

**Predicting multi-drug resistance in *Pseudomonas aeruginosa* in the UK and Ireland**

R. Reynolds\*, R. Hope, K. Maher on behalf of the BSAC Working Party on Resistance Surveillance

**Objective:** *Pseudomonas aeruginosa* are renowned for their capacity to display non-susceptibility (NS) to multiple antimicrobial agents. The BSAC Resistance Surveillance Project has monitored NS in *P. aeruginosa* in the UK and Ireland in blood from 2001 to 2010 and in hospital-acquired respiratory infections (RTI) from 2008/09 to 2009/10. **Methods:** Laboratories in the UK and Ireland contributed 2054 isolates from blood (24-39 centres/year) and 444 isolates from RTI (19-20 centres/year). MICs of ceftazidime, ciprofloxacin, gentamicin, imipenem and piperacillin-tazobactam were measured by the BSAC agar dilution MIC method at two central laboratories and categorised by BSAC/EUCAST breakpoints. Non-susceptibility to 3 or more of these 5 agents is reported as multiple drug resistance (MDR). Logistic regression models with robust errors for centre clustering were compared by Akaike information criterion. **Results:** Age and sex distribution of patients was unchanged over time, and the same in blood and respiratory infection: 59% male; median age 68; 2% <1year, 15% 1-44 years, 49% 45-74 years, 34%  $\geq$ 75 years. MDR prevalence in blood *P. aeruginosa* in 2009-2010 was similar to 2001-2008 at 4%, but ciprofloxacin-NS was significantly lower. MDR (and individual NS) was more common in RTI (7%) than blood (3%) in recent years, partly explained by more RTI patients being in ICU (42 vs. 14%). MDR in blood isolates was 6% in ICU vs. 3% in other specialities. MDR was more prevalent in isolates from blood of patients aged 1-44 years (7%) than in those of 45-74 (4%) or  $\geq$ 75 years (2%); the 5 individual agents all showed the same downward trend of NS with increasing age. Isolates from children under 1 were less commonly MDR (2%), with most agents, especially ciprofloxacin, showing less NS than in older patients. RTI *P. aeruginosa* showed a similar pattern of NS with age. Blood isolates originating from the genitourinary tract were less often MDR (1%) compared with those from other known sources (4-6%). **Conclusion:** The main factors predicting increased MDR in *P. aeruginosa* were ICU location and younger age (except infants); genitourinary focus of infection was associated with reduced MDR. Multiple NS in blood and respiratory infections was not unduly prevalent in recent years, with 7-13% of isolates NS to  $\geq$ 2 agents, 3-7% NS to  $\geq$ 3, and 1-2% NS to  $\geq$ 4. Occasional isolates (<1%) were NS to all 5 tested agents.

Antimicrobial agent	% Non-susceptibility		
	Blood		Respiratory
	2001-2008 N=1614	2009-2010 N=440	2008/09-2009/10 N=444
ceftazidime	3	2	6
ciprofloxacin	18	11	20
gentamicin	6	4	5
imipenem	7	11	18
piperacillin-tazobactam	6	5	8
MDR ( $\geq$ 3 agents NS)	4	3	7