

Summary of latest data on antibiotic resistance in the European Union

Highlights on antibiotic resistance

- Antibiotic resistance is a major global public health problem and is, for a large part, driven by use of antibiotics. As a result, patients are suffering from infections caused by bacteria that are resistant to antibiotics, sometime to multiple antibiotics.
- Resistance in bacteria commonly responsible for infections such as *Klebsiella pneumoniae* and *Escherichia coli* has been increasing Europe-wide for all antibiotic classes under surveillance. Single and combined resistance to several antibiotics (multi-drug resistance) are increasing in these bacteria.
- The percentage of carbapenem-resistant *Klebsiella pneumoniae* is increasing in the European Union and these resistant bacteria are now spreading to several European countries. Transfer of patients across borders poses a clear risk for the transmission of carbapenem-resistant bacteria, especially when patients are transferred from areas with high rates of such bacteria to healthcare facilities in another country or have received medical care abroad in areas with high rates of carbapenem-resistant bacteria.
- Carbapenems are the major last-line class of antibiotics to treat infections with multidrug-resistant Gram-negative bacteria such as *K. pneumoniae* and *E. coli*. Resistance to carbapenems limits available options for treatment of infected patients to only few antibiotics, which often are old antibiotics that were developed several decades ago and often have limitations and side-effects.
- The occurrence of meticillin-resistant *Staphylococcus aureus* (MRSA) shows a decrease in some European countries. However, one fourth of countries are still reporting that of all *Staphylococcus aureus* invasive infections, more than 25% are MRSA.

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 the European Centre for Disease Prevention and Control (ECDC). The maps presented in this summary show the occurrence of antibiotic resistance in selected bacteria causing invasive infections and are based on laboratory results reported by countries participating in EARS-Net.

Klebsiella pneumoniae (*K. pneumoniae*)

K. pneumoniae is one of the common causes of Gram-negative urinary and respiratory tract infections. This micro-organism can rapidly spread from the gastrointestinal tract of patients and *via* the hands of the hospital personnel to other patients, leading to nosocomial outbreaks. Importantly, patients with impaired immune defences are at higher risk to acquire these infections.

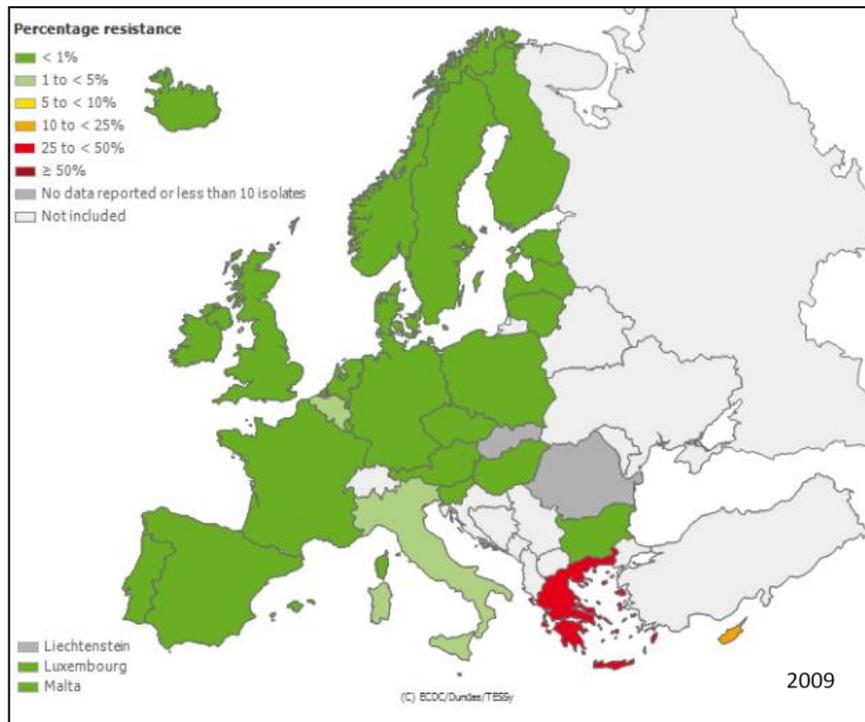
The percentage of carbapenem-resistant *K. pneumoniae* has increased dramatically in the European Union since 2009. In 2009, carbapenem resistance in *K. pneumoniae* was only established in Greece, although carbapenem-resistance in invasive isolates of *K. pneumoniae* was also found in Italy and Cyprus. In 2010, an increasing trend of carbapenem-resistant *K. pneumoniae* was observed for Austria, Cyprus, Hungary and Italy (Fig. 1).

This increasing trend is a particularly worrying phenomenon since carbapenems are last-line antibiotics for treatment of infections with multidrug-resistant Gram-negative bacteria - including those which produce an extended-spectrum beta-lactamase (ESBL). Treatment options for patients infected with carbapenem-resistant *K. pneumoniae* or other carbapenem-resistant bacteria are severely limited.

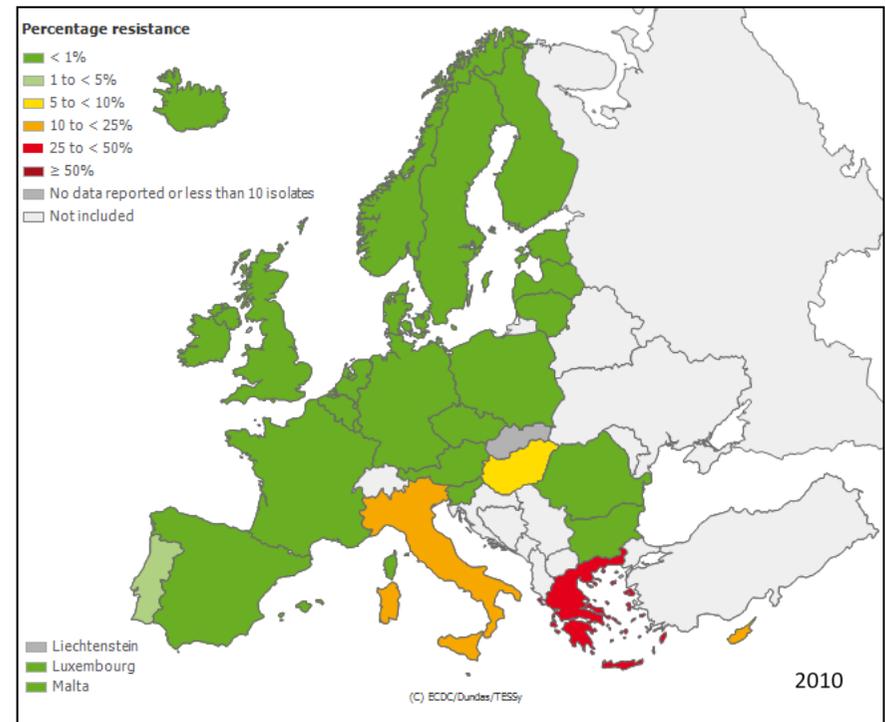


Figure 1: *Klebsiella pneumoniae*: percentage of invasive isolates resistant to carbapenems in 2009 (A) and in 2010 (B) (Data source: EARS-Net)

A: Percentage of carbapenem-resistant *K. pneumoniae* in 2009



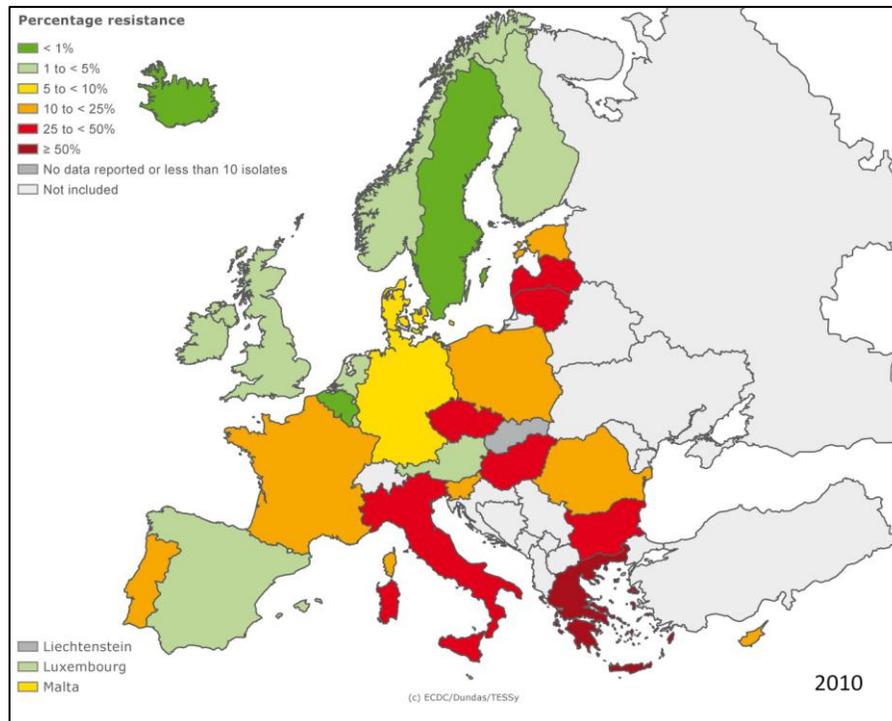
B: Percentage of carbapenem-resistant *K. pneumoniae* in 2010





In addition to resistance to carbapenems, a high frequency of multidrug-resistant *K. pneumoniae* (resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides) is evident in Southern, Central and Eastern Europe (Fig.2).

Figure 2: *Klebsiella pneumoniae*: percentage of multidrug-resistant *K. pneumoniae* (third-generation cephalosporins, fluoroquinolones and aminoglycosides) in 2010 (Data source: EARS-Net)



Escherichia coli (*E. coli*)

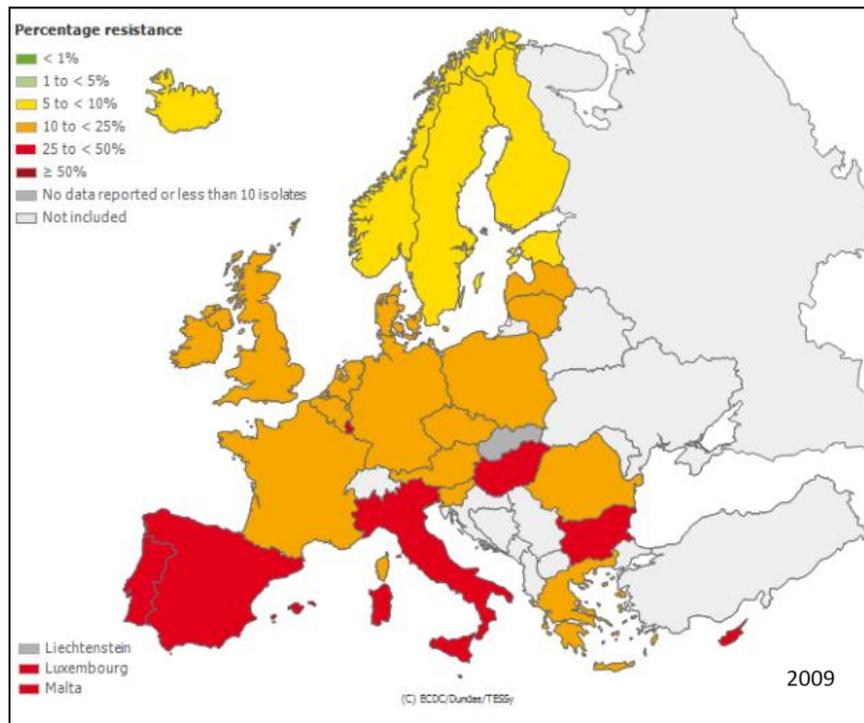
E. coli is the most frequent cause of bacteraemia caused by Gram-negative bacteria, as well as community and hospital-acquired urinary tract infections. It is also one of the most common foodborne pathogens worldwide.

The occurrence of antibiotic resistance in *E. coli* continues to increase Europe-wide for both multi-drug resistance and for single antibiotics under surveillance. For some antibiotics, the increase is evident even among countries already presenting relatively high levels of resistance. For fluoroquinolones, which are important antibiotics for treatment of *E. coli* infections, the resistance situation in Europe in 2010 is displayed in Fig. 3.

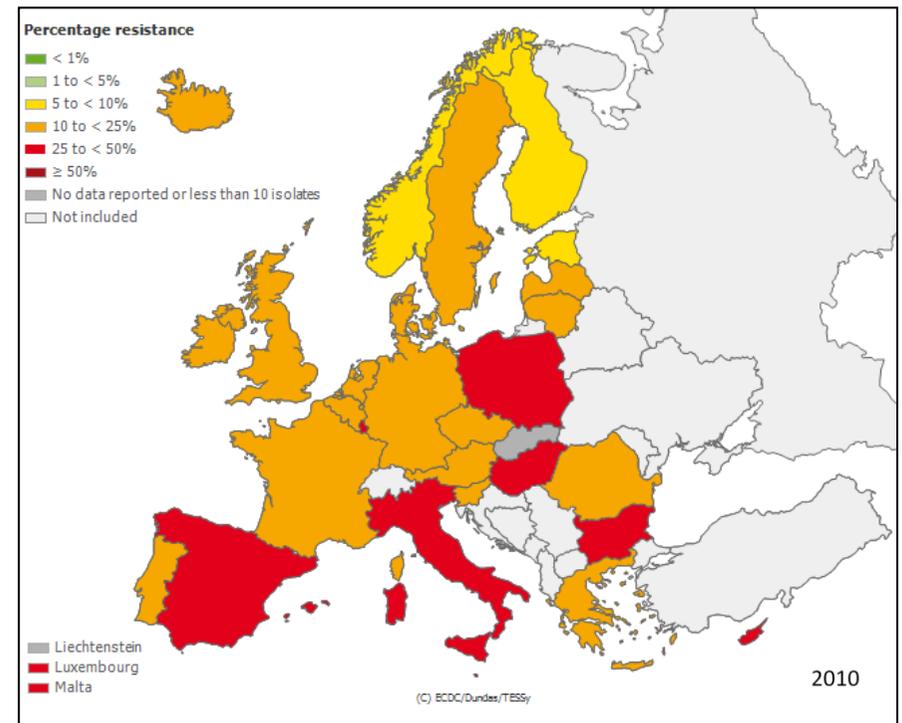


Figure 3: *Escherichia coli*: Percentage of invasive isolates with resistance to fluoroquinolones in 2009 and 2010 (Data source: EARS-Net)

A: Percentage of *E. coli* resistant to fluoroquinolones in 2009



B: Percentage of *E. coli* resistant to fluoroquinolones in 2010



Meticillin-resistant *Staphylococcus aureus* (MRSA)

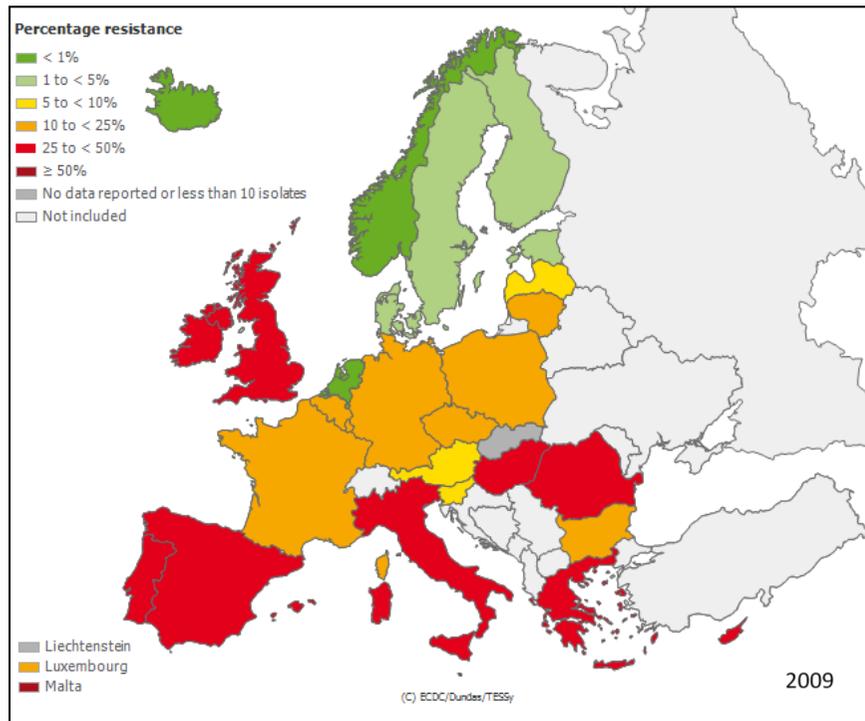
MRSA is the most important cause of antibiotic-resistant healthcare-associated infections worldwide. Infections with MRSA may result in prolonged hospital stay and increased mortality rates.

In 2010, seven countries (Austria, Cyprus, Estonia, France, Greece, Ireland and the UK) reported decreasing trends for MRSA. This brings hope that national efforts on infection control and containment of resistance may in some cases slow down the development of resistance. Nevertheless, MRSA remains a public health priority, since significantly increasing trend of MRSA was observed in four countries (Italy, Hungary, Germany and Slovenia) and the proportion of MRSA remains above 25% in more than one fourth of countries (Fig. 4).



Figure 4: *Staphylococcus aureus*: percentage of invasive isolates resistant to meticillin (MRSA) in 2009 (A) and in 2010 (B) (Data source: EARS-Net)

A: Percentage of MRSA in 2009



B: Percentage of MRSA in 2010

