C2-0422

Stable or Falling Antimicrobial Resistance in Community-Acquired Respiratory Pathogens in the UK

R. Reynolds[1] , L. Williams[2] , J. Shackcloth[2], D. Felmingham[2] and The BSAC Extended Working Party on Respiratory Resistance Surveillance[1]

[1]British Society for Antimicrobial Chemotherapy, Birmingham, B1 2JS [2]GR Micro Limited, London, NW1 3ER

rreynolds@bsac.org.uk.

46th ICAAC, 27 - 30 Sept 2006, San Francisco.

BACKGROUND

The BSAC Respiratory Resistance Surveillance Programme has monitored antimicrobial resistance in the pathogens causing community-acquired lower respiratory infection in the UK and Ireland since the winter of 1999-2000. The present analysis excludes the Republic of Ireland.

METHODS

Around 20 centres contributed up to 50 (non-duplicate, non-cystic fibrosis) *S. pneumoniae*, 50 *H. influenzae* and 25 *M. catarrhalis* isolates each winter from October to April, to be tested centrally by the BSAC agar dilution method.

Trends were analysed by logistic regression, including time (days from start of study) and centre, and power was assessed by simulation.

ABBREVIATIONS

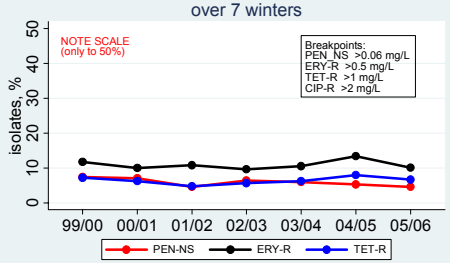
PEN	penicillin	β-LAC	β-lactamase
ERY	erythromycin	TET	tetracycline
CIP	ciprofloxacin	R	resistant/resistance
OR	odds ratio for resistance, per **5** years.		

RESULTS - See tables and charts

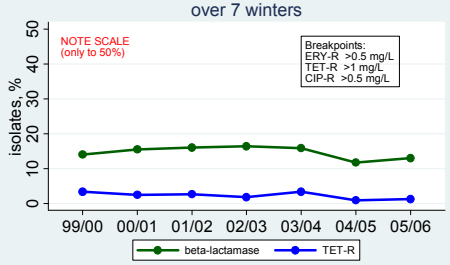
CONCLUSIONS

- **Resistance levels in community-acquired respiratory pathogens in the UK have remained generally low over seven winters.**
- Tetracycline resistance in *H. influenzae*, already rare in 1999, became rarer.
- β-Lactamase production in *M. catarrhalis*, already over 90% in 1999 rose further.
- **Most key resistances, e.g. penicillin non-susceptibility in *S. pneumoniae,* showed no change, in a study with high power to detect a doubling of the odds over 5 years.**
- Relatively low antibiotic consumption may contribute to the stability of resistance.

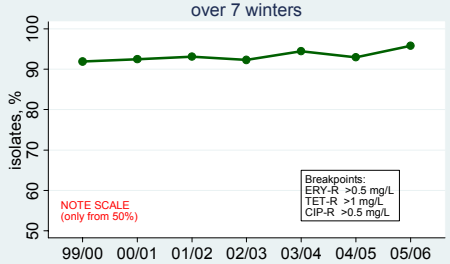
Resistance in 4562 S. pneumoniae
over 7 winters



Resistance in 5830 H. influenzae
over 7 winters



Resistance in 2648 M. catarrhalis
over 7 winters



S. pneumoniae		Regression (for trend)		
Resistance	%	p	OR	(95% CI)
PEN-NS	5.9	0.250	0.81	0.56, 1.16
ERY-R	10.9	0.506	1.10	0.84, 1.43
TET-R	6.4	0.632	1.09	0.77, 1.53
CIP-R	5.9	0.132	0.76	0.53, 1.09

There were no significant trends for *S. pneumoniae*. Only 0.9% had CIP MICs >8mg/L, a level suggesting resistance to respiratory fluoroquinolones.

H. influenzae		Regression (for trend)		
Resistance	%	p	OR	(95% CI)
β-LAC	14.7	0.293	0.90	0.73, 1.10
ERY-NS	99.0	------	------	------
TET-R	2.3	0.005	0.49	0.29, 0.80
CIP-R	0.1	------	------	------

TET-R fell significantly in *H. influenzae*. The estimated odds ratio would equate to a change from 3.4% to 1.4% R between the first and seventh season.

M. catarrhalis		Regression (for trend)		
Resistance	%	p	OR	(95% CI)
β-LAC	93.3	0.006	1.83	1.19, 2.79
ERY-R	0.2	------	------	------
TET-R	0.2	------	------	------
CIP-R	0.2	------	------	------

β-Lactamase rose significantly in *M. catarrhalis*, equivalent to a a change from 90.7% to 95.3% between the first and seventh season.

POWER TO DETECT TREND *by simulation*

The centres, and the number and timing of the isolates they submitted, were taken as given. Different levels of baseline resistance with different degrees of trend (odds ratio for 5 years) were simulated 1000 times to produce datasets with the same overall resistance rate as observed in reality. Logistic regression was applied to these datasets. Power is the proportion of cases in which regression identified a trend significant at 5% level. When there is no trend (OR=1) the 'power' should be 5% by design.

The inter-centre variation seen in the study was also included in the simulation, mimicked by treating log-odds ratios for centre as Normally distributed with SD 0.5 (see poster C2-1832), making these power estimates slightly conservative.

Species & Resistance	N	Power to detect trend at 5% significance level for each odds ratio / 5 years			
		1	1.5	2	3
S. pneumoniae, PEN-NS	4562	5.1	62.3	96.2	100
S. pneumoniae, ERY-R	4562	5.4	81.7	99.9	100
S. pneumoniae, TET-R	4562	7.0	63.8	96.8	100
H. influenzae , TET-R	5830	6.2	38.1	78.6	99.1
H. influenzae, β-LAC	5830	4.0	97.6	100	100
M. catarrhalis, β-LAC	2648	4.5	45.8	89.1	99.9

For combinations in which trend was insignificant, there was over 95% power to detect a doubling of odds over 5 years (e.g. pen-NS rising from 4.2 to 8.0%). For a 1.5-fold change in 5 years (e.g. from 4.8 to 7.1%), power was usually below 80%.

Data from the ESAC project show that England (84% of the UK population) had lower outpatient antibiotic consumption than the European average in 2003 and, within that, relatively low consumption of cephalosporins and fluoroquinolones. Consumption fell by 12% between 1997 and 2003. *JAC (2006) 58, 401-431. www.esac.ua.ac.be.*

Working Party Members (September 2006): A. MacGowan[1] (Chair), M. Allen[2], D. Brown[3], N. Deaney[4], D. Felmingham[5], Lewis[6], D. Livermore[7], R. Reynolds[1], C. Thomson[8] , A. White[9] , L. Williams[5].

Organism ID and Susceptibility Testing: L. Williams[5], J. Shackcloth[5], and staff at GR Micro[5].

[1]North Bristol NHS Trust ; [2]Wyeth; [3]Addenbrookes Hospital, Cambridge; [4]Merck, Sharp & Dohme ; [5]GR Micro, London ; [6]HPA South West; [7]Health Protection Agency, London; [8]IMS Health; [9]consultant.

Central Laboratory: GR Micro Ltd, London.

Collecting Laboratories: *England*: City H., Birmingham; Manor H., Birmingham, New Cross H., Birmingham; Southmead H., Bristol, Addenbrookes H., Cambridge, Queen Elizabeth H., Gateshead; Leeds General I.; St James's H., Leeds; Royal I., Leicester; Liverpool University H.; St Bartholomew's & Royal H., London; University College H., London; Hope H., Manchester; Freeman H., Newcastle; Royal Victoria I., Newcastle; Derriford H., Plymouth; Southampton General H.; Sunderland Royal I.. *Ireland*: Beaumont H., Dublin; Meath, Adelaide & Children's H., Dublin; St Vincent's H., Dublin; University College H., Galway. *N. Ireland*: Royal H., Belfast; Ulster H., Belfast. *Scotland*: Royal I., Aberdeen; Glasgow Royal I.; New Royal I., Edinburgh; Western General H., Edinburgh; Southern General H., Glasgow. *Wales*: University H., Cardiff; Wrexham Maelor H. [H.= Hospital, I.=Infirmary]

Sponsors: The BSAC Respiratory Resistance Surveillance Programme 1999 - 2006 was sponsored by Abbott, Aventis, Bayer, GeneSoft, GSK, MSD, and Wyeth and supported by the BSAC.

Correspondence:

Dr. R. Reynolds, BSAC Resistance Surveillance Co-ordinator

Department of Medical Microbiology, Southmead Hospital, Bristol, BS10 5NB, England.

rreynolds@bsac.org.uk

www.bsac.org.uk

BSAC
british society for antimicrobial chemotherapy