

Paediatric Overview



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Declaration of Interest

- I am a children's doctor not a microbiologist
- I spent 6 months failing to make PCR work

Watch out for;

- Corporate slides
- Shameless self advertising



Golden rules of Paediatrics

Children are NOT little adults
 Children grow and develop
 Treat the family

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Inspired by Children

Golden rules of Paediatrics 1. Children are NOT little adults

Different infections

- Group B strep, Kingella, Parechovirus
- Hospital acquired infection in Paediatric wards mostly viral (RSV)

Different severity

- Chickenpox less severe
- *C difficile* toxin in 40% neonatal stools none symptomatic

Hospital acquired infection in children ICHE 2000;21:260-3



Golden rules of Paediatrics 2. Children grow and develop

- Immune system not fully functional till 8yrs
- Frequent infections in toddlers
- Severe infections in young children, esp under 2 months

Invasive bacterial infection episodes in infants. England 2011/12 to 2016/17



Golden rules of Paediatrics 3. Treat the family

- Children may be infected by a family member (TB, HIV)
- Children may infect other family members (Chickenpox, pertussis)

Decreasing admissions for meningitis and septicaemia.



Increasing hospital admissions for children. Arch Dis Child. 2013;98:328-34



-40%





Very low rates of culture-confirmed invasive bacterial infections. Arch Dis Child. 2014;99:526-31

- 5 Hospitals in SW London, over 3 years
- 46,039 admissions
- Blood/CSF cultures obtained during 45% of admissions
- 2.4% (504) clinically significant
- 1.1% of hospital admissions

Finding a needle in a haystack?

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Contaminated blood cultures

- More common in children than adults (1.6%– 6.7%) – 40% of positive blood cultures
- Can lead to unnecessary hospitalisation, antibiotic administration and laboratory testing
- Blood culture;
 "GPC in clusters"
- Is it a contaminant?



FilmArray[®] Blood Culture Identification Panel (FA-BCIP)

Identifies;

- 8 gram-positive bacteria
- 11 gram-negative bacteria
- 5 Candida spp
- 3 antimicrobial resistance genes (*mecA*, *vanA/B*, KPC)

Hands-on-time = 2 minutes Turnaround time = 1 hour



U.S. list price for the instrument =\$39,500U.S. list price for the reagent = \$129 per test © A Riordan 2018

FA-BCIP assessment; Methods

- All "first" positive blood cultures 1st December 2013 and 30th June 2014
- FilmArray[®] if Gram negative or yeast seen
 - If Gram positive, clinical decision made by the Micro/ ID Consultant
- FilmArray[®] by biomedical scientist as part of routine laboratory work
- All positive blood cultures assessed by Micro/ ID Consultant;
 - significant vs contaminant

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PIDJ. 2016;35:e134-8
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FA-BCIP assessment; Results

FilmArray® done on 117 positive blood cultures

FilmArray® negative for 11 (9%) positive blood cultures – all contaminants

<u>Culture result – contam</u>	No.
CoNS (2*)	42
ALPHA STREP	22
MICROCOCCUS SP*	2
SPHINGOMONAS*	2
STENOTROPHOMONAS*	2
PSEUDOMONAS PUTIDA*	1
ROSEOMONAS GILARDII*	1
PARACOCCUS YEEI*	1
NEISSERIA CINEREA*	1
ACINETOBACTER LWOFFII*	1

*=Not detected on FilmArray®

FA-BCIP affecting clinical management;

<u>63 /117 children (54%)</u>

	<u>Start</u>	<u>Change</u>	<u>No</u>	<u>De-</u>	<u>Witheld</u>	<u>Stop</u>	<u>Disch</u>	<u>Total</u>
	<u>abiot</u>	<u>abiots</u>	<u>escalate</u>	<u>esc</u>	<u>abiot</u>	<u>abiot</u>		
Candida	4	4						8
Enterococcus	4	1						5
Pseudomonas	1	1		1				3
GBS				1				1
Pneumo								1
Enterobacter	Saved 14 bed days (10 children)							
H inf		• .			`` . · · · ·		· · · I	1
Klebsiella	2 children called back unnecessarily							
MSSA								5
CoNS	1			7	6	6	5	25
Viridans strep				2		1	3	6
Micrococcus				1			1	2
Stenotroph		2						2
Paracoccus							1	1
Total	10	13	1 © A Riorda	n 26 18	6	7	10	63

Antimicrobial Stewardship and Rapid Diagnostic Testing



- J Clin Microbiol. 2017;55:1496-1507
- Clin Infect Dis. 2015;61:1071-80
- J Pediatric Infect Dis Soc. 2017;6:267-274
- Diagn Microbiol Infect Dis. 2016;84:159-64

Case 1

- 18 month old boy
- 1 week of coryza and fever, improved
- Now not using R shoulder
- CRP 17; WCC 17.7; ESR 45.
- Shoulder washout; WBC++, no growth
- Given 4 days IV antibiotics, improved
- Do we need to continue antibiotics?
- 16s PCR for Kingella positive

Kingella kingae

- Gram-negative bacterium carried in oropharynx
- Commonest cause of joint infections in under 3s.
- Hard to grow, so use PCR
- PIDJ 2007;26:377-81



Age distribution of 128 patients with invasive *K kingae* infections



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Case 2

- 3 month old girl
- 1 day of fever, shock and irritability
- CRP 7; WCC 3.6
- Urine WBC 200; mixed growth
- Blood culture no growth
- CSF WBC 0; no growth
- Given 2 days IV antibiotics still irritable
- Do we need to continue antibiotics?
- CSF PCR for Parechovirus- positive

Human parechoviruses

- Picornavirus, 16 types identified.
- Occurs every other year even yrs in UK .
- Causes "sepsis like" illness or encephalitis in infants
- Presents with seizure, fever, rash.
- CSF WBC normal in 92%
 CSF Prot & glucose also normal
- MRI periventricular white matter changes



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FilmArray[®] Meningitis/Encephalitis Panel (FA-M/EP)

Identifies;

• 6 bacteria

Pneumo, Meningo, Hib, GBS, E coli, Listeria

• 7 viruses

HSV 1&2, VZV, CMV, HHV6, Enterovirus, parecho

- Cryptococcus
- Hands-on-time = 2 minutes
- Turnaround time = 1 hour







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