 days old with FWS and a very low risk of IBI.
Its inclusion in the management of these patients can also reduce the length of hospitalization and of antibiotic treatment in hospitalized infants.