

# Summary of the 2014 data on antibiotic resistance in the European Union

EARS-Net surveillance data  
November 2015

## A serious threat: antibiotic resistance in the European Union

- Antibiotic resistance is a serious threat to public health in Europe, leading to increased healthcare costs, prolonged hospital stays, treatment failures, and sometimes death.
- Over the last four years (2011–2014), the percentages of *K. pneumoniae* resistant to fluoroquinolones, third-generation cephalosporins and aminoglycosides, as well as combined resistance to all three antibiotic groups has increased significantly at EU/EEA level.
- During the same period, resistance to third-generation cephalosporins and combined resistance to fluoroquinolones, third-generation cephalosporins and aminoglycosides in *E. coli* increased significantly at EU/EEA level.
- Carbapenems are an important group of last-line antibiotics for treatment of infections involving multidrug-resistant gram-negative bacteria such as *K. pneumoniae* and *E. coli*. Although carbapenem resistance remains at relatively low levels for most countries, the significant increase of the population-weighted EU/EEA mean percentage of carbapenem resistance in *K. pneumoniae* is a cause for serious concern and a threat to patient safety in Europe.
- Antibiotic resistance in *Acinetobacter* species shows large intercountry variations in Europe. High percentages of isolates with combined resistance to fluoroquinolones, aminoglycosides and carbapenems were reported from the Baltic countries, southern and south-eastern Europe.
- In countries with high levels of multidrug resistance, including resistance to carbapenems, only a few therapeutic options are available, for example polymyxins. In these countries, the large number of isolates with resistance to polymyxins is an important warning that options for the treatment of infected patients are becoming even more limited.
- The percentage of methicillin-resistant *Staphylococcus aureus* showed a significantly decreasing trend at EU/EEA level between 2011 and 2014, but the decrease was less pronounced compared to the period 2009 to 2012.
- Prudent antibiotic use and comprehensive infection prevention and control strategies targeting all healthcare sectors (acute care hospitals, long-term care facilities and ambulatory care) are the cornerstones of effective interventions to prevent selection and transmission of antibiotic-resistant bacteria.

## Antibiotic resistance in the European Union

The data presented in this section were collected by the European Antimicrobial Resistance Surveillance Network (EARS-Net), which is coordinated by ECDC. For 2014, a total of 29 countries, including all EU Member States except Poland, and two EEA countries (Iceland and Norway), reported data to EARS-Net. For more details on

EARS-Net, surveillance results and information on methods please refer to the EARS-Net Annual Report 2014 and the EARS-Net interactive database\*.

## *Klebsiella pneumoniae*

*Klebsiella pneumoniae* is a common cause of urinary tract, respiratory tract and bloodstream infections. It can spread rapidly between patients in healthcare settings and is a frequent cause of hospital outbreaks.

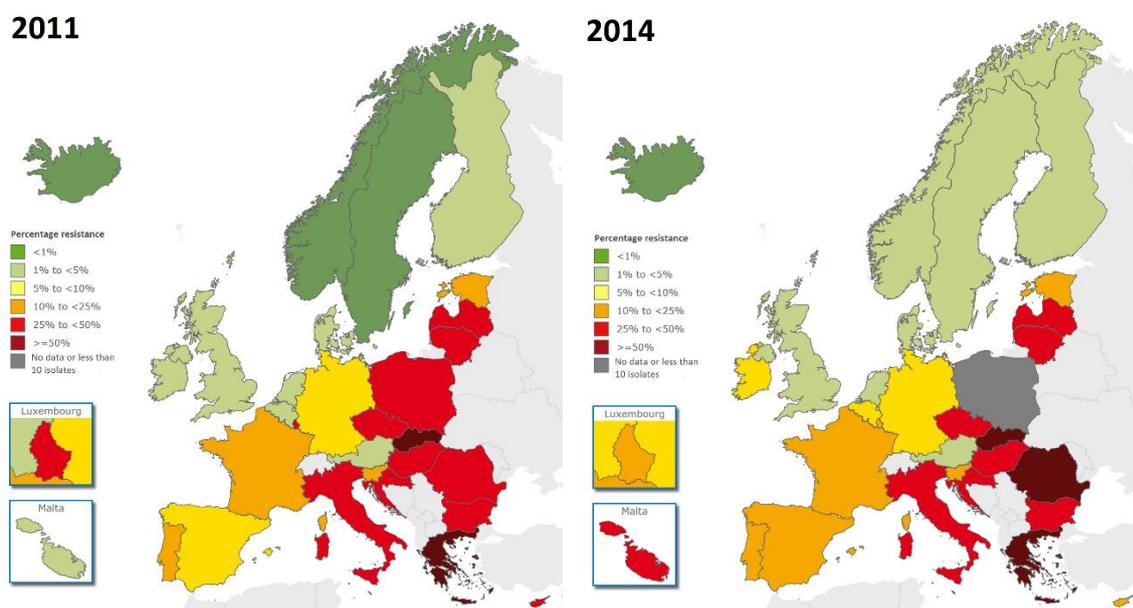
Antibiotic resistance in *K. pneumoniae* is a public health concern of increasing importance in Europe. More than one third of the *K. pneumoniae* isolates reported to EARS-Net for 2014 were resistant to at least one antibiotic group under surveillance, and resistance to multiple antibiotic groups was common.

The EU/EEA population-weighted mean percentages of *K. pneumoniae* resistant to fluoroquinolones, third-generation cephalosporins, aminoglycosides, and combined resistance to all three of these antibiotic groups, increased significantly between 2011 and 2014. The increasing trend of combined resistance to fluoroquinolones, third-generation cephalosporins and aminoglycosides from 16.7% in 2011 to 19.6% in 2014 (Figure 1), means that for patients who are infected with these multidrug-resistant bacteria, only few therapeutic options remain available. Among these are the carbapenems, a last-line group of antibiotics.

Although carbapenem-resistance percentages remained at low levels for most countries in 2014 (Figure 2), resistance to carbapenems at EU/EEA level significantly increased over the last four years, from a population-weighted mean percentage of 6.0% in 2011 to 7.3% in 2014. Resistance to carbapenems was more frequently reported in *K. pneumoniae* bloodstream infections from south and south-eastern Europe than from other parts of Europe.

Very few therapeutic options are left for patients infected with multidrug-resistant *K. pneumoniae* with additional resistance to carbapenems, and are often limited to combination therapy and to older antibiotics such as polymyxins. Although data on polymyxin susceptibility as part of EARS-Net surveillance are not complete, the fact that some countries, especially countries with already high percentages of carbapenem resistance, report large numbers of isolates with polymyxin resistance is an indication of the further loss of effective treatment options for gram-negative bacterial infections.

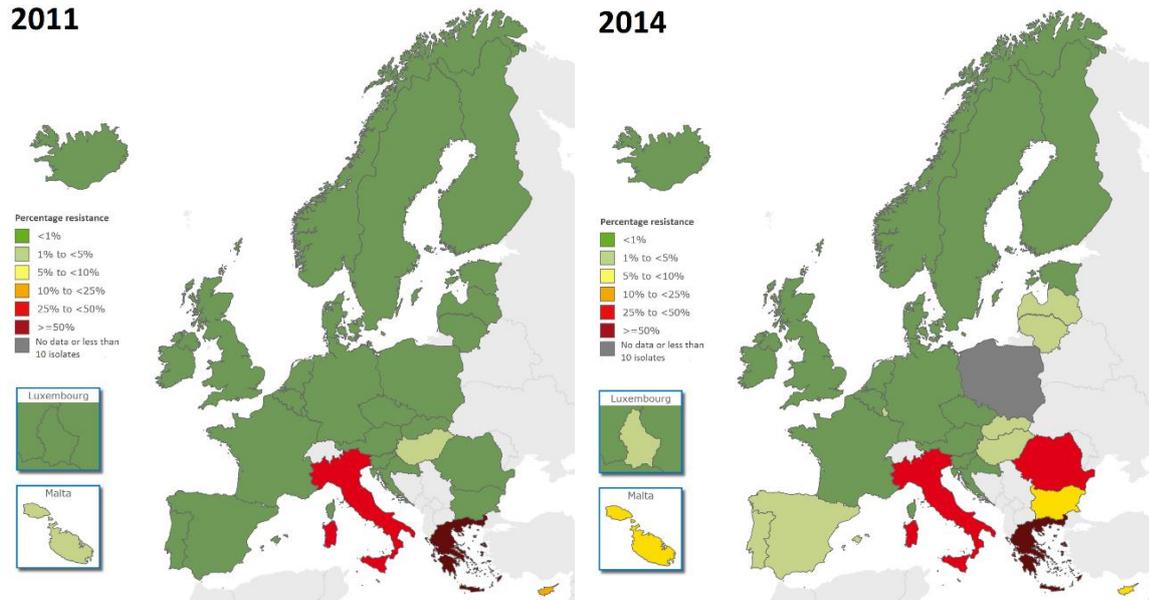
**Figure 1. *Klebsiella pneumoniae*: percentage of invasive isolates with combined resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides, EU/EEA, 2011 and 2014**



\* EARS-Net interactive database. Available from:

[http://ecdc.europa.eu/en/healthtopics/antimicrobial\\_resistance/database/Pages/database.aspx](http://ecdc.europa.eu/en/healthtopics/antimicrobial_resistance/database/Pages/database.aspx)

**Figure 2. *Klebsiella pneumoniae*: percentage of invasive isolates with resistance to carbapenems, EU/EEA, 2011 (left), 2014 (right)**



### *Escherichia coli*

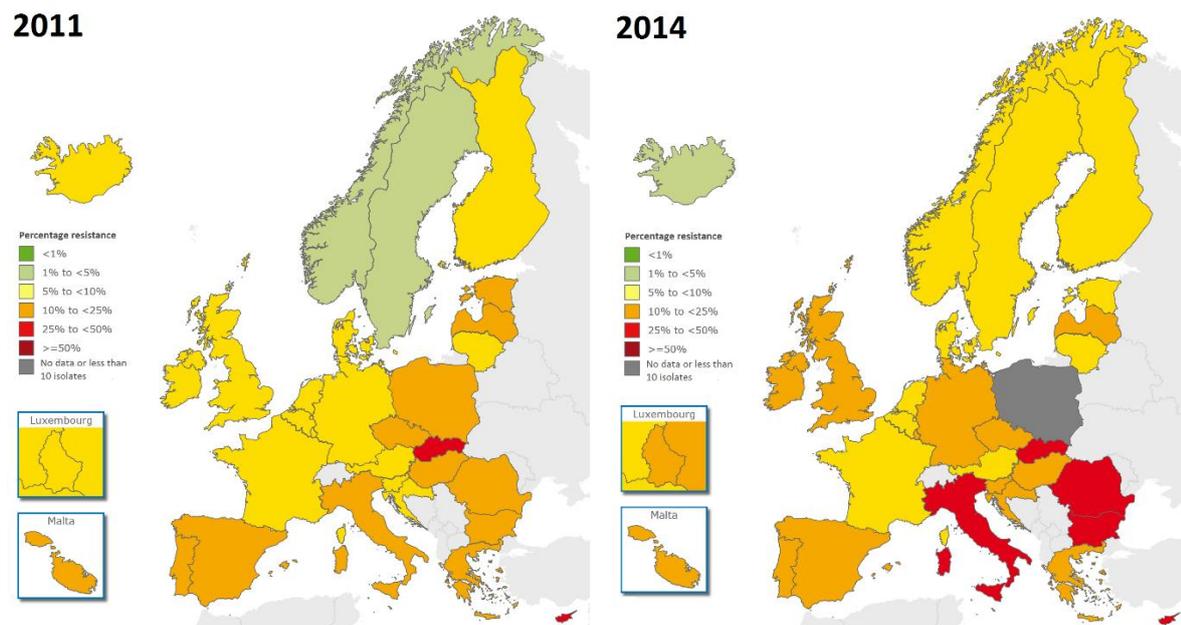
*Escherichia coli* is one of the most frequent causes of bloodstream infections and community- and healthcare-associated urinary tract infections worldwide.

Antibiotic resistance in *E. coli* requires close attention as the percentages of isolates resistant to commonly used antibiotics continue to increase throughout Europe. More than half of the isolates reported to EARS-Net in 2014 were resistant to at least one antibiotic group under surveillance.

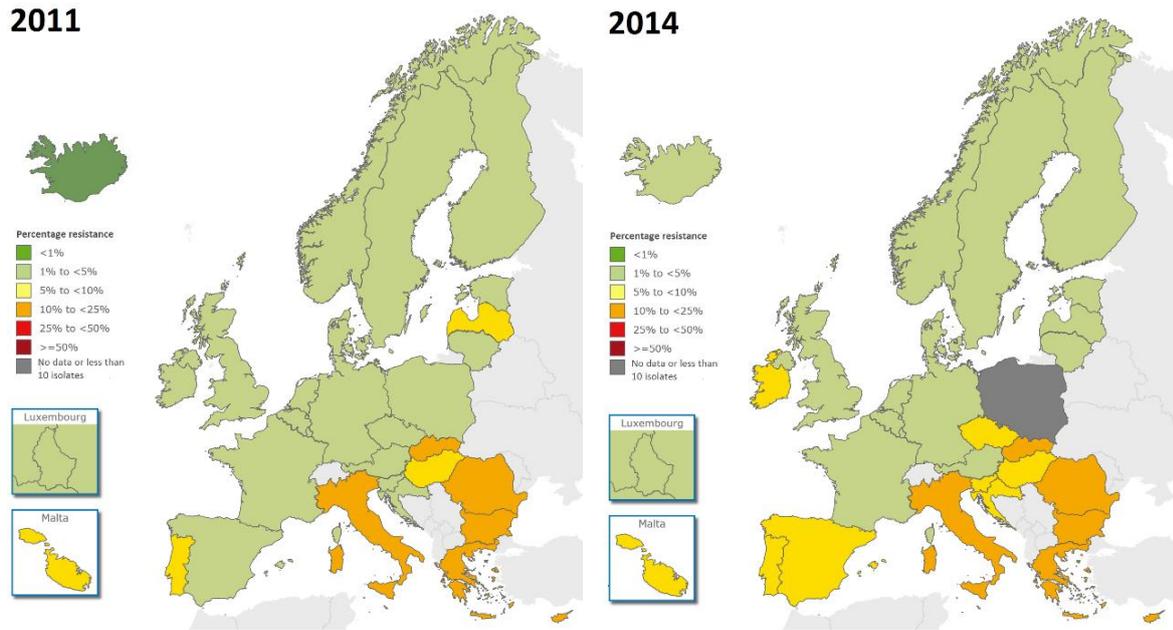
Of particular concern is the increase in resistance to third-generation cephalosporins (Figure 3), which increased significantly on EU/EEA level from 9.6% in 2011 to 12.0% in 2014, and combined resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides (Figure 4), which increased significantly on EU/EEA level from 3.8% in 2011 to 4.8% in 2014. Several countries reported statistically significant increasing trends for these types of resistance during the period 2011 to 2014.

Resistance to carbapenems in *E. coli* remains low in Europe.

**Figure 3. *Escherichia coli*: percentage of invasive isolates with resistance to third-generation cephalosporins, EU/EEA, 2011 and 2014**



**Figure 4. *Escherichia coli*: percentage of invasive isolates with combined resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides, EU/EEA, 2011 and 2014**



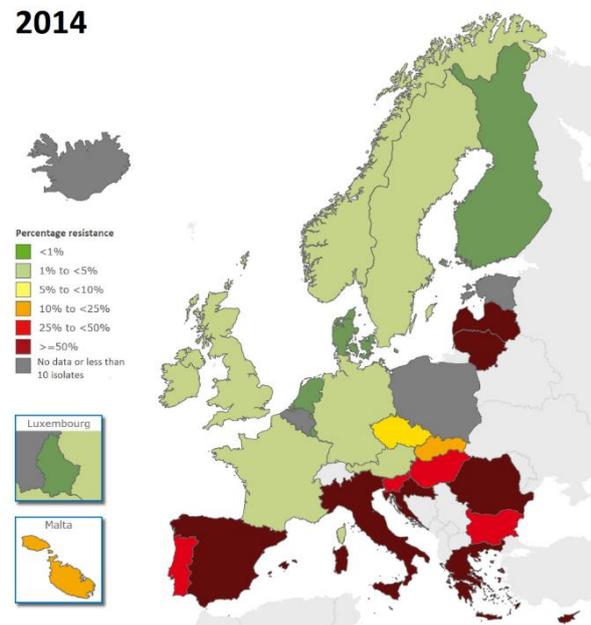
### **Acinetobacter species**

*Acinetobacter* species mainly cause healthcare-associated infections, such as pneumonia and bloodstream infections, and often results in hospital outbreaks.

Antibiotic resistance in *Acinetobacter* spp. showed large variations across Europe, with generally very high resistance percentages reported from the Baltic countries, southern and south-eastern Europe. Combined resistance to fluoroquinolones, aminoglycosides and carbapenems was the most frequently reported resistance phenotype in 2014 and accounted for almost half of the reported isolates. Eight out of 25 countries reporting susceptibility results for 10 or more isolates had percentages for this type of combined resistance of 50% or higher, indicating seriously limited options for the treatment of patients infected with *Acinetobacter* spp. in these countries (Figure 5).

Resistance to polymyxins was observed in 4% of the isolates, with a vast majority reported from southern Europe. These results should be interpreted with caution due to the low number of isolates tested and differences in laboratory methodology to determine susceptibility. However, the high levels of resistance to multiple antibiotics reported from several places in Europe is of great concern, especially when resistance to carbapenems is already high and resistance to polymyxins starts being reported.

**Figure 5. *Acinetobacter* species: percentage of invasive isolates with combined resistance to fluoroquinolones, aminoglycosides and carbapenems, EU/EEA, 2014**



## Meticillin-resistant *Staphylococcus aureus*

Meticillin-resistant *Staphylococcus aureus* (MRSA) is one of the most frequent causes of antibiotic-resistant, healthcare-associated infections worldwide. In addition, increasing levels of community-associated MRSA are being reported from many parts of the world, including Europe.

As in previous years, large intercountry variations in MRSA percentages were observed across Europe in 2014, with percentages ranging from 0.9 % to 56% (Figure 6). The EU/EEA population-weighted mean percentage decreased significantly from 18.6% in 2011 to 17.4% in 2014, but the decrease was less pronounced compared with that observed for the period 2009 to 2012.

Comprehensive MRSA strategies targeting all healthcare sectors (acute, long-term care facilities and ambulatory care) remain essential to sustain the reduction of the spread of MRSA in Europe.

**Figure 6. *Staphylococcus aureus*: percentage of invasive isolates with resistance to meticillin (MRSA), EU/EEA, 2011 and 2014**

