Antimicrobial Resistance Surveillance - ECDC

“Red alert” for AMR in Europe..?

B-debate, Barcelona, 6th November, 2013

Ole Heuer and Liselotte Diaz Högberg

Surveillance Section, Surveillance and Response Support Unit
European Centre for Disease Prevention and Control (ECDC)
What is the role of ECDC..?

... to identify, assess and communicate current and emerging health threats to human health from communicable diseases.
— ECDC Founding Regulation (851/2004), Article 3

**ECDC - Surveillance of communicable diseases**

- 52 diseases and health conditions to be placed under surveillance
- Former outsourced surveillance networks transferred to ECDC
- Data reported to one central database “TESSy”

Decision No. 2119/98/EC of the European Parliament and the Council setting up a network for the epidemiological surveillance and control of communicable diseases in the Community
As of January 1st, 2010, five non-EU Member States previously participating in EARSS (Bosnia-Herzegovina, Croatia, Israel, Switzerland and Turkey) had to be detached from the network. Hereafter, EARS-Net included a total of 28 Countries.
As of January 1st, 2010, five non-EU Member States previously participating in EARSS (Bosnia-Herzegovina, Croatia, Israel, Switzerland and Turkey) had to be detached from the network. Hereafter, EARS-Net included a total of 28 Countries.
Meeting of EARSS Advisory board/
EARS-Net Coordination Group

ECDC, Stockholm, March 2010
EARS-Net data

Surveillance of AMR in bacterial isolates from BSI and CSF from humans

Data reported by 28 EU Member States + Norway and Iceland

EARS-Net data originate from over 900 laboratories serving more than 1400 hospitals in Europe

Includes 7 selected bacterial pathogens of public health importance

Annual EQA Exercise

EARS-Net data recommends use of EUCAST intrepretive criteria

- *Streptococcus pneumoniae*
- *Staphylococcus aureus*
- *Enterococcus faecalis*
- *Enterococcus faecium*
- *Escherichia coli*
- *Klebsiella pneumoniae*
- *Pseudomonas auruginosa*
- *(Acinetobacter spp)* pilot
Species distribution (%) of isolates reported to EARS-Net, 2011 (all countries)

- **E. coli**: 42%
- **S. aureus**: 22%
- **K. pneumoniae**: 10%
- **P. aeruginosa**: 7%
- **S. pneumoniae**: 8%
- **E. faecalis**: 7%
- **E. faceium**: 4%

Data: EARS-Net 2011
Case ascertainment

Range: 5.5 - 91.3 blood culture sets per 1000 patient days

Number of blood culture sets per 1000 patient-days

Country

*) data from 2010

Data from EARS-Net
Annual number of unique isolates reported to EARSS/EARS-Net 2003-2012*

* ) Only includes data reported from EU/EEA countries

Data from EARSS/EARS-Net

> 1 000 000 isolates!
EARS-Net data – the tip of the iceberg...!

Invasive infections

Non-invasive infections

Ecological reservoir
B-DEBATE input:

...A look at selected results from the 2011 EARS-Net data, trend analysis 2008-2011 and selected long term trends
Escherichia coli: percentage of invasive isolates resistant to third-generation cephalosporins; EU/EEA, 2008–2011

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2008-2011, respectively. These trends were calculated on laboratories that consistently reported during 2008-2011.
**E. Coli** - 3\textsuperscript{rd} gen cephalosporin resistance, 2008-2011

- 3\textsuperscript{rd} gen cephalosporin resistance in *E. coli* increased significantly in 15 of 28 countries 2008-2011

- Increasing trends observed for many low prevalence countries

- None of the 28 countries had a significantly decreasing trend 2008-2011

Data: EARS-Net
*E. Coli* - 3rd gen cephalosporin resistance, 1999-2011

Data: EARS-Net
*E. coli* – Combined resistance*, 2008-2011*

- Combined resistance in *E. coli* increased significantly in 9 of 28 countries 2008-2011

- 36% of the isolates were resistant to at least one of the four antimicrobials

- 4% of the isolates were resistant all four antimicrobials

- A significantly decreasing trend was observed only for one country (Malta)

*resistance to 3rd generation cephalosporins, fluoroquinolones, aminopenicillins, and aminoglycosides*
Klebsiella pneumoniae – 3rd gen cephalosporin resistance, 2011

- 30% of the isolates were resistant to 3rd gen cephalosporin
- Large variation across Europe from 2.3% (Sweden) to 81% (Bulgaria)
- 16/29 countries >25%
- 6/29 countries >50%

Data: EARS-Net
Klebsiella pneumoniae – 3rd gen cephalosporin resistance, 2008-2011

- 3rd gen cephalosporin resistance increased significantly in 9 of 25 countries 2008-2011

- None of the countries had decreasing trends (2nd year)

- High proportions of resistance in 1/3 of the countries and sharp increasing trends for countries already at high level

Data: EARS-Net
**Klebsiella pneumoniae** - Combined resistance*, 2011

* Resistance to 3rd gen cephalosporins, fluoroquinolones and aminoglycosides

- Large variation across Europe from 0% (Iceland) to 64% (Greece)
- 22% of the isolates were resistant to all three antimicrobials. This was even the most frequent resistance pattern
- Combined resistance leaves few treatment options (carbapenems)

Data: EARS-Net
Klebsiella pneumoniae: percentage of invasive isolates with combined resistance*; EU/EEA, 2008–2011

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2008-2011, respectively. These trends were calculated on laboratories that consistently reported during 2008-2011.

*Combined resistance: resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides

Source: EARS-Net, 2012
Klebsiella pneumoniae – Combined resistance, 2008-2011

- Significantly increasing trends for combined resistance in 10/25 countries, 2008-2011

- Decrease observed only for one country (UK)*

- Significant increase observed for countries already at high level and in countries at middle level

*Not significant when including only labs reporting for all four years

Data: EARS-Net
**Klebsiella pneumoniae – Combined resistance**, 2005-2011

*Resistance to 3rd gen cephalosporins, fluoroquinolones and aminoglycosides*

Data: EARS-Net
*Klebsiella pneumoniae* – resistance to carbapenems, 2008-2011

**Trends 2008-2011**

Data: EARS-Net
Carbapenem consumption* (for the large majority in hospitals); EU/EEA, 2007–2010

*in Defined Daily Doses per 1000 inhabitants and per day

The symbols ↑ and ↓ indicate a significant increase or decrease between 2007 and 2010, respectively. These trends are indicated only for countries that reported relevant data for both 2007 and 2010.
Staphylococcus aureus: percentage of invasive isolates resistant to meticillin (MRSA); EU/EEA, 2008–2011

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2008-2011, respectively. These trends were calculated on laboratories that consistently reported during 2008-2011.
Trends for MRSA 2008-2011

- Seven countries (UK, Germany, Belgium, France, Spain and Ireland) had decreasing trends for MRSA 2008-2011

- Increasing trend for MRSA 2008-2011 was observed only for one country (Hungary)

Data: EARS-Net
Meticillin-resistant 
*Staphylococcus aureus* (MRSA) 1999-2011
Conclusions - based on EARS-Net data on AMR in 2011 and trends for 2008-2011

Good news:
• MRSA is stabilising or even decreasing in some countries

Bad news:
• 3rd gen cephalosporin resistance and combined resistance (3-4 antimicrobials) continues a sharp and widespread increase in *E. coli* and *K. pneumoniae*

Sad news:
• Increasing resistance to last resort antimicrobials – carbapenem resistance is becoming more frequent in a number of countries
EARS-Net interactive database


...or Google: EARS-Net
EARS-Net interactive database

Options for integrated surveillance at EU level

**EARS-Net:** European Antimicrobial Resistance Surveillance Network

**HAI-Net:** Healthcare Associated Infections Network

**ESAC-Net:** European Surveillance of Antimicrobial consumption Network

**EUCAST:** European Committee on Antimicrobial Susceptibility Testing
“It is not difficult to make microbes resistant to penicillin ....

.... The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant.”

*Alexander Fleming's Nobel Lecture, 1945*
Thank you for your attention!

Special thanks to National EARS-Net participants, and all staff involved in data collection at Laboratories and Hospitals in the participating countries.

Photo: Frank Hansen, SSI, Denmark
EUROPEAN ANTIBIOTIC AWARENESS DAY

A EUROPEAN HEALTH INITIATIVE

18 November 2013

Website: http://antibiotic.ecdc.europa.eu
Facebook: EAAD.EU
Twitter: @EAAD_EU (#EAAD)
B-DEBATE questions:

1. How can we assure that AMR surveillance systems at international level capture sufficient (and suitable) data for action?
   Major AMR reservoirs exist outside of the EU..

2. What should be the “Red alert” level of AMR for G-negative pathogens in Europe?
   Is it when 60-80% of the isolates are resistant and treatment failure is highly frequent..?