Prevention and control of antimicrobial resistance in healthcare settings: raising awareness about best practices

Dominique L. Monnet, on behalf of ECDC Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI) Programme, ECDC
Brussels, 22 November 2017
Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI) Networks

• European Antimicrobial Resistance Surveillance Network (EARS-Net)  
  (formerly EARSS, integrated in January 2010)

• European Surveillance of Antimicrobial Consumption Network (ESAC-Net)  
  (formerly ESAC, integrated in July 2011)

• Healthcare-Associated Infections surveillance Network (HAI-Net)  
  (formerly HELICS / IPSE, integrated in July 2008)
Staphylococcus aureus: % of invasive isolates with resistance to meticillin (MRSA), EU/EEA, 2013 & 2016

The symbols \(\uparrow\) and \(\downarrow\) indicate a significant increasing or decreasing trend for the period 2013-2016, respectively. These trends were calculated on laboratories that consistently reported during this period.

**Klebsiella pneumoniae**: % of invasive isolates with combined resistance*  
EU/EEA, 2013 & 2016

*Third-generation cephalosporins, fluoroquinolones and aminoglycosides

Source: EARS-Net, 2017. The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2013-2016, respectively. These trends were calculated on laboratories that consistently reported during this period.
Klebsiella pneumoniae: % of invasive isolates with resistance to carbapenems EU/EEA, 2013 & 2016

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2013-2016, respectively. These trends were calculated on laboratories that consistently reported during this period.

**Carbapenem-resistant infections: a challenge for appropriate patient therapy**

1. *Klebsiella pneumoniae ESBL-CARBA > E5 CFU/mL*
   - MIC: Aztreonam = 0.25 mg/L = S
   - MIC: Colistin = 0.12 mg/L = S
   - MIC: Kloramfenikol = 256 mg/L = R
   - MIC: Tobramycin = <256 mg/L = R
   - MIC: Amikacin = <256 mg/L = R
   - MIC: Netilmicin = <256 mg/L = R
   - MIC: Nitrofurantoin = 512 mg/L = R
   - MIC: Gentamicin = <256 mg/L = R

   **Obs! Stammen bildar ESBL-CARBA (ICD-10 kod U82.2). Klinisk anmärkningsplikt och smittspårningsplikt enl smittskyddslagen. Kontakta alltid vårdhygien. För mer information: www.smittskyddstockholm.se**

<table>
<thead>
<tr>
<th>ANTIMICROBIALS</th>
<th>Susceptibility</th>
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<tbody>
<tr>
<td>Ampicillin</td>
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<tr>
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<td>Ertapenem</td>
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**Svarskommentar: Sammanfattning/Övrigt:**

**Obs! Mycket omfattande resistensprofil.**

Endast känslig för colistin.
ECDC point prevalence survey, 2011-2012: antimicrobial use in European acute care hospitals

- On any given day: 33% patients [range: 21-55%]
- 59% of surgical prophylaxis > 1 day

Consumption of last-line antibiotics in the hospital sector, EU/EEA, 2012-2016

**Carbapenems**
(DDD per 1000 inh. and per day)

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<tbody>
<tr>
<td>Bulgaria</td>
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<tr>
<td>Greece</td>
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**Polymyxins** (mainly colistin)
(DDD per 1000 inh. and per day)

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<td>Cyprus</td>
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<td>Portugal (b)</td>
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<td>Romania</td>
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<td>Greece</td>
<td>0.102</td>
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* Cyprus and Romania: total care data, including consumption in the community. These data were not used to calculate the EU/EEA population-weighted average.

(a) Finland: data include consumption in remote primary healthcare centres and nursing homes.

(b) Portugal: data relate to public hospitals only.

Source: ESAC-Net, 2017. The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2012-2016, respectively.
**Klebsiella pneumoniae**: % of invasive isolates with combined resistance to carbapenems and colistin, EU/EEA, 2016

All isolates tested for carbapenem susceptibility were included in the denominator to limit the effect of sequential testing.
Examples

- *Mycobacterium chimaera* cardiovascular infections linked to heater-cooler devices
- *Candida auris* infection
- *optrA* (transferable oxazolidinone and chloramphenicol resistance)

**Epidemic Intelligence Information System (EPIS)**

The Epidemic Intelligence Information System (EPIS) is a web-based communication platform that allows nominated public health experts to exchange technical information to assess whether current and emerging public health threats have a potential impact in the European Union (EU).
Main actions to prevent and control antimicrobial resistance (AMR)

New antimicrobial agents
(with a novel mechanism of action, research, development)

Infection prevention and control
(hand hygiene, screening, isolation)

Prudent use of antimicrobial agents
(only when needed, correct dose, correct dose intervals, correct duration)
EU Guidelines for the prudent use of antimicrobials in human health (June 2017)

https://ec.europa.eu/health/amr/action_eu_en
Directory of online resources for prevention and control of antimicrobial resistance (AMR) and healthcare-associated infections (HAI)

The directory lists strategies, guidance documents and training courses on the prevention and control of antimicrobial resistance and healthcare-associated infections available online. These documents were published by ECDC, EU/EEA Member States, international and national agencies and professional societies to support healthcare professionals, hospital administrators and public health professionals. In addition, the directory lists ongoing research projects and their corresponding websites.

ECDC welcomes suggestions and further information on existing guidance. Comments can be provided to: arhal@ecdc.europa.eu

Guidelines for specific infections and organisms

<table>
<thead>
<tr>
<th>Healthcare-associated infections</th>
<th>Multidrug-resistant organisms</th>
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<tbody>
<tr>
<td>Carbapenem-resistant Enterobacteriaceae (CRE)</td>
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<tr>
<td>Methicillin-resistant Staphylococcus aureus (MRSA)</td>
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Prevention and control measures in healthcare settings

<table>
<thead>
<tr>
<th>Strategies, action plans, projects</th>
<th>Prudent use of antibiotics</th>
<th>Infection and control measures</th>
<th>Training</th>
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<tr>
<td>Antimicrobial resistance strategies and action plans</td>
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<td>Projects on antimicrobial resistance and healthcare-associated infections</td>
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Control of an outbreak of OXA-48-producing *Enterobacteriaceae*, Maastad Hosp., Rotterdam (NL), 2009-2012


A CPE event was defined as one index case (respectively defined as infected or colonised with CPE), followed or not by secondary case(s).

Infection prevention and control measures and tools to prevent entry of carbapenem-resistant Enterobacteriaceae (CRE) into healthcare settings: ECDC guidance

• Core measures

• Profile for “at risk” patients who require supplemental measures

• Preliminary supplemental measures (at admission, for “at risk” patients)

• Supplemental measures (for confirmed CRE-positive patients)

Antimicrobial consumption drives antimicrobial resistance in hospitals

Implementation of control programme

Intervention to control carbapenem-resistant *Klebsiella pneumoniae*, onco-haematology unit, Greece, 2011-2014

Example of national initiative on surgical prophylaxis, Belgium, 1997

- Royal Decree: reimbursement of prophylactic antibiotics by surgical procedure, 1997
- Prophylaxis given when indicated: from 92.3% (1992-1996) to 95.3% (1998-1999)
- Prolonged administration: from 19.8% to 9.9%
- Use of more than one antibiotic per procedure: from 16.3% to 5.5%

Communicating to professionals in hospitals and long-term care facilities

Up to half of all antibiotic use in hospitals is unnecessary or inappropriate. Antibiotic misuse in hospitals is a major driver of antibiotics resistance. What can be done?

View materials

New communication toolkit

Patient stories

Data and reports

#KeepAntibioticsWorking: join us on social media!

As a healthcare professional, what can you do to keep antibiotics working? What can a patient association do to contribute? What can policymakers do at European level? What can a parent do? Everyone can join the campaign on European Antibiotics Awareness Day—posting his/her own message, picture or video using the #KeepAntibioticsWorking hashtag. Tell the world what you do, in your professional or personal life, at individual or collective level, to use antibiotics responsibly and #KeepAntibioticsWorking!

Read about the #KeepAntibioticsWorking campaign

https://antibiotic.ecdc.europa.eu
Materials for professionals in hospitals and other healthcare settings

Materials for professionals in hospitals and other healthcare settings, such as long-term care facilities, who have different roles and influence in the use of antibiotics in such settings.

General key messages for healthcare professionals in hospitals and other healthcare settings

Data
Facetsheet for professionals in hospitals and other healthcare settings
factsheet, information material, toolkit material

Data
Infographics about antibiotic stewardship programmes
infographic, information material, toolkit material
New EAAD toolkit (1)

• **Objective**
  - to support efforts to increase prudent use of antibiotics in hospitals and other healthcare settings through dissemination of evidence-based educational and information materials.

• Review of the scientific literature by ECDC experts ("evidence-based", 111 references) and extensive consultation and editing process.

• Some of the messages are indicated to be "expert consensus": agreement reached by ECDC experts, EAAD Technical Advisory Committee members, and other external experts and stakeholders.

https://antibiotic.ecdc.europa.eu
New EAAD toolkit (2)

• **Key messages**

• Primary target audience: **professionals in hospitals and other healthcare settings**, who have different roles and influence in the use of antibiotics in such settings:
  - Managers/administrators,
  - Infectious disease specialists,
  - Infection prevention and control professionals,
  - Epidemiologists,
  - Prescribers,
  - Junior doctors and students,
  - Pharmacists,
  - Nurses,
  - Clinical microbiologists,
  - Professionals in emergency departments,
  - Professionals in intensive care units,
  - Professionals in long-term care facilities

https://antibiotic.ecdc.europa.eu
Key messages for hospital managers / administrators

Tasks

1. Your tasks related to improving antibiotic use include [31,42,56,71,75]:
   a) Establishing a multidisciplinary team for your hospital antibiotic stewardship programme. This team should include infectious disease specialists, clinical microbiologists and pharmacists, and should receive dedicated funding and resources;
   b) Supporting implementation of antibiotic guidelines and infection prevention and control measures;
   c) Implementing targeted educational activities and training that:
      i. optimise the diagnostic and therapeutic management of patients;

Things you should know

Things you can do in your hospital or institution
New EAAD materials

• Aim at creating a **sense of individual responsibility** in tackling antibiotic resistance and at **empowering professionals to take action**.

• Include one slogan, linking all materials: "**Antibiotics: handle with care**".

• Available in Adobe InDesign, Microsoft Word and Microsoft PowerPoint, which makes it easy to adapt them by anyone with experience in any of these three software packages.

• Need to be adapted to national contexts to better respond to specific communication needs.
Antibiotics: handle with care!

As a hospital prescriber, you have a responsibility to use antibiotics wisely and to ensure that they remain effective. In your role, you must:

- Follow infection prevention and control guidance;
- Initiate antibiotic treatment as soon as possible in patients with severe infection;
- Ensure that relevant cultures are taken timely;
- Re-evaluate treatment after 48–72 hours, or when results from microbiological samples are available;
- Prescribe according to evidence-based hospital antibiotic guidelines for common infections and for surgical prophylaxis;
- Inform your patients of any antibiotics prescribed, and their potential adverse effects.

Antibiotic resistance keeps increasing in Europe, threatening patient safety in all healthcare settings.

As a nurse, you have a responsibility to use antibiotic prudently and to ensure that they remain effective. In your role, you must:

- Follow infection prevention and control guidance;
- Administer antibiotics to patients according to the prescription;
- Coordinate the taking and sending of microbiological specimen and their reporting back to physicians;
- Report adverse effects of antibiotic therapy to physicians and to appropriate review committees;
- Manage antibiotic stocks on your ward, and ensuring the traces of antibiotic use;
- Provide information on treatments to patients and families.

In this hospital we are committed to use antibiotics prudently and to ensure that they remain effective.

We follow infection prevention and control guidance;

We initiate antibiotic treatment as soon as possible in patients with severe infection;

We ensure that relevant cultures are taken timely;

We re-evaluate treatment after 48–72 hours, or when results from microbiological samples are available;

We prescribe according to evidence-based hospital antibiotic guidelines for common infections and for surgical prophylaxis;

We inform our patients of any antibiotics prescribed, and their potential adverse effects.

https://antibiotic.ecdc.europa.eu
Antibiotic resistance: You are responsible to ensure that antibiotics remain effective

This checklist is supported by scientific evidence. Visit https://antibiotic.ecdc.europa.eu or scan the QR code.

1. Is there a high probability of a bacterial infection, rather than colonization or a viral infection?
2. Does the patient have an infection that will respond to antibiotics?
   - Have you checked the patient’s recent antibiotic use, drug allergies, hospitalisation or institutionalisation, use of immunosuppressive therapy and microbiology results for the previous 3 months?
3. Is the patient on the right antibiotics, dosage, and route of administration?
4. Can an antibiotic with a narrower spectrum be used to treat the infection?
5. Have you prescribed the shortest possible duration of treatment?
6. Have the appropriate cultures been taken?
7. Do the culture results necessitate starting antibiotic therapy or modifying ongoing the current antibiotic therapy?
8. Have you documented the indication of antibiotic treatment, drug choice, dosage, route of administration and duration of treatment in the patient’s chart?
9. Does the choice of antibiotic therapy comply with your hospital’s guidelines?
10. Does the choice of antibiotic therapy comply with your hospital’s antibiotic resistance patterns?

https://antibiotic.ecdc.europa.eu
A forward look

- Burden of antimicrobial resistance (AMR) for the EU/EEA (Q2 2018)

- Annual update on AMR and antimicrobial consumption in humans in the EU/EEA (November 2018)

- ECDC point prevalence surveys of HAI s, AMR and antimicrobial use in European acute care hospitals and in long-term care facilities, 2016-2017 (ECDC publications, November 2018)

- Contribution to the implementation of the European One Health Action Plan against Antimicrobial Resistance (AMR)