C2-536

Resistance in Invasive *vs.* Respiratory *Streptococcus pneumoniae* in the UK and Ireland Before and After Introduction of 7-valent Pneumococcal Vaccine (PCV7)

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BACKGROUND 7-valent pneumococcal conjugate vaccine (PCV7) was added to childhood immunization schedules in England and Wales in September 2006, and replaced by 13-valent PCV13 in April 2010. Invasive pneumococcal disease incidence fell by estimated 34% from 2000-06 to 2009-10 (86% drop in PCV7 types, 19% rise in others).[1]

The BSAC Resistance Surveillance Project tracked antimicrobial susceptibility in *S. pneumoniae* from blood (invasive infections) and community-onset lower respiratory infections (RTI, up to 48 hours in hospital).

[1]Miller et al (2011) Lancet Infect Dis 11: 760-68.

METHODS Between Jan 2001 and Dec 2012, 7496 RTI and 2724 blood isolates were collected from 20-39 centres per year.

MICs were measured by BSAC agar dilution in two central laboratories and interpreted by BSAC/EUCAST breakpoints.

Serotypes were identified for blood isolates only.

RESULTS show resistance to erythromycin (ERY-R, MIC>0.5 mg/L) alone, or in combination with penicillin non-susceptibility, tetracycline resistance or constitutive clindamycin resistance (MICs >0.06, 2 and 0.5 mg/L, respectively).

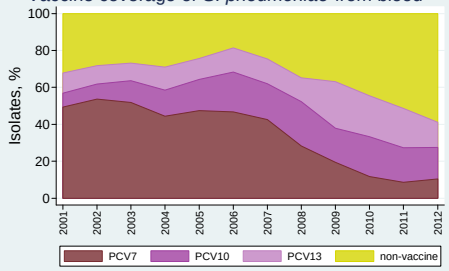
CONCLUSIONS

Following the introduction of PCV7:

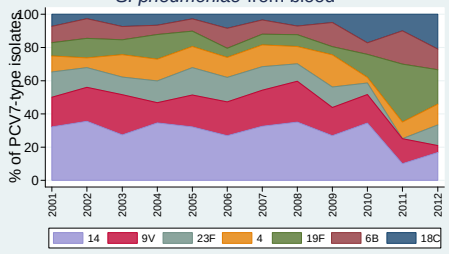
- **Erythromycin resistance** fell among invasive (blood) but not respiratory *S. pneumoniae.*
- **Multiple resistance** increased in blood and especially in respiratory *S. pneumoniae*.
- Previously dominant serotypes 14 and 9V declined in bacteremia, while **types not covered by PCV13** - such as 6C, 15A, 22F and 33F - have become more prominent.
- The **emergence of 15A** is of particular concern as it is very often multi-resistant.

Serotype distribution and resistance in invasive isolates

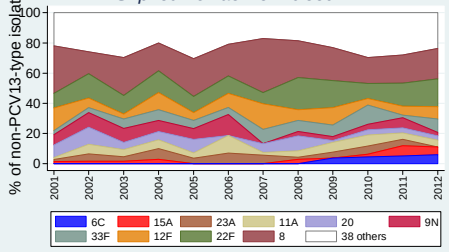
Vaccine coverage of *S. pneumoniae* from blood



Serotype distribution **within PCV7 types** *S. pneumoniae* from blood



Serotype distribution **within non-PCV13 types** *S. pneumoniae* from blood



- PCV7 serotypes fell from 49% of invasive (blood) infections before PCV7 to 10% from 5 years afterwards. Serotypes 14 and 9V fell most sharply, from 15 and 9% before PCV7 to 2 and <1% after 5 years, respectively.
- The six added serotypes of PCV13 rose from 18% of bacteremias in 2001 to peak at 44% in 2009-10, before retreating to 30%.
- From Oct 2011, non-PCV serotypes made up 60% of the total, with 6C, 15A and 33F emerging from very low levels to account for 4, 3 and 5% of all blood *S. pneumoniae*.

Invasive PCV13 serotypes

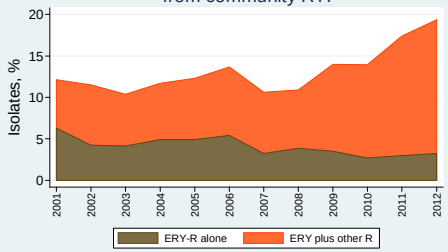
	Sero-type	N of isolates	Erythromycin resistance %		
			single	+ other	total
PCV7	14	290	54	2	57
PCV7	9V	180	3	8	11
PCV7	23F	121	2	7	10
PCV7	4	108	0	1	1
PCV7	19F	94	4	10	14
PCV7	6B	88	6	16	22
PCV7	18C	60	2	0	2
PCV10	1	247	2	0	2
PCV10	7F	200	1	0	1
PCV10	5	4	no calc	no calc	no calc
PCV13	19A	165	1	10	10
PCV13	3	149	3	1	4
PCV13	6A	85	4	1	5

Top ten invasive non-PCV13 serotypes

Sero-type	N of isolates	Erythromycin resistance %		
		single	+ other	total
other	229	4	3	7
8	205	2	0	3
22F	133	1	1	2
12F	78	1	1	3
33F	62	2	10	11
9N	51	6	0	6
20	48	0	2	2
11A	47	6	2	9
23A	34	0	0	0
15A	24	0	50	50
6C	22	0	5	5

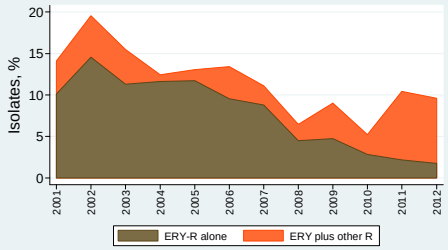
Erythromycin resistance over time

Erythromycin resistance of *S. pneumoniae* from community RTI



Resistance to erythromycin alone was quite stable at around 4% among community-onset RTI but combined resistance rose from 7% before PCV7 to 17% in the year from Oct 2011.

Erythromycin resistance of *S. pneumoniae* from blood



In blood *S. pneumoniae*, resistance to erythromycin alone fell from average 12% before PCV7 to 2% from Oct 2011.

Combined resistance to erythromycin and other agents was uncommon at 3% before PCV7 but reached 8% from Oct 2011.

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Organism ID and Susceptibility Testing 2012 collection: A. Kidney, S. Mushtaq and staff at Quotient Bio Analytical Sciences & Public Health England, London.

Collecting Laboratories: *See* www.bsac.org.uk [1]North Bristol NHS Trust ; [2]Novartis; [3]EUCAST Scientific Secretary; [4]Cempra, [5]RIVM ; [6]Public Health Wales; [7]Quotient Bio Analytical Sciences; [8]Basilea; [9]Public Health England, London; [10]Cubist; [11]AstraZeneca; [12]Pfizer; [13]Astellas; [14]Transcrip Partners.

Central Laboratories: Public Health England, London; Quotient Bio Analytical Sciences, Fordham. Sponsors 2012: Cempra, Cubist, Pfizer, Basilea (associate). **Support:** BSAC.

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