



SURVEILLANCE REPORT

Summary: Point prevalence survey of healthcare-associated infections and antimicrobial use in European hospitals 2011–2012

2 July 2013

Facts in brief

- With more than 1 000 hospitals in 30 countries, ECDC's point prevalence survey (PPS) of healthcare-associated infections (HAIs) and antimicrobial use is the largest survey of its kind ever performed in Europe.
- The survey confirms that HAIs represent a major public health problem: ECDC estimates that on any given day, about 80 000 patients have at least one HAI, i.e. one in 18 patients in a European hospital has an HAI.
- In the European hospitals covered by the PPS, the prevalence of HAIs was the highest among patients admitted to intensive care units (ICUs), where 19.5% patients had at least one HAI. The most common types of HAI in these ICUs were respiratory tract infections and bloodstream infections.
- ECDC estimates that more than 400 000 patients in European hospitals, i.e. one in three patients, receive at least one antimicrobial agent on any given day.
- While a first major step has been taken by improving surveillance skills and raising awareness about HAI in healthcare workers across Europe, a lot remains to be done: healthcare workers who conduct PPSs need further training to harmonise the interpretation of case definitions, and the comparability of HAI prevalence percentages between European countries needs to be improved – which could be achieved through additional validation studies of national PPSs.
- In order to maximise the prevention of HAIs/antimicrobial resistance in European healthcare institutions, the continued implementation of the *Council Recommendation of 9 June 2009 on patient safety, including the prevention and control of healthcare-associated infections (2009/C 151/01)*, is crucial.
- ECDC will organise a second Europe-wide PPS in all Member States in 2016–17 and will offer continued support to the organisation, data collection, validation, and analysis of national surveys during 2013–15.

Point prevalence survey of healthcare-associated infections and antimicrobial use in European hospitals 2011–2012

The European Centre for Disease Prevention and Control (ECDC) supports Member States to adopt and implement specific strategies for the prevention and control of healthcare-associated infections - aiming at improving patient safety, to respond to the *Council Recommendation of 9 June 2009 on patient safety, including the prevention and control of healthcare associated infections (2009/C 151/01)*. One of the strategies for the implementation of Council Recommendation 2009/C 151/01 is to conduct point prevalence surveys of healthcare-associated infections (HAIs), which give a snapshot picture of the number of patients with HAI in hospital at a particular point in time.

In 2011–2012, ECDC coordinated the first European Union (EU)-wide point prevalence survey (PPS) of healthcare-associated infections and antimicrobial use in hospitals. The objectives of this PPS were to estimate the total burden (prevalence) of HAIs in the EU; to estimate antimicrobial use in EU hospitals; to describe HAIs (sites, microorganisms, including markers of antimicrobial resistance) and prescribed antimicrobial agents (compounds, indications) by type of patients, specialties or healthcare facilities and by EU country, and perform the necessary stratified analyses and adjustments to allow comparisons; to disseminate the results to policymakers and healthcare professionals at local, regional, national and EU levels in order (a) to raise awareness, perform training, and reinforce surveillance structures and skills; (b) identify issues that are common for hospitals in EU/EEA countries and set up priorities accordingly; and (c) provide a standardised tool for hospitals to identify targets for quality improvement.

Prior to conducting the EU-wide PPS, ECDC developed a standardised methodology, training materials, a 'train-the-trainer' course for national PPS coordinating staff, free hospital software for data collection, and a validation methodology. A pilot survey including nearly 20 000 patients was conducted in 66 hospitals in 23 European countries (Zarb et al., 2012¹). An estimated 2 800 healthcare workers from 1 200 hospitals across Europe were trained by national PPS coordinating staff to implement the standardised PPS methodology.

Between 2011 and 2012, 30 European countries (all EU Member States plus Norway, Iceland and Croatia) participated in this first EU-wide PPS.

The results on HAIs and antimicrobial use presented in this report are based on data of 231 459 patients from 947 acute care hospitals:

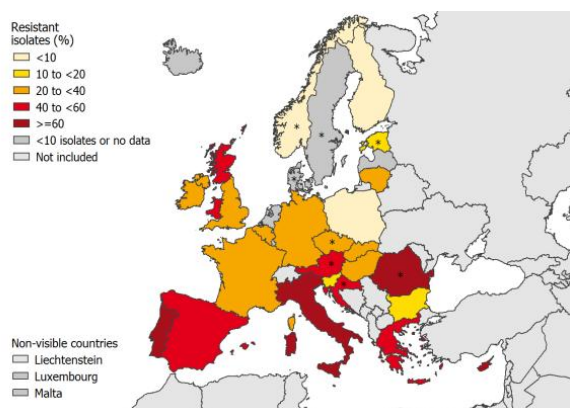
- On any given day, 5.7% of patients (= one in 18 patients²) in European hospitals have at least one HAI (95% confidence interval: 4.5–7.4%). This translates into about 80 000 hospitalised patients in Europe who have at least one HAI on any given day.
- Out of a total of 15 000 reported HAIs, the most frequently reported types were respiratory tract infections (pneumonia: 19.4%; lower respiratory tract infections: 4.1%), surgical site infections (19.6%), urinary tract infections (19.0%), bloodstream infections (10.7%), and gastro-intestinal infections (7.7%); *Clostridium difficile* infections were responsible for 48% of all gastro-intestinal infections, and for 3.6% of all HAIs.
- Less than half (45.9%) of the HAIs were reported with microbiological results on the day of the PPS. Of these, the ten most frequently isolated microorganisms were: *Escherichia coli* (15.9%), *Staphylococcus aureus* (12.3%), *Enterococcus* species (9.6%), *Pseudomonas aeruginosa* (8.9%), *Klebsiella* species (8.7%), coagulase-negative staphylococci (7.5%), *Candida* species (6.1%), *Clostridium difficile* (5.4%), *Enterobacter* species (4.2%), *Proteus* species (3.8%) and *Acinetobacter* species (3.6%).
- Other, less common microorganisms in HAIs were *Serratia* species, *Stenotrophomonas maltophilia* and *Aspergillus* species, which accounted for 1.1%, 1.0% and 0.4% of all reported microorganisms, respectively. Although less frequent, these microorganisms are important because of their epidemic potential or intrinsic resistance to antimicrobials.
- In most cases (85.0%), antimicrobial susceptibility testing (AST) results for the microorganism responsible for the HAI were available on the day of the PPS.
- Among all *Staphylococcus aureus* isolates with known AST results, 41.2% were reported to be resistant to methicillin (MRSA) (Figure 1a). Among all *Enterococcus* species isolates with known AST results, 10.2% were reported to be resistant to vancomycin (Figure 1b). Among all isolates of *Enterobacteriaceae* with known AST results, 33.4% and 7.6% were reported as non-susceptible to third-generation cephalosporins (Figure 1c) and carbapenems (Figure 1d), respectively.

¹ Zarb P, Coignard B, Griskeviciene J, Muller A, Vankerckhoven V, Weist K, et al. The European Centre for Disease Prevention and Control (ECDC) pilot point prevalence survey of healthcare-associated infections and antimicrobial use. Euro Surveill. 2012 Nov 15;17(46).

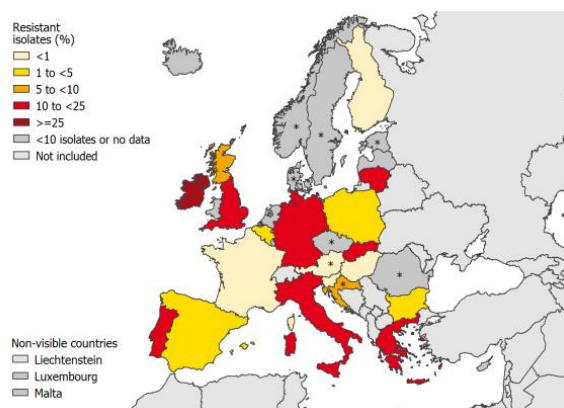
² Overall figure for Europe: 5.7% (95% confidence interval: 4.5–7.4%); the HAI prevalence by country varied from 2.3% to 10.8%.

Figure 1: Percentage of resistant isolates among isolates from HAIs with known antimicrobial susceptibility testing (AST) results, by species and by country, ECDC PPS 2011–2012³

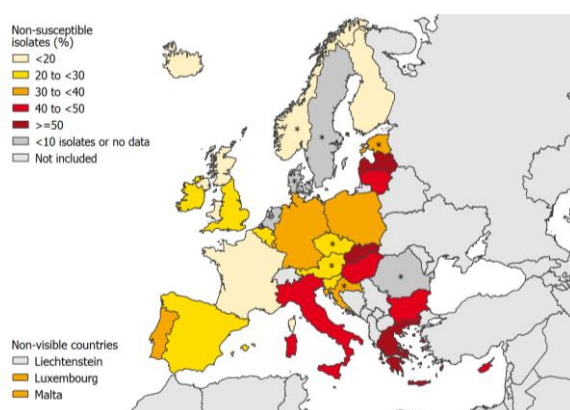
a. Methicillin-resistant *Staphylococcus aureus* (MRSA)



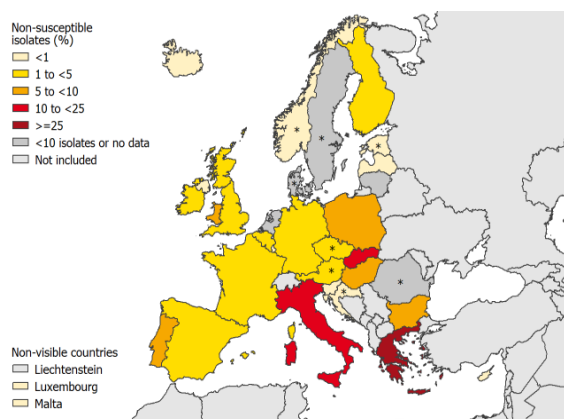
b. Vancomycin-resistant *Enterococcus species* (VRE)



c. Third-generation cephalosporin-non-susceptible *Enterobacteriaceae*



d. Carbapenem-non-susceptible *Enterobacteriaceae*



An asterisk indicates that reported PPS data did not provide a proper representation of the situation in a given country. Representativeness of PPS data was poor in Austria, Croatia, the Czech Republic, Estonia, Norway and Romania, and very poor in Denmark and Sweden.

Data from countries that reported less than 10 isolates of a given species are not presented in this figure, and the country is shown in dark grey.

- On any given day, an estimated 32.7% (95% confidence interval: 29.4–36.2%) of patients in European hospitals received at least one antimicrobial agent (country range: 21.4–54.7%) (Figure 2).
- ECDC estimates that more than 400 000 patients, i.e. one in three patients, receive at least one antimicrobial agent on any given day in European hospitals. Among patients receiving at least one antimicrobial agent, 70.9% received only one antimicrobial agent, 23.4% received two antimicrobial agents, and 5.7% received three or more antimicrobial agents. Antimicrobials were most frequently prescribed for the treatment of an infection (68.4%), followed by surgical prophylaxis (16.3%).
- The following areas for improvement were identified: limiting the use of broad-spectrum antimicrobials, reducing the unnecessary prolongation of surgical prophylaxis, promoting an earlier change from parenteral to oral administration of antimicrobials, and improving the documentation of the reasons for antimicrobial prescribing in the patients' charts.
- Antimicrobials were administered parenterally in 70.6% of the cases (country range: 47.8–91.4%), and the reasons for antimicrobial use were documented in the patient's medical record for 79.4% of prescriptions (country range: 49.5–98.0%). Surgical prophylaxis was prolonged for more than one day in 59.2% of the cases (country range: 10.7%–92.3%).

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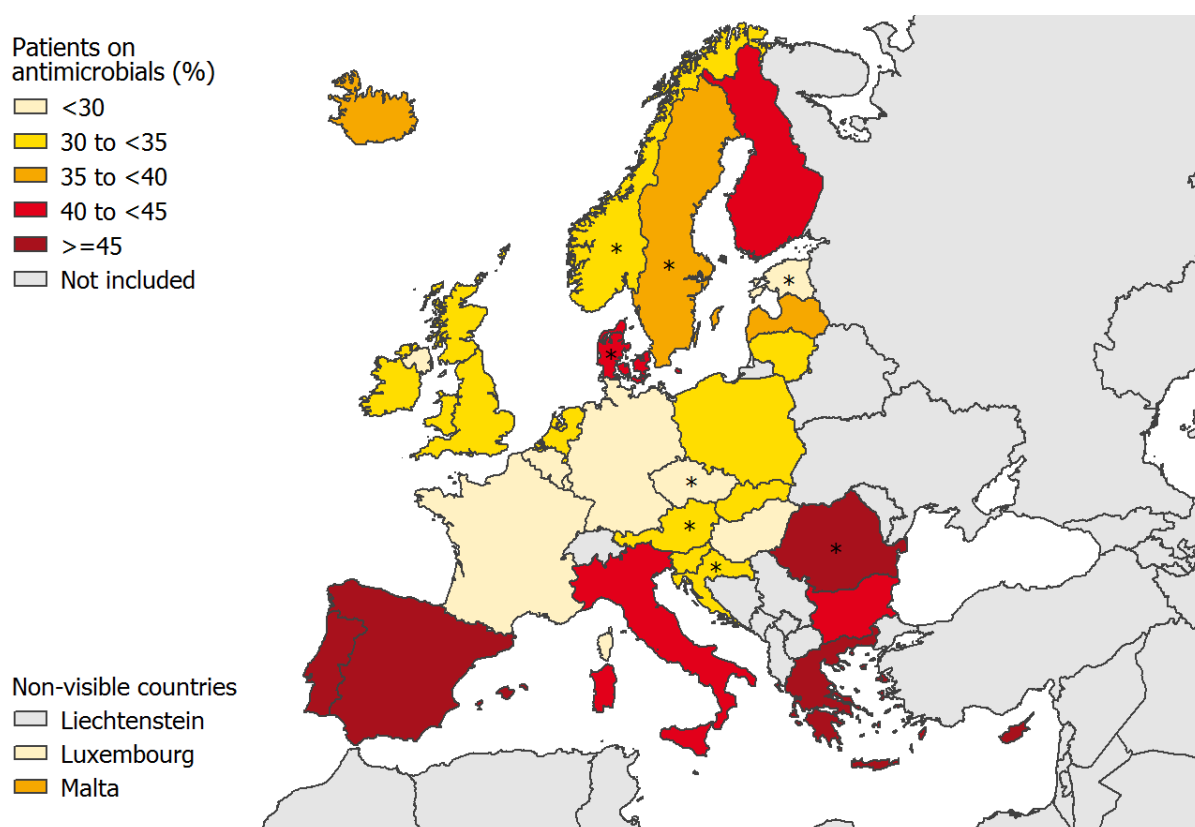
a) Percentage of *Staphylococcus aureus* isolates from methicillin-resistant (MRSA) HAIs (n=1071 isolates).

b) Percentage of *Enterococcus species* isolates from vancomycin-resistant HAIs (n=755 isolates).

c) Percentage of *Enterobacteriaceae* isolates from HAIs that were non-susceptible to third-generation cephalosporins (n=2851 isolates).

d) Percentage of *Enterobacteriaceae* isolates from HAIs that were non-susceptible to carbapenems (n=2787 isolates).

Figure 2: Prevalence of antimicrobial use (percentage of patients receiving at least one antimicrobial agent) in European hospitals, by country, ECDC PPS 2011–2012⁴



An asterisk indicates that reported PPS data did not provide a proper representation of the situation in a given country. Representativeness of PPS data was poor in Austria, Croatia, the Czech Republic, Estonia, Norway and Romania, and very poor in Denmark and Sweden.

Many of the HAIs in European acute care hospitals could be prevented by sustained, multifaceted infection prevention and control programmes, including surveillance of HAIs. The safety of patients in European hospitals would be greatly improved by such programmes, as well as by antimicrobial stewardship programmes, which promote a more rational and prudent use of antibiotics by supporting healthcare workers and other hospital staff.

ECDC's PPS suggests a series of recommendations:

- Provide continued support for the appropriate use and monitoring of accurate diagnostic testing tools for HAIs and antimicrobial resistance in EU/EEA Member States.
- Implement standardised EU surveillance of alcohol hand rub consumption, complemented, if possible, by hand hygiene compliance monitoring.
- Implement standardised surveillance of *C. difficile* infections at local, national and EU levels.
- Develop guidance for the prevention and control of HAIs with carbapenem-resistant Gram-negative bacteria.
- Enhance EU surveillance of HAI with carbapenem-resistant Gram-negative bacteria, e.g. by improving the EARS-Net surveillance of antimicrobial resistance with regard to the origin of the infection (community or healthcare associated) and by improving coverage of other infection types and antimicrobial resistance markers.
- Support the early detection of new epidemics with alert microorganisms and support the implementation of appropriate prevention and control measures, e.g. by promoting the use of the ECDC Epidemic Intelligence System (EPIS) for antimicrobial resistance.
- Develop or improve antimicrobial stewardship programmes to improve antimicrobial prescribing in acute care hospitals, in particular:
 - to rationalise the use of broad-spectrum antimicrobials (e.g. carbapenems);
 - to limit the unnecessary prolongation of surgical prophylaxis;

⁴ Country representativeness of PPS data was evaluated based on compliance with the recommended sampling methodology of hospitals and sample size. It was considered as 'optimal' or 'good' in 25 (76%) countries, and as 'poor' or 'very poor' in 8 (24%) countries. Countries (number of participating hospitals) with poor representativeness were: Austria (n=9), Croatia (n=11), the Czech Republic (n=14), Estonia (n=4), Norway (n=7), Romania (n=10). Countries with 'very poor' representativeness were Denmark (n=3) and Sweden (n=4).

- to rationalise the use of antimicrobials for medical prophylaxis;
 - to promote the practice of changing the route of administration of antimicrobials from parenteral to oral when possible; and
 - to improve the documentation of the reasons for antimicrobial prescribing in patients' charts.
- Report hospital antimicrobial consumption to ESAC-Net as a number of Defined Daily Doses (DDD) per number of patient-days (rather than per number of inhabitants).

Although the data collected during this first EU-wide PPS have their limitations, the ECDC PPS provides the most comprehensive EU-wide database on HAIs and antimicrobial use in European hospitals to date and has identified a series of priorities for the prevention of HAIs and antimicrobial resistance in European hospitals.

ECDC's EU-wide PPS represents a major step in raising awareness about HAIs and antimicrobial use among healthcare workers across Europe and has already managed to improve the surveillance skills of participating healthcare workers.