



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive



EARS-Net Report for Quarter 3 2010

Key Points for Q3 2010

- 21% of *S. aureus* were MRSA (64 of 299) compared with 27% (90 of 329) in Q2 2010. MRSA decreased from 42% in 2006 to 27% in 2009 and 25% in 2010*.

These are the lowest quarterly and annual proportions since surveillance began in 1999

Between Q1-3 2009 (n=282) and Q1-3 2010 (n=240), there was a 15% reduction in the overall numbers of MRSA reported

- 32% of *S. pneumoniae*⁺ (n=38) were PNSP compared with 13% in Q2 2010. PNSP decreased from 23% in 2008 to 19% in 2010*

Between Q1-3 2009 and Q1-3 2010, there was a 17% decrease in the overall numbers of pneumococcal isolates and a 32% reduction in the numbers of PNSP isolates reported, which follows the introduction of the PCV7 vaccine into the childhood immunisation schedule in September 2008

- 36% of *E. faecium*⁺ (n=101) were VRE compared with 31% in Q2 2010. VRE decreased from 38% in 2009 to 36% in 2010*

- 21% of *E. coli* (n=587) were resistant to ciprofloxacin (Q2 2010, 21%).

In 2010*, resistance to ciprofloxacin increased marginally to 23% (2009, 22%); and resistance to aminoglycosides increased to 12% (2009, 9%), with just a slight increase in resistance to gentamicin to 9% (2009, 8%). The annual proportions of 3GC-resistant and ESBL-producing isolates of *E. coli* have levelled off at 8% and 6%, respectively

* 2010 data provisional to the end of Q3; † Exercise caution with interpretation: low numbers

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Abbreviations used

- 3GC – 3rd-Generation Cephalosporin
- CI – Confidence Interval
- CLSI – Clinical and Laboratory Standards Institute
- ESBL – Extended-Spectrum Beta-Lactamase
- HLG – High-Level Gentamicin
- HLR – High-Level Resistant
- MIC – Minimum Inhibitory Concentration
- MDR – Multi-Drug Resistant
- MRSA – Meticillin-Resistant *Staphylococcus aureus*
- NMRSARL – National MRSA Reference Laboratory
- PCV7 – Pneumococcal Conjugate Vaccine (7-valent)
- PPV23 – Pneumococcal Polysaccharide Vaccine (23-valent)
- PNSP – Penicillin-Non-Susceptible *Streptococcus pneumoniae*
- PSSP – Penicillin-Susceptible *Streptococcus pneumoniae*
- RCSI – Royal College of Surgeons in Ireland
- VISA – Vancomycin-intermediate *S. aureus*
- VRE – Vancomycin-Resistant Enterococci

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Data correct as of 20/12/2010

Report produced by the Irish EARS-Net Steering Group with special thanks to all the participating laboratories for their continued support and commitment to this surveillance system

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Background

The European Antimicrobial Resistance Surveillance System (EARSS) was established in 1999 in response to the growing threat of antimicrobial resistance in Europe. EARSS comprises a network of over 900 microbiological laboratories serving some 1500 hospitals in 33 countries that collects routinely-generated antimicrobial susceptibility testing data on invasive infections caused by seven important bacterial pathogens: *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Escherichia coli*, *Enterococcus faecalis*, *Enterococcus faecium*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. In January 2010, EARSS was taken over by ECDC becoming the European Antimicrobial Resistance Surveillance Network (EARS-Net). As of Q3 2010, 40 Irish laboratories serving 60 acute hospitals (public and private) participate in EARS-Net representing 100% coverage of the Irish population.

Results

A summary of the data submitted on all pathogens for Q3 2010 is shown in Table 1

S. aureus

- 299 isolates from 33 of 40 laboratories, of which 64 (21.4%) were MRSA
- 21 (42%) of 50 MRSA isolates were fusidic acid-resistant compared with 28 (14%) of 204 MSSA isolates
- 2 of 63 MRSA isolates were resistant to rifampicin. Of 64 isolates, none were resistant to linezolid

Data from the National MRSA Reference Laboratory

- 49 MRSA isolates were referred to the NMRSARL at St James's Hospital, Dublin, where oxacillin MICs were performed using Etests[®] and CLSI interpretive criteria. In addition, isolates were tested by the Etest[®] macromethod for the optimal detection of VISA strains
- 14 isolates (29%) exhibited oxacillin MICs of >256 mg/L
- No VISA isolates were detected
- 21 isolates (43%) were fusidic acid-resistant

Table 1. Summary of EARSS data for Q3 2010 and Total 2010 (provisional to the end of Q3 2010) by pathogen (with total numbers of isolates reported and proportion resistance/non-susceptibility to the important antibiotics) compared with the data for the previous quarter (Q3 2010), the equivalent quarter last year (Q2 2009), **the equivalent period last year (Q1-3 2009)** and the total for 2009

Pathogen	Previous Year			Current Year		
	Q3 2009	Q1-3 2009	Total 2009	Q2 2010	Q3 2010	Total 2010 [‡]
No. laboratories	44	43	43	43	40	40
<i>S. aureus</i>						
No. isolates	336	1,007	1,309	329	299	975
No. Meticillin-R (or MRSA)	87	282	355	90	64	240
Meticillin-R (or MRSA)	25.9%	28.0%	27.1%	27.4%	21.4%	24.6%
No. VISA (MRSA isolates only)*	0	0	0	0	0	0
VISA (MRSA isolates only)*	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
No. laboratories	43	43	43	43	40	40
<i>S. pneumoniae</i>						
No. isolates	40	269	356	84	38	224 ¹
Penicillin-NS*	20.0%	20.2%	20.2%	13.1%	31.6%	18.8%
of which: HLR	7.5%	5.6%	5.6%	2.4%	10.5%	6.3%
Int	12.5%	13.8%	13.8%	10.7%	18.4%	11.2%
Erythromycin-R*	8.1%	17.3%	17.3%	10.3%	27.3%	16.3%
<i>E. faecalis</i>						
No. isolates	74	195	289	63 ¹	74	231 ²
Ampicillin-R*	1.4%	2.1%	2.1%	1.6%	1.4%	1.8%
Vancomycin-R	0.0%	0.0%	0.7%	0.0%	0.0%	0.4%
HLG-R*	44.3%	36.6%	36.7%	31.6%	28.4%	31.4%
<i>E. faecium</i>						
No. isolates	74	303	397	104	101	295
Ampicillin-R*	91.9%	92.4%	92.9%	93.3%	93.1%	94.6%
Vancomycin-R*	37.8%	36.6%	38.3%	31.1%	35.6%	36.1%
HLG-R*	42.0%	36.1%	39.1%	39.8%	30.5%	39.3%
MDR*	26.1%	23.6%	26.7%	20.6%	21.3%	23.3%
<i>E. coli</i>						
No. isolates	577	1,547	2,064	538	587	1630 ²
Ampicillin-R*	66.9%	68.4%	68.7%	65.8%	69.2%	68.6%
3GC-R*	8.9%	7.5%	7.5%	7.4%	7.0%	7.6%
ESBL-producers*	7.1%	5.7%	5.8%	5.5%	4.8%	5.7%
Ciprofloxacin-R*	24.4%	22.4%	22.3%	21.1%	20.5%	22.8%
Gentamicin-R*	7.3%	7.6%	7.7%	9.7%	8.5%	9.2%
Aminoglycoside-R*	9.7%	9.3%	9.3%	11.9%	11.3%	11.7%
MDR*	11.3%	10.1%	10.4%	10.8%	10.3%	11.3%
No. laboratories	43	42	42	42	40	40
<i>K. pneumoniae</i>						
No. isolates	101	233	323	77 ¹	97	234 ¹
Ampicillin-R*	99.0%	99.6%	99.7%	100.0%	96.9%	98.7%
3GC-R*	14.9%	10.3%	11.2%	12.0%	11.3%	11.6%
ESBL-producers*	9.3%	7.6%	8.2%	6.8%	4.7%	5.9%
Ciprofloxacin-R*	17.8%	13.3%	13.0%	8.0%	7.2%	9.9%
Gentamicin-R*	12.9%	1.7%	11.1%	6.7%	4.1%	6.4%
Imipenem/meropenem-R*	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
MDR*	16.8%	11.7%	11.9%	5.3%	8.3%	7.3%
<i>P. aeruginosa</i>						
No. isolates	73	168	248	59	79	180 ¹
Piperacillin/tazobactam-R*	8.2%	7.1%	8.9%	10.2%	7.7%	10.1%
Ceftazidime-R*	9.6%	7.8%	11.8%	12.3%	3.8%	9.1%
Imipenem/meropenem-R*	9.9%	8.0%	9.7%	8.6%	5.1%	8.5%
Ciprofloxacin-R*	8.2%	10.7%	12.1%	12.1%	8.9%	12.4%
Gentamicin-R*	6.8%	7.2%	7.7%	6.8%	6.3%	8.5%
MDR*	2.8%	4.4%	6.4%	8.9%	2.6%	6.9%

[‡] 2010 data are provisional (to end Q3)

R, Resistant; NS, Non-Susceptible [includes isolates with intermediate (Int) and high-level resistance (HLR)]

MRSA, Meticillin-Resistant *S. aureus*; VISA, Vancomycin-Intermediate *S. aureus*

HLG, High-Level Gentamicin; 3GC, 3rd-Generation Cephalosporin (includes cefotaxime, ceftriaxone, ceftazidime and cefepime); ESBL, Extended-Spectrum Beta-Lactamase; MDR, Multi-Drug Resistant

* Not all isolates tested

¹ Includes one isolate for which no susceptibility results were provided

² Includes 2 isolates for which no susceptibility results were provided

Changes to the data presented in previous reports are highlighted in red

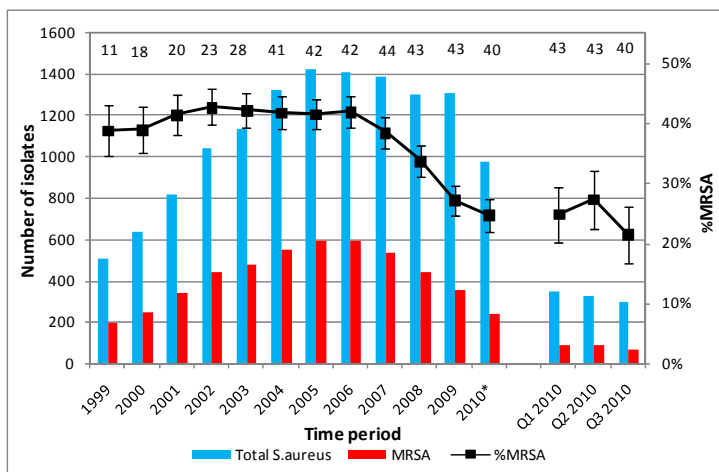


Figure 1. Trends for *S. aureus* – total numbers of *S. aureus*/MRSA and percentage MRSA with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

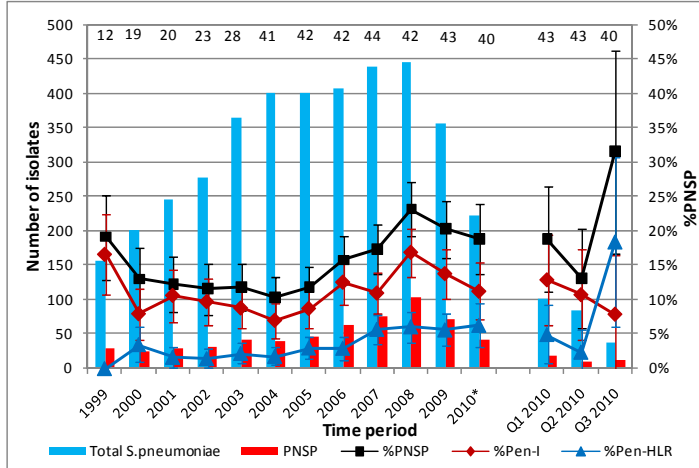


Figure 2. Trends for *S. pneumoniae* – total numbers of *S. pneumoniae*/PNSP and percentage PNSP [penicillin-intermediate (Pen-I) and high-level resistant (Pen-HLR)] with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

S. aureus trends in resistance

- In Q3 2010, 21.4% of isolates were MRSA, which is lower than in Q2 2010 (27.4%, or 90 of 329).
- The annual trends indicate the proportion of MRSA in Ireland decreased from approximately 42% in 2006 (Figure 1) to 38.5% in 2007, 33.7% in 2008 and 27.1% in 2009. In 2010 (to the end of Q3), the proportion of MRSA is 24.6%, which is the lowest annual proportion since surveillance began in 1999
- Comparing Q1-3 2010 with Q1-3 2009, there was a 15% reduction in the numbers of MRSA reported (240 vs. 282), while there was a small increase in the numbers of MSSA (1.4%; 735 vs. 725)

S. pneumoniae

- 38 isolates (37 from blood and one from CSF) from 18 of 40 laboratories
- The latest CLSI guidelines (2008) distinguish between non-meningitis [Susceptible (S) ≤ 2 mg/L, Intermediate (I) 4 mg/L, Resistant (R) ≥ 8 mg/L] and meningitis breakpoints (S ≤ 0.06 mg/L, R ≥ 0.12 mg/L) for iv/parenteral penicillin and recommend that blood isolates should be reported using both sets of breakpoints. EARSS recommends using the old breakpoints (S ≤ 0.06 mg/L, I 0.12-1.0 mg/L, R ≥ 2 mg/L), corresponding to the new oral breakpoints, for surveillance purposes and to avoid confusion with interpretation of historic data
- *****Penicillin and cefotaxime/ceftriaxone MICs should be submitted on all pneumococcal isolates*****
- 12 (31.6%) of 38 isolates were PNSP (defined as having a penicillin MIC of ≥ 0.12 mg/L) and 9 (24.3%) of 37 isolates were resistant to erythromycin
- Penicillin and cefotaxime/ceftriaxone MICs were available for 11 of the 12 PNSP isolates. One isolate was reported as intermediately resistant to penicillin and susceptible to cefotaxime but with no MICs
- 4 isolates (10.5% of total) were HLR to penicillin and 7 (18.4% of total) were intermediately resistant. 2 isolates with HLR to penicillin were intermediately resistant to cefotaxime according to the meningitis breakpoint (MIC, 1 mg/L)
- Erythromycin resistance was reported in 4 PNSP (all intermediately resistant) and one PSSP isolate
- The CSF isolate was susceptible to both penicillin and cefotaxime
- In Q3 2010, 35 (92%) of 38 pneumococcal isolates reported were referred to RCSI/Temple St for capsular serotyping (using a combination of multiplex PCR and conventional serological methods). Serotype coverage among the target population for each vaccine, <2 years for PCV7 and ≥ 65 years for PPV23, was 50% (1 of 2 isolates) and 80% (16 of 20 isolates), respectively. The most common serotypes identified were 22F (n=5), 7F, 8, 14 and 19A (n=3 each), and 3, 6C, 9N and 19F (n=2 each), representing 71% of all isolates typed

S. pneumoniae trends in resistance

Exercise caution with interpretation: low numbers

- In Q3 2010, 31.6% of isolates were PNSP, which is higher than in Q2 2010 (13.1%). Compared with the equivalent quarter in 2009 (20% PNSP), the overall number of isolates is comparable (Q3 2009, n=40), while the number of PNSP isolates is 50% lower (Q3 2009, n=8)
- The annual trends indicate that the proportion of PNSP increased from 10.3% in 2004 to 23.1% in 2008 (Figure 2), which was the highest annual proportion since surveillance began in 1999. The proportion of PNSP decreased to 20.2% in 2009 and to 18.8% in 2010 (to the end of Q3)
- For the first 3 quarters of 2010, there was a 17% decrease in the overall numbers of pneumococcal isolates and a 32% (**Erratum: Q2 2009 Report amended from 11% to 44%**) reduction in the numbers of PNSP isolates reported compared to the equivalent period in 2009. This follows the introduction of the PCV7 vaccine into the childhood immunisation schedule in September 2008

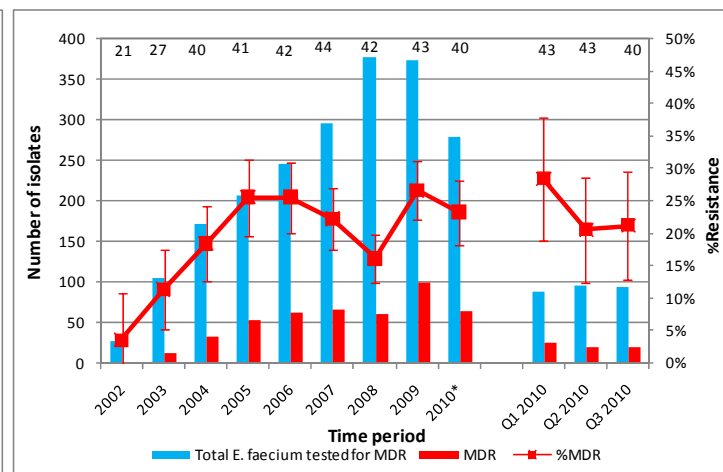
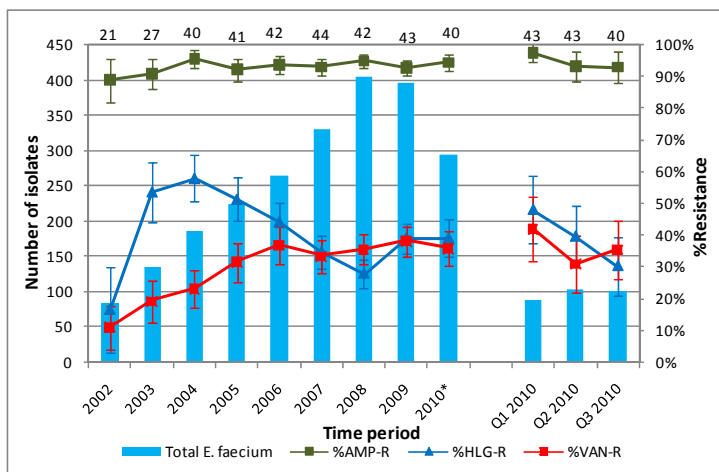


Figure 3. Trends for *E. faecium* – total numbers of *E. faecium* and percentage resistance to ampicillin (AMP), high-level gentamicin (HLG) and vancomycin (VAN) with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

Figure 4. Trends for Multi-Drug Resistant (MDR) *E. faecium* – total numbers of MDR *E. faecium* and percentage MDR with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

E. faecium

- 101 isolates from 17 of 40 laboratories
- 36 (35.6%) of 101 were resistant to vancomycin and 30 (31.3%) of 96 isolates were resistant to HLG
- 20 (21.3%) of 94 isolates from 9 hospitals were MDR, defined as resistant to ampicillin, HLG and vancomycin

E. faecium trends in resistance

Exercise caution with interpretation: low numbers

- In Q3 2010, 35.6% of isolates were VRE, an increase from 31.1% in Q2 2010
- The annual trends indicate that the proportion of VRE increased from 11.1% in 2002 to 37.1% in 2006 (Figure 3). Between 2006 and 2009 the proportion fluctuated between 33.5% and 38.3% and stands at 36.1% in 2010 (to the end of Q3)
- In Q3 2010, 21.3% of isolates were MDR, a slight increase from 20.6% in Q1 2010
- MDR *E. faecium* increased steadily from 3.6% in 2002 to 25.6% in 2006 but subsequently decreased to 22.3% in 2007 and 16.2% in 2008 (between 2006 and 2008 the total number of *E. faecium* isolates reported increased by over 50% while the corresponding number of MDR isolates remained constant at 60-65) (Figure 4). The proportion of MDR isolates increased again to 26.7% in 2009 but subsequently decreased to 23.3% in 2010 (to the end of Q3)

E. coli

- 587 isolates (586 from blood and one from CSF) from 38 of 40 laboratories
- 41 (7.0%) of 587 isolates were resistant to 3GCs, of which 28 were ESBL-positive and 13 were ESBL-negative; 120 (22.8%) of 585 were ciprofloxacin-resistant; and 50 (8.5%) of 586 were gentamicin-resistant [66 (11.3%) of 586 were aminoglycoside-resistant (i.e. resistant to amikacin, gentamicin or tobramycin)]
- 60 (10.3%) of 584 isolates from 30 hospitals were MDR, i.e. resistant to 3 or more of the required antibiotic classes [ampicillin, 3GCs (e.g. cefotaxime, ceftazidime), fluoroquinolones (e.g. ciprofloxacin) and aminoglycosides (as above)]
 - 21 with resistance to ampicillin, 3GCs, ciprofloxacin and aminoglycosides (18 ESBL-positive, 3 -negative)
 - 10 with resistance to ampicillin, 3GCs and ciprofloxacin (6 ESBL-positive, 4 -negative)
 - 29 with resistance to ampicillin, ciprofloxacin and aminoglycosides
- 28 (4.8%) of 578 isolates were ESBL-positive

E. coli trends in resistance

- In Q3 2010, 20.5% of isolates were ciprofloxacin-resistant, a slight decrease from 21.1% in Q2 2010. Over the same period, resistance to 3GCs also decreased slightly from 7.4% to 7.0%, while ESBL producers decreased from 5.5% to 4.8%; and resistance to gentamicin decreased from 9.7% to 8.5% [resistance to aminoglycosides decreased from 11.9% to 11.3%]
- Between 2002 and 2008, the overall trend for all 3 indicator antibiotics was upwards. Between 2008 and 2009, resistance to ciprofloxacin decreased slightly from 23.3% to 22.3% and resistance to gentamicin decreased from 10.2% to 7.7% [resistance to aminoglycosides decreased from 11.0% to 9.3%] (Figure 5). Resistance to 3GCs levelled off at 7.5% (2008, 7.5%) while the proportion of ESBL producers increased slightly from 5.0% to 5.8% (Figure 6). In 2010 (to the end of Q3), resistance to ciprofloxacin increased marginally to 22.8%; and resistance to gentamicin increased slightly to 9.2% (aminoglycosides, 11.7%). 3GC-resistance and ESBL producers remained stable at 7.6% and 5.7%, respectively

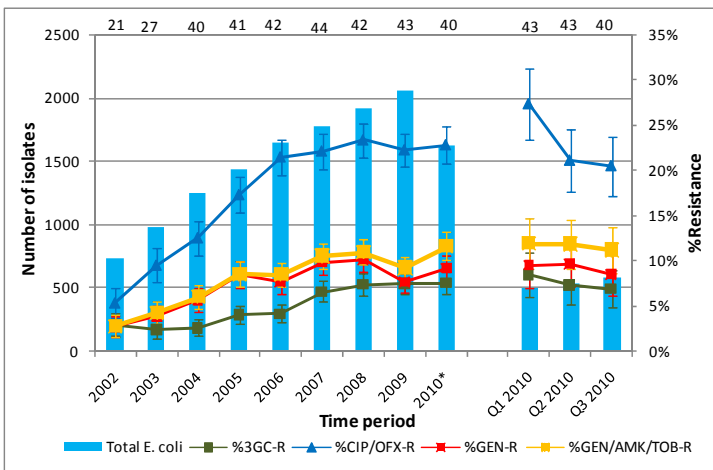


Figure 5. Trends for *E. coli* – total numbers of *E. coli* and percentage resistance to 3GCs, ciprofloxacin/ofloxacin (CIP/OFX), gentamicin (GEN) and gentamicin/ amikacin/ tobramycin (GEN/AMK/TOB) with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

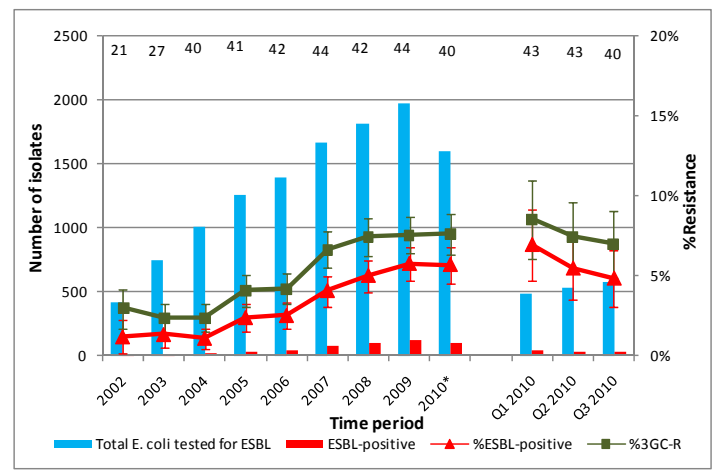


Figure 6. Trends for ESBL-producing *E. coli* – total numbers of ESBL producers and percentage positivity (with percentage 3GC-resistance for comparison) with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

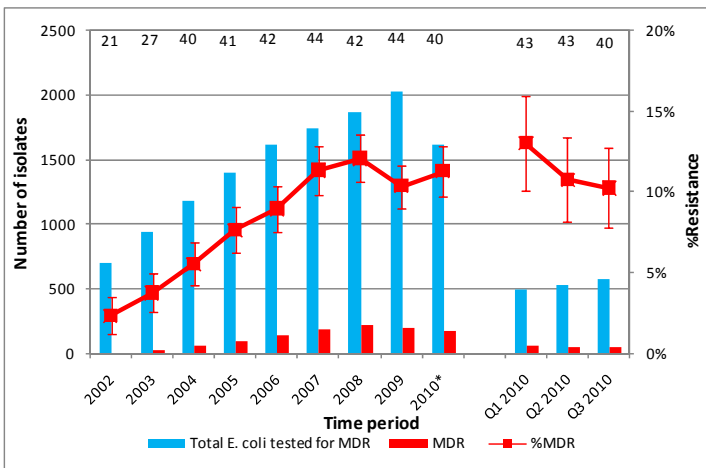


Figure 7. Trends for Multi-Drug Resistant (MDR) *E. coli* – total numbers of MDR *E. coli* and percentage MDR with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

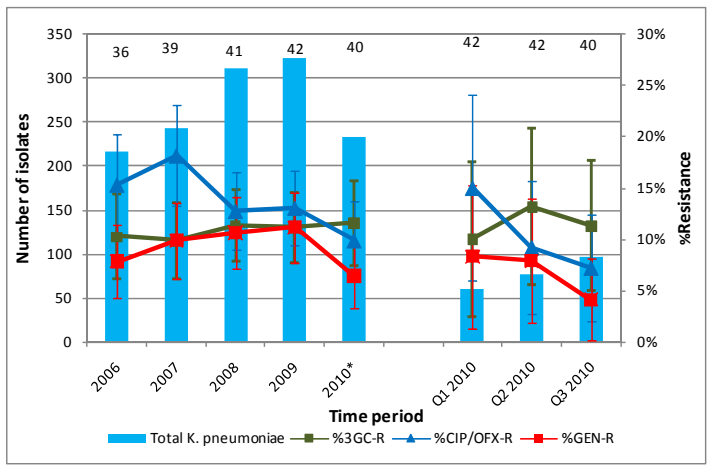


Figure 8. Trends for *K. pneumoniae* – total numbers of *K. pneumoniae* and percentage resistance to 3GCs, ciprofloxacin/ofloxacin (CIP/OFX) and gentamicin (GEN) with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

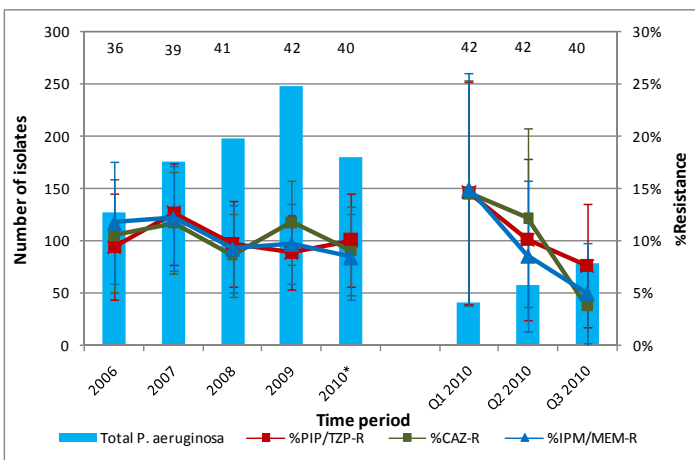


Figure 9. Trends for *P. aeruginosa* – total numbers of *P. aeruginosa* and percentage resistance to piperacillin-tazobactam (PIP/TZP), ceftazidime (CAZ) and imipenem/meropenem (IPM/MEM) with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

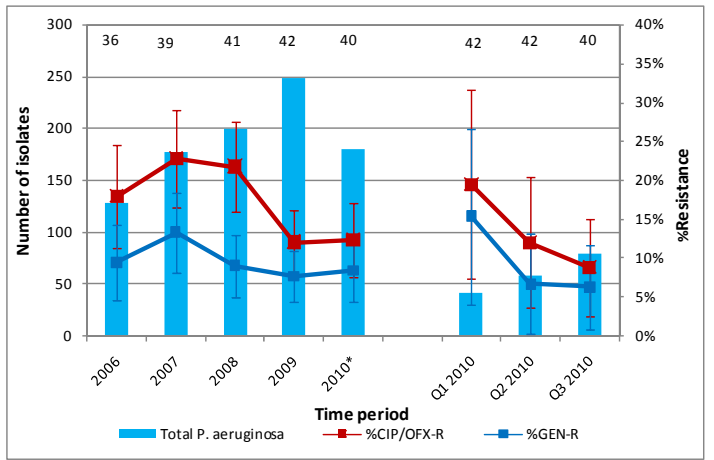


Figure 10. Trends for *P. aeruginosa* – total numbers of *P. aeruginosa* and percentage resistance to ciprofloxacin/ofloxacin (CIP/OFX) and gentamicin (GEN) with 95% CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

E. coli trends in resistance (continued)

- In Q3 2010, 10.3% of isolates were MDR, a slight increase from 10.8% in Q2 2010
- The trend in the proportion of MDR isolates was upwards from 2002 to 2008. MDR *E. coli* decreased from 12.1% in 2008 to 10.4% in 2009 but increased again to 11.3% in 2010 (to the end of Q3) (Figure 7)
- Comparing Q1-3 2010 with Q1-3 2009, there was a 5% increase in the numbers of *E. coli* reported (1,630 vs. 1,547)

K. pneumoniae

- 97 isolates (all from blood) from 29 of 40 laboratories
- 3 isolates were reported as ampicillin-susceptible suggesting that either the identification or the susceptibility test result were incorrect as *K. pneumoniae* are always ampicillin-resistant
- 11 (11.3%) of 96 isolates were resistant to 3GCs, of which 4 were ESBL-positive and 7 were ESBL-negative; 7 (7.2%) of 97 were ciprofloxacin-resistant; and 4 (4.1%) of 97 were gentamicin-resistant [no additional isolates were resistant to the other aminoglycosides (amikacin or tobramycin)]
- 8 (8.3%) of 96 isolates from 7 hospitals were MDR:
 - 2 with resistance to ampicillin, 3GCs, ciprofloxacin and aminoglycosides (both ESBL-positive)
 - 4 with resistance to ampicillin, 3GCs and ciprofloxacin (all ESBL-negative)
 - 2 with resistance to ampicillin, 3GCs and aminoglycosides (both ESBL-positive)
- Of 96 isolates, 4 (4.2%) were found to produce ESBLs
- No resistance to imipenem/meropenem was reported from 93 isolates

K. pneumoniae trends in resistance

Exercise caution with interpretation: low numbers

- Between Q2 2010 and Q3 2010, resistance to all antibiotics decreased (Figures 6)
- Between 2009 and 2010 (to the end of Q3), resistance to 3GC stabilised (11.6% in Q3 vs. 11.2% in Q2) while resistance to the other antibiotics decreased, most notably from 11.1% to 6.4% for gentamicin
- Only one isolate with resistance to imipenem/meropenem has been reported to date (Q2 2007)
- In Q3 2010, 8.3% of isolates were MDR compared with 5.3% in Q2 2010
- The proportion of MDR decreased from 11.9% in 2009 to 7.3% in 2010 (to the end of Q3)

P. aeruginosa

- 79 isolates (78 from blood and one from CSF) from 22 of 40 laboratories
- 6 (7.7%) of 78 isolates were resistant to piperacillin-tazobactam; 3 (3.8%) of 78 were resistant to ceftazidime; 4 (5.1%) of 79 were resistant to imipenem or meropenem; 7 (8.9%) of 79 were resistant to ciprofloxacin; and 5 (6.3%) of 79 were resistant to gentamicin [no additional isolates were resistant to the other aminoglycosides (amikacin or tobramycin)]
- 2 (2.6%) of 77 isolates from 2 hospitals were MDR:
 - with resistance to 3 of the 5 required antibiotics classes:
 - piperacillin-tazobactam, ceftazidime and meropenem

P. aeruginosa trends in resistance

Exercise caution with interpretation: low numbers

- Between Q2 2010 and Q3 2010, resistance to all required antibiotics decreased, notably from 12.3% to 3.8% for ceftazidime (Figures 7 and 8)
- Between 2009 and 2010 (to the end of Q3), resistance to piperacillin-tazobactam and gentamicin increased while resistance to ceftazidime and meropenem decreased. Ciprofloxacin resistance appears to have stabilised
- In Q3 2010, 2.6% of isolates were MDR compared with 8.9% in Q2 2010
- The proportion of MDR increased slightly from 6.4% in 2009 to 6.9% in 2010 (to the end of Q3)