



# Regional trend analyses of antibiotic consumption in the ambulatory statutory health care sector in 2008 through 2014 with special focus on cephalosporins and fluoroquinolones

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## Abstract

### Background:

Due to the increasing burden of resistance to antibiotics and superinfections by *Clostridium difficile* monitoring of antibiotic prescriptions is essential for the development and evaluation of targeted quality assurance measures in Germany. Therefore, nationwide ambulatory drug prescription data from 2008 to 2014 were analyzed, focusing on cephalosporins and fluoroquinolones due to their specific importance for resistance.

### Method:

We computed yearly prescription densities (DDD per 1,000 statutory health insurees) for all antibiotics for systemic use as well as for cephalosporins and fluoroquinolones separately, nationwide, by federal states and age groups (<15 years, 15-69 years and ≥70 years). Trend analyses were performed by calculating the annual percent change (APC) and testing for statistical significance using joinpoint regression.

### Results:

Total ambulatory prescription of antibiotics in Germany was largely stable between 2008 and 2014, both on the national and state level. For the youngest age group (<15-year-olds), we observed significant downward trends in prescription density with a mean annual change of -6.7 %. In the oldest age group (70+ year olds), we found discrete declining trends regarding mostly fluoroquinolones, although not reaching statistical significance in most provinces. In contrast, a slight uptrend in fluoroquinolone prescriptions was observed in the 15- to 69-year-olds. Prescription densities of cephalosporins significantly increased over time across all provinces and age groups with an overall annual change of +7.6 %. However, this trend was less pronounced in the age group <15 years.

### Conclusion:

Despite the overall decline of antibiotic prescription density – specifically in children – in the investigation period, significant changes were found concerning medical prescription of the examined antibiotic drug classes in the ambulatory setting. The pronounced rise in cephalosporin prescriptions observed in all provinces needs special attention, since these substances can have adverse effects regarding the

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development of resistances and superinfections by *Clostridium difficile* and are not recommended as a method of choice in current guidelines. The declining trend of fluoroquinolone prescriptions in elderly patients must be interpreted positively. Further, our state- and age-specific results point out regional variation in prescription rates. These data should be acknowledged by public health care decision makers and allow for planning and successful implementation of targeted and regionally adapted quality assurance measures concerning future outpatient antibiotic therapy.

**Keywords:**

Antibiotic prescriptions, antibiotic consumption surveillance, ambulatory health care sector, statutory health care insures, fluoroquinolones, cephalosporins

**Citation:**

Bätzing-Feigenbaum J, Schulz Maik, Schulz Mandy, Hering R, Gisbert Morales J, Kern WV. Regional trend analyses of antibiotic consumption in the ambulatory statutory health care sector in 2008 through 2014 with special focus on cephalosporins and fluoroquinolones. Central Research Institute of Ambulatory Health Care in Germany (Zi), Versorgungsatlas-Report No. 15/15-17. Berlin, 2015. Link: <http://www.versorgungsatlas.de/themen/alle-analysen-nach-datum-sortiert/?tab=6&uid=65>