

# Antimicrobial Drug Use and Resistance in Europe

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## CME ACTIVITY

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### Learning Objectives

Upon completion of this activity, participants will be able to:

- Identify the classes of antimicrobial drugs most commonly used in Europe.
- Describe patterns of antimicrobial drug use across regions in Europe.
- Identify the most widely used antimicrobial drugs by country in Europe.
- List European countries that show the highest antimicrobial drug resistance proportions.
- Describe the association between antimicrobial drug use and the emergence of resistance.

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Our study confronts the use of antimicrobial agents in ambulatory care with the resistance trends of 2 major pathogens, *Streptococcus pneumoniae* and *Escherichia coli*, in 21 European countries in 2000–2005 and explores whether the notion that antimicrobial drug use determines resistance can be supported by surveillance data at national aggregation levels. The data obtained from the European Surveillance of Antimicrobial Consumption and the European Antimicrobial Resistance Surveillance System suggest that variation of consumption coincides with the occurrence of resistance at the country level. Linear regression analysis

showed that the association between antimicrobial drug use and resistance was specific and robust for 2 of 3 compound pathogen combinations, stable over time, but not sensitive enough to explain all of the observed variations. Ecologic studies based on routine surveillance data indicate a relation between use and resistance and support interventions designed to reduce antimicrobial drug consumption at a national level in Europe.

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For the past 60 years, antimicrobial chemotherapy has been the mainstay of medical intervention against infectious diseases caused by bacterial pathogens. The continuous decline of therapeutic effectiveness as a result of extensive use of antimicrobial chemotherapy has been long predicted and seems inescapable (1). Many surveillance efforts have over the last decade (1997–2007) drawn attention to this phenomenon (2–5). At the same time, the once-abundant supply of new and improved antimicrobial compounds has worn thin, as

1722

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### Article Title

## Antimicrobial Drug Use and Resistance in Europe

### CME Questions

1. Which of the following classes of antimicrobial drugs is least likely to be used in European countries?

- Lincosamides
- Fluoroquinolones
- Cotrimoxazole
- Macrolides

2. Which of the following regions in Europe has the highest outpatient utilization of antimicrobial drugs?

- Southern
- Northern
- Eastern
- Central

3. Which of the following is the most widely used antimicrobial drug class in Europe?

- Macrolides
- Penicillins
- Nonpenicillin beta-lactams
- Fluoroquinolones

4. Which of the following European countries showed both the greatest use of antimicrobial drugs in ambulatory care and the highest resistance proportions?

- France
- Croatia
- Italy
- Greece

5. Among European countries with high antimicrobial drug resistance rates, a robust and consistent association was most likely to be found between utilization and resistance for which of the following drugs?

- Penicillins and macrolides
- Lincosamides and macrolides
- Penicillins and streptogramins
- Penicillins and fluoroquinolones

## Activity Evaluation

1. The activity supported the learning objectives.

Strongly Disagree

1

2

3

4

Strongly Agree

5

2. The material was organized clearly for learning to occur.

Strongly Disagree

1

2

3

4

Strongly Agree

5

3. The content learned from this activity will impact my practice.

Strongly Disagree

1

2

3

4

Strongly Agree

5

4. The activity was presented objectively and free of commercial bias.

Strongly Disagree

1

2

3

4

Strongly Agree

5

1832

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