Antibiotic resistance: What's in store for patients and how do we help?

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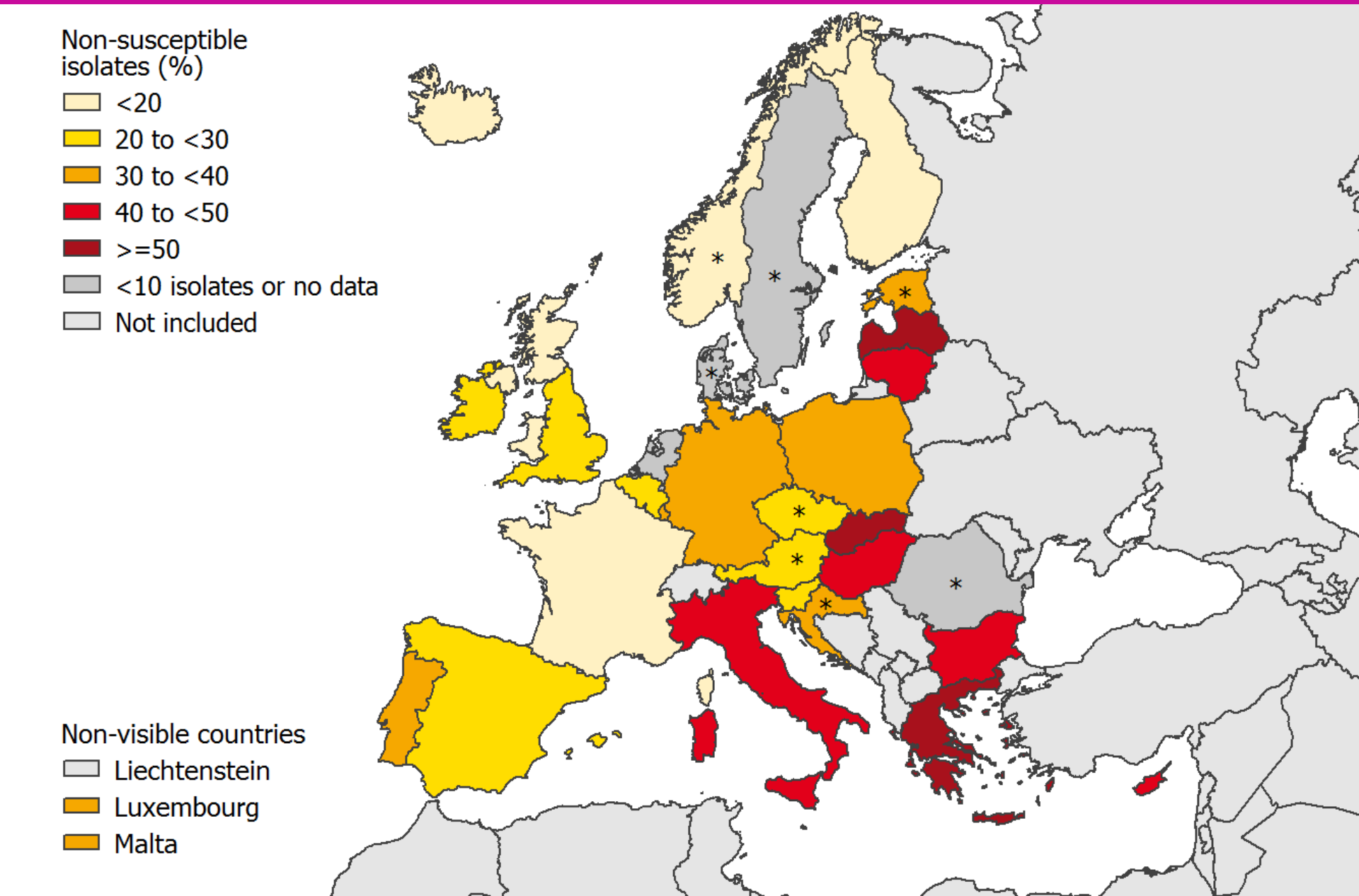
Figure 4. Percentage of Enterobacteriaceae isolates from HAIs non-susceptible to third-generation cephalosporins, by country, ECDC PPS 2011–2012

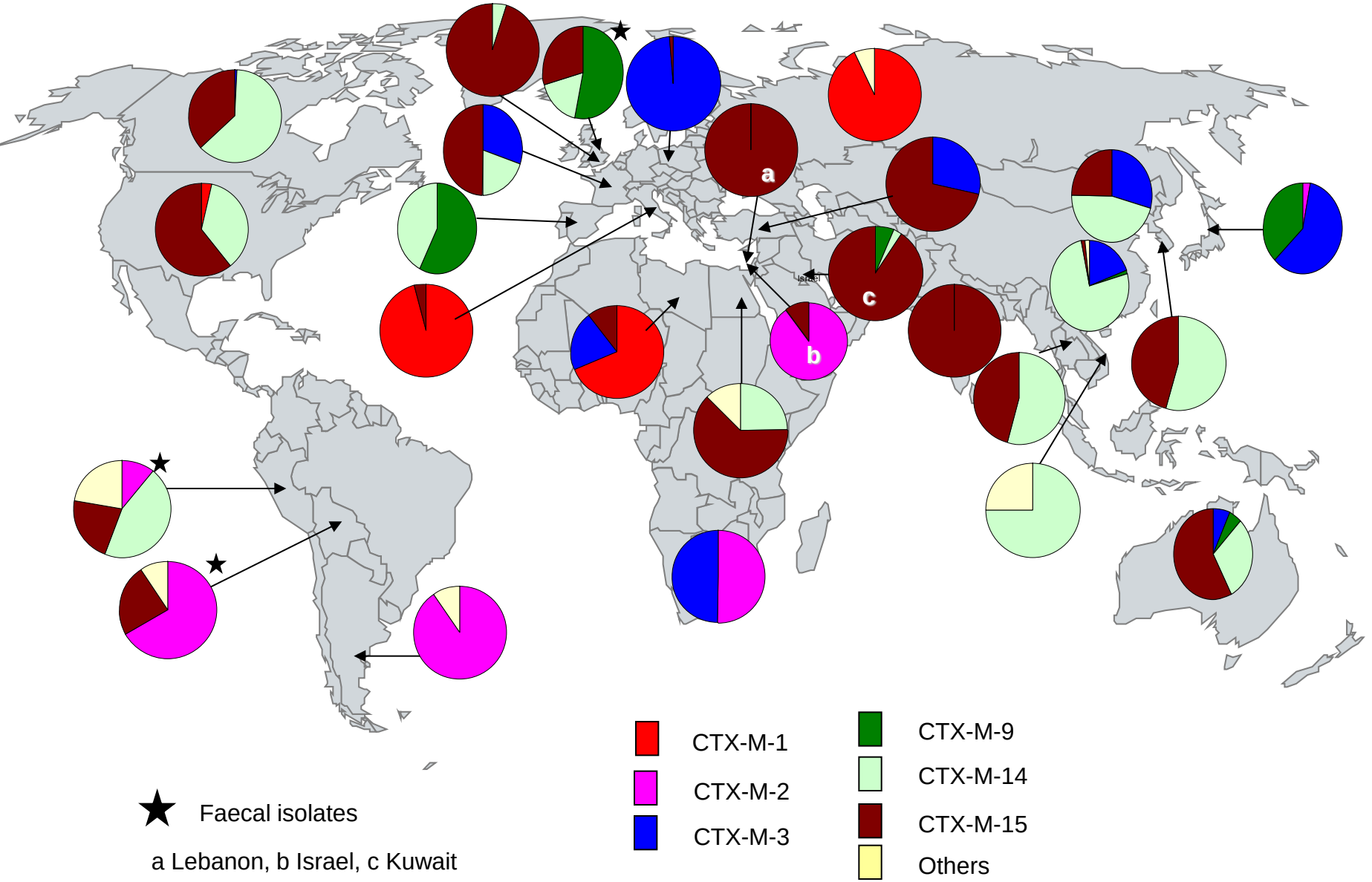


ESBL definition

" an ESBL is any β-lactamase, ordinarily acquired and not inherent to a species, that can rapidly hydrolyse or confer resistance to, oxyimino-cephalosporins (not carbapenems) or any β-lactamase mutant, within a family that has an enhanced ability to do so".

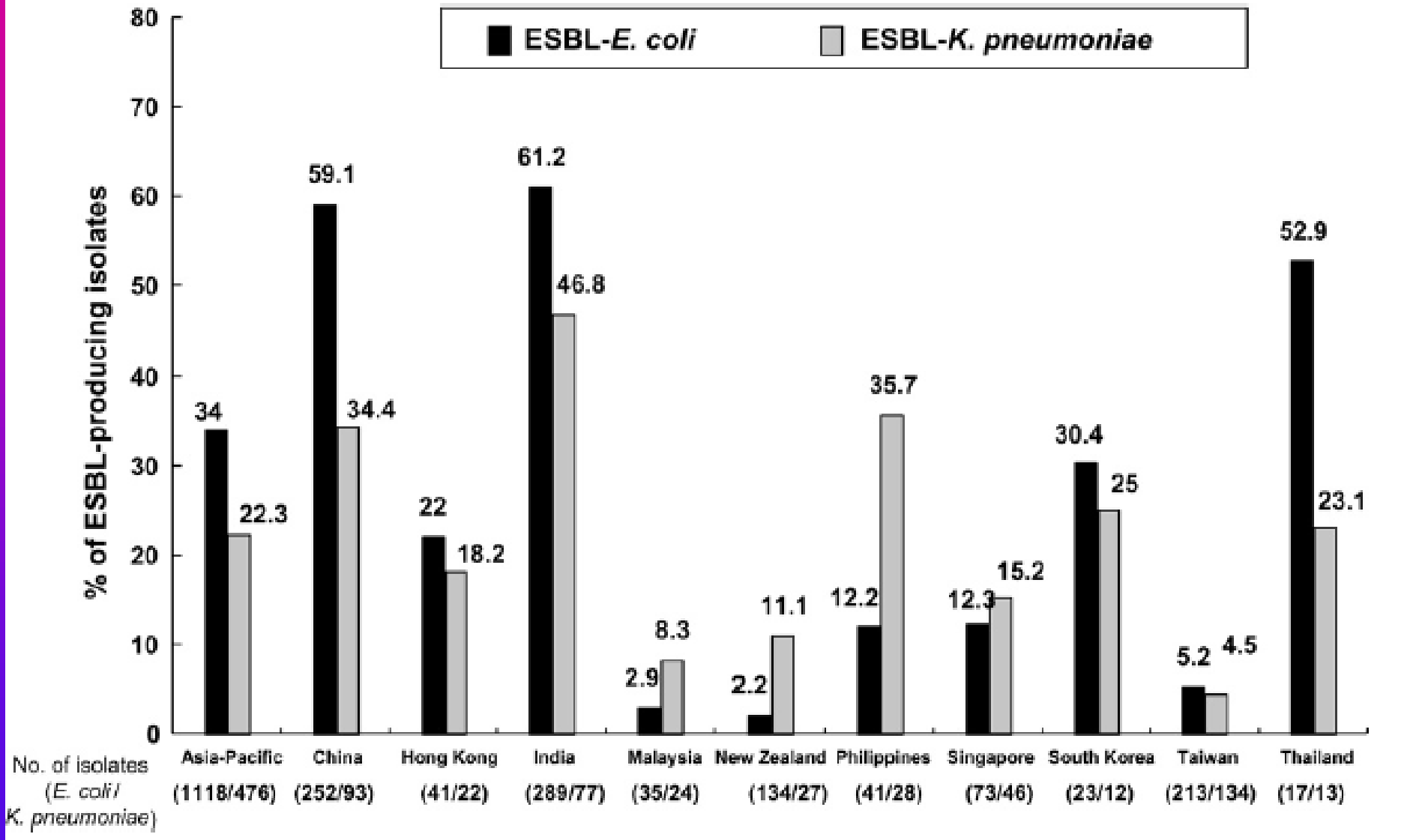
Livermore (2008) CMI 14;(Suppl 1);3-10

Proportions and country distributions of CTX-M ESBL genotypes



Hawkey & Jones 2009 JAC 64 Suppl 1 i3-i10

SMART study for 2008. E. coli / Klebsiella in IAI



Hsueh et al. Int. J Antimicrob. Agents. 2010. **36**:408-14

Report from Prof Xiao Head of Ministry of Health National Antibacterial Resistance Investigation Net,2012

新华社（Xinhua News Agency）据调查发现，中国每年生产抗生素原料大约21万吨，其中有9.7万吨抗生素用于畜牧养殖业，占年总产量的46.1%。养殖业滥用抗生素现象引发社会各界关注和热议。

210,000 tons antibiotic produced annually

% of antibiotics used in Food animals

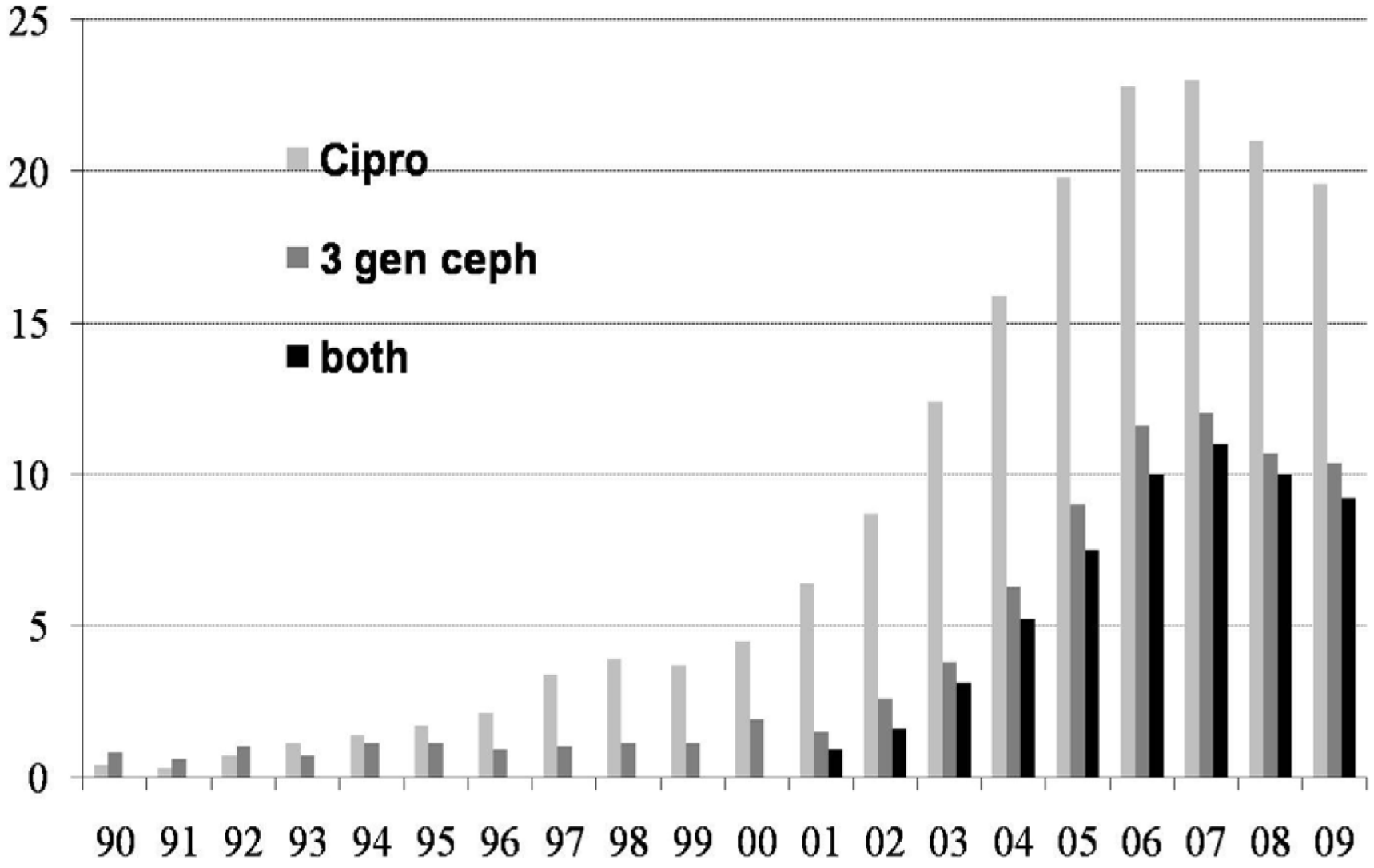
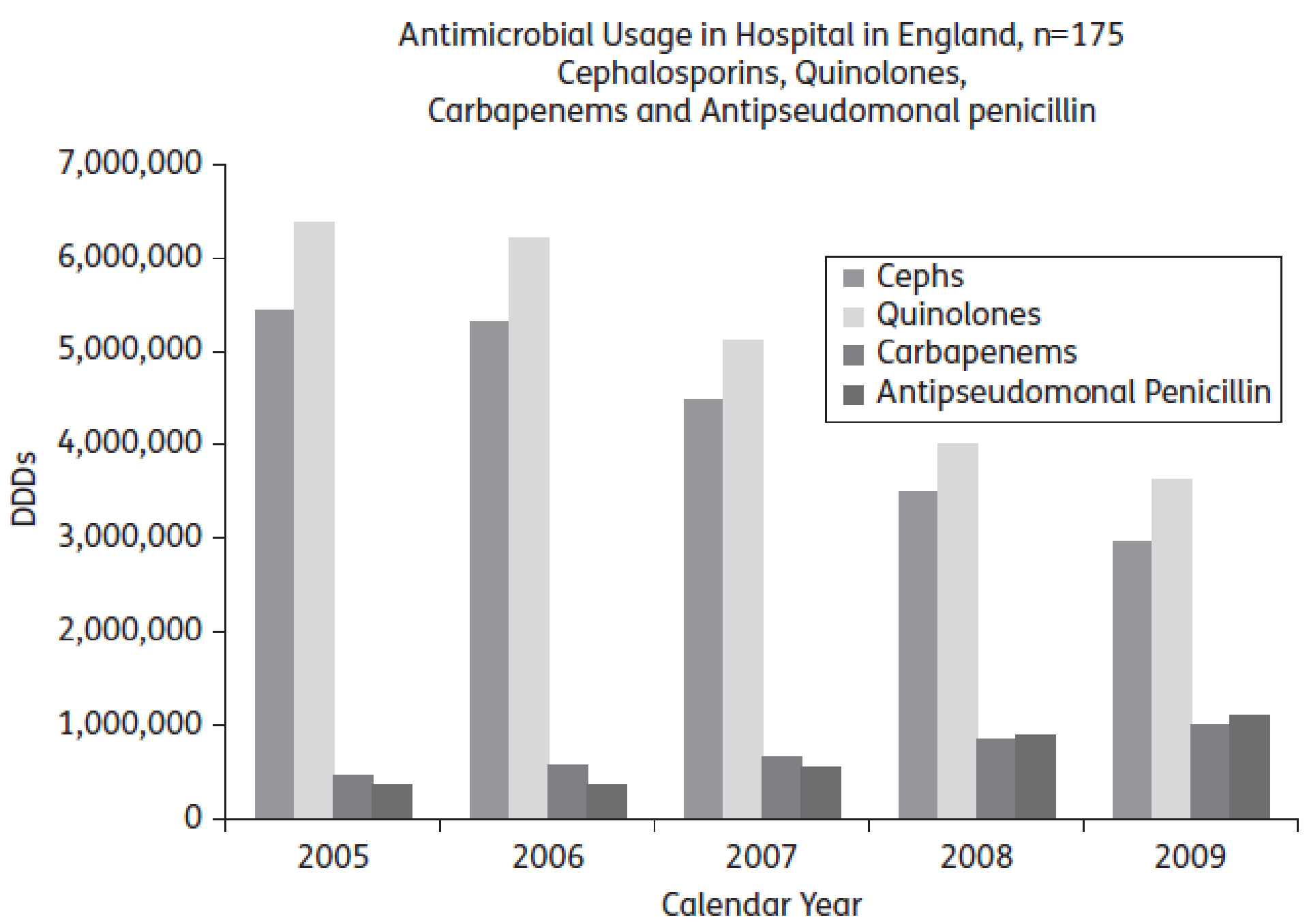


Figure 3.2 Antibiotic resistance rates among *E. coli* from cases of bacteraemia in England, Wales and Northern Ireland between 1990–2009. (Cipro: ciprofloxacin; 3GSc.)

ESBLs – A threat to human and animal health? 2011 Hawkey et al



IMS data

JAC 2012 Suppl. 1 67:i51-i63

Faecal carriage of CTX-M ESBL in community faeces samples

- 727 samples cultured on chromID
  confirmed by double disc diffusion & API 20E
- 80 samples gave *E. coli* CTX-M +ve
- All analysed by PFGE, 10 groups identified
  One example typed by MLST,
  All isolates screened by PCR for ST131.

Wickramasinghe et al. 2012 JAC,**67**:1108-13

Demography of Birmingham

Total population: 997,087

Ethnicity	% Population
White	67.0
Asian	21.0
Black	6.7
Chinese	3.2
Other	1.4

ONS 2007


TESCO
CLUBCARD
Every little helps

Origins Info - Empowering Diversity Insight

Business Decision Makers Overview | Technical Decision Makers Overview

Appying OriginsInfo to give Cultural Ethnic Linguistic groupings

571 European

152 Middle Eastern/South Asian

(MESA includes 4 African & 2 Chinese)

4 Unassigned

Distribution of CTX-M genotypes according to global origin

Global origin	***bla*$_{\text{CTX-M}}$**	***bla*$_{\text{CTX-M 9/14}}$**	***bla*$_{\text{CTX-M 15}}$**	ST131/Others
Europe n=571	46 (8.1%)[a]	15 (2.5%)	31(5.4%)[a]	8/23
MESA n=152	34 (22.4%)[a]	7 (4.5%)	27 (17.8%)[a]	6/21

[a] $p < 0.0002$

Wickramasinghe et al. al.J Antimicrob Chemother (2012)**67 :** 1108-13

CARBAPENEM ANTIBIOTICS…

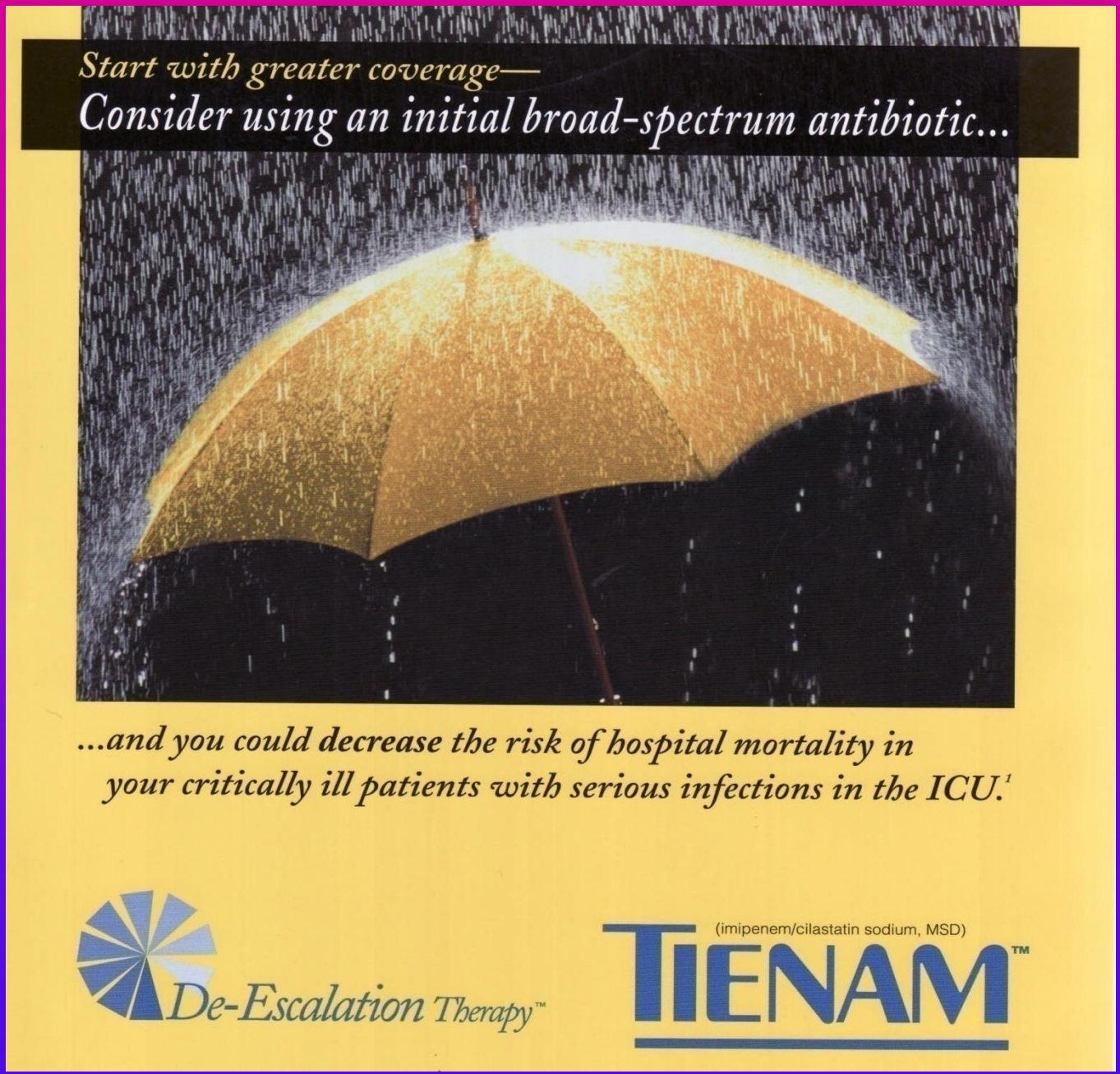


Figure 47. Percentage of Enterobacteriaceae isolates from HAIs non-susceptible to carbapenems, by country (n=2787 isolates), ECDC PPS 2011–2012

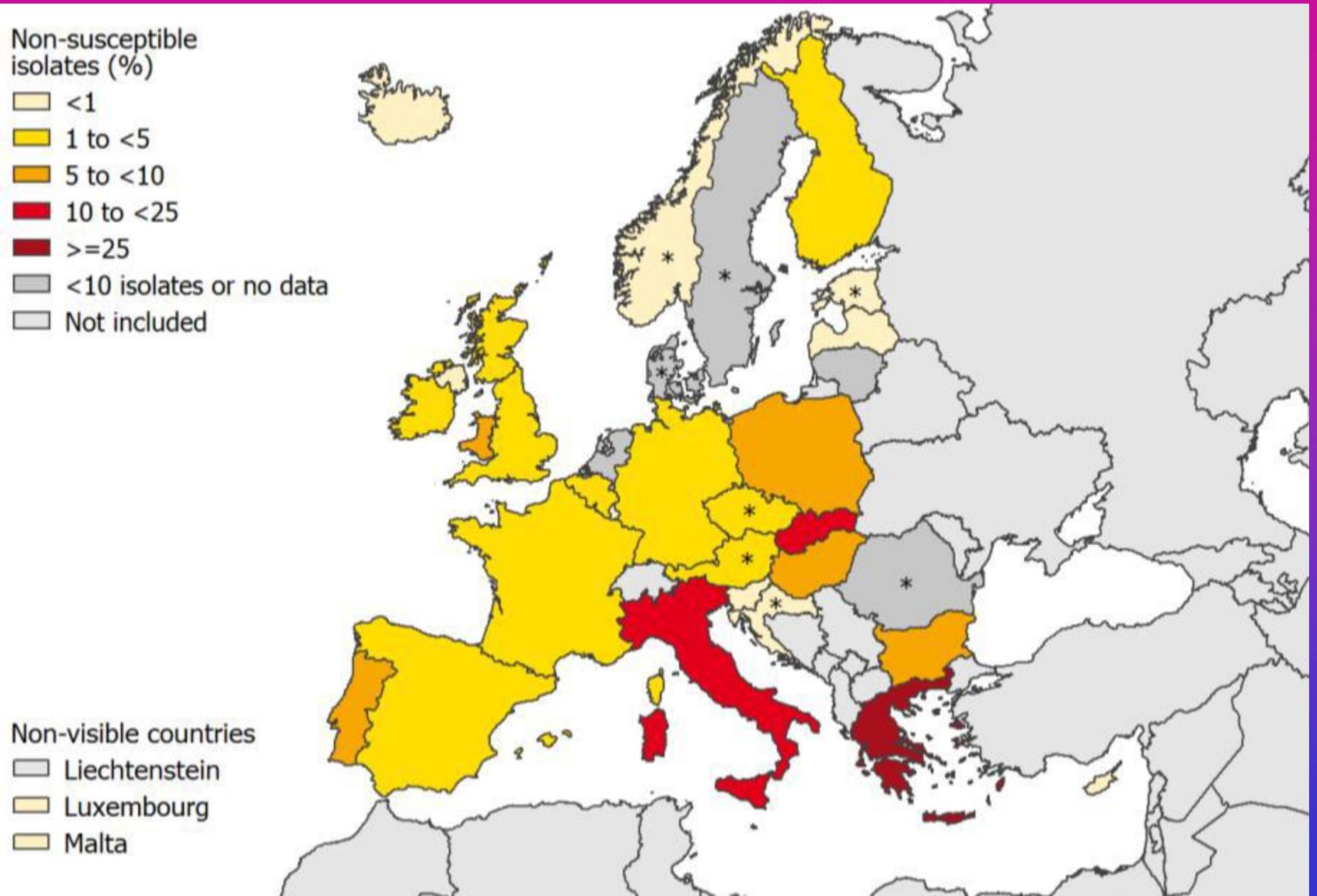
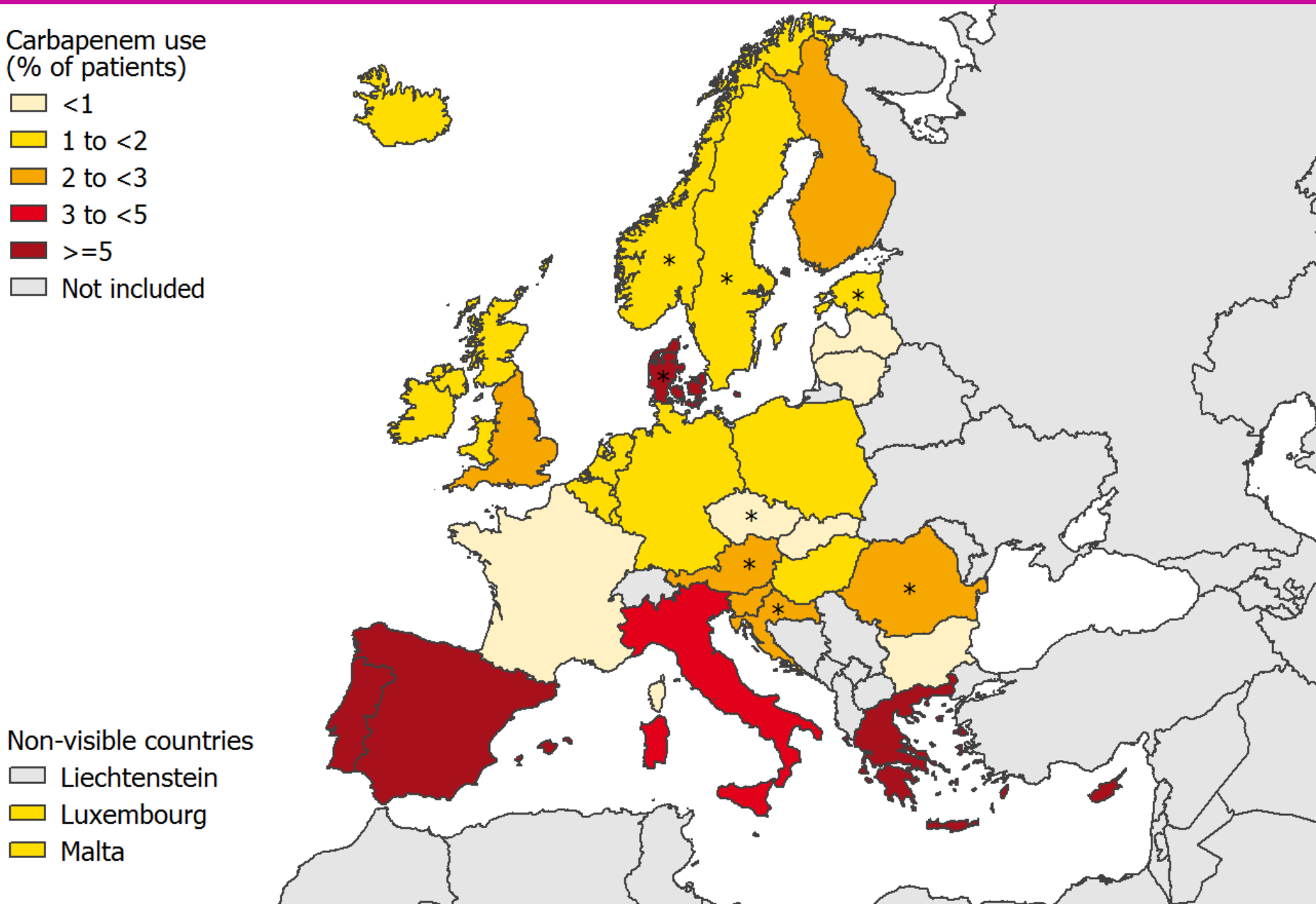
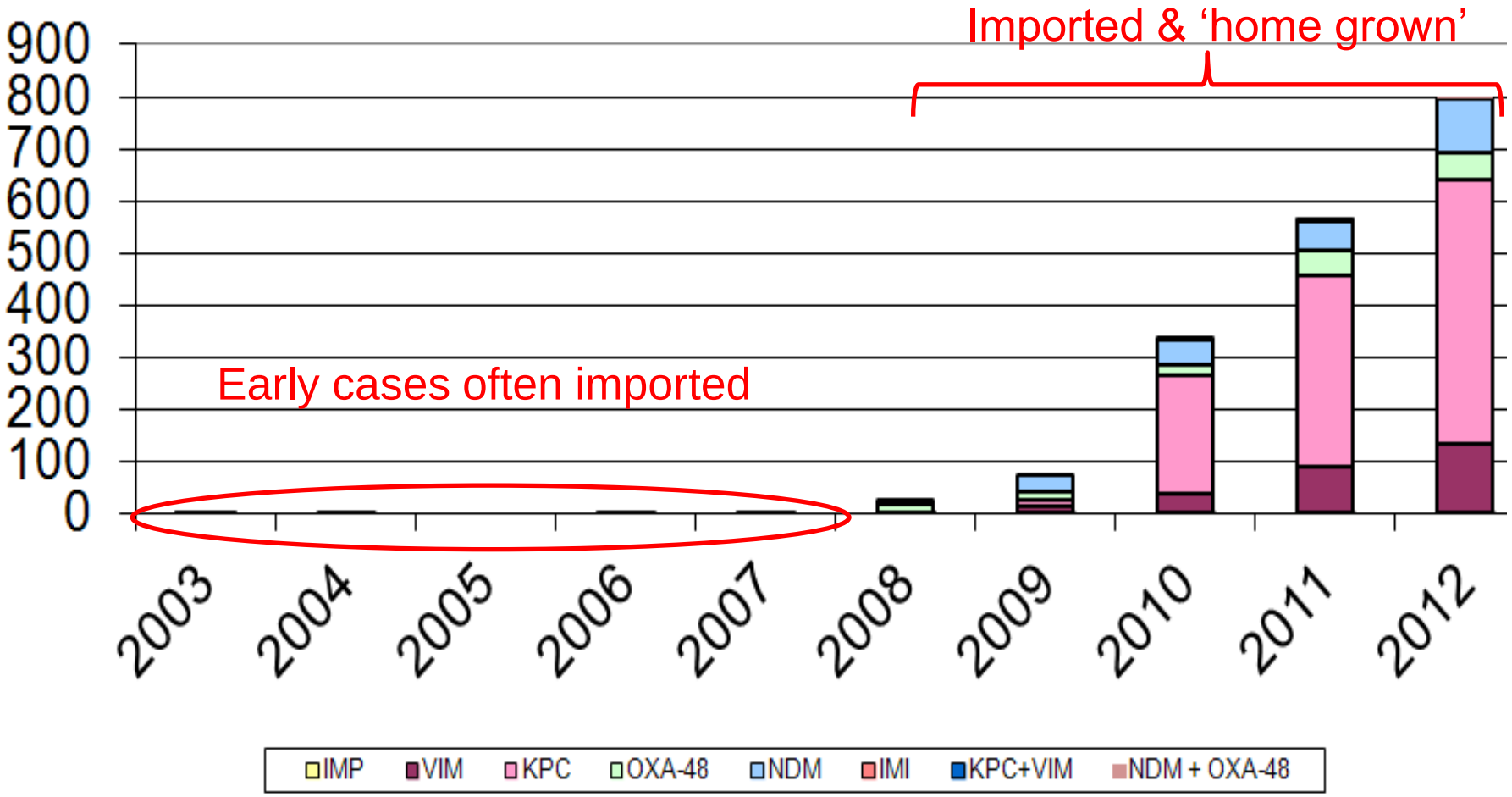


Figure 76. Prevalence of carbapenem (J01DH) use (percentage of hospitalised patients receiving carbapenems), ECDC PPS 2011–2012



Public Health England

Carbapenemase-producing Enterobacteriaceae in the UK (n = 1802)



Klebsiella spp. 79%; *E. coli* 12%, *Enterobacter* spp., 7%; others 2%

AMRHAI, Unpublished data

Distribution of NDM-1-producing Enterobacteriaceae strains in Bangladesh, India, Pakistan, and the UK

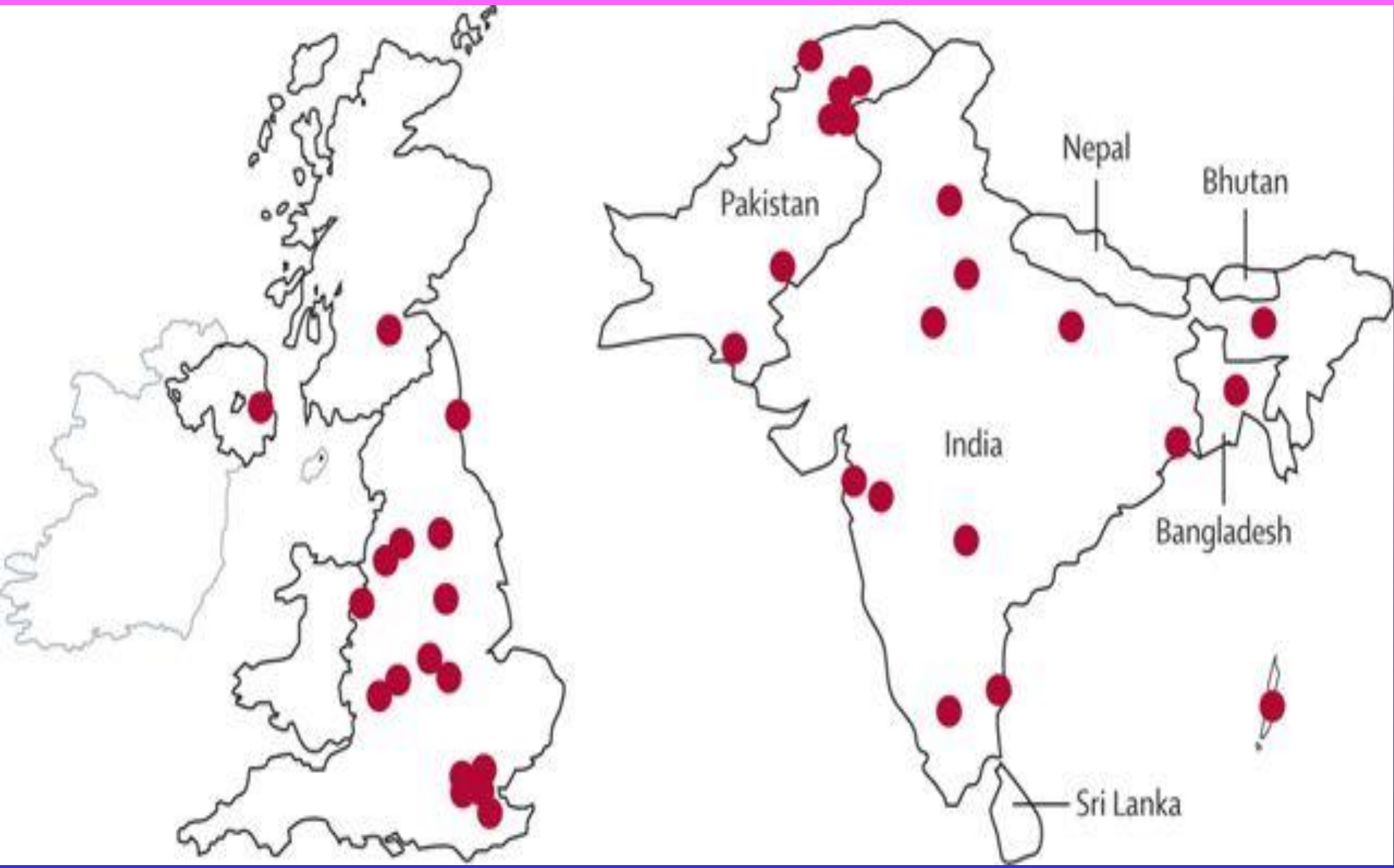
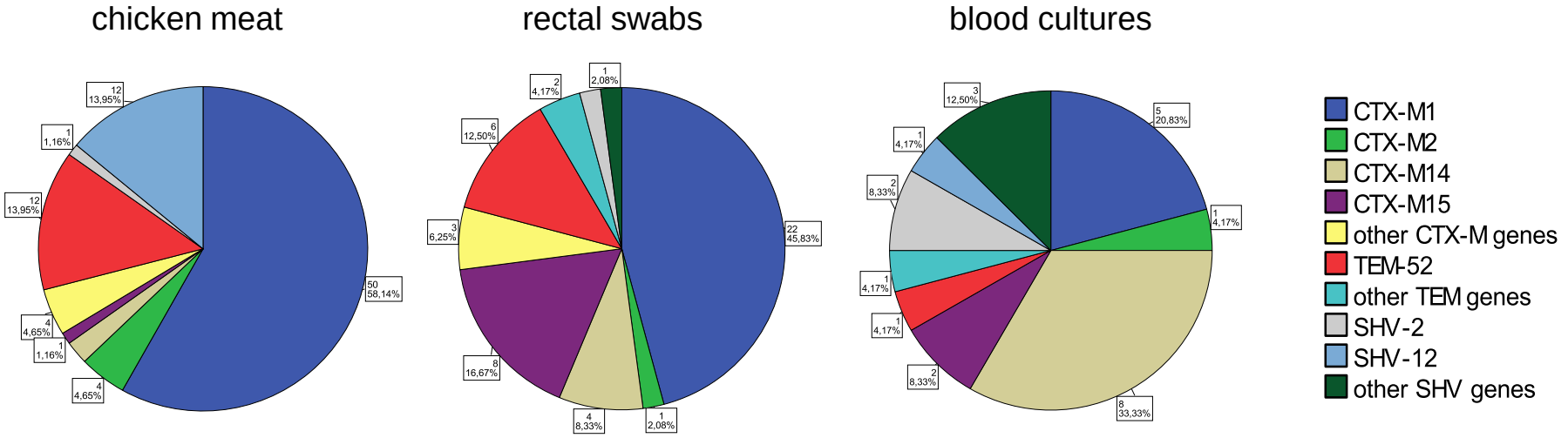
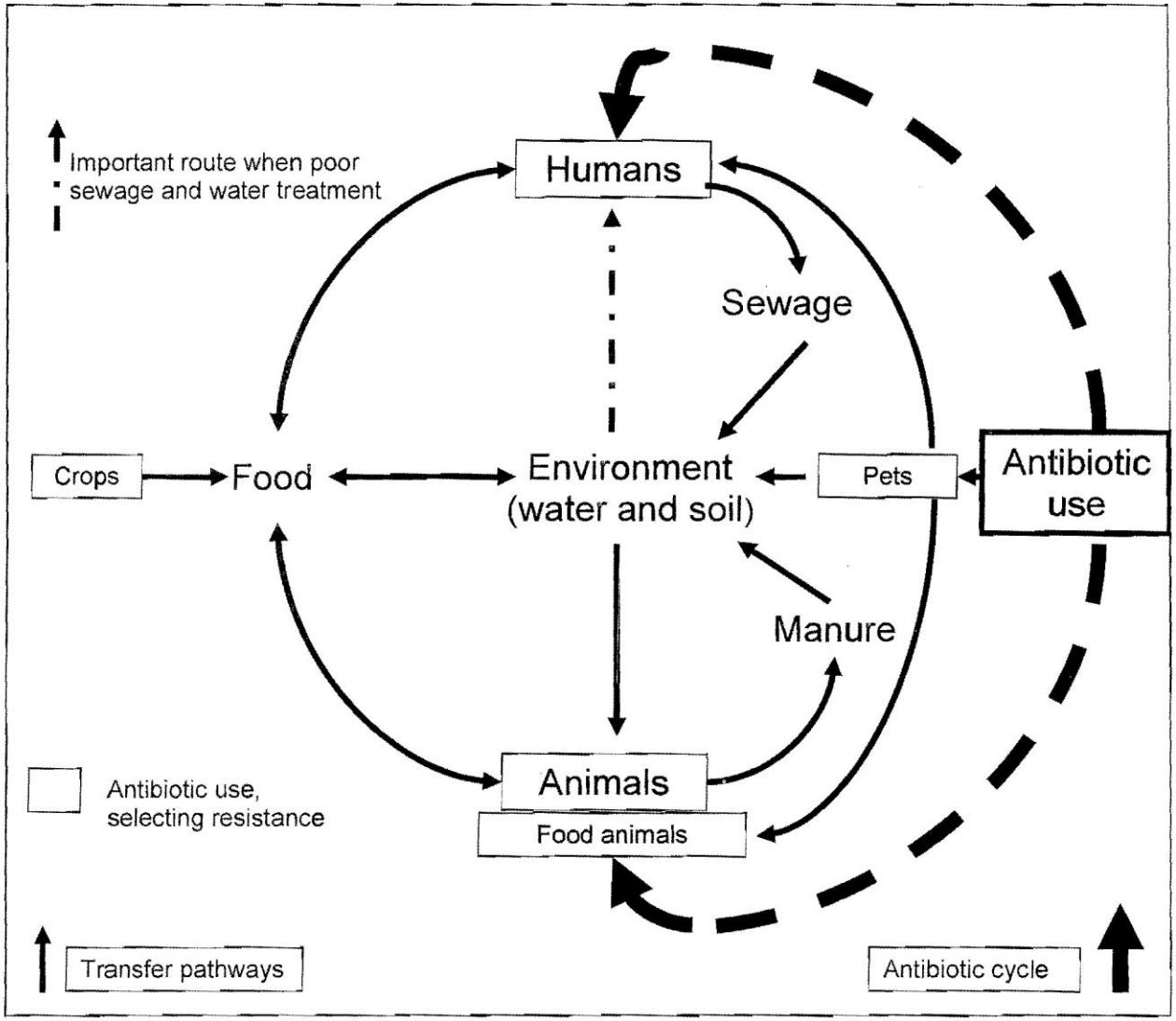


Figure 1: Distribution of ESBL genotypes in chicken meat, rectal swabs and blood cultures



Overdevest,Hawkey: et al 2011
Emerging Infectious Diseases **17**(Jul):1216-22

Principal routes outlining the transfer pathways for antibiotic resistance genes between humans, animals, food and the environment



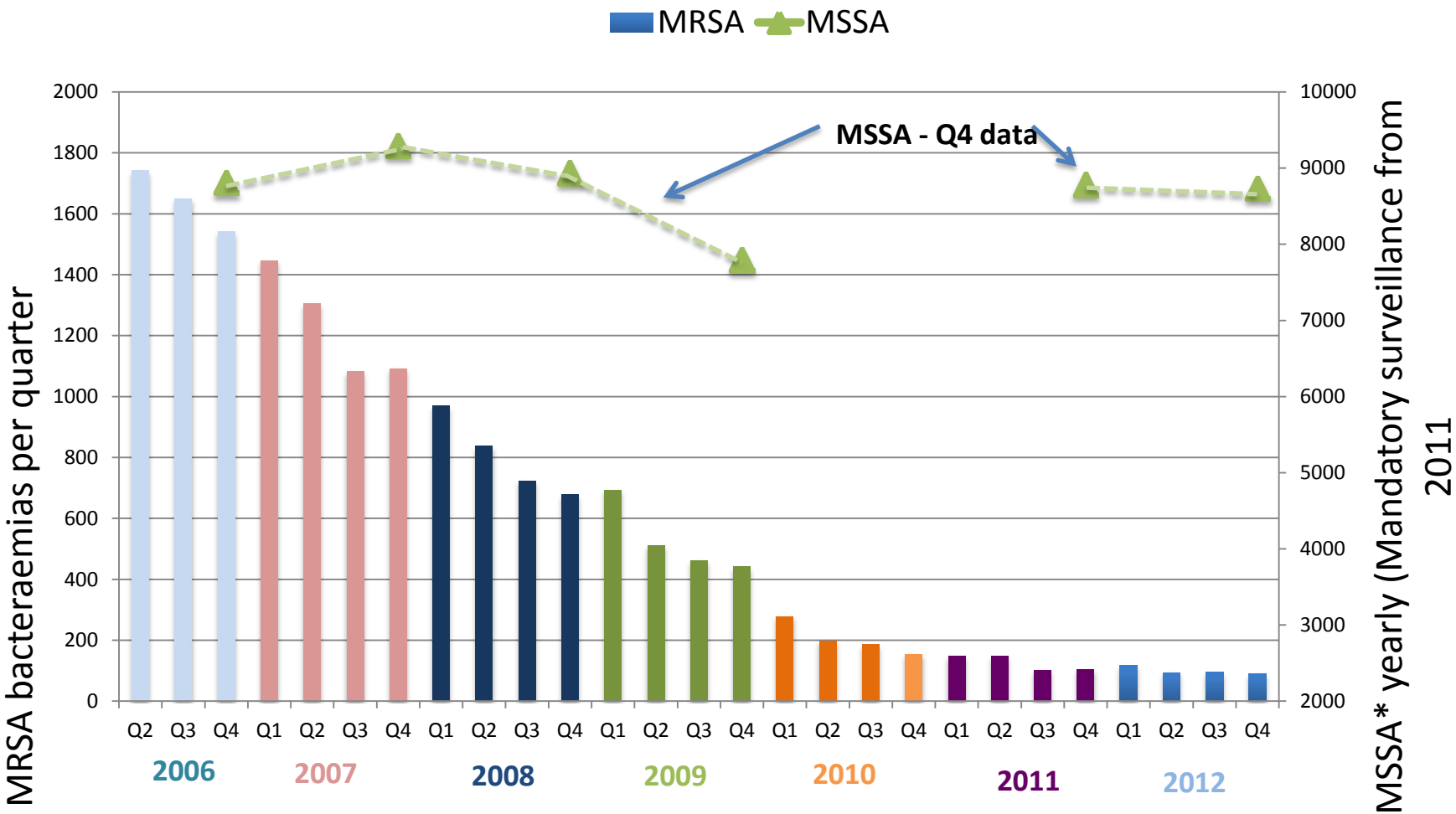
Wellington, Hawkey, et al. LID 2013 13: 155-65

UK 5 YEAR AMR STRATEGY
7 KEY AREAS

1. **Improving infection prevention & control practices**
2. Optimising prescribing practice
3. Improving professorial education, training & public engagement
4. Developing new drugs treatment & diagnostics
5. Better access to and use of surveillance data
6. Better identification and prioritisation of AMR research
7. Strengthened international collaboration

DoH/DEFRA Sept 2013

Trends in MRSA and MSSA 2007 - 2012



Source: Centre for Infections, Surveillance Team, Health Protection Agency, March 2013

* No data available for 2010

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DoH/DEFRA Sept 2013

Figure 65. Prevalence of antimicrobial use (percentage of patients receiving antimicrobials) in acute care hospitals, ECDC PPS 2011–2012

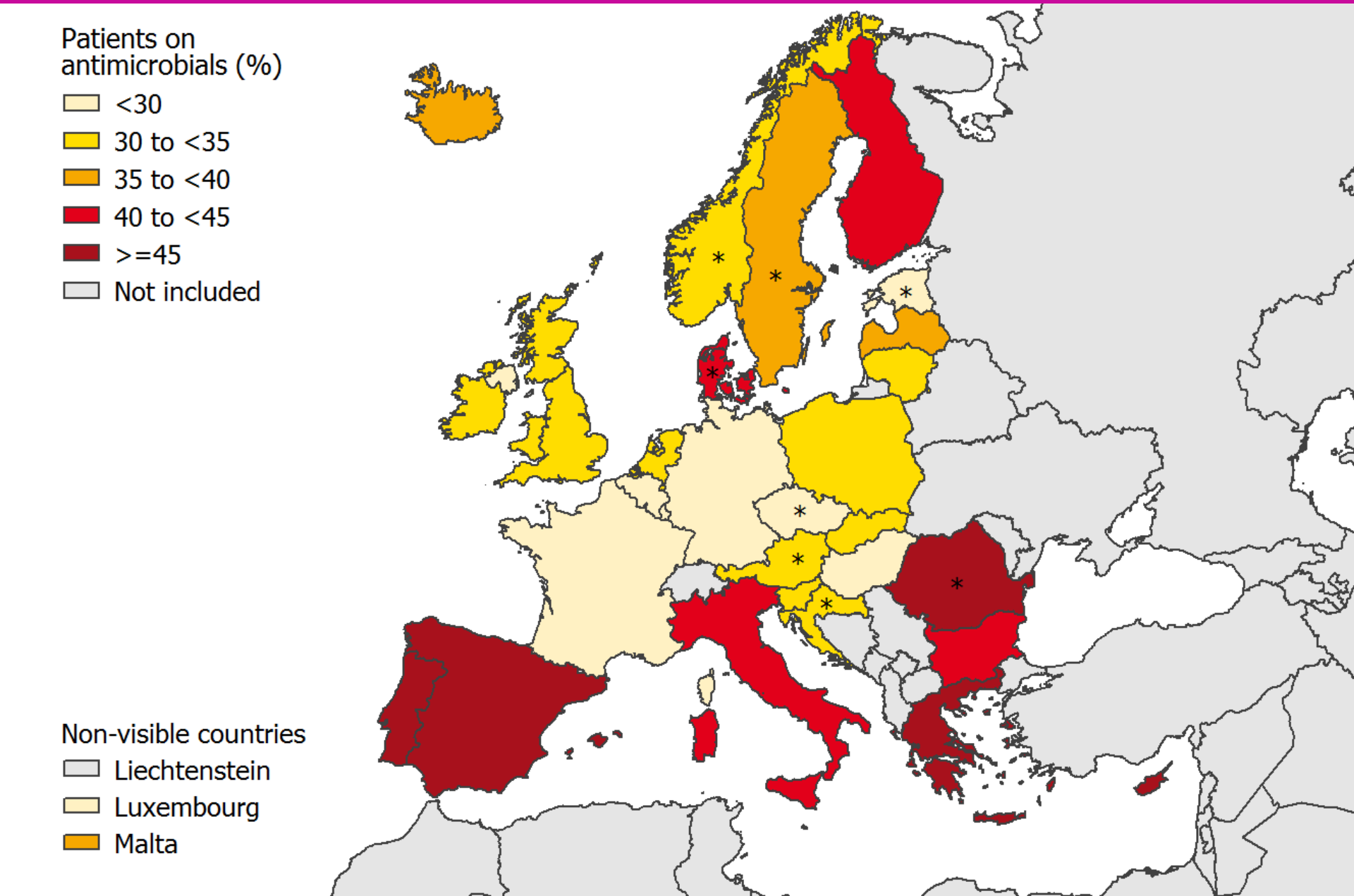
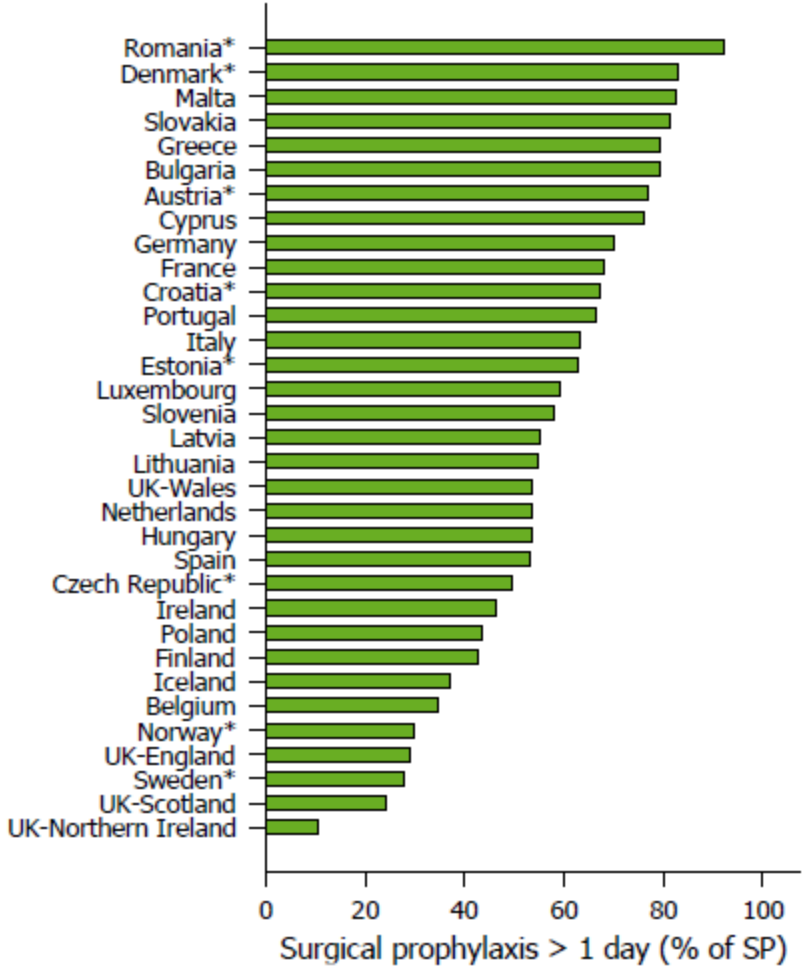


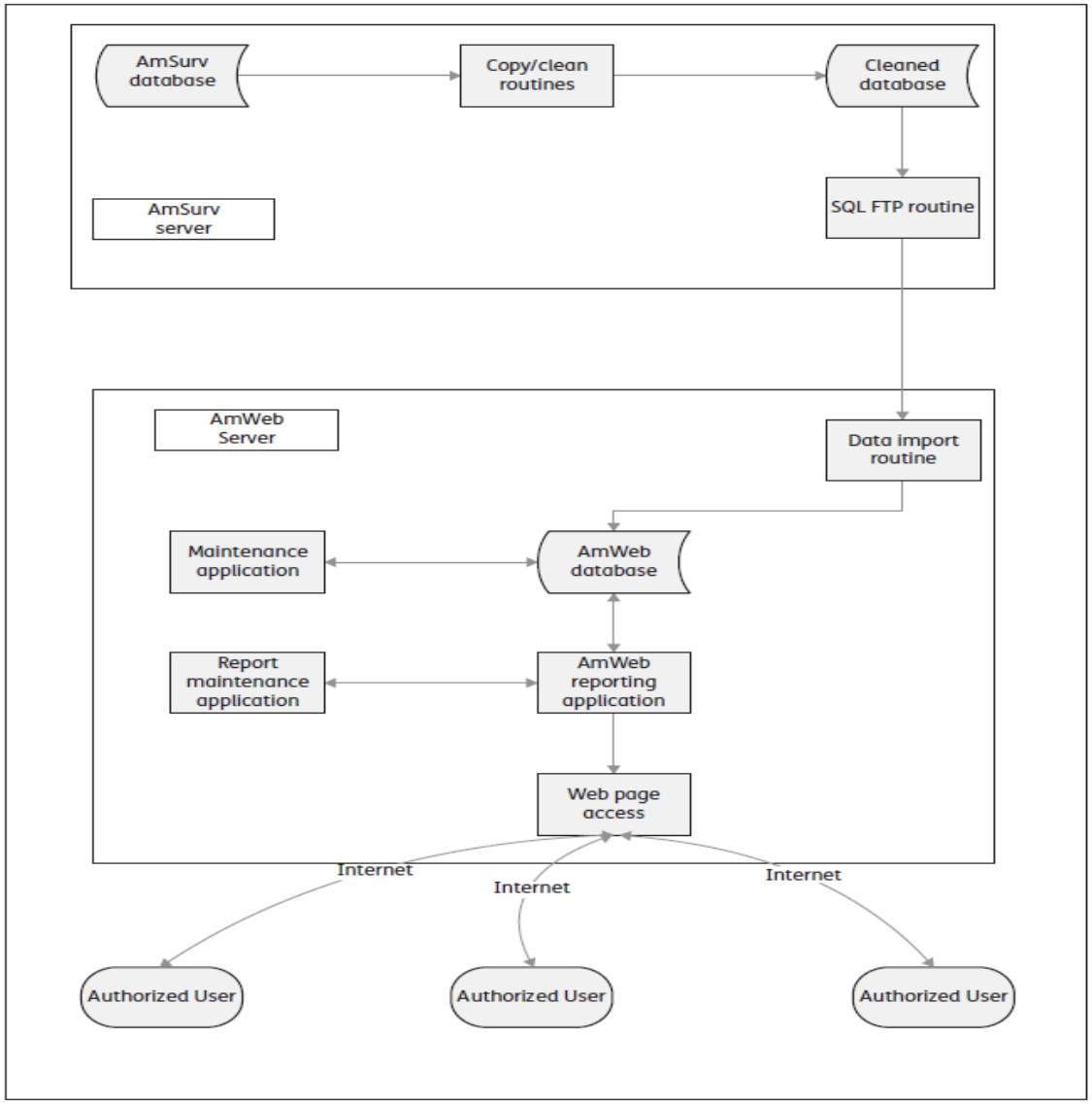
Figure 69. Surgical prophylaxis given for more than one day as a percentage of the total antimicrobials prescribed for surgical prophylaxis, by country, ECDC PPS 2011–2012



SP=surgical prophylaxis.

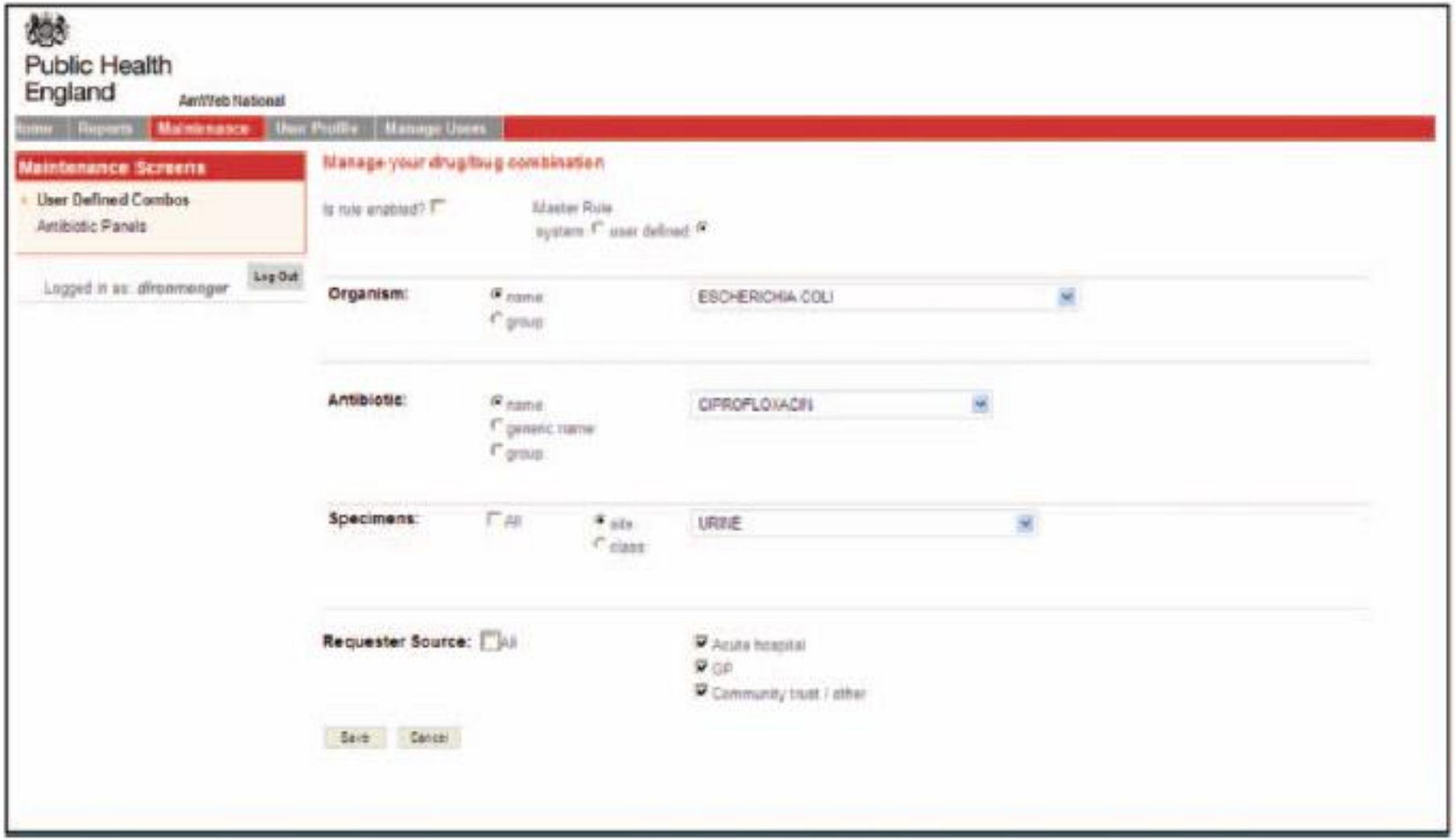
**PPS data representativeness was poor in Austria, Croatia, Czech Republic, Estonia, Norway and Romania and very poor in Denmark and Sweden.*

AmWeb process map



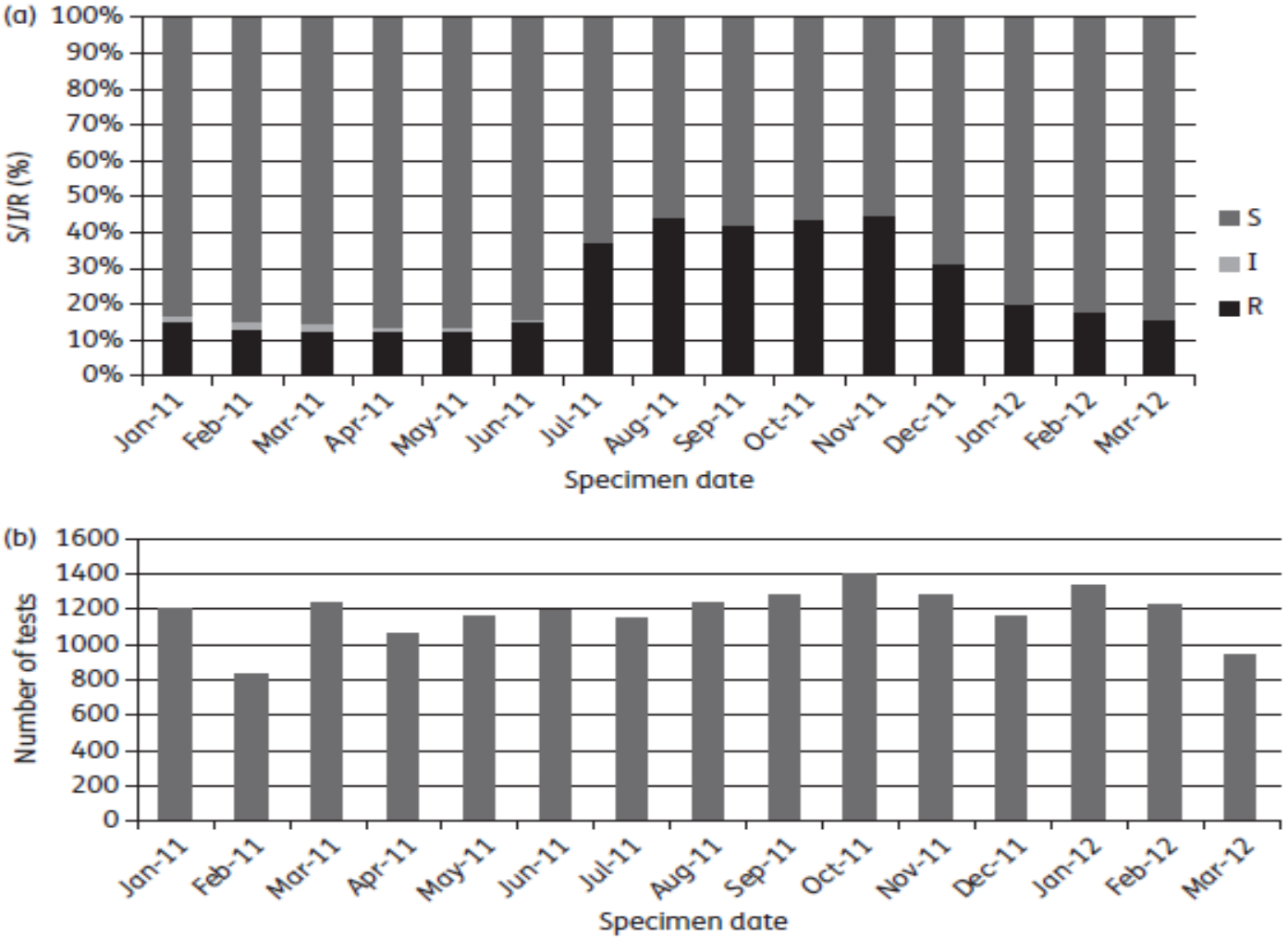
Ironmonger, Hawkey, *et al*, JAC 2013 **68**:2406

AmWeb drug/bug report maintenance screen



Ironmonger, Hawkey, *et al*, JAC 2013 **68**:2406

(a) Distribution of resistance profile *E. coli* from all specimens for co-amoxiclav in Lab Jan-Mar 2012
(b) Number of *E. coli* isolates from all specimens, tested in Lab A



Ironmonger, Hawkey, *et al*, JAC 2013 **68**:2406

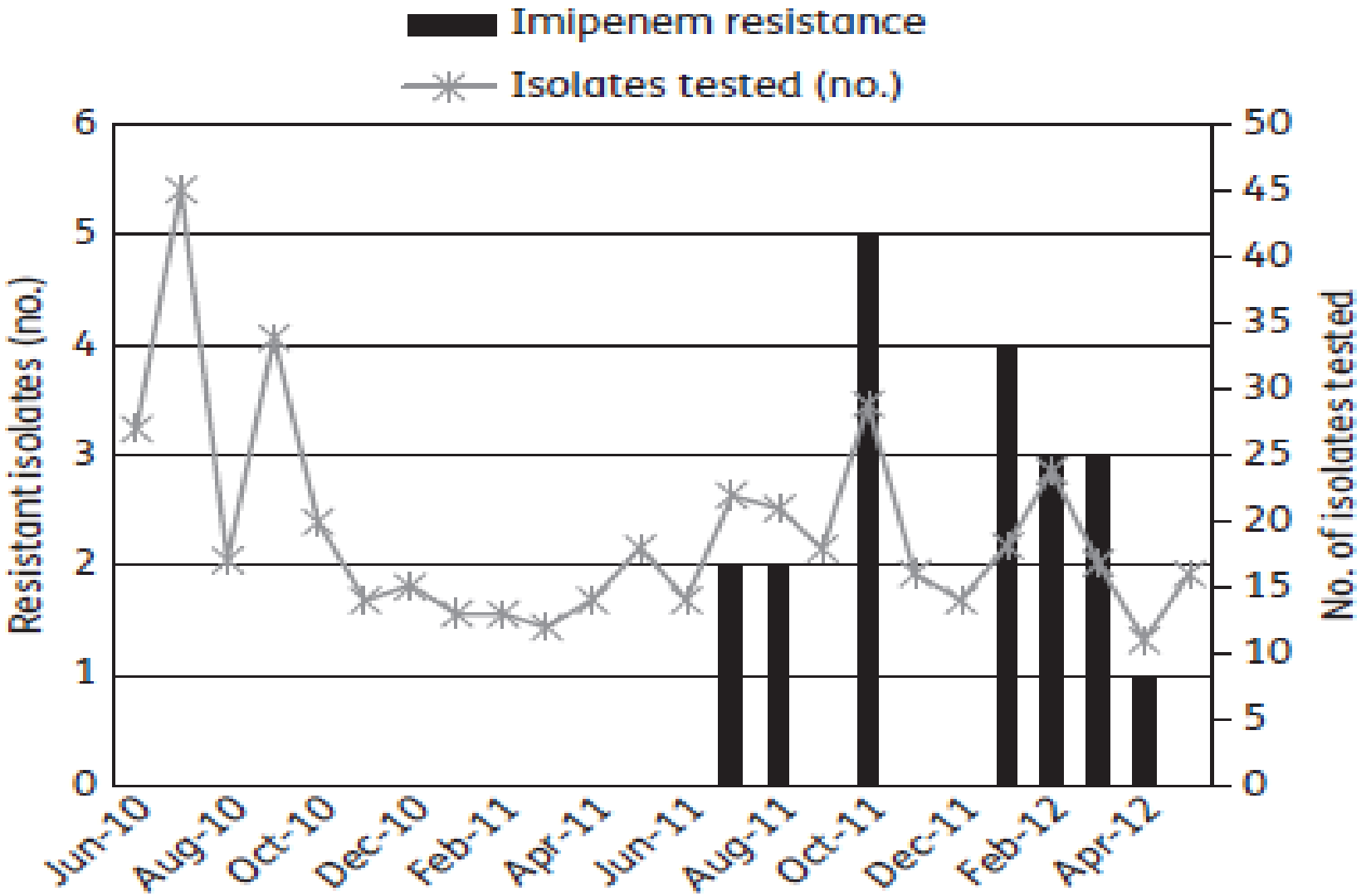


Figure 5. Results of susceptibility testing to imipenem for *K. pneumoniae* isolates from all specimens, reported by Laboratory B, together with totals of *K. pneumoniae* isolates tested against imipenem by Laboratory B.

UK 5 YEAR AMR STRATEGY
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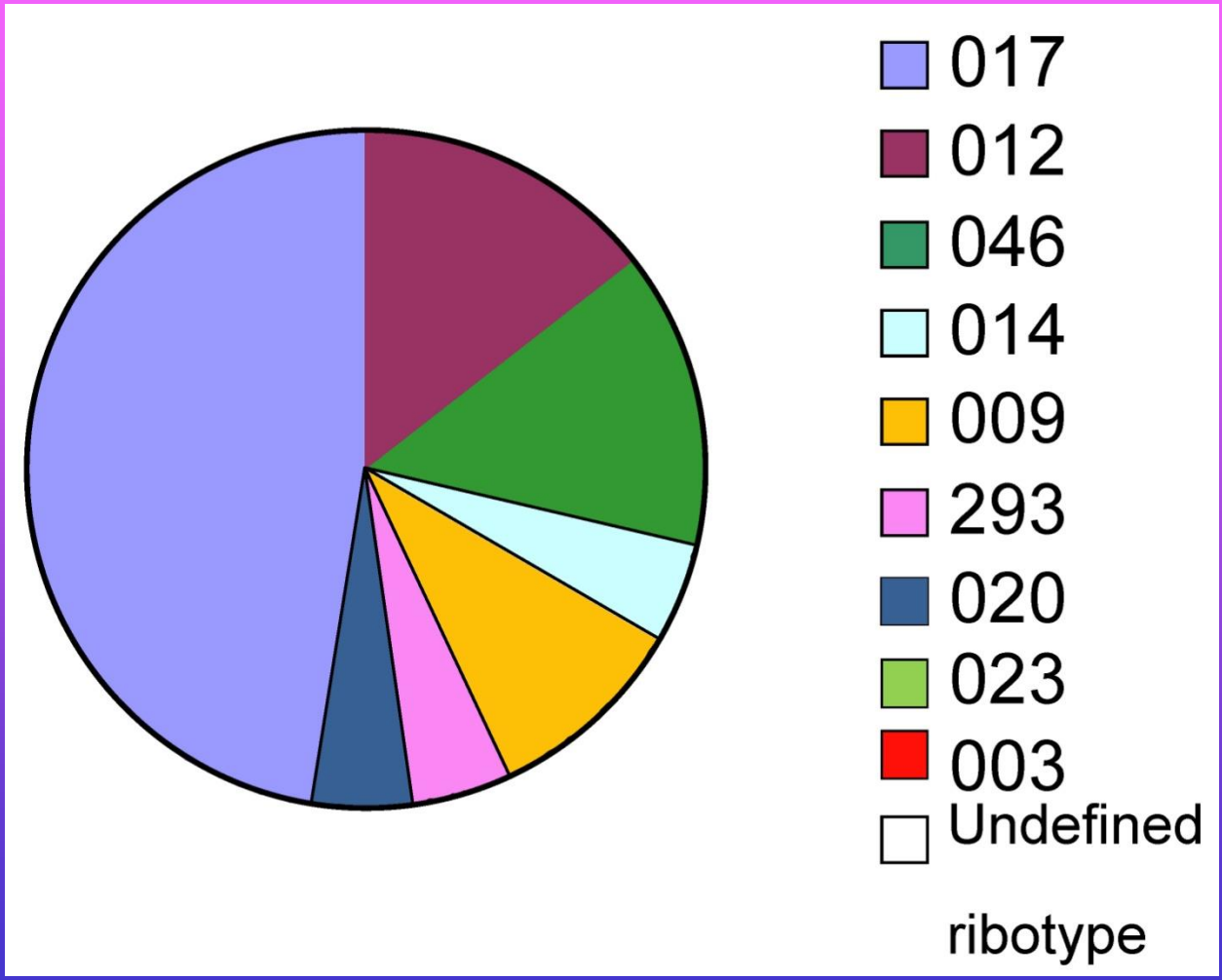
DoH/DEFRA Sept 2013

Joint China-UK Centre for the Molecular Diagnosis of Infection (CUCMDI)

Joint Directors Professor Wen-en Liu and Professor Peter Hawkey

Xiangya Hospital, Changsha, China

PCR ribotypes of *C. difficile* from 21 patients at Xiangya Hospital, Changsha



Hawkey et al J Clin Micro 2013 **51**:3308-13