

Antimicrobial consumption: what do we know and what does it tell us?

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*ESCMID Postgraduate
Education Course
Antimicrobial Stewardship:
a Practical and
Integrated Approach*

Global Agenda > Davos 2016 > Global Health and Healthcare

We must stop squandering our precious antibiotics

Jeremy Farrar, Director, Wellcome Trust

<https://www.weforum.org/agenda/2016/01/explaining-the-challenge-of-drug-resistant-infections>



"One solution is to increase the supply of new drugs."

Image: REUTERS/Brian Snyder

agriculture: World

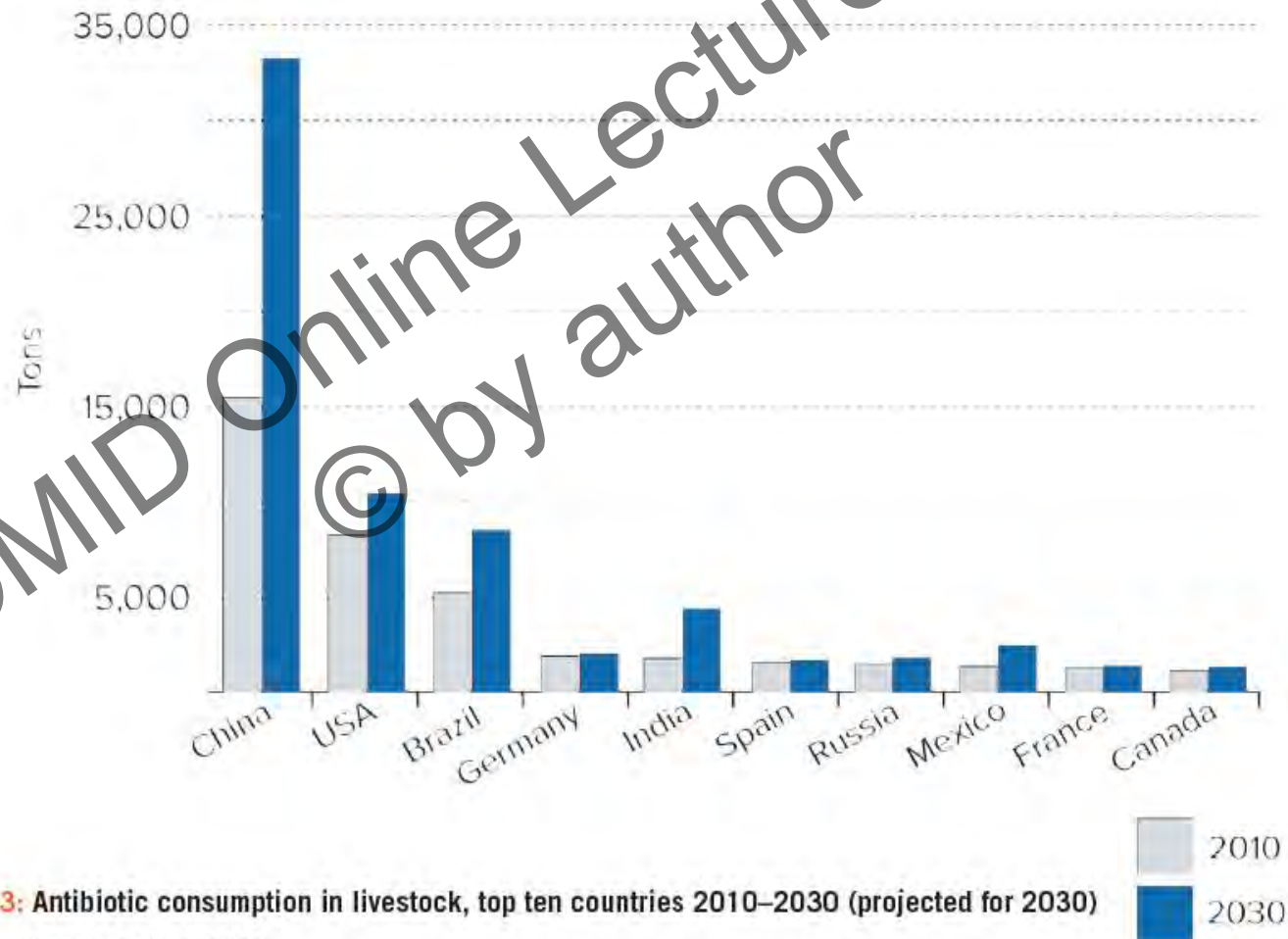


FIGURE ES-3: Antibiotic consumption in livestock, top ten countries 2010–2030 (projected for 2030)

Source: Van Boeckel et al. 2015

agriculture: USA

ANIMALS IN THE USA CONSUME MORE THAN TWICE AS MANY MEDICALLY IMPORTANT ANTIBIOTICS AS HUMANS

O'Neill, March 2016



Source: Animal consumption figure of 8,895,193kg from FDA, 2013. Human consumption of 3,379,310kg in 2012 based on calculations by IMV Health. The figures are rounded from 22.5% used in animals and 27.5% used in humans.

Review on Antimicrobial Resistance

agriculture

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Review on Antimicrobial Resistance

MOST PUBLISHED PAPERS PROVIDE EVIDENCE TO SUPPORT LIMITING USE OF ANTIBIOTICS IN AGRICULTURE

O'Neill, March 2016



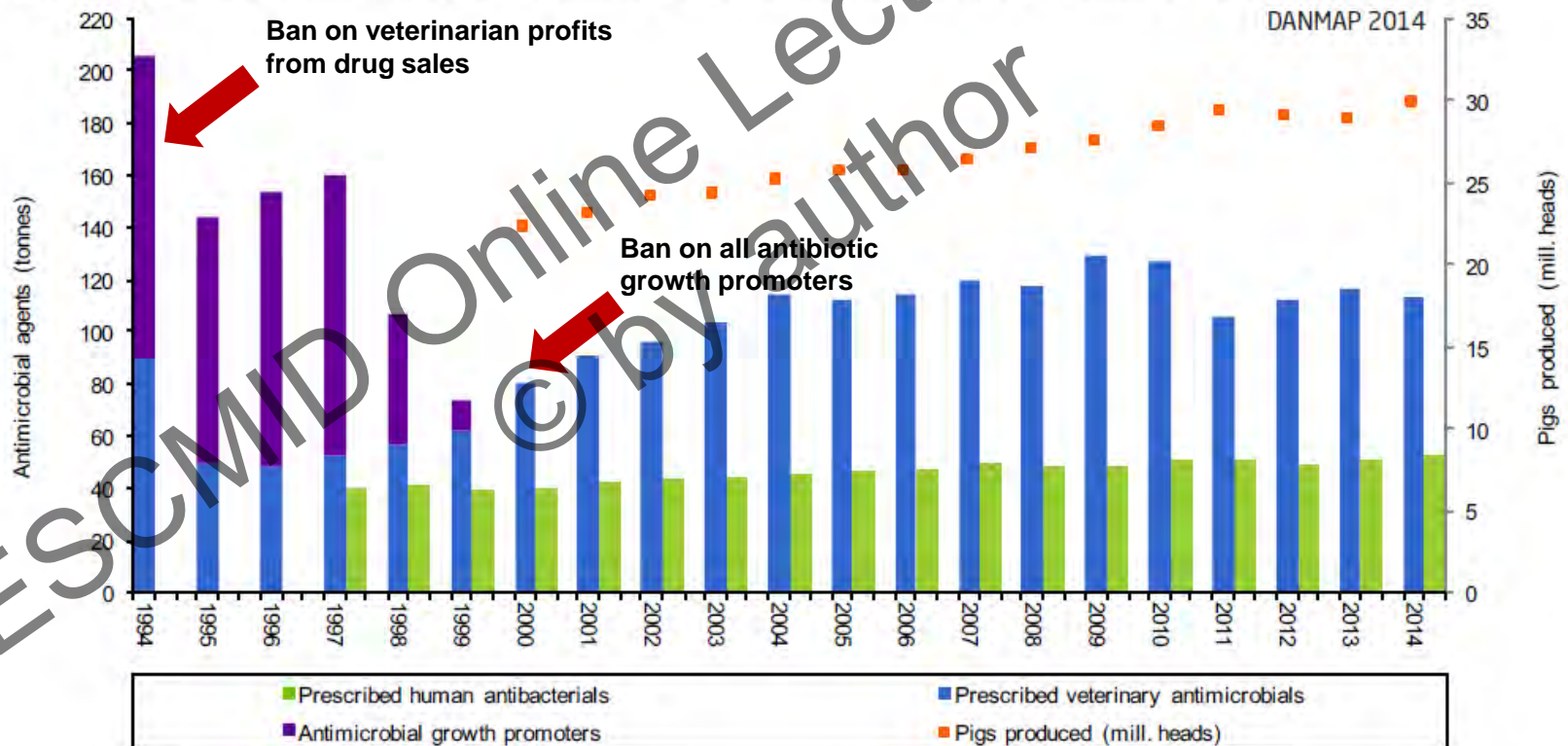
Based on a representative sample using the 200 papers from the NCI's PubMed database found with the search terms "drug resistance, microbial" AND "agriculture" 94 of which were deemed not to be applicable as they did not address antibiotic use in agriculture. Papers were categorized as "supportive" if they provided evidence to support limiting antibiotics in agriculture, "against" if they provided evidence that we should not be concerned with limiting antibiotics in agriculture and "neutral" if they did not explicitly take a stance. There were 63 papers that were categorized as neutral. Of the papers classified as neutral, 46 were written by academics. Academic papers are defined as those that were written by academics.

Source: Review's own analysis.

Review on Antimicrobial Resistance

agriculture: Denmark

Figure 4.1. Prescribed antimicrobial agents for humans, and for animals compared with the number of pigs produced, Denmark



Sources: Human therapeutics: The Danish Medicines Agency. Veterinary consumption: Until 2001, data are based on reports from the pharmaceutical industry of total annual sales from the Federation of Danish pig producers and slaughterhouses (1994-1995) and Danish Medicines Agency and Danish Plant Directorate (1996-2000). Data from 2001-2014 originate from VetStat.

summary agriculture

➤ What do we know?

- main consumption sector (e.g. US 70%)
- estimated total consumption worldwide in 2010: ~63000 tons
- estimated increase worldwide in the next 14 years: +67%
- main expected increase: Brazil, Russia, India, China, South Africa

➤ What does it tell us?

- ABS in veterinary medicine is effective (e.g. Denmark)
- surveillance of consumption is mandatory

human: global antibiotic consumption

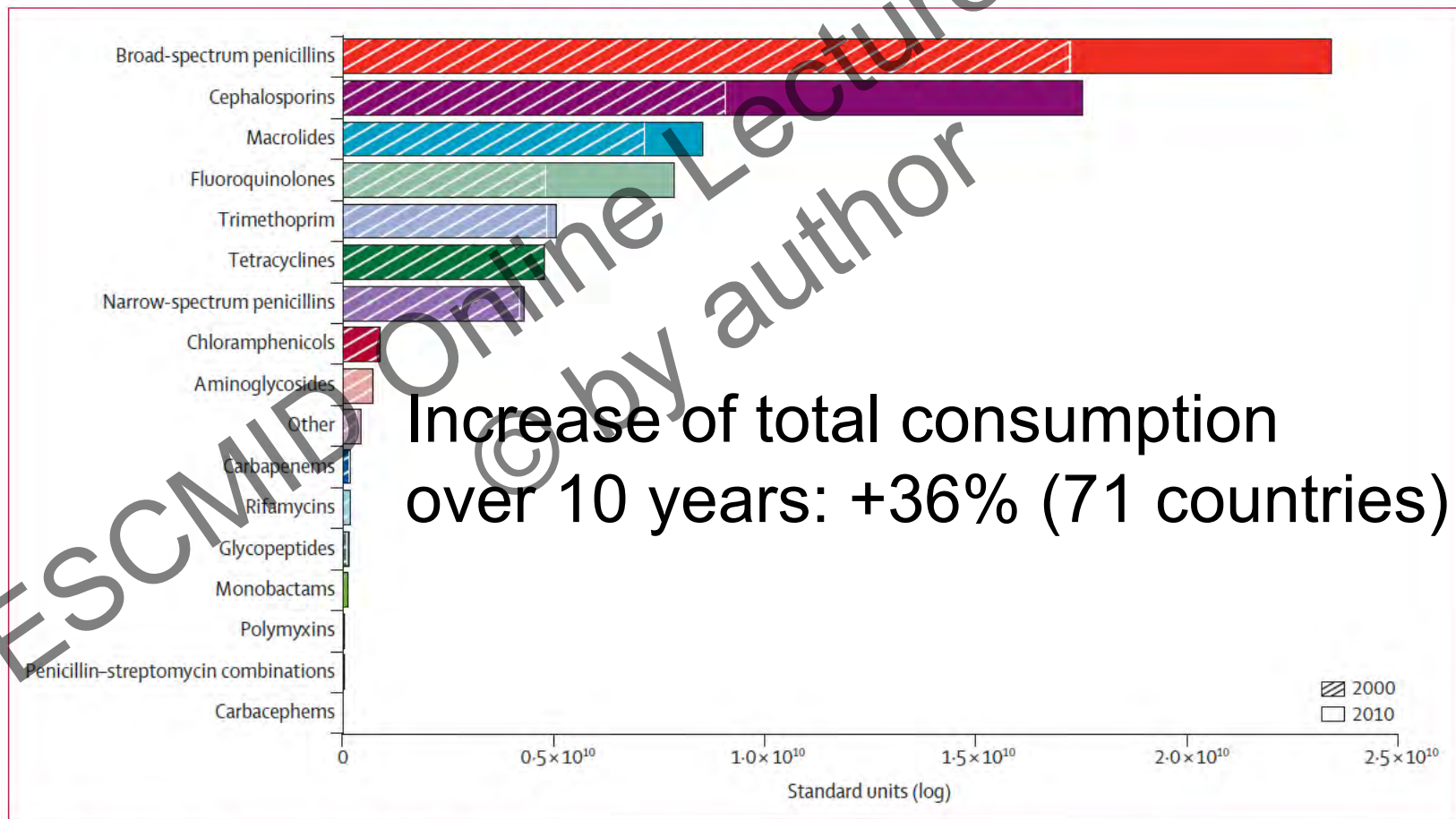


Figure 1: Global antibiotic consumption by class in 2000 and 2010
Standard units are defined as a single dose unit (ie, pill, capsule, or ampoule).

Top 3 in the world in 2010

1. India (13 billion SU)
2. China (10 billion SU)
3. USA (7 billion SU)

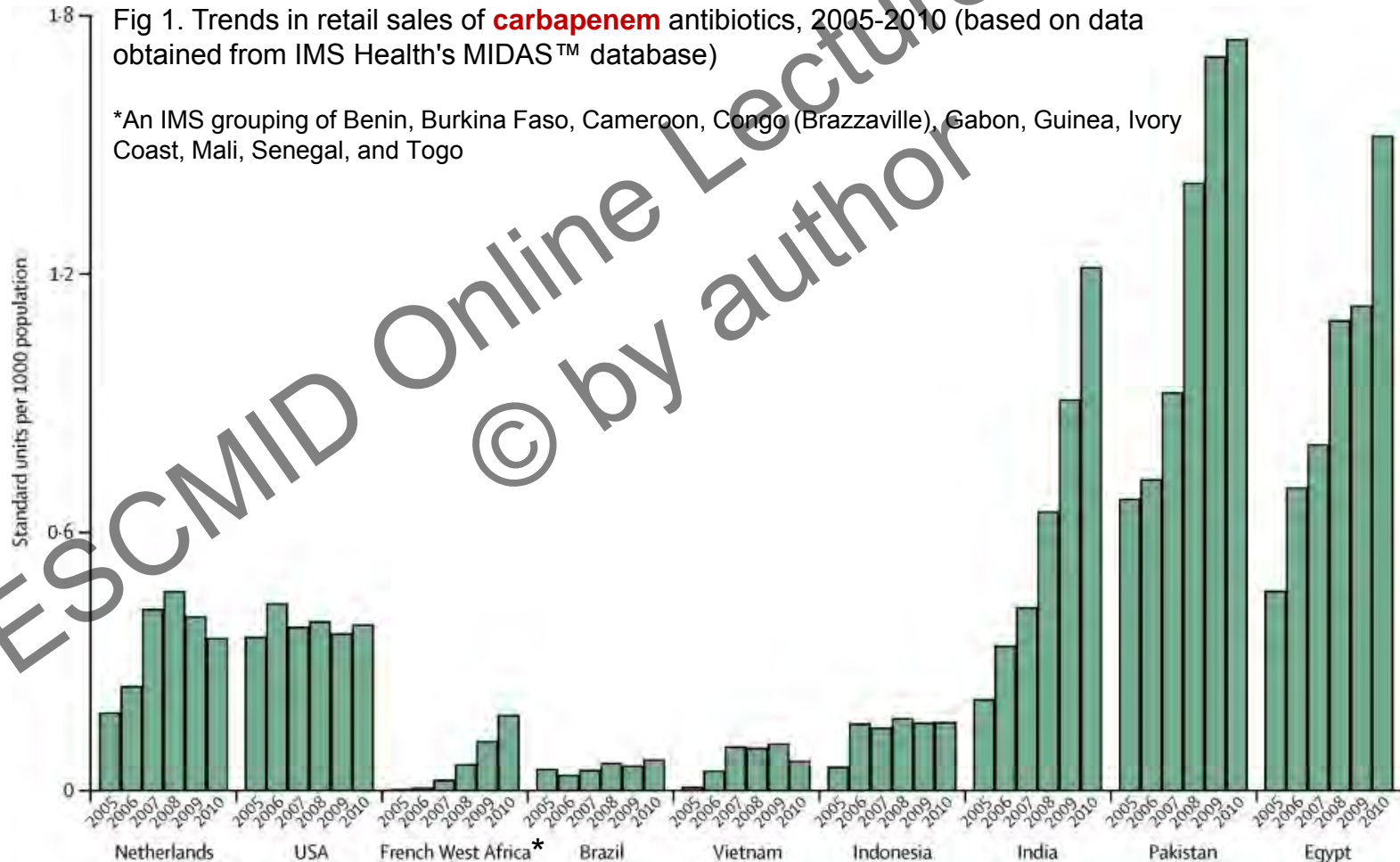
last-resort antibiotics in 2010

- carbapenems +45%
- polymixins +13%

Trends in retail sales of carbapenems worldwide

Fig 1. Trends in retail sales of **carbapenem** antibiotics, 2005-2010 (based on data obtained from IMS Health's MIDAS™ database)

*An IMS grouping of Benin, Burkina Faso, Cameroon, Congo (Brazzaville), Gabon, Guinea, Ivory Coast, Mali, Senegal, and Togo



EU/EEA countries participating in ESAC-Net



Community antimicrobial consumption: EU/EEA countries reporting for 2012

- Participating countries reporting data
- Non-participating countries



SURVEILLANCE REPORT



Surveillance of antimicrobial consumption in Europe

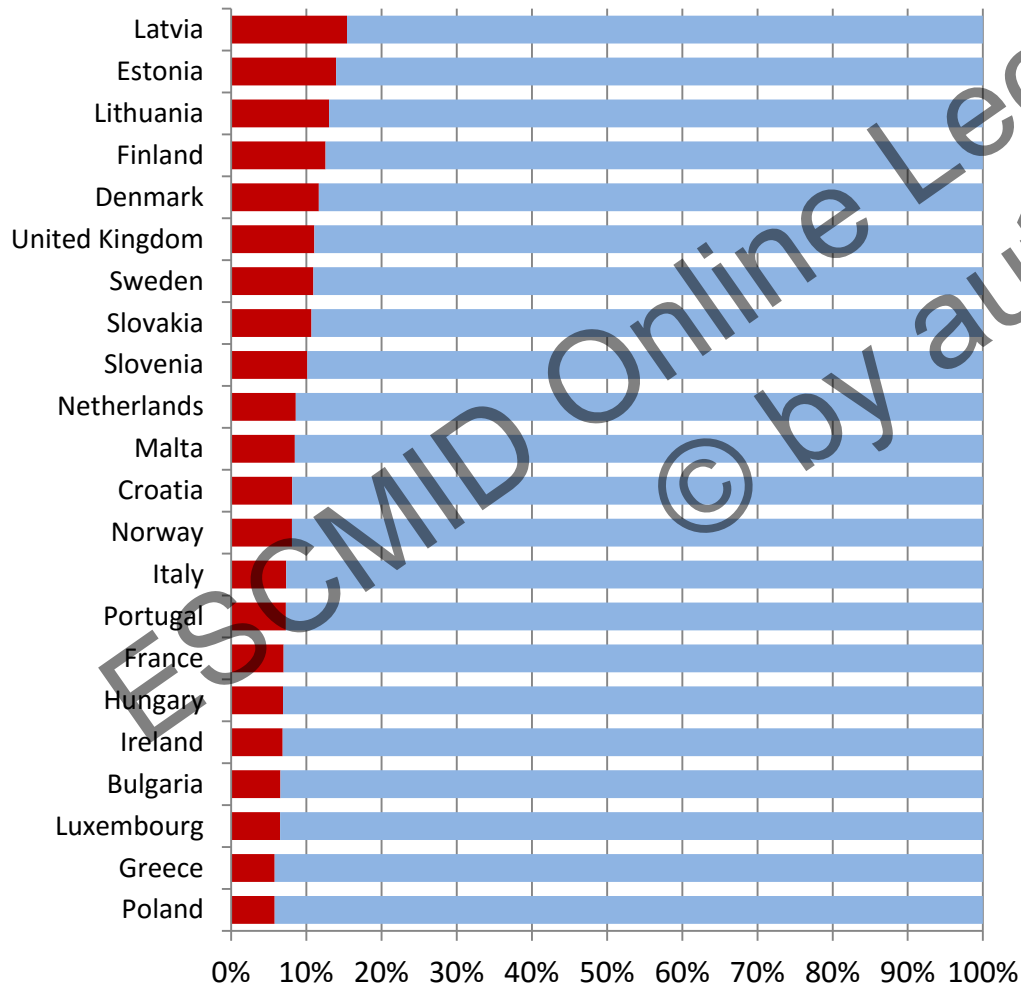
2012

Hospital sector antimicrobial consumption: EU/EEA countries reporting for 2012

- Participating countries reporting data
- Participating countries not reporting data
- Non-participating countries



hospital vs community 2014



■ hospital
■ community

up to 15%

at least 85%

Summary of the latest data on antibiotic consumption in the EU
ESAC-Net surveillance data
November 2015

Figure 1. Consumption of antibiotics for systemic use in the community by antibiotic group in 30 EU/EEA countries, 2014 (expressed in DDD per 1 000 inhabitants and per day)

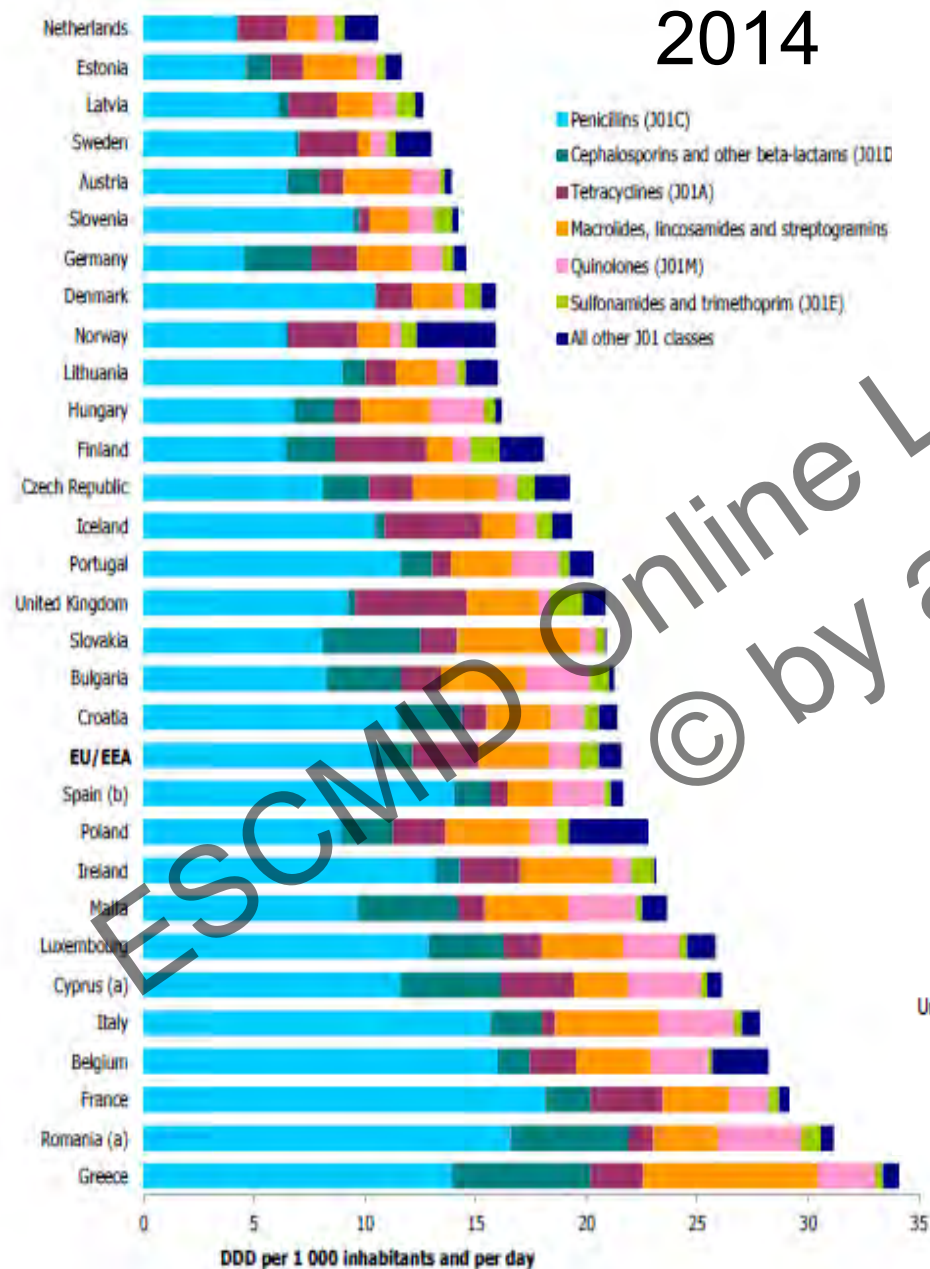
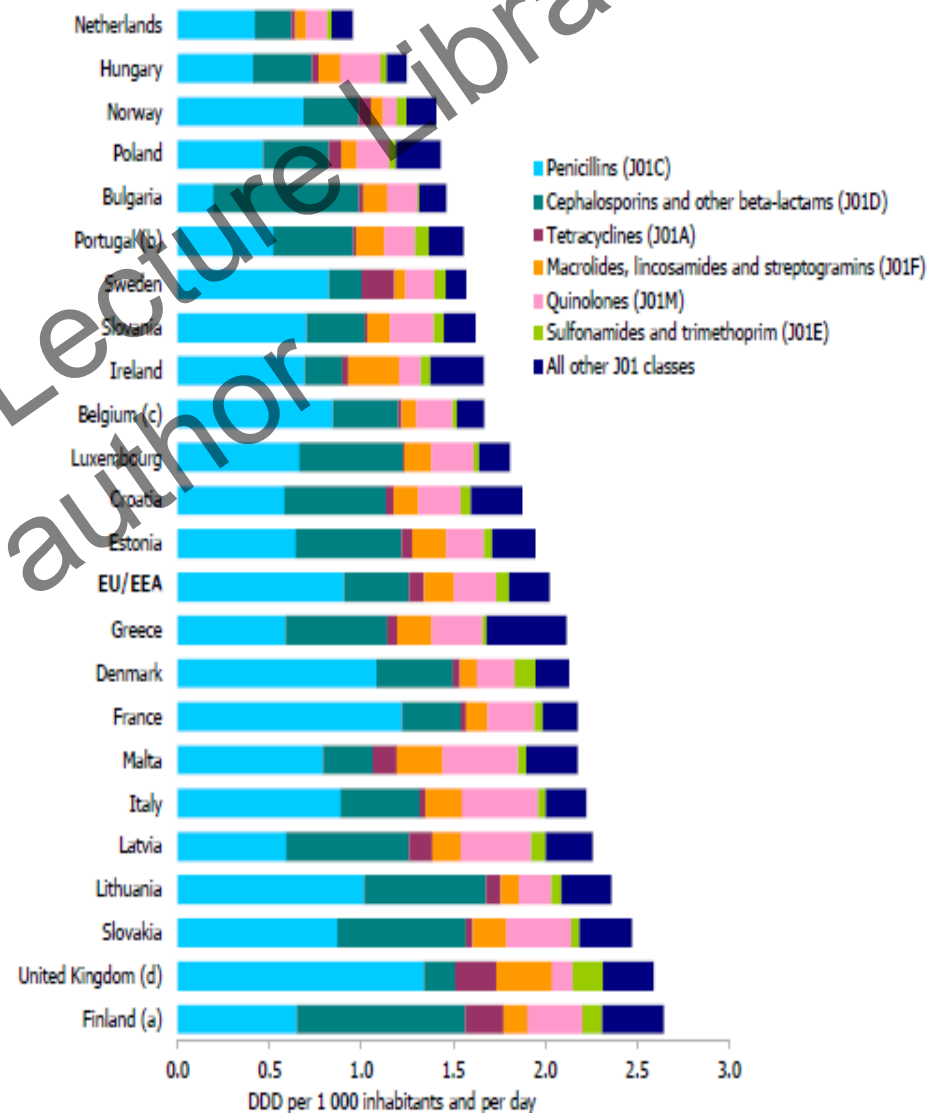


Figure 3. Consumption of antibiotics for systemic use in the hospital sector by antibiotic group in 23 EU/EEA countries, 2014 (expressed in DDD per 1 000 inhabitants and per day)



Trends of carbapenem consumption in european hospitals

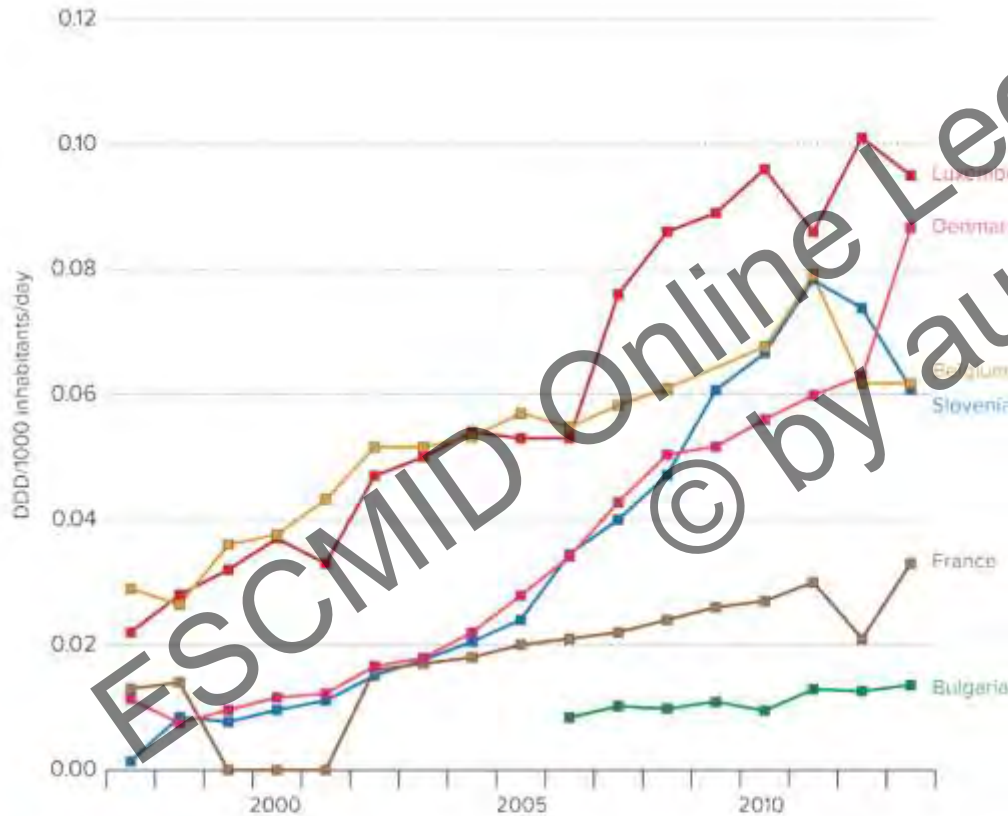


FIGURE 2-3: Carbapenem consumption in the hospital sector in selected European countries, 1997–2013

Source: ESAC-Net 2015

EU/EEA countries participating in ESAC-Net

Community antimicrobial consumption: EU/EEA countries reporting for 2012

- Participating countries reporting data
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Hospital sector antimicrobial consumption: EU/EEA countries reporting for 2012

- Participating countries reporting data
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Sweden

www.sva.se



Netherlands

www.swab.nl



Denmark

www.danmap.org



Germany

www.p-e-g.org



England

www.gov.uk

Belgium



www.health.belgium.be

Australia



www.safetyandquality.gov.au

Italy



www.agenziafarmaco.gov.it

Proportion of antibiotic use in the hospital sector

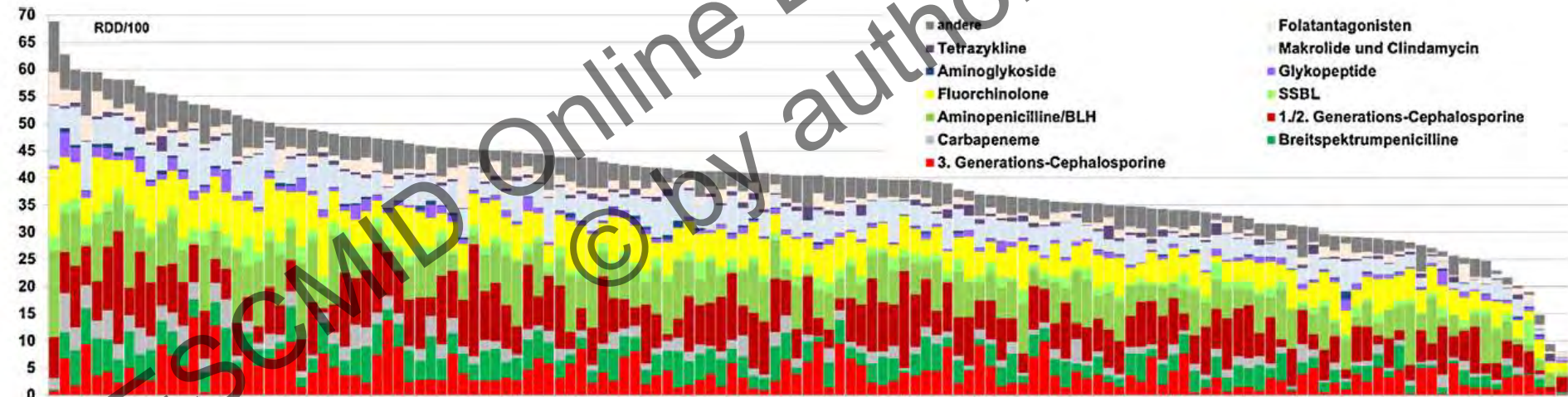
	2004	2008	2011
normal wards	90%	87%	88%
intensive care units	10%	13%	12%



Regional surveillance (Germany)

- Surveillance data for 2013/2014
- 141 acute care hospitals
- 80 hospitals <400 beds
- 33 hospitals 400-800 beds
- 28 hospitals >800 beds (incl. 13 university hospitals)
- Total consumption, consumption for different drug classes
- consumption for 11 specialities
- Separate for ICU and general wards

Germany 2013/2014



Antibiotic consumption of 141 acute care hospitals

summary human

➤ What do we know?

- total consumption increased worldwide from 2000 to 2010: +36%
- Brazil, Russia, India, China, South Africa accounted for 76% of this increase
- main consumption sector: ambulatory care (e.g. EU ≥ 85%)
- increase of last-resort antibiotics

➤ What does it tell us?

- surveillance of consumption is mandatory (German Infection Protection Act (IfSG))

2 **Strategies to enhance rational use of antibiotics in hospital: a**
3 **guideline by the German Society for Infectious Diseases**

4 K. de With¹ · F. Allerberger² · S. Amann³ · P. Apfalter⁴ · H.-R. Brodt⁵ · T. Eckmanns⁶ ·
5 M. Fellhauer⁷ · H. K. Geiss⁸ · O. Janata⁹ · R. Krause¹⁰ · S. Lemmen¹¹ · E. Meyer¹² ·
6 H. Mittermayer⁴ · U. Porsche¹³ · E. Presterl¹⁴ · S. Reuter¹⁵ · B. Sinha¹⁶ · R. Strauß¹⁷ ·
7 A. Wechsler-Fördös¹⁸ · C. Wenisch¹⁹ · W. V. Kern²⁰

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1 GUIDELINE

2 **Strategies to enhance rational use of antibiotics in hospital: a**
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5 M. Fellhauer⁷ · H. K. Geiss⁸ · O. Ianata⁹ · R. Krause¹⁰ · S. Lemmen¹¹ · E. Meyer¹² ·
6 H. Mittermayer⁴ · *3.1.2.2 Antimicrobial consumption*
7 A. Wechsler-För

The guideline development group recommends:

Data on antimicrobial consumption, expressed as use density (daily doses per 100 patient-days) should be collected at least annually or preferably quarterly and are generally reported by the pharmacist. Data are reported institution-wide, at the ward level as well as for individual (speciality) departments. On demand, data should be broken down to the agent level and should be provided to the ABS team. Participation in an established surveillance system is recommended (A).