

ANTIBIOTIC RESISTANCE OF STREPTOCOCCUS PNEUMONIAE CAUSING PAEDIATRIC MENINGITIS IN WEST AND CENTRAL AFRICA, 2007-2016

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Introduction

- Worldwide spread of antibiotic resistance to *Streptococcus pneumoniae* (pneumococci) is a major public health concern
- The introduction of pneumococcal conjugate vaccines (PCVs) in children has been associated with a decline in antibiotic resistance. However, data from West and Central Africa are scanty
- The World Health Organization Collaborating Center (WHOCC) for New Vaccines Surveillance at The MRCG supports African countries to monitor pneumococcal antimicrobial resistance as part of surveillance for vaccine preventable invasive bacterial diseases
- We report data collected between 2007 and 2016

Methods and study isolates

- Pneumococcal isolates (185) recovered from suspected meningitis patients aged 0-59 months, were shipped to the WHO CC MRCG (Figure 1)
- Serotyping and antibiogram were performed by latex slide agglutination and Etest methods, respectively
- Sequence types (STs) and resistance genotypes (tetM, pbp, mef1, folA, cat1) were inferred from the genome and displayed on the phylogeny (Figure 3)

Results

Table 1: Characteristics of study population (N=185)

	Category	BEN (%)	CAE (%)	RDC (%)	GHA (%)	CIV (%)	NIG (%)	NIE (%)	SEN (%)	GAM (%)	TOG (%)	Total
Sex	Male	1 (20)	11 (38)	1 (100)	4 (15)	0 (0)	14 (58)	0 (0)	24 (44)	8 (42)	16 (70)	79 (43)
	Female	0 (0)	7 (24)	0 (0)	6 (23)	0 (0)	2 (8)	1 (100)	22 (40)	11 (58)	6 (26)	55 (30)
	Unknown	4 (80)	11 (38)	0 (0)	16 (62)	2 (100)	8 (33)	0 (0)	9 (16)	0 (0)	1 (4)	51 (28)
Age in months	0-11	0 (0)	11 (38)	1 (100)	4 (15)	0 (0)	6 (25)	1 (100)	22 (40)	2 (11)	12 (52)	59 (32)
	12-23	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	6 (25)	0 (0)	9 (16)	9 (47)	2 (9)	27 (15)
	24-59	1 (20)	4 (14)	0 (0)	3 (12)	0 (0)	4 (17)	0 (0)	13 (24)	7 (37)	7 (30)	39 (21)
	Unknown	4 (80)	13 (45)	0 (0)	19 (73)	2 (100)	8 (33)	0 (0)	11 (20)	1 (5)	2 (9)	60 (32)
Source	Blood	0 (0)	0 (0)	0 (0)	8 (31)	0 (0)	0 (0)	0 (0)	1 (2)	12 (63)	0 (0)	21 (11)
	CSF	5 (100)	29 (100)	1 (100)	18 (69)	2 (100)	24 (100)	1 (100)	47 (85)	1 (5)	23 (100)	151 (82)
	Unknown	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (12)	6 (31)	0 (0)	13 (7)
Total		5	29	1	26	2	24	1	55	19	23	185

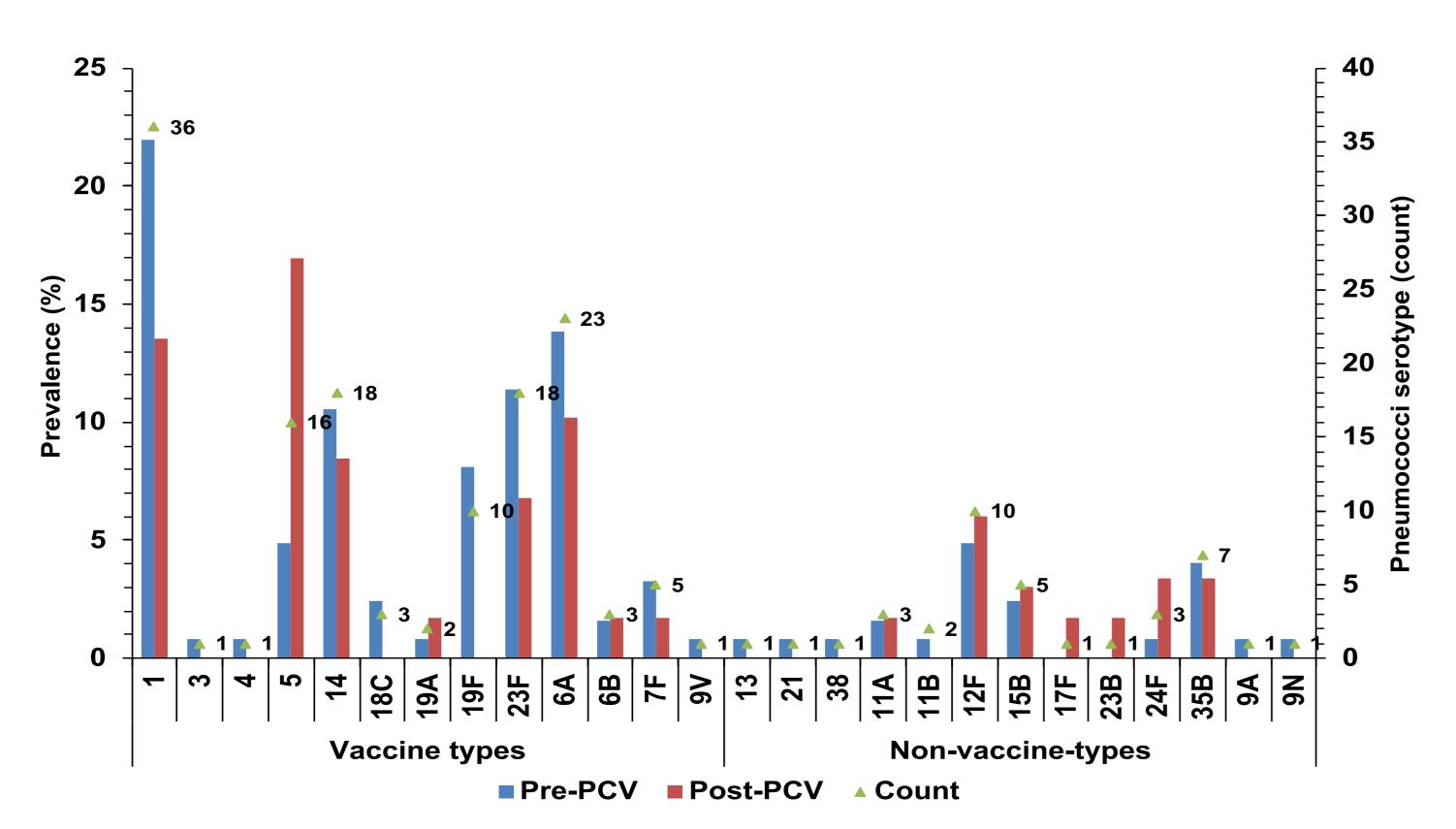


Figure 1: Distribution of pneumococcal serotypes associated with paediatric bacterial meningitis by era of collection

A smaller proportion of vaccine type (VT) isolates have been recovered during post-PCV era

Results continued

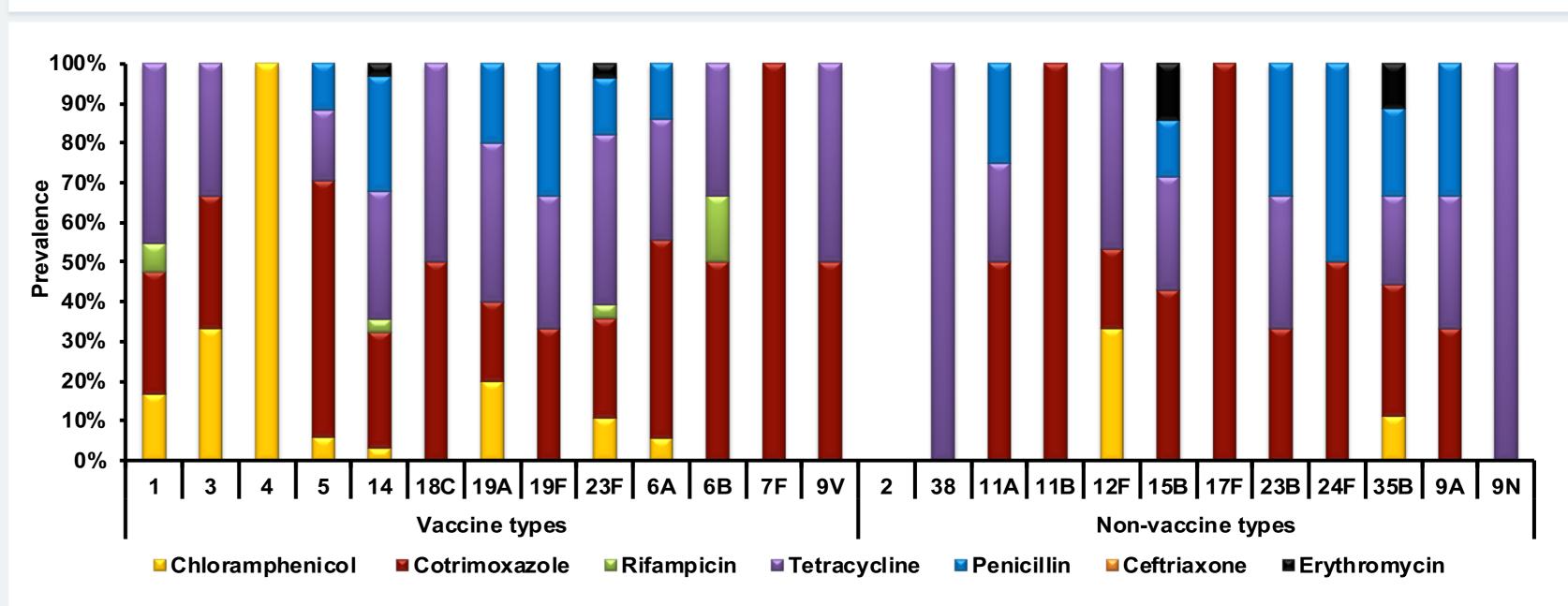


Figure 2: Pneumococcal antibiotic resistance by serotype

- Resistance of pneumococci to cotrimoxazole and tetracycline was shown in 59% and 65% of all serotypes, respectively (Figure 2)
- Multi-drug resistance (resistance to more than three antibiotics) occurred in 80% of vaccine serotypes recovered
- No resistance to ceftriaxone was observed

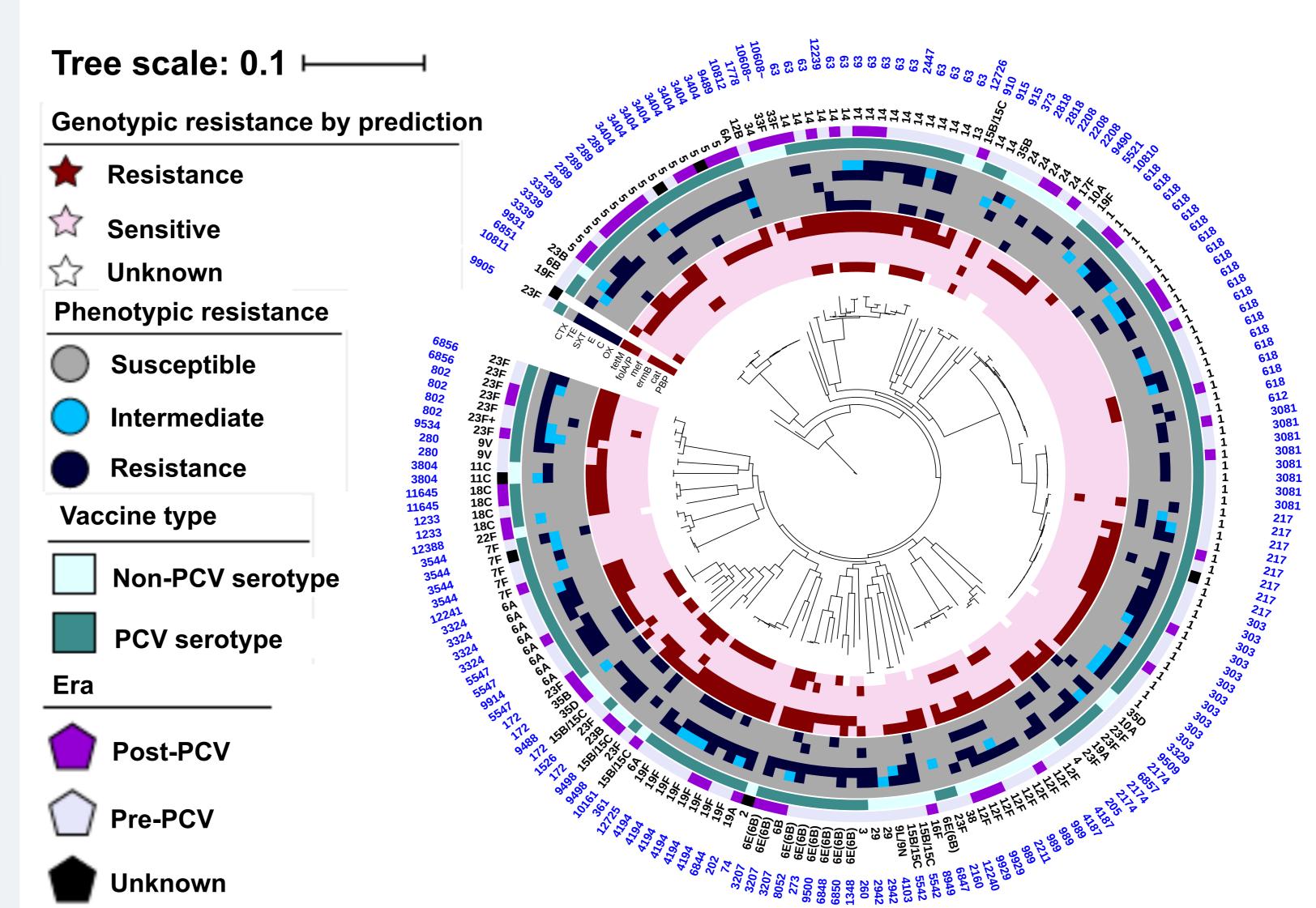


Figure 3: Phylogeny of pneumococcal isolates associated with bacterial meningitis in West and Central Africa

Inner metadata blocks (pink background) show predicted antibiotic resistance alongside phenotypic resistance (grey block) to penicillin (*PBP*; OX), chloramphenicol (*cat*; C), erythromycin (*mef/ermB*; E), cotrimoxazole (*folP/folA*; SXT) and tetracycline (*tetM*; TE). Outer metadata blocks show era of collection (pre or post PCV) and whether serotypes were vaccine or non vaccine. Outer text rings show serotype (black) and ST (blue).

NB: Isolates cultured from blood, lungs and pus are included to contextualize the isolates cultured from CSF

- The phylogeny showed resistance genes were associated with clonal lineages (Figure 3)
- The *pbp* and *cat* genes identified in 20.5% and 9.7% of isolates, respectively were associated with vaccine types (VTs) as well as emerging non-vaccine types (NVTs) 12F (ST989 and ST9929) and 15B/15C (ST9498)

Concluding remarks

The increased prevalence of NVTs e.g serotype 12F carrying the chloramphenicol resistance gene in the post-PCV era poses a significant public heath threat

Acknowledgements

This surveillance was sponsored by WHO Regional Office for Africa and facilitated by the WHO Collaborating Center for New Vaccines Surveillance MRC Unit The Gambia at LSHTM