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Sociedad Española de Farmacia Hospitalaria

SUMANDO VALOR

65 CONGRESO NACIONAL | 20-22 OCTUBRE 2020

PROA también en Pediatría.

"Uso y prescripción de antimicrobianos en población pediátrica"

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Objetivos

-Actualizar los conocimientos en farmacoterapia de las principales patologías infecciosas en pediatría.

-Conocer cuáles son los procesos infecciosos diferentes respecto a adultos.

-Saber qué grupos antibióticos son utilizados con mayor frecuencia.

-Como afectan los patrones de resistencia antimicrobiana a la población pediátrica.

Procesos infecciosos en pediatría

Enferm Infecc Microbiol Clin. 2010;**28**(**5**):310–320

ELSEVIER DOYMA

Enfermedades Infecciosas y Microbiología Clínica

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Formación médica continuada

Uso de los antimicrobianos en la población pediátrica

Carlos Rodrigo

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El uso de antimicrobianos en pediatría conlleva una serie de problemas singulares, propios de las circunstancias que concurren en los niños.

- Diagnóstico sindrómico
- Estudios microbiológicos
- Sospecha etiológica
- Necesidad de antibioterapia
- Individualizar según paciente y proceso infeccioso
- Elección de antibiótico empírico y/o dirigido

Infección	Agentes frecuentes	Agentes ocasionales
Vías respiratorias altas		
Rinofaringitis	Virus	Neumococo, estreptococo A
Faringitris y amigdalitis	Virus, estreptococo A	Estreptococos C y G
Absceso/celulitis periamigdalar	Estreptococo A+anaerobios	
Absceso retro/laterofaríngeo	Estreptococos+anaerobios	*S. aureus*
Uvulitis	Virus, estreptococo A	
Laringotraqueitis	Virus	*M. pneumoniae*
Oído y senos paranasales		
Otitis media aguda	Neumococo, *H. influenzae*	Estreptococo A, *M. catarrhalis*
Otitis externa difusa	*P. aeruginosa*	*Proteus* sp.
Sinusitis aguda	Neumococo, *H. influenzae*	Estreptococo A
Mastoiditis aguda	Neumococo, estreptococo A	*S. aureus*
Vías respiratorias bajas		
Traqueobronquitis	Virus	*M. pneumoniae*, neumococo
Bronquiolitis	Virus	
Tos ferina	*Bordetella pertussis*	B. parapertussis
Neumonía en < 4 años	Virus, neumococo,	*M. pneumoniae*
Neumonia en > 4 años	*M. pneumoniae*, neumococo	Virus, *Chlamydia* pneumoniae,
Pleuroneumonía/empiema	Neumococo	estreptococo A, *S. aureus*
Piel y tejidos blandos		
Impétigo, absceso	*S. aureus*, estreptococo A	
Foliculitis, forúnculo	*S. aureus*	
Herida infectada	Estreptococo A, *S. aureus*	Clostridium spp.
Erisipela	Estreptococo A	
Dermatitis perianal	Estreptococo A	
Celulitis con o sin linfangitis	*S. aureus*, estreptococo A	
Celulitis crepitante (con gas)	*Clostridium* spp.	Otros anaerobios, *E. coli*
Celulitis plantar pospunción	*P. aeruginosa*	
Mordedura de gato o perro	*P. multocida*, *S. aureus*	Estreptococos, anaerobios
Mordedura humana	Estreptococos+anaerobios	+estafilococos, corinebacterias, etc.
Flemón dentario	Anaerobios, estreptococos	Estafilococos
Adenitis cervical aguda	Estreptococo A, *S. aureus*	Virus, anaerobios
Adenitis no cervical	*S. aureus*, estreptococo A	
Enfermedad por arañazo gato	*Bartonella henselae*	
Fascitis necrosante	Estreptococo A	Aerobios+anaerobios

Aparato digestivo		
Gastroenteritis aguda	Virus, *Salmonella* spp., *C. jejuni*, *E. coli* spp.	*Shigella* spp., *Aeromonas* sp. *Yersinia enterocolitica*
Gastroenteritis subaguda	*G. lamblia*, *Cryptosporidium*	*Salmonella* spp., *C. jejuni*
Absceso perirrectal	*S. aureus*	Enterobacterias, anaerobios
Peritonitis primaria	Neumococo, enterobacterias (ascitis)	Estreptococo A
Peritonitis apendicular	Enterobacterias+anaerobios	Enterococo, *P. aeruginosa*
Aparato genitourinario		
Infección urinaria	*E. coli*	*Otras enterobacterias*, enterococo
Epididimitis (prepuberal)	*E. coli*, *S. aureus*	*H. influenzae*
Esqueleto		
Artritis purulenta	*S. aureus*, estreptococo A	Neumococo, estreptococo B (< 3 meses)
Osteomielitis/artritis postpunción	*S. aureus*, estreptococo A *P. aeruginosa* (plantar), S. aureus (rotuliana)	Estreptococo B (< 3 meses)
Espondilitis, discitis	*S. aureus*	Enterobacterias
Sistema nervioso central		
Meningitis	Virus, meningococo, *estreptococo B (< 3 meses)*	Neumococo, *M. tuberculosis* *E. coli* (< 3 meses)
Infección derivación LCR	*S. epidermidis*	*S. aureus*, enterobacterias
Absceso cerebral	Estreptococos anaerobios y aerobios, *Bacteroides* sp.	Enterobacterias, *S. aureus*
Encefalitis aguda	Virus	*M. pneumoniae*
Generalizadas		
Sepsis	Meningococo, neumococo	Virus
Recién nacido		
Onfalitis	*S. aureus*, estreptococo A	Enterobacterias, estreptococo B
Mastitis, absceso mamario	*S. aureus*	Estreptococo B, enterobacterias
Sepsis, neumonía, meningitis	Estreptococo B, virus	*E. coli*, *K. pneumoniae*, otros estreptococos, *S. aureus*

Las infecciones pediátricas generalmente son agudas y autolimitadas, se acompañan de fiebre y predomina la etiología viral.

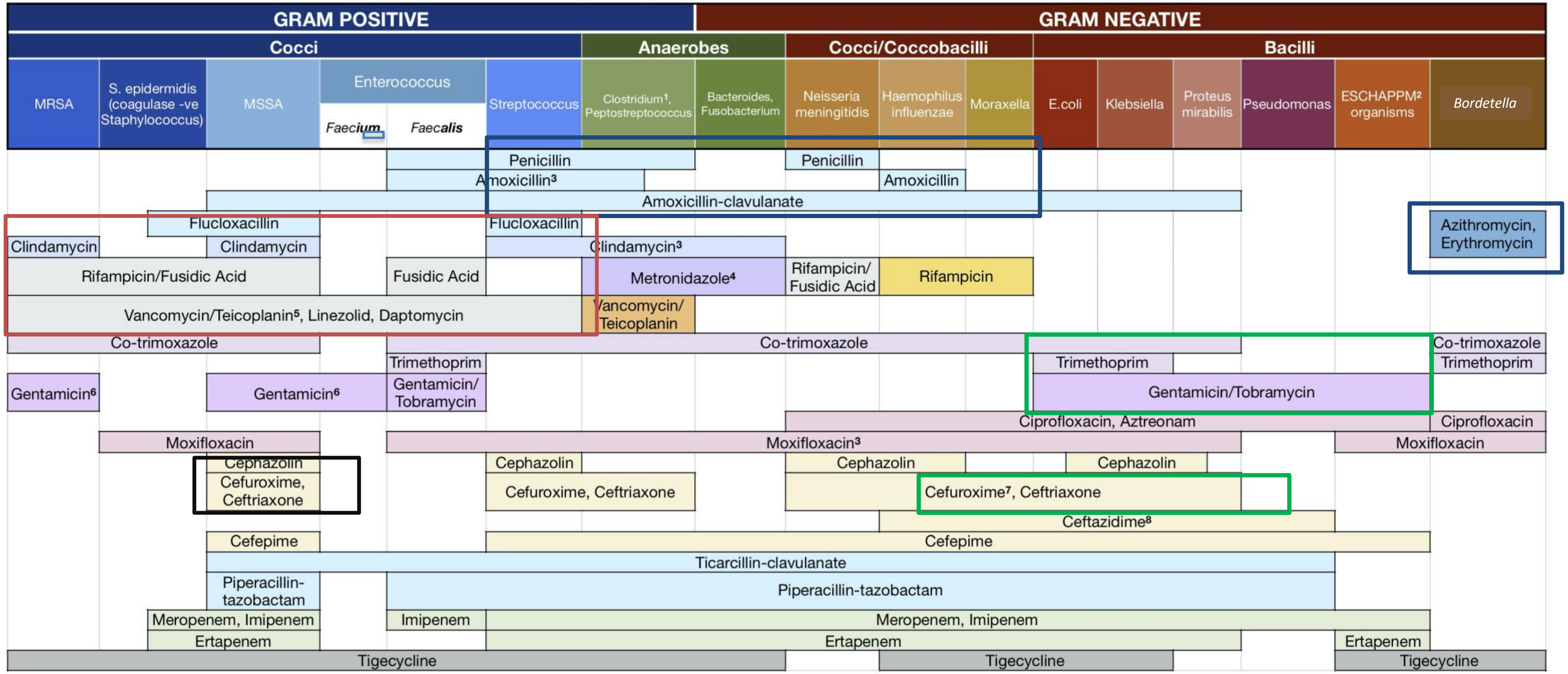
*C. Rodrigo / Enferm Infecc Microbiol Clin. 2010;**28(5)**:310–320*

Respiratorias

Cutáneas

Urinarias

Osteoarticulares



For simplicity, atypical organisms are not included above. Partial columns indicate incomplete coverage. ESBL-producing organisms are not susceptible to most antibiotics containing a beta-lactam ring; carbapenems are the usual agent of choice.

1: *C. difficile* should only be treated with metronidazole or vancomycin. **2:** ESCHAPPM are β-lactamase producing organisms. These are *Enterobacter, Serratia, Citrobacter freundii, Hafnia, Acinetobacter/Aeromonas, Proteus* (**not** *mirabilis*), *Providencia & Morganella morganii*.

3: Not effective against *Clostridium*. **4:** Metronidazole is not effective against *Peptostreptococcus*, **5**: Teicoplanin is not effective against *Enterococcus faecium*, **6:** Gentamicin is not appropriate mono therapy for *Staphylococcus aureus* & should only be used in conjunction with a β-lactam.

7: Due to increasing MIC, Cefuxorime is not recommended therapy for *Moraxella*. **8**: Although it has other actions, Ceftazidime should only be used for *Pseudomonas*.

ANTIBIOTIC CLASS KEY

PENICILLINS	LINCOSAMIDE	MACROLIDES	NITROIMIDAZOLE	RIFAMYCIN	GLYCOPEPTIDES
SULFONAMIDES	AMINOGLYCOSIDES	FLUOROQUINOLONES	CEPHALOSPORINS	CARBAPENEMS	GLYCYLCYCLINE

Antibioterapia en pediatría

An Pediatr (Barc). 2018;88(5):259–265

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ORIGINAL

Adecuación de la prescripción de antimicrobianos en población pediátrica en un servicio de urgencias hospitalario

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Tabla 1 Enfermedades y aspecto en el que se produce la inadecuación del tratamiento

Enfermedad n (%)	Enfermedad no subsidiaria N = 22 (40,7%)	Elección incorrecta del antimicrobiano N = 19 (35,2%)	Posología incorrecta N = 13 (24,1%)	Total N = 54/104 (51,9%)
Otitis media aguda	0 (0)	6 (11,5)	4 (7,3)	10 (18,5)
Faringoamigdalitis criterios bacteriana	0 (0)	5 (9,3)	1 (1,8)	6 (11,5)
Faringoamigdalitis criterios viral	4 (7,3)	0 (0)	0 (0)	4 (7,3)
Episodio de sibilancias	7 (13)	0 (0)	0 (0)	7 (13,0)
Fiebre sin foco	7 (13)	0 (0)	0 (0)	7 (13,0)
Neumonía adquirida en la comunidad	0 (0)	3 (5,5)	2 (3,7)	5 (9,3)
Herida complicada con infección	0 (0)	1 (1,8)	2 (3,7)	3 (5,5)
Herida no complicada	0 (0)	0 (0)	1(1,8)	1 (1,8)
Conjuntivitis aguda	1 (1,8)	0 (0)	2 (3,7)	3 (5,5)
Catarro de vías altas	2 (3,7)	0 (0)	0 (0)	2 (3,7)
Mordedura de perro	0 (0)	1 (1,8)	1 (1,8)	2 (3,7)
Adenitis bacteriana	0 (0)	1 (1,8)	0 (0)	1 (1,8)
Orquiepididimitis	0 (0)	1 (1,8)	0 (0)	1 (1,8)
Otitis externa	0 (0)	1 (1,8)	0 (0)	1 (1,8)
Traumatismo ocular	1 (1,8)	0 (0)	0 (0)	1 (1,8)

16,5% recibieron ATB
51,9% inadecuado:

- 40,7% innecesario, 35,2% incorrecto, 24,1% incorrecta posología
- OMA, sibilantes, FSF, FAA NAC

An Pediatr (Barc). 2018;89(4):197–204

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ORIGINAL

Prescripción de antibióticos y realización de pruebas complementarias en función de la frecuentación y de la fidelización en Atención Primaria☆

Josep Vicent Balaguer Martínez[a,*], Guadalupe del Castillo Aguas[b], Ana Gallego Iborra[c] y Grupo de Investigación de la AEPap y Red de pediatras Centinela PAP.en.Red

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[c] Centro de Salud Trinidad, Málaga, España

Tabla 3 Tasas de prescripción de antibióticos global y por grupos de edad

	Global	De 0 a 2 años	De 3 a 6 años	De 7 a 14 años
Total de antibióticos	0,88	1,42	1,35	0,55
Penicilinas	0,45	0,73	0,75	0,25
Penicilinas con inhibidores	0,19	0,31	0,27	0,13
Cefalosporinas	0,03	0,07	0,04	0,02
Macrólidos	0,12	0,18	0,19	0,08
Otros	0,09	0,13	0,09	0,08

Tasas de prescripción expresadas en número de prescripciones por paciente y año.

Tabla 5 Relación entre hiperfrecuentación y prescripción de antibióticos

	HF moderados	HF extremos
Total	2,13 (1,74-2,62)	3,25 (2,55-4,13)
De 0 a 2 años	2,06 (1,34-3,18)	2,11 (1,24-3,60)
De 3 a 6 años	1,96 (1,32-2,90)	3,57 (2,23-5,69)
De 7 a 14 años	2,43 (1,80-3,28)	3,66 (2,60-5,17)

Se muestra la razón de tasas de prescripción de ATB con el intervalo de confianza del 95% de los HF moderados y extremos respecto a los no HF. Cálculos obtenidos mediante regresión binomial ajustando el resultado por las variables edad, inmigrante, familia monoparental, seguro privado, enfermedad crónica y número de morbilidades.

La prescripción de antibióticos y la realización de pruebas complementarias se relacionaron significativamente con la hiperfrecuentación.

- el riesgo de prescripción de ATB es el doble entre los HF moderados y el triple entre los HF extremos respecto a los no HF

J Antimicrob Chemother 2016; 71: 1106–1117
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The Worldwide Antibiotic Resistance and Prescribing in European Children (ARPEC) point prevalence survey: developing hospital-quality indicators of antibiotic prescribing for children

Ann Versporten[1], Julia Bielicki[2], Nico Drapier[1], Mike Sharland[2] and Herman Goossens[1*] on behalf of the ARPEC project group†

[1]Laboratory of Medical Microbiology, Vaccine & Infectious Disease Institute (VAXINFECTIO), Faculty of Medicine and Health Science, University of Antwerp, Antwerp, Belgium; [2]Paediatric Infectious Diseases Research Group, Institute for Infection and Immunity, St George's, University of London, London, UK

Table 1. Overview of the suggested antibiotic quality indicators

Potential antimicrobial quality indicators for hospitalized neonates and children

1. Documentation of the reason for antimicrobial prescribing in the notes[a]
2. Targeted therapeutic antibiotic prescribing[a]
3. Parenteral administration of antibiotics[a]
4. Number of antibiotic combination therapies[a]
5. Broad-spectrum antibiotic prescribing[b]
6. Antibiotic prevalence rates for hospital-acquired infections[c]
7. Targeted broad-spectrum antibiotic prescribing for hospital-acquired infections[c]
8. Empirical broad-spectrum antibiotic prescribing for community-acquired infections[c]
9. Broad-spectrum antibiotic prescribing for surgical prophylaxis[d]
10. Prolonged antibiotic prescribing for surgical prophylaxis[d]

[a]See Table 2.
[b]See Figures 1 and 2 and Tables 3 and 4.
[c]See the Results section 'Therapeutic prescribing' and Tables 6 and 7.
[d]See the Results section, last paragraph.

Table 2. Overview of antibiotic prevalence rates and quality indicators by ward type

Ward type	Patients (*n*)	Patients treated [*n* (%)]	Prescriptions (*n*)	Reason in notes (%)	Targeted treatment (%)	Parenteral administration (% of patients)	Antibiot combinat (% of patie
Paediatric intensive care unit (PICU)	1062	651 (61.3)	1113	74.1	25.7	89.7	50.7
Specialized paediatric medical ward (SPMW)	3584	1648 (46.0)	2662	67.9	27.4	66.1	40.7
General paediatric medical ward (GPMW)	5298	2091 (39.5)	2929	76.4	19.7	74.3	31.6
Paediatric surgical ward (PSW)	2273	803 (35.3)	1135	63.3	19.0	78.1	32.6
Neonatal intensive care unit (NICU)	3515	1065 (30.3)	1933	82.7	18.7	95.6	71.2
General neonatal medical ward (GNMW)	1961	241 (12.3)	424	68.2	27.9	96.7	70.1
Total	17693	6499 (36.7)	10196	73.3	22.3	78.6	43.8

All indicators were calculated at patient level, with the exception of Reason in notes and Targeted treatment, which were calculated at prescription l
For targeted treatment, selection has been made for therapeutic antibiotic use only (HAI and CAI).
Gambia, with outlying results for targeted use, was removed from analyses.

Table 5. Top 10 most-recorded reasons to treat children (>1 month) and neonates (<30 days)

Reason to treat (children)	%	Reason to treat (neonates)	%
Bacterial lower respiratory tract infection	18.7	sepsis	36.4
Prophylaxis for medical problems	15.1	prophylaxis for maternal risk factors	12.2
Prophylaxis for surgical disease	9.9	prophylaxis for newborn risk factors	11.3
Sepsis	9.0	lower respiratory tract infection	8.7
Treatment for surgical disease	6.1	prophylaxis for surgical disease	5.4
Urinary tract infection (upper and lower)	5.6	prophylaxis for medical problems	5.1
Febrile neutropenia/fever in oncologic patients	4.8	catheter-related bloodstream infection	3.4
Upper respiratory tract infection	4.6	CNS infections	3.2
Skin/soft tissue infections	4.4	treatment for surgical disease	2.6
Viral lower respiratory tract infection	3.7	skin/soft tissue infections	2.6

Table 3. Most prescribed antibiotics (ATC J01; 5th level) to children (≥30 days old) (%) by UN region[a], ranked at overall drug utilization 90% (DU90%)

Eastern Europe (n=112)		Northern Europe (n=1806)		Southern Europe (n=1558)		Western Europe (n=1157)		Africa (n=491)		Asia (n=1094)		Australia (n=502)		Latin America (n=528)		North America (n=463)	
ceftriaxone	31.3	amoxicillin/inhib.	13.6	ceftriaxone	9.8	sulfa./trimethoprim	11.4	gentamicin	16.3	ceftriaxone	13.0	sulfa./ trimethoprim	10.0	meropenem	13.1	sulfa./trimethoprim	11.2
ampicillin	10.7	amoxicillin	7.1	amoxicillin/inhib.	7.6	amoxicillin/inhib.	8.1	ceftriaxone	14.1	vancomycin	8.5	piperacillin/inhib.	7.6	vancomycin	12.9	vancomycin	10.6
sulfa./trimethoprim	8.0	ceftriaxone	6.9	sulfa./ trimethoprim	7.4	cefuroxime	6.7	benzylpenicillin	10.2	cefotaxime	8.2	gentamicin	7.6	ceftriaxone	11.6	cefepime	7.8
cefuroxime	5.4	cefuroxime	5.5	piperacillin/inhib.	5.5	amoxicillin	5.6	cefuroxime	9.8	amikacin	7.4	cefazolin	7.6	clindamycin	7.6	azithromycin	7.6
ampicillin/inhib.	4.5	sulfa./ trimethoprim	5.3	meropenem	4.7	vancomycin	4.8	sulfa./ trimethoprim	8.1	meropenem	7.1	amoxicillin	6.2	amikacin	6.6	clindamycin	6.5
procaine benzylpenicillin	4.5	flucloxacillin	5.3	gentamicin	4.6	cefotaxime	4.8	ampicillin	5.1	piperacillin/inhib.	5.4	flucloxacillin	6.2	piperacillin/inhib.	5.1	cefazolin	6.5
amikacin	3.6	gentamicin	5.1	teicoplanin	4.6	meropenem	4.6	cloxacillin	4.1	ceftazidime	4.5	ticarcillin	6.0	cefalotin	4.7	piperacillin/inhib.	5.8
azithromycin	3.6	azithromycin	4.5	metronidazole	4.5	piperacillin/inhib.	4.5	chloramphenicol	3.5	cefuroxime	4.2	cefotaxime	5.6	ciprofloxacin	3.2	amoxicillin	5.0
levofloxacin	3.6	cefotaxime	4.4	cefotaxime	4.3	gentamicin	4.2	amoxicillin/inhib.	3.3	metronidazole	4.2	vancomycin	5.2	sulfa./ trimethoprim	3.0	ceftriaxone	4.3
vancomycin	2.7	piperacillin/inhib.	4.0	ceftazidime	4.0	colistin	3.8	ciprofloxacin	3.3	sulfa./ trimethoprim	3.7	amoxicillin/inhib.	3.8	ampicillin	3.0	gentamicin	3.5
piperacillin/inhib.	2.7	clarithromycin	3.9	amikacin	3.9	metronidazole	3.5	metronidazole	2.9	ampicillin/inhib.	3.1	metronidazole	3.8	trimethoprim	3.0	ampicillin	3.5
gentamicin	2.7	metronidazole	3.7	ampicillin	3.9	ampicillin	3.0	meropenem	2.4	clindamycin	2.9	azithromycin	3.8	amoxicillin	2.8	tobramycin	3.5
cefoperazone comb.	2.7	meropenem	3.5	cefuroxime	3.6	teicoplanin	2.9	amikacin	2.4	clarithromycin	2.7	ceftriaxone	3.2	metronidazole	2.7	metronidazole	2.4
nalidixic acid	2.7	benzylpenicillin	3.0	vancomycin	3.5	ceftriaxone	2.9	flucloxacillin	2.4	amoxicillin/inhib.	2.7	tobramycin	2.8	ampicillin/inhib.	2.7	ciprofloxacin	2.4
meropenem	1.8	vancomycin	2.4	ciprofloxacin	2.8	ceftazidime	2.8	amoxicillin	1.8	cefazolin	2.3	ciprofloxacin	2.6	cloxacillin	2.7	cefalexin	2.4
		ceftazidime	2.4	clarithromycin	2.5	cefazolin	2.2			ampicillin	2.2	benzylpenicillin	2.2	cefotaxime	2.1	trimethoprim	2.2
		ciprofloxacin	2.1	clindamycin	2.3	amikacin	2.1			cefoperazone. comb.	2.0	cefalexin	2.0	clarithromycin	1.9	phenoxymethylpenicillin	1.9
		tobramycin	1.9	amoxicillin	2.1	ciprofloxacin	2.1			gentamicin	1.6	meropenem	1.6	cefepime	1.7	erythromycin	1.9
		cefazolin	1.7	ampicillin/inhib.	1.9	tobramycin	1.9			ciprofloxacin	1.5	lincomycin	1.6			meropenem	1.7
		clindamycin	1.7	trimethoprim	1.7	imipenem/inhib.	1.9			cloxacillin	1.5	amikacin	1.4				
		teicoplanin	1.6	ceforanide	1.5	trimethoprim	1.6			azithromycin	1.2						
				cefazolin	1.4	phenoxymethylpenicillin	1.5										
				azithromycin	1.3	clindamycin	1.4										
				cefepime	0.9	azithromycin	1.1										
						ampicillin/inhib.	1.1										

sulfa., sulfamethoxazole; inhib., β-lactamase inhibitor; comb., combination.
Grey shading indicates drug utilization 75% (DU75%) by UN region.
[a]Number of countries included from each region: Eastern Europe (3), Northern Europe (6), Southern Europe (9), Western Europe (6), Africa (4), Asia (8), Australia (1), Latin America (3), North America (1).

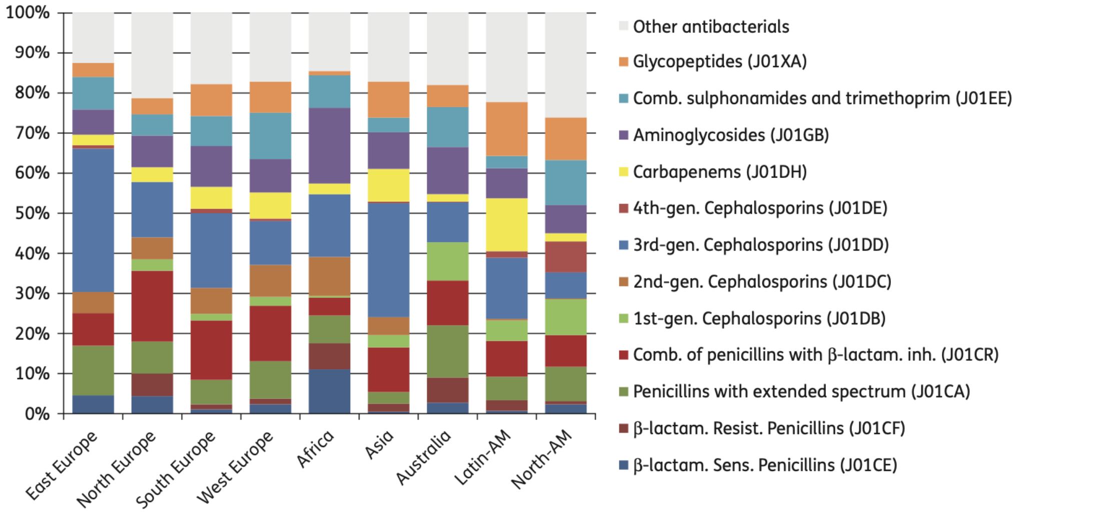

Figure 1. Proportion of prescribed antibiotics (ATC4 level) among children (>1 month) by region. The pale grey part of the stacked bars represents other

Amplia variabiliad regional siendo los beta lactámicos son más de la mitad de los ATB prescriptos en total.

Las cefalosporinas de de 3ªG son las más presciptas en Europa (35,7%) y Asia (28,6%)

Cefrtiaxona la primera en Europa del este, Asia y Europa del sur, Cefotaxima en Australia y Europa occidental

Cefepime en NA (7,8%) y carbapenemes en Latinoamérica (13%)

TMP-SMX primero en Europa occidental (11,4%), NA 11,2% y Australia 10%); Vancomicina segundo en Latinoamérica 12,9%

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The Worldwide Antibiotic Resistance and Prescribing in European Children (ARPEC) point prevalence survey: developing hospital-quality indicators of antibiotic prescribing for children

Ann Versporten[1], Julia Bielicki[2], Nico Drapier[1], Mike Sharland[2] and Herman Goossens[1*] on behalf of the ARPEC project group†

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Table 4. Most prescribed antibiotics (ATC J01; 5th level) to neonates (<30 days old) (%) by UN region[a], ranked at overall drug utilization 90% (DU90%)

Northern Europe (n=674)		Southern Europe (n=386)		Western Europe (n=332)		Africa (n=245)		Asia (n=416)		Australia (n=122)		Latin America (n=69)		North America (n=48)	
gentamicin	29.1	ampicillin	29.5	ampicillin	18.4	gentamicin	36.3	ampicillin	24.3	gentamicin	32.8	ampicillin	29.0	gentamicin	31.3
benzylpenicillin	28.2	gentamicin	23.6	gentamicin	12.7	benzylpenicillin	21.6	gentamicin	13.9	benzylpenicillin	24.6	gentamicin	14.5	ampicillin	29.2
cefotaxime	10.8	vancomycin	9.8	cefotaxime	10.2	ampicillin	13.5	amikacin	11.8	cefotaxime	12.3	vancomycin	13.0	amoxicillin	10.4
amoxicillin	5.0	amikacin	7.0	vancomycin	10.2	cefuroxime	5.7	cefotaxime	9.9	amoxicillin	9.0	amikacin	11.6	cefazolin	8.3
vancomycin	4.3	meropenem	5.2	amoxicillin	7.5	meropenem	4.9	meropenem	8.7	vancomycin	8.2	cefotaxime	8.7	cefotaxime	6.3
metronidazole	4.2	ceftriaxone	4.4	tobramycin	7.2	cloxacillin	4.1	piperacillin/ inhib.	7.0	flucloxacillin	3.3	piperacillin/ inhib.	4.3	clindamycin	4.2
flucloxacillin	2.8	cefotaxime	3.6	amikacin	6.9	cefotaxime	3.7	vancomycin	6.7			meropenem	4.3		
amoxicillin/inhib.	2.4	netilmicin	2.8	meropenem	4.2			metronidazole	2.9			procaine penicillin	2.9		
meropenem	2.4	teicoplanin	2.8	ampicillin/inhib.	3.9			benzylpenicillin	2.4			cloxacillin	2.9		
amikacin	1.2	ceftazidime	1.6	cefuroxime	3.3			cloxacillin	1.9						
				piperacillin/inhib.	3.0			ceftazidime	1.4						
				amoxicillin/inhib.	1.8										
				imipenem	1.8										

inhib., enzyme inhibitor.
Grey shading indicates drug utilization 75% (DU75%) by UN region.
[a]Number of countries included from each region: Northern Europe (6), Southern Europe (9), Western Europe (6), Africa (4), Asia (8), Australia (1), Latin America (3), North America (1).

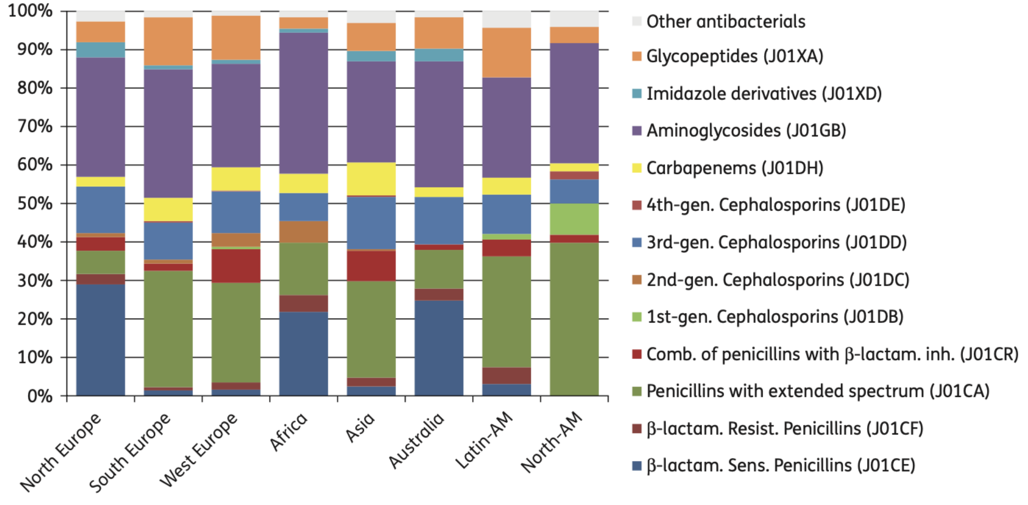

Figure 2. Proportion of prescribed antibiotics (ATC4 level) among neonates (<30 days) by region. The pale grey part of the stacked bars represents other antibacterial subgroups. There are no data for Eastern Europe. This figure appears in colour in the online version of *JAC* and in black and white in the print

En neonatos los ATB más usados han sido:
1- gentamicina 23,6%
2- ampicilina 15,3%
3- bencilpenicilina 12,8%

Menor variabilidad por regiones, destacando:

- Amikacina en Europa occidental y Sur, Asia y latinoamérica
- Meropenem en Asia

- De 17.693 admisiones, el 36,7% de los niños recibieron al menos un antimicrobiano, con amplia variabilidad entre regiones.
- Utilización de ATB de amplio espectro
- Alto uso de ATB para ineecciones relacionadas con la asistencia sanitaria en neonatos
- Alto uso de ATB parenterales
- Falta de documentación sobre indicación de antibioterapia
- Profilaxis quirúrgicas prolongadas

Table 6. Antibiotic use by indication, type of treatment (empirical versus targeted) and UN region for children >1 month

	Therapeutic use								Prophylactic use			
	community-acquired infection				hospital-acquired infection							
	empirical		targeted		empirical		targeted		medical		surgical	
Region	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Europe	2073	81.8	461	18.2	676	69.9	291	30.1	768	63.3	445	36.7
Africa	343	81.7	77	18.3	54	76.1	17	23.9	27	96.4	1	3.6
Asia	411	72.4	157	27.6	138	60.8	89	39.2	124	42.9	165	57.1
Australia	201	73.1	74	26.9	54	56.8	41	43.2	79	56.4	61	43.6
Latin America	167	73.9	59	26.1	149	69.0	67	31.0	42	48.3	45	51.7
North America	149	70.6	62	29.4	66	68.0	31	32.0	119	71.7	47	28.3
Total	3344	79.0	890	21.0	1137	68.0	536	32.0	1159	60.3	764	39.7

Sixty-eight antibiotics were recorded with unknown indication.

Table 7. Antibiotic use by indication, type of treatment (empirical versus targeted) and UN region for neonates <30 days

	Therapeutic use								Prophylactic use			
	community-acquired infection				hospital-acquired infection							
	empirical		targeted		empirical		targeted		medical		surgical	
Region	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Europe	665	91.7	60	8.3	275	77.2	81	22.8	236	76.1	74	23.9
Africa	148	72.2	57	27.8	26	76.5	8	23.5	2	28.6	5	71.4
Asia	108	92.3	9	7.7	103	73.6	37	26.4	122	80.3	30	19.7
Australia	44	100	—	—	23	71.9	9	28.1	41	89.1	5	10.9
Latin America	6	75.0	2	25.0	10	58.8	7	41.2	37	86.0	6	14.0
North America	14	93.3	1	6.7	17	94.4	1	5.6	8	53.3	7	46.7
Total	985	88.4	129	11.6	454	76.0	143	24.0	446	77.8	127	22.2

Fourteen antibiotics were recorded with unknown indication.

Characteristic	n (%) or median (IQR)	Range across EDs (%)	Missing, n (%)
Age in years	2.77 (1.32–5.59)		
Male	19,476 (54.6)	51.5–59.1	1 (0.0)
Comorbidity	5,889 (16.5)	5.1–65.3	326 (0.9)
Season			1,111 (3.1)
Winter	12,665 (35.5)	26.8–53.2	
Spring	9,054 (25.4)	18.2–31.2	
Summer	5,767 (16.2)	9.5–23.5	
Autumn	8,164 (22.9)	6.9–31.4	
Triage urgency			1,059 (2.9)
High: immediate, very urgent, urgent	12,251 (34.4)	8.3–88.5	
Low: standard, non-urgent	22,340 (62.7)	10.1–91.6	
Referred	15,104 (42.4)	4.9–99.2	1,110 (3.1)
Fever duration in days	1.5 (0–3)		2,449 (6.9)
NICE "red traffic light" alarming signs			
Ill appearance	5,567 (15.6)	0.8–47.4	1,525 (4.3)
Work of breathing	2,987 (8.4)	3.2–25.7	4,482 (12.6)
Dehydration	1,763 (4.9)	0.4–15.2	6,323 (17.7)
Rash: petechiae/non-blanching	1,039 (2.9)	1.4–5.8	3,963 (11.1)
Decreased consciousness	188 (0.5)	0.1–3.8	334 (0.9)
Meningeal signs	132 (0.4)	0.1–1.7	1,807 (5.1)
Focal neurology	121 (0.3)	0.0–2.6	2,224 (6.2)
Status epilepticus	60 (0.2)	0.0–1.9	1,099 (3.1)
C-reactive protein (CRP)			
No CRP performed	19,578 (54.9)	7.9–93.2	
<20 mg/l	8,729 (24.5)	3.2–58.4	
20–60 mg/l	4,191 (11.8)	1.9–24.9	
>60 mg/l	3,152 (8.8)	1.6–30.2	
Chest X-ray			
No	30,662 (86.0)	78.6–93.8	
Normal	1,931 (5.4)	0.9–10.0	
Abnormal	3,057 (8.6)	2.9–12.8	
Urinalysis			
No	26,691 (74.9)	60.8–91.4	
Normal	7,210 (20.2)	7.1–29.8	
Abnormal	1,749 (4.9)	1.5–9.5	

ED, emergency department; IQR, interquartile range; NICE, National Institute for Health and Care Excellence.

https://doi.org/10.1371/journal.pmed.1003208.t002

PLOS MEDICINE

RESEARCH ARTICLE

Variation in antibiotic prescription rates in febrile children presenting to emergency departments across Europe (MOFICHE): A multicentre observational study

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Parte del proyecto PERFORM (Personalised Risk assessment in Febrile illness to Optimise Real-life Management across the European Union) el estudio MOFICHE (Management and Outcome of Fever in Children in Europe) estudia la varabilidad y adecuación de la prescripción ATB en niños febriles en urgencias pediátricas en Europa

Outcome	n (%) or median (IQR)	Range across EDs (%)
Therapeutic antibiotics use in last 7 days*	3,592 (10.1)	6.6–15.6
Antibiotic treatment duration, days	7 (5–10)	
Antibiotics prescribed at ED visit or first day of hospital admission*	11,371 (31.9)	22.4–41.6
Narrow-spectrum	5,401 (15.2)	3.1–23.2
Broad-spectrum	5,887 (16.5)	9.5–34.7
Antibiotic administration*		
Oral	7,636 (21.4)	10.4–34.2
Intravenous/intramuscular	3,564 (9.9)	1.7–21.3
Admission*	9,000 (25.2)	4.5–54.2
ICU admission*	147 (0.4)	0.1–4.3
Focus of infection		
Upper respiratory tract	18,783 (52.7)	25.7–70.0
Lower respiratory tract	5,167 (14.5)	8.5–26.4
Gastrointestinal/surgical abdomen	3,694 (10.4)	6.0–19.2
Undifferentiated fever	2,784 (7.8)	1.8–18.8
Flu-like illness/exanthem	1,753 (4.9)	2.0–11.9
Urinary tract	1,231 (3.5)	1.2–5.8
Soft tissue/musculoskeletal	876 (2.5)	0.5–6.8
Sepsis/central nervous system	270 (0.8)	0.0–3.9
Inflammatory	136 (0.4)	0.0–1.3
Other	957 (2.7)	1.2–8.4
Cause of infection		
Presumed viral	20,383 (57.2)	37.3–71.4
Definite bacterial	1,451 (4.1)	1.6–10.9
Probable bacterial/bacterial syndrome	6,438 (18.1)	4.7–31.8
Unknown bacterial/viral	5,200 (14.6)	1.6–37.9
Other	2,178 (6.1)	1.1–30.9

*Missing: therapeutic antibiotic use in last 7 days, 681/35,650 (1.9%); antibiotic duration, 1,980/11,371 (17.4%); broad-spectrum versus narrow-spectrum antibiotics, 83/11,371 (0.7%); antibiotic administration, 171/11,371 (1.5%); admission and ICU admission, 25/35,650 (0.1%).

ED, emergency department; ICU, intensive care unit; IQR, interquartile range.

https://doi.org/10.1371/journal.pmed.1003208.t003

Antibiotic class	*n* (%)	Range across EDs (%)
Beta-lactamase sensitive penicillins (e.g., benzylpenicillin)	2,001 (17.6)	0.1–32.5
Beta-lactamase resistant penicillins (e.g., flucloxacillin)	167 (1.5)	0.0–8.1
Penicillins with extended spectrum (e.g., amoxicillin)	3,220 (28.3)	2.6–61.6
Combinations of penicillins with beta-lactamase inhibitors (e.g., amoxicillin with clavulanate)	2,309 (20.3)	1.4–59.0
Macrolides (e.g., azithromycin)	638 (5.6)	2.9–11.0
First-generation cephalosporins	167 (1.4)	0.0–9.8
Second-generation cephalosporins	1,154 (10.1)	0.0–25.6
Third-generation cephalosporins	1,097 (9.6)	1.1–25.1
Trimethoprim and sulphonamides	128 (1.1)	0.0–5.1
Aminoglycosides	205 (1.8)	0.0–15.6
Quinolones	51 (0.4)	0.0–2.8
Glycopeptides	31 (0.3)	0.0–2.7
Other	120 (1.1)	0.0–4.6
Missing	83 (0.7)	0.0–3.6

ED, emergency department.

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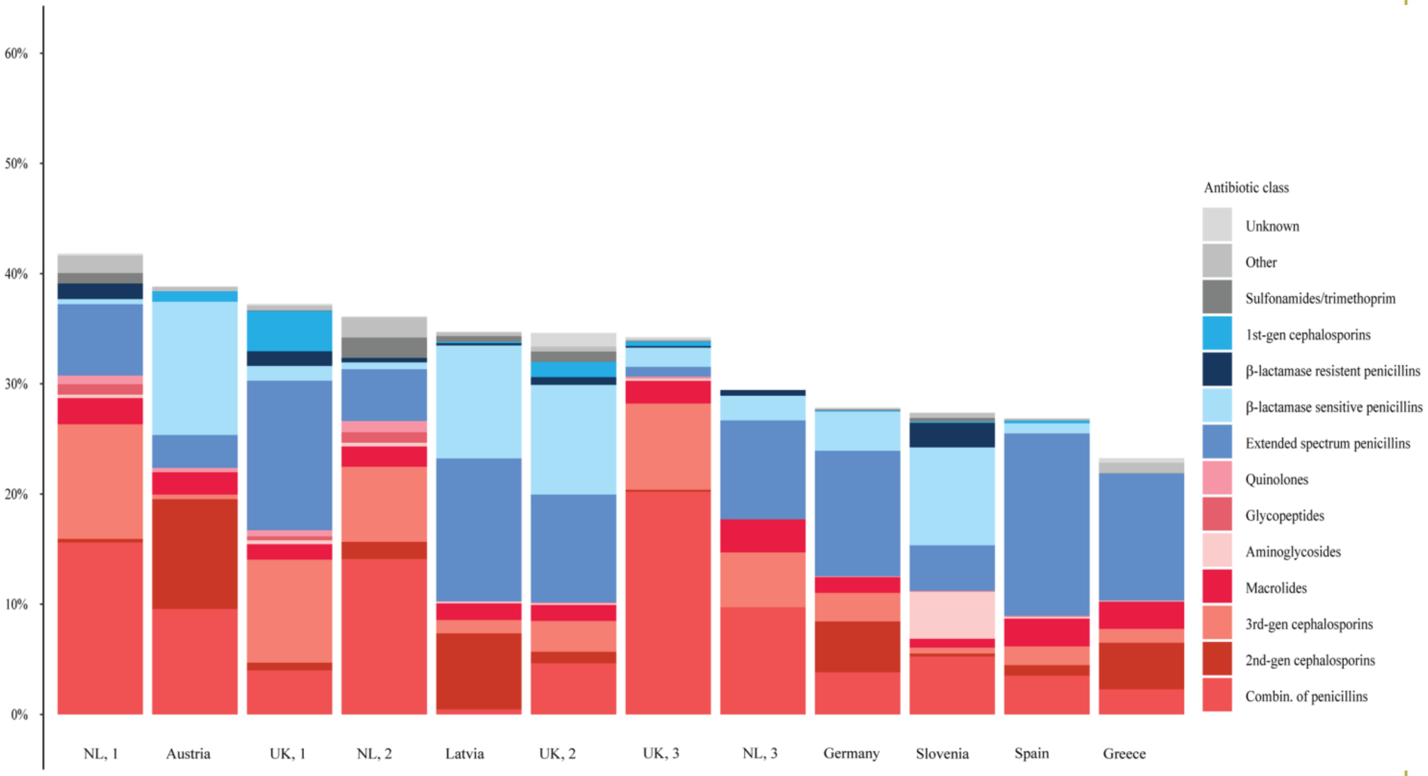


Prescripción 31,9% de los cuales el 67,2% fueron orales.
1/3 fueron tratados más de 7 días
Los más frecuentemente prescriptos fueron penicilinas de espectro extendido, combinaciones con inhibidores de beta-lactamasa y penicilinas BLS
51,7% fueron ATB de amplio espectro: combinaciones de penicilinas con inhibidores de beta lactamasa, cefalosporinas de de segunda y tercera generación

Citation: Hagedoorn NN, Borensztajn DM, Nijman R, Balode A, von Both U, Carrol ED, et al. (2020) Variation in antibiotic prescription rates in febrile children presenting to emergency departments across Europe (MOFICHE): A multicentre observational study. PLoS Med 17 (8): e1003208. https://doi.org/10.1371/journal.pmed.1003208

De todas las prescripciones 65.0% (7,386/11,371 fueron adecuadas (23.7%–98.9%), 12.5% (1,418/11,371) inadecuadas (0.6%–29.3%), y 22.6% (2,567/11,371) no concluyentes (0.5%–61.7%).

EN infecciones VAI el 22,3% de las prescripciones orales no fueron concordantes con las guías, tanto en indicación, duración y concordancia con guía.

En ITUs no complicadas, el 45,1% no fueron concordantes con las guías locales, y el 65,9% fue inadecuada en las 3 medidas.

Conclusions

In this study, we observed wide variation between European EDs in prescriptions of antibiotics and broad-spectrum antibiotics in febrile children. Overall, one-third of prescriptions were inappropriate or inconclusive, with marked variation between EDs. Until better diagnostics are available to accurately differentiate between bacterial and viral aetiologies, implementation of antimicrobial stewardship guidelines across Europe is necessary to limit antimicrobial resistance.

EDs	Inappropriate indication in all prescriptions n=11371	Inappropriate duration in oral prescriptions n=7636	Not guideline-concordant prescriptions in uncomplicated respiratory tract infections n=4373
UK, 3	29.3%	9.0%	19.1%
NL, 2	27.5%	18.3%	36.8%
NL, 3	22.9%	19.7%	43.8%
Greece	20.2%	59.0%	34.7%
UK, 1	18.5%	13.0%	12.4%
NL, 1	14.8%	15.6%	40.0%
Germany	11.2%	8.8%	33.8%
UK, 2	10.5%	4.4%	11.8%
Spain	9.8%	48.4%	19.6%
Austria	9.0%	11.5%	47.3%
Slovenia	4.9%	17.6%	24.3%
Latvia	0.6%	11.4%	12.3%
Scale	Min. 10% 20% Max.	Min. 10% 20% 30% 40% 50% Max.	Min. 20% 30% 40% Max.

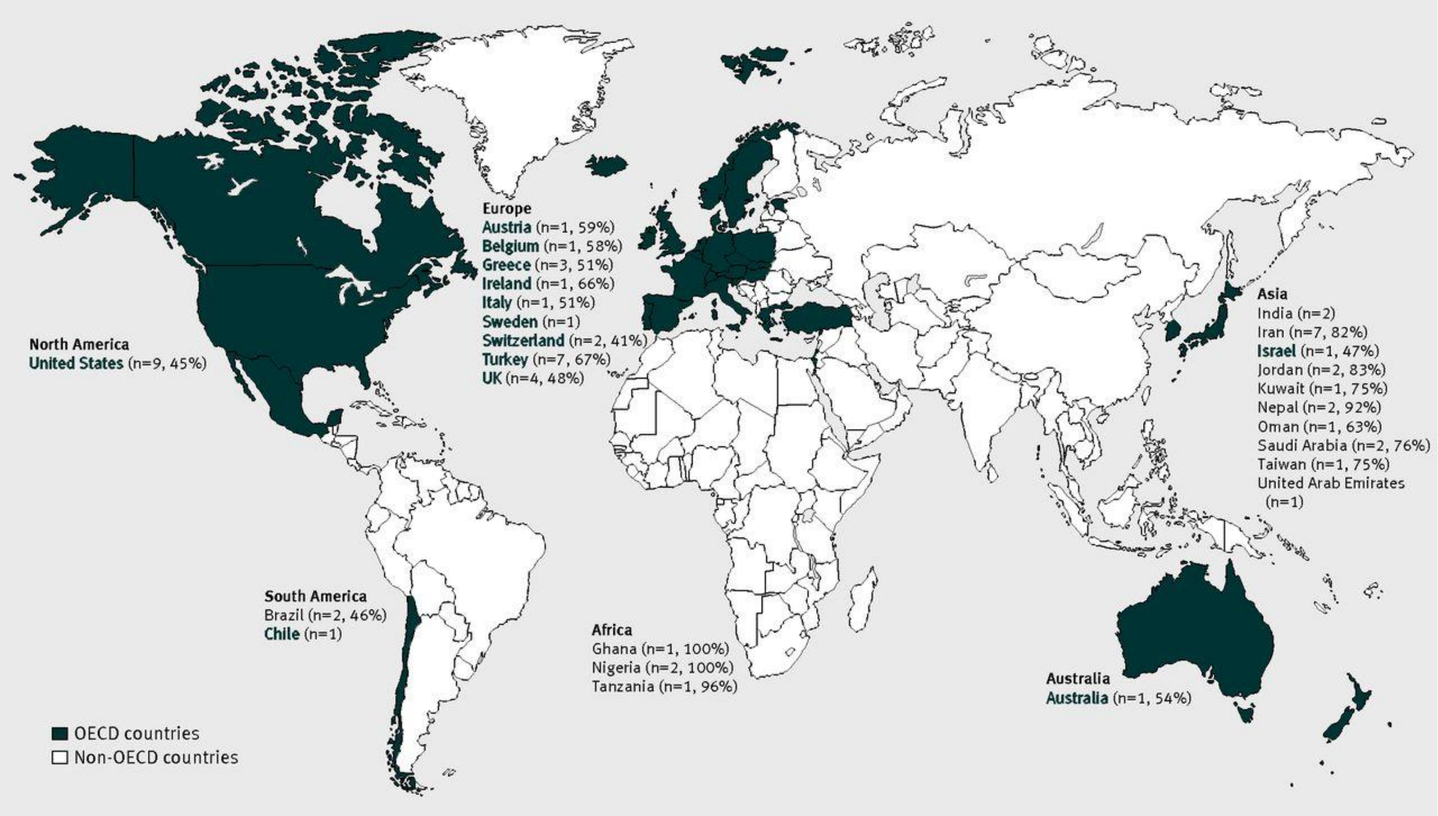
Resistencia antibiótica: también en pediatría

Global prevalence of antibiotic resistance in paediatric urinary tract infections caused by *Escherichia coli* and association with routine use of antibiotics in primary care: systematic review and meta-analysis

Ashley Bryce,[1] Alastair D Hay,[1] Isabel F Lane,[1] Hannah V Thornton,[1] Mandy Wootton,[2] Céi

Ashley Bryce et al. BMJ 2016;352:bmj.i939

Fig 2 Geographical distribution of urinary E coli resistance prevalence to ampicillin (%) by OECD and non-OECD countries,15 with number of included studies per country in parentheses).



Metaanálisis que estudia la prevalencia de R de *E. coli* en ITUs pediátricas en AP y su relación con la administración previa de

Table 2 | Pooled percentage prevalence (95% confidence interval) of resistance to antibiotics in primary care used to treat urinary *E coli* infection in children (see appendix 4 for corresponding forest plots) by OECD (Organisation for Economic Co-operation and Development) status of study country

	OECD				Non-OECD			
Antibiotic	Pooled prevalence (%)	No of isolates tested	No of reporting studies	I^2 (%)	Pooled prevalence (%)	No of isolates tested	No of reporting studies	I^2 (%)
Ampicillin	53.4 (46.0 to 60.8)	66 503	25 (11 countries)[8 20 21 23 26 28-35 37-42 44 46 47 48 49 50]	7	79.8 (73.0 to 87.7)	2265	15 (11 countries)[52 53 56 57 58 61 62 65 68-74]	25
Co-amoxiclav	8.2 (7.9 to 9.6)	65 076	21 (9 countries)[8 20 21 23 25-31 33 34 37 41 42 44 46 47 48 49]	45	60.3 (40.9 to 79.0)	1256	8 (8 countries)[52 61 62 69 70 72-74]	62
Co-trimoxazole	30.2 (20.5 to 39.3)	50 230	24 (9 countries)[8 20 21 23 25 27 28 29-34 36 38 39 42 44-50]	28	69.6 (59.8 to 81.5)	2590	18 (10 countries)[52-54 56-61 64-67 69 72-74 76]	37
Trimethoprim	23.6 (13.9 to 32.3)	18 977	7 (5 countries)[24 26 33 35 37 41 43]	16	Too few data*	596	1 (1 country)[70]	Too few data*
Nitrofurantoin	1.3 (0.8 to 1.7)	50 994	21 (13 countries)[8 20 25 26 27 28 32 33 35 37-47 49 50]	0	17.0 (9.8 to 24.2)	3020	18 (10 countries)[53 54 57-62 64 66-70 72 73 75 76]	42
Ciprofloxacin	2.1 (0.8 to 4.4)	52 209	17 (9 countries)[8 20 25-28 31-33 35 37 41 42 45-48]	59	26.8 (11.1 to 43.0)	1723	11 (7 countries)[52 55 56 58 59 61-64 66 68]	35
Ceftazidime†	2.4 (0.9 to 3.3)	25 805	10 (8 countries)[20 25 28 29 31 39 41 45 46 48]	58	26.1 (14.6 to 37.5)	1136	8 (5 countries)[52 53 55 56 62 70 73 75]	54

*Only one study from non-OECD countries (Saudi-Arabia).
†Marker for cephalosporin resistance.

Results: 58 observational studies investigated 77,783 E coli isolates in urine. In studies from OECD countries, the pooled prevalence of resistance was 53.4% (95% confidence interval 46.0% to 60.8%) for ampicillin, 23.6% (13.9% to 32.3%) for trimethoprim, 8.2% (7.9% to 9.6%) for co-amoxiclav, and 2.1% (0.8 to 4.4%) for ciprofloxacin; nitrofurantoin was the lowest at 1.3% (0.8% to 1.7%). Resistance in studies in countries outside the OECD was significantly higher: 79.8% (73.0% to 87.7%) for ampicillin, 60.3% (40.9% to 79.0%) for co-amoxiclav, 26.8% (11.1% to 43.0%) for ciprofloxacin, and 17.0% (9.8% to 24.2%) for nitrofurantoin. There was evidence that bacterial isolates from the urinary tract from individual children who had received previous prescriptions for antibiotics in primary care were more likely to be resistant to antibiotics, and this increased risk could persist for up to six months (odds ratio 13.23, 95% confidence interval 7.84 to 22.31).

Table 3 | Pooled prevalence (%) of resistance to antibiotics in primary care used to treat urinary *E coli* infection in children aged 0-5 by OECD (Organisation for Economic Co-operation and Development) status of study country

	OECD				Non-OECD			
Antibiotic	Pooled prevalence (%)	No of isolates tested	No of reporting studies	I^2 (%)	Pooled prevalence (%)	No of isolates tested	No of reporting studies	I^2 (%)
Ampicillin	55.0 (48.6 to 61.4)	5273	5 (4 countries)[8 29 31 33 34]	10	90.3 (73.4 to 100)	176	3 (3 countries)[65 69 74]	0
Co-amoxiclav	9.6 (5.7 to 13.5)	5273	5 (4 countries)[8 29 31 33 34]	51	71.9 (40.7 to 100)	89	3 (3 countries)[62 69 74]	66
Co-trimoxazole	29.8 (21.0 to 38.5)	5405	7 (5 countries)[8 29 31 33 34 36 45]	39	71.0 (44.9 to 97.0)	257	5 (4 countries)[65 69 74-76]	0
Trimethoprim	Too few data*	188	1 (1 country)[33]	Too few data*	No data†	0	0	—
Nitrofurantoin	0.4 (0.0 to 0.7)	3089	5 (5 countries)[8 29 33 43 45]	45	35.2 (31.6 to 38.8)	145	3 (3 countries)[62 69 75]	0
Ciprofloxacin	6.2 (3.2 to 9.3)	4544	4 (4 countries)[8 31 33 45]	33	Too few data‡	49	1 (1 country)[62]	Too few data[c]
Ceftazidime§	4.9 (0.3 to 9.5)	1535	4 (4 countries)[29 31 33 45]	28	43.6 (9.0 to 78.2)	130	2 (2 countries)[62 75]	0

*Only one study from OECD countries (Austria).
†No studies from non-OECD countries reported resistance to trimethoprim in children aged 0-5.
‡Only one study from non-OECD countries (India).
§Marker for cephalosporin resistance.

Study	Antibiotic exposure	Resistant	Odds ratio (95% CI)
0-1 month			
Conway (2007)[22]	Any antibiotic	Any antibiotic	7.50 (1.60 to 35.17)
McCloughin (2003)[38]	Any antibiotic	Any antibiotic	9.33 (2.04 to 42.66)
Subtotal: P=0.839, I^2=0%			8.38 (2.84 to 24.77)
0-3 months			
Topaloglu (2010)[51]	Any antibiotic	3rd generation cephalosporin	3.38 (2.05 to 5.55)
Subtotal			3.38 (2.05 to 5.55)
0-6 months			
Allen (1999)[50]	Any antibiotic	Co-trimoxazole	13.23 (7.84 to 22.31)
Subtotal			13.23 (7.84 to 22.31)

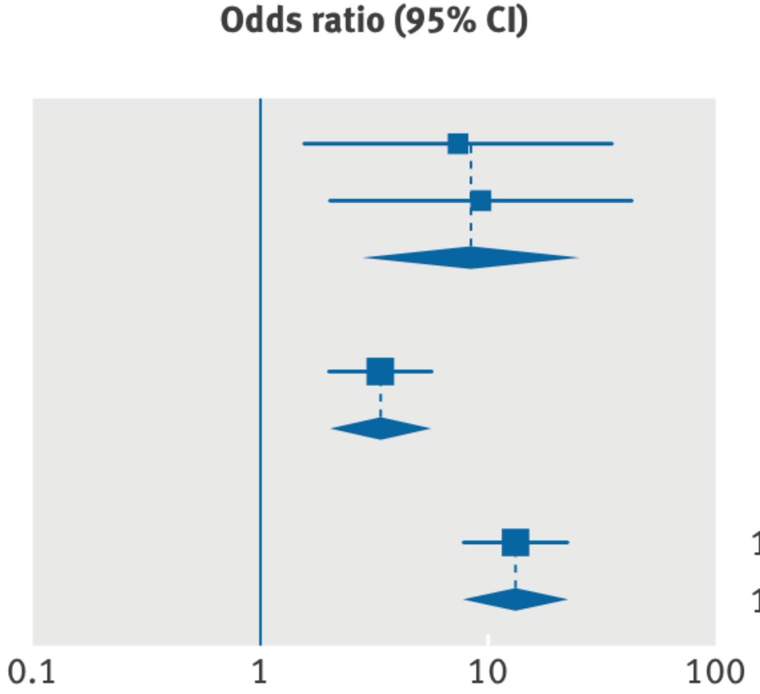


Fig 3 | Pooled crude odds ratios (log scale) for resistance in children's urinary bacteria and previous exposure to any antibiotic. Studies grouped according to time period after antibiotic use during which exposure was measured and ordered within each time period by increasing standard error

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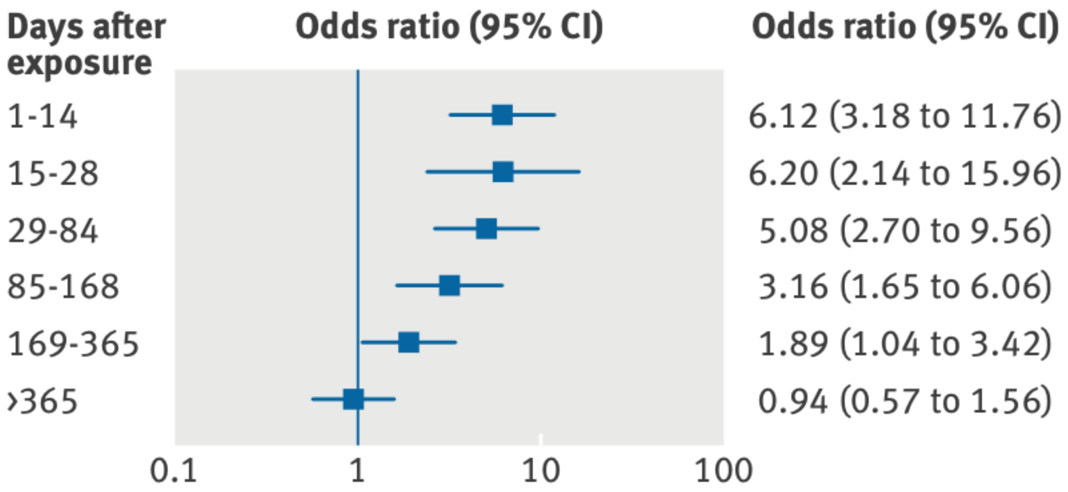

Fig 4 | Individual crude multilevel odds ratios for trimethoprim resistance in urinary isolates of children from Duffy and colleagues[24] and previous trimethoprim prescribing

Un solo estudio mide la relación entre exposición previa al mismo ATB (TMP) y la R en urocultivos antes y después

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Conclusions

Prevalence of resistance to commonly prescribed primary care antibiotics in *E coli* urinary tract infections in children is high, particularly in non-OECD countries, where one possible explanation is availability of antibiotics over the counter. This could render some drugs ineffective as first line treatments for urinary tract infection. Routine use of antibiotics in primary care contributes to antimicrobial resistance in children, which can persist for up to six months after antibiotic prescription.

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Previous Antibiotic Exposure Increases Risk of Infection with Extended-Spectrum-β-Lactamase- and AmpC-Producing *Escherichia coli* and *Klebsiella pneumoniae* in Pediatric Patients

Danielle M. Zerr,[a,d] Arianna Miles-Jay,[b] Matthew P. Kronman,[a,d] Chuan Zhou,[a,d] Amanda L. Adler,[d] Wren Haaland,[d] Scott J. Weissman,[a,d] Alexis Elward,[e,f] Jason G. Newland,[g,h,*] Theoklis Zaoutis,[i,j] Xuan Qin[c,d]

Antimicrobial Agents and Chemotherapy Jun 2016, 60 (7) 4237-4243; **DOI:** 10.1128/AAC.00187-16

EL RR de tener un aislado BLEE es 2,2 veces mayor (IC 98%) en aquellos niños expuestos a ATB en el mes previo. Similar si la exposición fue a cef 3ªG, otros ATB de amplio especgtro o TMP-SMX

El riesgo relativo de tener un aislado con AmpC no fue significativamente elevado con la exposición a ATB el mes anterior fde forma global, pero si fue de 4,48 en aquellos expuestos a Cef 3ªG sin relación con la dosis.

TABLE 2 Descriptive statistics and adjusted odds ratios for antibiotic exposure in patients with ESBL-producing, AmpC-producing, and susceptible infections in previous 30 days, 90 days, and by antibiotic category

	No. (%)			Adjusted relative risk ratio (95% CI)[b]	
Time of exposure, drug category[a]	ESBL n = 210	AmpC n = 94	Controls n = 900	ESBL vs control	AmpC vs control
30 days before culture					
Any antibiotic	100 (48)	32 (34)	200 (22)	2.19 (1.48–3.23)	1.12 (0.65–1.91)
Broad-spectrum beta-lactams	33 (16)	11 (12)	52 (6)	1.98 (1.15–3.40)	1.88 (0.86–4.11)
Third-generation cephalosporins	14 (7)	8 (9)	19 (2)	2.32 (1.09–4.93)	4.47 (1.75–11.41)
Carbapenems	3 (1)	1 (1)	3 (0)	2.35 (0.45–12.37)	2.06 (0.18–23.25)
Cefepime and/or BL/BLIs	24 (11)	4 (4)	34 (4)	2.01 (1.07–3.74)	0.88 (0.28–2.77)
Anaerobic agents	19 (9)	3 (3)	43 (5)	1.20 (0.65–2.20)	0.40 (0.12–1.37)
Aminoglycosides	10 (4)	1 (1)	22 (2)	0.89 (0.37–2.12)	0.37 (0.05–2.98)
Fluoroquinolones	7 (3)	3 (3)	12 (1)	1.62 (0.58–4.50)	1.71 (0.42–6.89)
TMP-SMX	44 (21)	19 (20)	74 (8)	1.81 (1.11–2.96)	1.69 (0.88–3.23)
90 days before culture					
Any antibiotic	120 (57)	45 (48)	289 (32)	1.91 (1.31–2.79)	1.03 (0.62–1.73)
Broad-spectrum beta-lactams	49 (23)	25 (27)	109 (12)	1.31 (0.84–2.05)	1.91 (1.07–3.41)
Third-generation cephalosporins	21 (10)	20 (21)	62 (7)	0.92 (0.53–1.60)	2.68 (1.45–4.94)
Carbapenems	6 (3)	4 (4)	14 (2)	1.04 (0.37–2.90)	1.85 (0.53–6.48)
Cefepime and/or BL/BLIs	37 (18)	11 (12)	62 (7)	1.80 (1.07–3.02)	1.30 (0.60–2.81)
Anaerobic agents	30 (14)	12 (13)	80 (9)	1.08 (0.64–1.78)	0.96 (0.47–1.98)
Aminoglycosides	13 (6)	6 (6)	38 (4)	0.61 (0.30–1.28)	1.06 (0.38–2.94)
Fluoroquinolones	14 (7)	5 (5)	22 (2)	1.76 (0.83–3.74)	1.30 (0.44–3.82)
TMP-SMX	51 (24)	25 (27)	101 (11)	1.53 (0.97–2.41)	1.62 (0.90–2.92)

[a] BL/BLIs, beta-lactams/beta-lactamase inhibitors; TMP-SMX, trimethoprim-sulfamethoxazole.
[b] Multinomial logistic regression was performed controlling for age, sex, previous hospitalization in the last year, presence of an indwelling device, underlying medical conditions, and immunosuppression as defined in Table 1.

Conclusiones

Los procesos infecciosos en la edad pediátrica más frecuentes son de vías respiratorias y otirgen viral

La prescripción de antibióticos en el primer nivel asistencial suele ser inadecuada y/o innecesaria en casi el 50% de los casos

La complejidad asistencial se ve relacionada con la utilización de antiicrobianos de amplio espectro de manera prolongada y sostenida, asi como de utilización profiláctica inadecuada

Las resistencias bacterianas producto de la mala utilización de antimicrobianos afecta también a la edad pediátrica

Los PROA específicos para pediatría son una pieza clave en la lucha contra las resistencias a antimicrobianos

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MUCHAS GRACIAS!

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