

Summary of the latest data on antibiotic resistance in the European Union

November 2012

Highlights on antibiotic resistance

- Antibiotic resistance is a major European and global public health problem and is, for a large part, driven by misuse of antibiotics. As a consequence, patients who are infected with these resistant bacteria, that are often resistant to multiple antibiotics (multi-drug resistance), have limited options for treatment.
- Antibiotic resistance is a serious threat to public health in Europe, because it leads to increasing healthcare costs, extra length of stay in the hospital, treatment failures, and sometimes death.
- Over the last several years, there has been a Europe-wide increase of antibiotic resistance and of multi-drug resistance in Gram-negative bacteria such as *Klebsiella pneumoniae* and *Escherichia coli* (*E. coli*).
- Over the last four years (2008 to 2011), in more than one-third of the EU/EEA countries there has been a significant increasing trend of combined resistance in both *Klebsiella pneumoniae* and *E. coli*. Combined resistance in these bacteria is defined as resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides.
- The increasing trend of combined resistance means that, for patients who are infected with these multidrug-resistant bacteria, only few therapeutic options remain available, e.g. carbapenems.
- Carbapenems represent a major last-line class of antibiotics to treat infections with multidrug-resistant Gram-negative bacteria such as *Klebsiella pneumoniae*, and *E. coli*, both common causes of pneumonia and urinary tract infections. However, the percentage of carbapenem-resistant *Klebsiella pneumoniae* is already high and increasing in some countries in the EU.
- In contrast, in the past few years, methicillin-resistant *Staphylococcus aureus* (MRSA), has shown either a continuous decrease or a stabilising trend in most EU countries. Nevertheless, MRSA remains above 25% in more than one fourth of the reporting countries, mainly in Southern and Eastern Europe.

Antibiotic resistance in the European Union

The data presented in this summary were collected by the European Antimicrobial Resistance Surveillance Network (EARS-Net) which is coordinated by the European Centre for Disease Prevention and Control (ECDC). The maps show the percentages of antibiotic resistance in selected bacteria that are reported from invasive infections (in blood and/or cerebrospinal fluid). These data are based on laboratory antibiotic susceptibility results reported by countries participating in EARS-Net.

Klebsiella pneumoniae

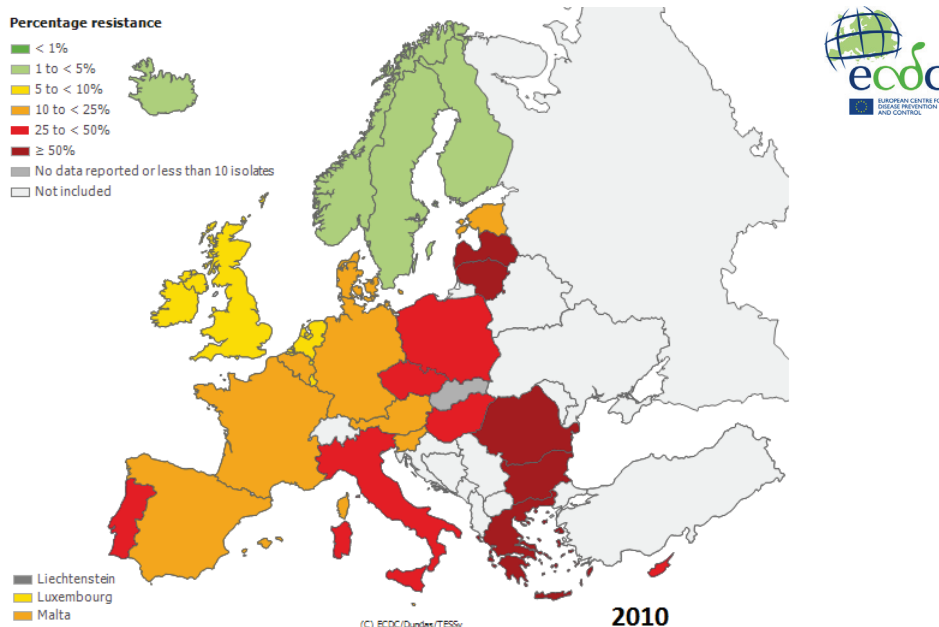
Klebsiella pneumoniae is a bacterium which is a common cause of Gram-negative urinary, respiratory tract and bloodstream infections. It can rapidly spread between patients in healthcare settings via the hands of healthcare workers, and is a frequent cause of hospital outbreaks. Any patient can be at-risk for a healthcare-associated infection with *K. pneumoniae*, but this is especially worrisome in patients with an impaired immune system because they are more susceptible to acquiring infections with this bacterium.

Antibiotic resistance in *K. pneumoniae* is a public health concern of increasing importance in Europe. Resistance to third-generation cephalosporins has increased significantly in several countries in recent years (Figure 1).

Combined resistance (defined as resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides) is common in *K. pneumoniae* infections in the EU and is increasing in several European countries (Figure 2). The increasing trend of combined resistance means that for patients who are infected with these multidrug-resistant bacteria, only few therapeutic options remain available, e.g. carbapenems.

In recent years, resistance to carbapenems – a last-line class of antibiotics – increased in a number of European countries. In 2011, the percentage of carbapenem resistance in *K. pneumoniae* was above 15% in three countries, all situated in the south of Europe (Figure 3).

Figure 1. *Klebsiella pneumoniae*: percentage of invasive isolates with resistance to third-generation cephalosporins in 2010 (top) and 2011 (bottom)



Percentage resistance

- < 1%
- 1 to < 5%
- 5 to < 10%
- 10 to < 25%
- 25 to < 50%
- ≥ 50%
- No data reported or less than 10 isolates
- Not included

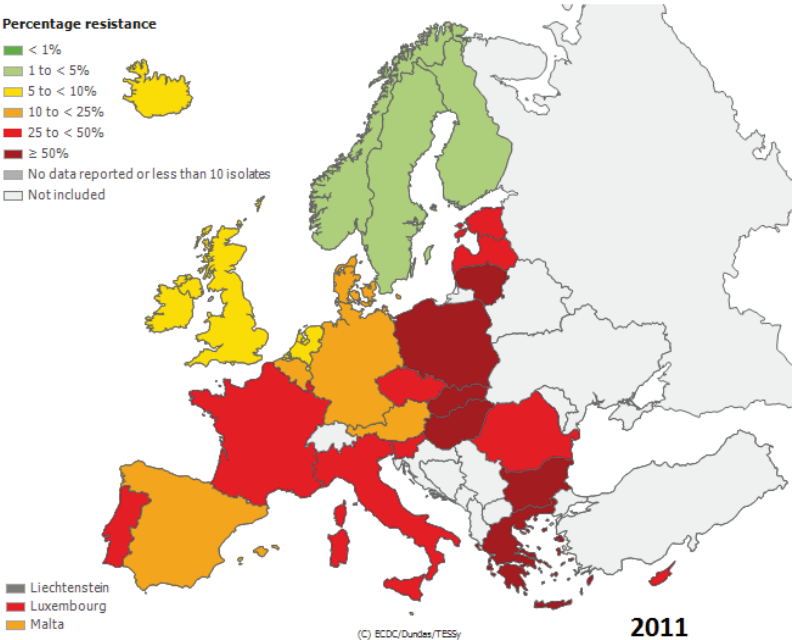


Figure 2. *Klebsiella pneumoniae*: percentage of invasive isolates with combined resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides in 2010 (top) and 2011 (bottom)

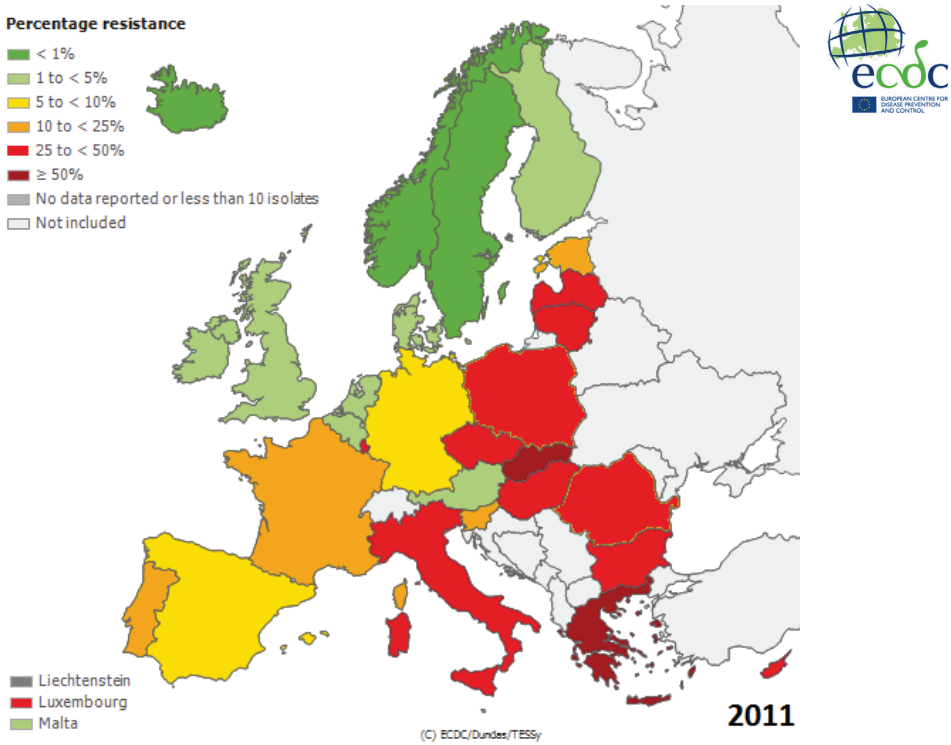
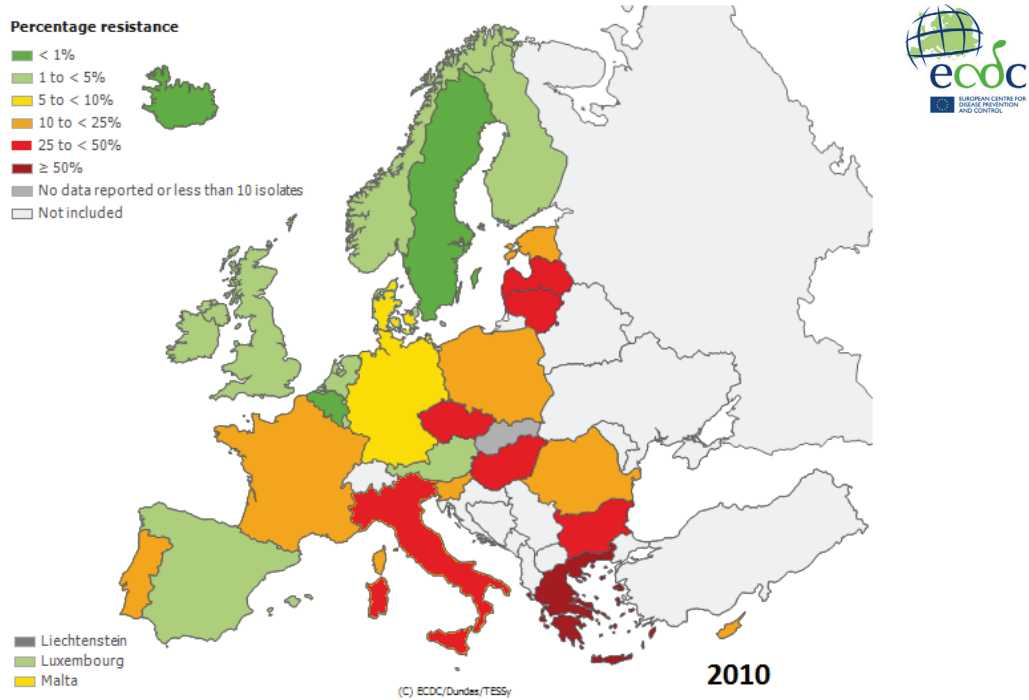
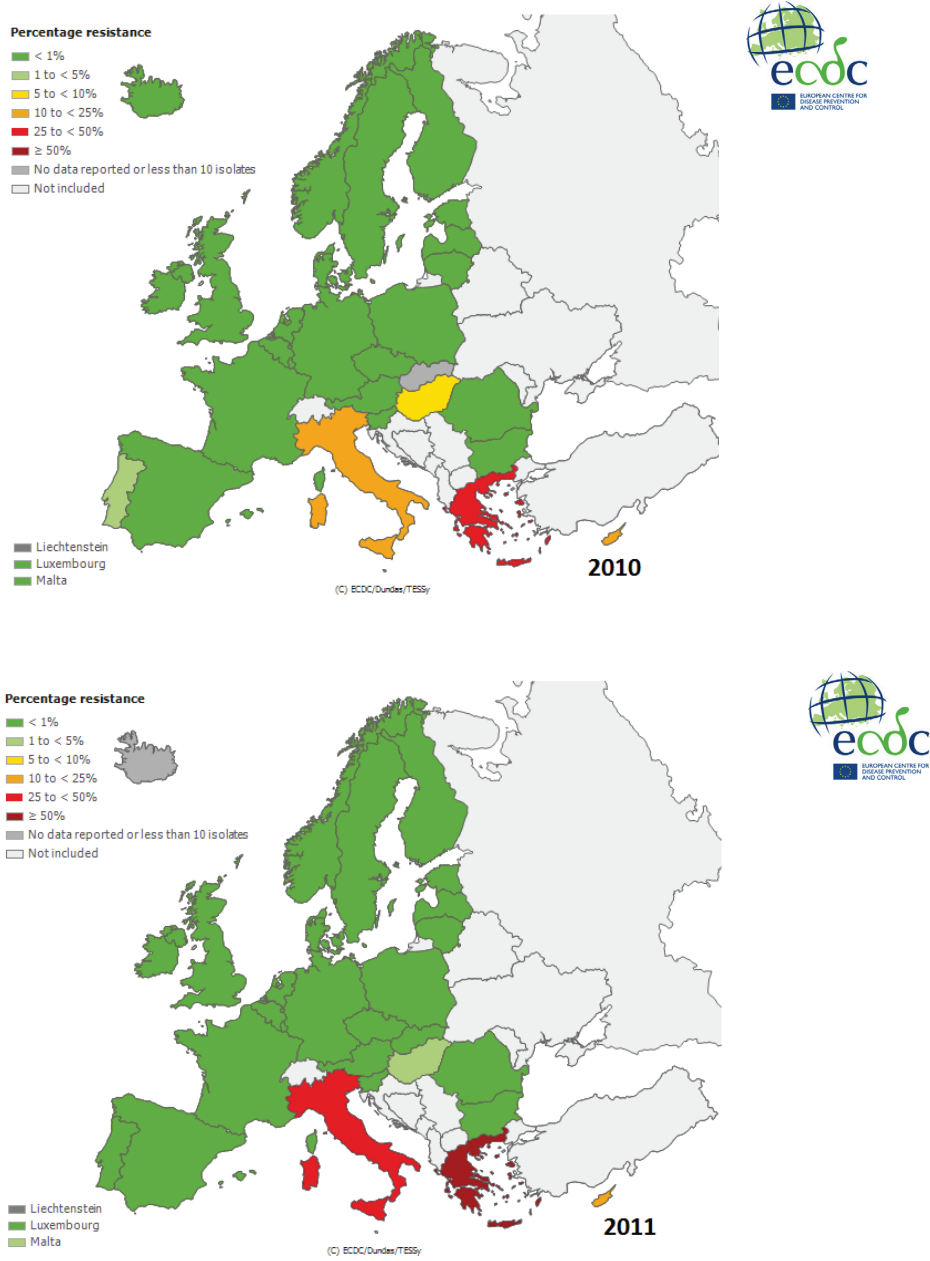


Figure 3. *Klebsiella pneumoniae*: percentage of invasive isolates with resistance to carbapenems in 2010 (top) and 2011 (bottom)

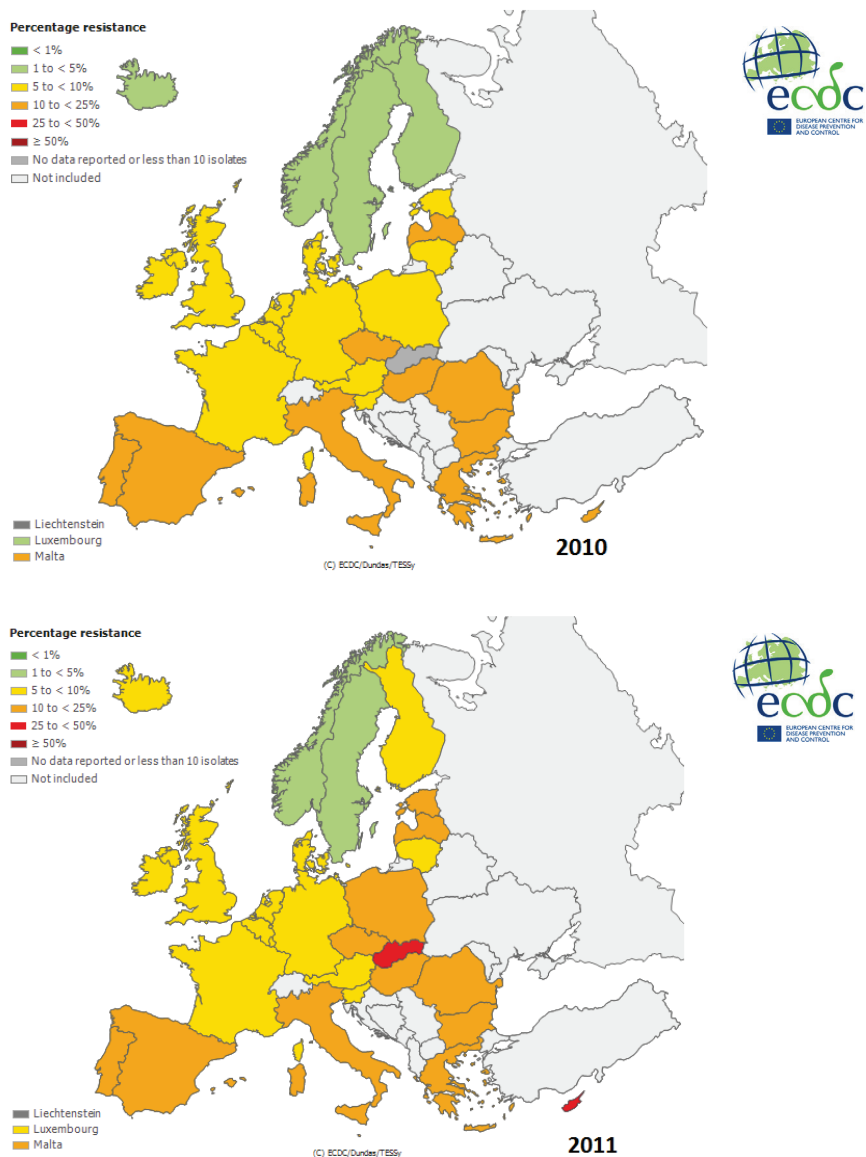


Escherichia coli

Escherichia coli is the most frequent cause of bloodstream and community- and hospital-acquired urinary tract infections reported worldwide. Furthermore, it is also one of the most common food-borne pathogens worldwide.

Antimicrobial resistance in *E. coli* requires close attention as the percentages of isolates resistant to commonly used antimicrobials continue to increase throughout Europe. Especially worrisome is the increase of resistance to third-generation cephalosporins (Figure 4) and of combined resistance, for which many countries had significantly increasing trends during the period 2008-2011 (data not shown).

Figure 4. *Escherichia coli*: percentage of invasive isolates with resistance to third-generation cephalosporins in 2010 (top) and 2011 (bottom)



Meticillin-resistant *Staphylococcus aureus* (MRSA)

Meticillin-resistant *Staphylococcus aureus* (MRSA) is one of the most important causes of antibiotic-resistant healthcare-associated infections worldwide.

Data for 2011 reported to EARS-Net show that MRSA percentages continued to either decrease or stabilise in most European countries. Although these observations provide reasons for being optimistic, MRSA still remains a significant public health problem, as the percentage of MRSA of all invasive *S. aureus* infections (bloodstream and cerebrospinal fluid) is above 25% in eight out of 28 countries, mainly in Southern and Eastern Europe (Figure 5). In order to reduce the spread of MRSA in Europe, comprehensive MRSA prevention and control strategies targeting all healthcare sectors (acute, long-term care facilities and ambulatory care) remain essential.

Figure 5. *Staphylococcus aureus*: percentage of invasive isolates with resistance to meticillin (MRSA) in 2010 (top) and 2011 (bottom)

