



EARSS in Ireland, 1999-2004

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Introduction

Prior to 1999, there was no national surveillance of antimicrobial resistance (AMR) in Ireland although some surveillance was undertaken both locally and regionally. The European Antimicrobial Resistance Surveillance System (EARSS) was established in Ireland in 1999 with 11-12 laboratories participating in the surveillance of two important invasive pathogens, *Staphylococcus aureus* (SAU) and *Streptococcus pneumoniae* (SPN). Since then EARSS has gone from strength to strength with participation extended to 36 laboratories by June 2004 giving an estimated population coverage of 95%, based on Acute Public Hospital Activity (APHA) Data kindly provided by Claire Grant at DoHC (see Table 1). As of January 2001, EARSS has been extended to include 3 additional pathogens: *Escherichia coli*, *Enterococcus faecalis* and *E. faecium*.

Table 1. EARSS coverage in Ireland

	Number of labs		Current estimate ^a	
	SAU	SPN	SAU	SPN
1999	11	12	42	49
2000	18	19	59	66
2001	20	21	70	77
2002	23	23	81	81
2003	28	28	89	89
2004*	33	33	95	95

* up to Q2 only

^a based on Acute Public Hospital Activity Data

Protocol

EARSS collects routinely-generated susceptibility testing data, plus basic demographic information on patients, on the first invasive isolate per patient per quarter of 5 pathogens:

• *S. aureus* and the enterococci, *E. faecalis* and *E. faecium* (blood)

• *S. pneumoniae* and *E. coli* (blood and CSF)

Results

1. *S. aureus*

The proportion of *S. aureus* isolates resistant to methicillin/oxacillin (MRSA) increased from approx. 39% in 1999-2000 to 42.7% in 2002 and has subsequently remained at about this level (see Figure 1). Linear regression analysis with analysis of variance (ANOVA) shows that there is a linear relationship with % resistance increasing by approx. 1% per year (ANOVA: $F = 13.7$, $P = 0.034$). However, a Chi-squared test for trend suggests that the increase is borderline insignificant (Chi² slope = 3.02, $P = 0.082$).

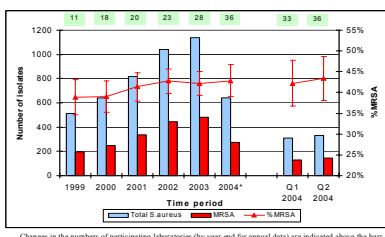


Figure 1. *S. aureus* trends

Using the APHA Data, it is now possible to calculate the rates of infection per 1000-bed days locally (by participating hospitals), regionally (by Health Board) and nationally. The MRSA rates by Health Board for 2003 ranged from 0.07 to 0.16/1000-bed days, with the overall national rate at 0.14/1000-bed days. When looking at rates for individual hospitals, it is essential that such data should be interpreted with extreme caution as there are fundamental differences in the case mixes and services provided by different hospitals (and indeed Health Boards).

The trend observed with MRSA rates nationally over the first 5 years is similar to that seen with proportions (see Figure 2).

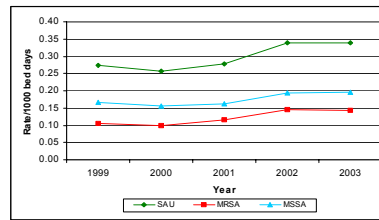


Figure 2. Rates of *S. aureus* infection

MRSA Rates: Comparison with the UK

The highest MRSA rates are seen in England with 0.17 infections/1000-bed days over 2003/4, followed by Northern Ireland with 0.17/1000-bed days and Scotland with 0.15/1000-bed days. The rate for Ireland in 2003 at 0.14/1000-bed days appears lower but direct comparisons with the UK are invalid as different definitions and data collection systems are used (Dept. Health Mandatory MRSA Bacteraemia Scheme in the UK; EARSS in Ireland).

MRSA Proportions: Comparison with Europe

The proportion of MRSA observed in Ireland is one of the highest in Europe (see Figure 3) but significant increases have been observed recently in a number of other countries, including Greece (>50%) and the countries of Central Europe.

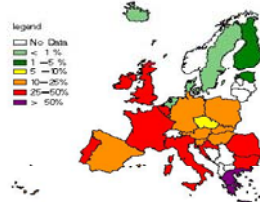


Figure 3. Distribution of MRSA in EARSS countries in 2003

2. *S. pneumoniae*

The proportion of *S. pneumoniae* isolates non-susceptible to penicillin (PNSP) was highest in 1999 (18.5%) but subsequently settled at approx. 11-12% (see Figure 4).

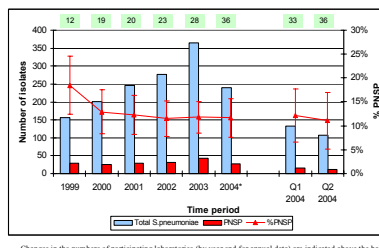


Figure 4. *S. pneumoniae* trends

Using APHA Data for 2003 to estimate the proportion of the population covered, crude rates of invasive *S. pneumoniae* infection per 100,000 population in Ireland have been calculated for the first 5 years of *S. pneumoniae* surveillance (see Figure 5).

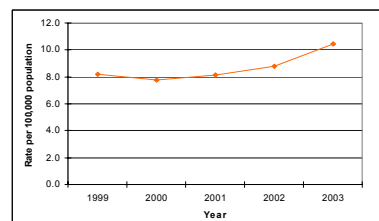


Figure 5. Rates of *S. pneumoniae* infection

PNSP rates: Comparison with the UK

In England and Wales, the rates of invasive *S. pneumoniae* infection in 1999 and 2000 were 8.6 and 8.9/100,000 population respectively, which are slightly higher than the estimated Irish rates of 8.2 and 8.9/100,000 population over the corresponding period. The rate in Scotland for 1999-2001 was 11/100,000 population.

PNSP Proportions: Comparison with Europe

The proportion of PNSP observed in Ireland is closer to that seen in Southern and Eastern European countries than in other Northern European countries such as the UK and Scandinavia.

3. *E. coli*

Surveillance of invasive *E. coli* infection has been ongoing since January 2002. Over this period the quarterly proportions of all isolates with resistance to either 3rd-generation cephalosporins (3GCs) or gentamicin (GEN) have fluctuated between approx. 0.5% and 6% (see Figure 6) but both are at the lower end of the resistance spectrum compared with other European countries.

The proportion of isolates with resistance to fluoroquinolones (CIP/OFX) has increased significantly over the surveillance period from 2.9% in Q2 2002 to 13.4% in Q2 2004 (ANOVA: $F = 9.79$, $P = 0.014$; Chi² slope = 19.86, $P = <0.001$). The overall proportion in Ireland for 2003 was 9.5% and as such was one of the lowest in Europe.

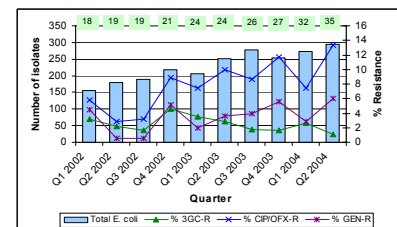


Figure 6. *E. coli* trends by Quarter

4. *E. faecium*

The proportions of *E. faecium* isolates with resistance to either high-level gentamicin (GEH) or vancomycin (VAN) have increased over the surveillance period (see Figure 7). Increased awareness of issues concerning the testing and interpretation of GEH may explain the sudden increase in GEH resistance observed from Q4 2002 to Q1 2003.

The proportions of GEH and VAN resistance in Ireland in 2003 were amongst the highest observed in Europe.

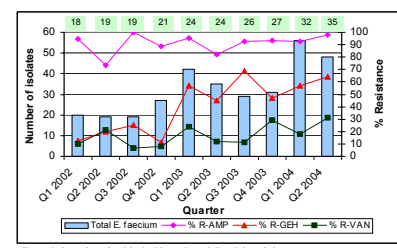


Figure 7. *E. faecium* trends by Quarter

Conclusions

With EARSS coverage now approaching 100% of the Irish population, we are now able to provide more detailed and meaningful analyses of the AMR trends for the pathogens currently under surveillance as part of EARSS. This will help to inform infection control policies in the fight against the emergence and spread of antimicrobial resistance in bacterial pathogens in both the hospital and the community.

Acknowledgements

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