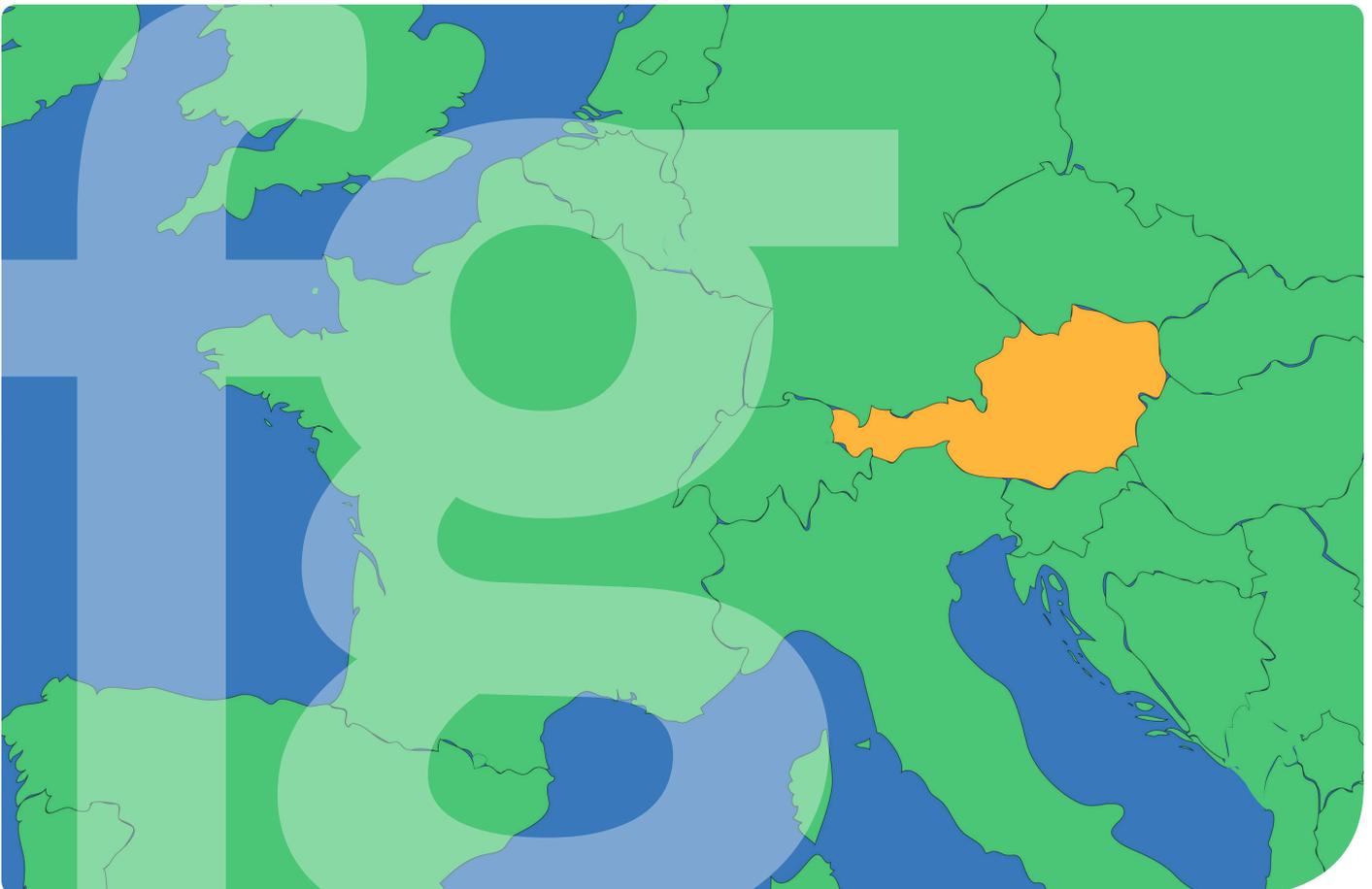


# Resistance Report Austria AURES 2015

## Summary



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# Foreword

The AURES – the Austrian report on antimicrobial resistance – that is published by the Federal Ministry of Health and Women’s Affairs on an annual basis enables the observation of the development of the resistance situation in Austria, thereby deducing strategic measures and decisions therefrom. The rational and selected use of antimicrobially effective drugs represents an important prerequisite for a successful therapy of infections also in the future.



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With the publication of the summary of the AURES, there is to be established easy access to information regarding antibiotic resistance. In this way, the importance of antimicrobial resistance for the treatment of human beings as well as animals having a medical condition may be explained to a bigger audience – in the sense of “One health”, thereby supporting the awareness of the importance of a proper handling of antimicrobial substances.

**Pamela Rendi-Wagner, MD, MSc**

Federal Minister of Health and Women’s Affairs

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# LIST OF ABBREVIATIONS

Table 1: List of abbreviation

Abbreviation	Long text
AGES	Austrian Agency for Health and Foodsafety
AMR	Antimicrobial resistance
ART	Antiretroviral therapy
AT	Austria
AURES	Austrian Report on Antimicrobial Resistance
BIOHAZ	Biological Hazards
BMGF	Federal Ministry of Health and Women´s Affairs
CASCADE	Co-operative Air Traffic Services Through Surveillance and Communications Applications Deployed in ECAC
CLSI	Clinical and Laboratory Standards Institute
EARS-Net	European Antimicrobial Resistance Surveillance Network
ECAC	European Civil Aviation Conference
EFSA	European Food Safety Authority
ESAC-Net	European Surveillance of Antibiotic Consumption Network
ESBL	Extended spectrum beta-lactamase
ESVAC	European Surveillance of Veterinary Antimicrobial Consumption
EU	Europe/European
EUCAST	European Committee on Antimicrobial Susceptibility Testing
HIV	Human immunodeficiency virus
MDR	Multidrugresistance
MIC (MHK)	Minimum inhibitory concentration
MRSA	Methicillin-resistant Staphylococcus aureus
MSSA	Methicillin-sensitive Staphylococcus aureus
NNRTI	Non-nucleoside reverse transcriptase inhibitors
NRTI	Nucleoside reverse transcriptase inhibitors
OIE	World Organization for Animal Health
STD	Sexual transmitted diseases
TB	Tuberculosis
TDR-Tuberkulose	Transmitted drug-resistant tuberculosis
VRE	Vancomycin-resistant enterococci
WHA	World Health Assambly
WHO	World Health Organization
XDR-Tuberkulose	Extensively drug-resistant tuberculosis

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## INTRODUCTION

The present summary of the AURES 2015 has resulted from the full version of the AURES 2015, an inter-departmental co-operation in the field of human and veterinary medicine as well as food technology. Like in the reports of the previous years, the aim of the AURES 2015 is the sustainable and comparative illustration of representative data on antimicrobial resistance and on the consumption of antimicrobial agents with special consideration of Austrian characteristics and development trends over time. The data provided by National Reference Centres, appointed by the Federal Ministry of Health and Women's Affairs, and the respective projects are illustrated in separate chapters. This method has been chosen in order to take into account the different approaches used in data collection. Direct comparison with data from veterinary medicine and human medicine is only possible to a limited extent at the present on account of the use of different test procedures and/or laboratory methods and antimicrobial limit values (epidemiological cut-offs and clinical limit values). The AURES provides data for a comprehensive professional discussion and will subsequently contribute to the optimization of the use of antimicrobial agents in Austria. The present short version, hence, is composed of the summaries of the individual chapters of the AURES. In this way, a first introduction to the subject of antimicrobial resistance and a brief survey on the situation in Austria will be made available. Details on the individual chapters may be found in the long version of the AURES 2015.

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## INITIAL SITUATION

Antibiotics have been used for decades for the treatment and prevention of infectious diseases and infections. The use of antimicrobial agents has highly contributed to the improvement of the state of health of human beings and animals. Antibiotics are indispensable in modern medicine and procedures; transplantations, chemotherapies to treat cancer or orthopaedic surgery, all these could not be performed without antibiotics. A steady increase of resistant microorganisms, however, has been associated with the wide application thereof. The Health Ministers of the European Union in the year 2012 issued a declaration, emphasizing that this increasing antibiotic resistance in Europe and all over the world constitutes a growing health hazard for human beings and animals, leading to limited or inadequate treatment options and, hence, diminishing the quality of life [1]. The World Health Organization (WHO) had chosen as the primary issue in 2011 for the World Health Day on April 7 the theme of “*Antimicrobial resistance: no action today, no cure tomorrow*” [2]. Since 2008, on the initiative of the European Parliament, the European Antibiotic Awareness Day has been held annually on November 18, with the objective to inform the population as well as those skilled in the art on the prudent use of antimicrobially active agents. Furthermore, the problem of antimicrobial resistance was included in the working programme of the European Commission in 2015 as a “key priority” (being of highest importance and priority) [3]. The topic of antibiotic resistance was part of the agenda of the G7 Summit in 2015 in Schloss Elmau, Germany. The global action plan of the WHO is to be supported and promoted. The G7 member nations aim at following the approach of “One Health” [4].

In human medicine, the use of antibacterial agents for the treatment of viral infections, the unjustified use of agents having an extremely wide action spectrum, too long “prophylactic” use of antibiotics with surgical interventions and the use of antibiotics in the case of mere colonization (and not infection) of the patient are considered the essential reasons and causes of the resistance problem. Furthermore, patients (in the case of children, their parents) with therapy demands contribute to the improper use of antibiotics. The causal relationship between antibiotic use and development of resistance in bacteria may clearly be demonstrated for both infections in patients of medical practitioners as well as nosocomial infections [5]. Already in the Council Recommendation of November 15, 2001 for the prudent use of antimicrobial agents in human medicine, the member states were asked to ensure that specific strategies for the prudent use of antimicrobial agents are available and are implemented with the object to limit the increase of microorganisms being resistant to these agents [6].

Attempts to reduce the development of resistance through a rational use of antibiotics by general practitioners have been found on a European level [7]. These efforts are mainly directed at the omission of antibiotic use in the treatment of viral infections. The fact that high-quality microbiological diagnostics is not available throughout Austria makes it in many cases difficult for the physician to clearly differentiate between infections requiring treatment and such that do not require antimicrobial therapies; in addition, it is frequently only possible to start with a very broad antimicrobial therapy. This will result in unnecessary use of antibiotics and the preferred use of agents having a wide spectrum of action – both being factors that promote the development of antibiotic resistance due to an immanent selection pressure. Due to the improved treatability of viral diseases, also drug-resistant viruses are gaining increasing importance. The biggest hazard caused by drug-resistant viruses is currently posed by HIV infection. This may lead to a limited or absent effectiveness of the anti-retroviral therapy with patients being already in treatment as well as with persons infected with these resistant viruses.

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In hospitals, and especially in the intensive care units, multi-resistant hospital pathogens have been considered a problem of everyday life. The combination of “immunocompromised” patients, the intensive and prolonged use of antibiotics as well as the transmission of pathogens between patients will lead to the occurrence of infections with multi-resistant pathogens, which sometimes will not be responsive to antibiotic therapy anymore. In the document “WHO Global Strategy for Containment of Antimicrobial Resistance”, the World Health Organization refers to hospitals as “*a critical component of the antimicrobial resistance problem worldwide*” [8].

Although it is still true that “*most of the problems with resistance in human medicine are correlated to use of antimicrobials in humans*”, it is currently in no way doubted that, in the field of foodstuff having animal origin, the antibiotic resistance is also of significance [9, 10]. The Panel on Biological Hazards (BIOHAZ) of the European Food Safety Authority (EFSA) already in the year 2008 recommended the elaboration and implementation of specific measures for the control of raw poultry, pork and beef, wherein measures for countering antibiotic resistance were classified as a priority [11]. In the veterinary field, in Austria already since 2004 compulsory surveillance of the prevalence of zoonoses and selected zoonotic pathogens as well as their susceptibility to antimicrobial agents in the livestock population of Austria has been carried out (in the form of randomized sampling schemes in healthy slaughtered animals – cattle, pork, poultry) [12]. The OIE (World Organization for Animal Health) has elaborated recommendations for countering antimicrobial resistance in order to protect the health of animals and ensure food safety [13]. In regard to the surveillance of the antibiotic resistance and the ascertainment of antibiotics volume flows there have been existent guidelines for the harmonization of national programmes as well as recommendations on the prudent use of antibiotics in veterinary medicine and on the risk assessment of antibiotic resistance with the treatment of animals as well as for laboratory methods for the detection of antibiotic resistance.

The increasing antibiotic resistance of human pathogens currently constitutes a problem, which requires the willingness of all fields and sectors involved (human medicine, veterinary medicine, primary livestock production, food processing and food preparation, consumers) to assume responsibility in their respective areas of influence in order to impede the development and further distribution of antimicrobial resistance. The World Health Assembly (WHA) as the supreme decision-making organ of the World Health Organization (WHO) on May 25, 2015, passed a resolution asking all WHO member states to develop concrete national action plans for countering the problem of antimicrobial resistance within two years (until 2017), with the aspect of “ensuring sustainable investment in countering AMR” being one of the five objectives determined [14]. In the year 2016 the conclusions of the Council regarding the next steps within the concept of “One Health” for combatting antimicrobial resistance were published. On September 21, 2016, the problem of antimicrobial resistances was addressed on the level of the General Assembly of the United Nations [15].

Co-ordinated measures for countering the distribution of antimicrobial resistance are in need of surveillance systems. Only with these, it will be possible to assess how local and global resistance situations will react to an altered use of antibiotics and new measures for infection control. In the field of human medicine, many Austrian hospitals participate in the European system for the surveillance of resistance to antimicrobial agents (“European Antimicrobial Resistance Surveillance Network” [EARS-Net]) and in the “European Surveillance of Antibiotic Consumption Network” (ESAC-Net). EARS-Net and ESAC-Net are surveillance programmes initiated by the Community and confirmed in their importance by the EU Council, wherein standardized, harmonized and comparative human medicine data on the resistance to bacterial pathogens and/or the use of antibiotics are being sampled and collected [1]. The present Resistance Report makes available to the public the data acquired within the network of the Austria-wide resistance surveillance.

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Einsichtnahme am 17. 08. 2016)

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# Antimicrobial resistance in selected bacterial invasive infectious pathogens

## Data from the human sector

An activity by the National Reference Centre for nosocomial infections and antibiotic resistance within the scope of participation in the European Antimicrobial Resistance Surveillance Network (EARS-Net)

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## European Antimicrobial Resistance Surveillance Network (EARS-Net)

The Austrian EARS-Net data base is currently based on 141 Austrian hospitals. The resistance rates of the invasive indicator pathogens, hence, constitute a reliably measured substitute value for the prevalence of the respective pathogens in relation to the antibiotic substances selected. As far as human antimicrobial susceptibility testing methodology is concerned, Austrian microbiology laboratories switched from CLSI to EUCAST in 2011, a process that was successfully completed in 2012. The Austrian results for 2015 may be summarised as follows:

In the case of *S. pneumoniae*, there has been a stable and very positive situation for penicillin for years. According to EUCAST threshold values that differ due to clinical indication and intended forms of administration, isolates having on MIC with of > 2 mg/l would be regarded as "highly resistant". In 2015 only one of these was detected in Austria. Based on the strict meningitis threshold values, only 10 invasive isolates proved to be resistant to penicillin in the year 2015 (2.3%). The situation of the resistance rate in regard to macrolides, which significantly increased to 17% in 2012, showed a continuous decrease to 8.4% in 2015. The three most frequent serotypes of invasive isolates in the year 2015 were 3, 19A and 22F. With children younger ≤ 2 years, type 19A was the most frequent one. In the age group of 60+, the most frequent serotypes were 3, 14, 19A und 22F.

The **MRSA rate** showed an upward trend until 2013 (9.1%) and decreased to 7.5% in 2015. No reduced sensitivity to (resistance against) vancomycin was detected and confirmed in the year 2015 in any invasive *S. aureus* isolate.

In the case of *E. coli*, the resistance rate of aminopenicillins (50%) has remained stable since 2010. In comparison to 2014, the same situation applies to fluoroquinolones (from 19.8% to 20.0%), 3rd generation cephalosporins (from 9.4% to 9.5%) and aminoglycosides (stable at 7.2%).

With **enterococci**, no change of the resistance rates of aminopenicillin and aminoglycosides in comparison to the years before has been detected. The **VRE rate** was 0% with *E. faecalis* and 3.1% with *E. faecium*.

In the case of *K. pneumoniae*, the resistance rates of fluoroquinolones and 3rd generation cephalosporins showed a notably declining trend until 2014, with that for aminoglycosides remaining essentially stable. In comparison to 2014, the resistance rates of fluoroquinolones (from

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10.4% to 11.7%) and 3rd generation cephalosporins (from 8.2% to 8.4%) were slightly increasing. The resistance rate of aminoglycosides decreased from 5.5% to 4.7%.

**Carbapenemase producing isolates:** In 2015 one *E. coli* invasive isolate and 11 *K. pneumonia* invasive isolates were documented.

With *P. aeruginosa*, a slight decrease of the resistance rates in connection with the following substance classes was recorded in 2015: fluoroquinolones 10.3% (-0.6%), carbapenems 12.7% (-0.5%) and aminoglycosides 6.3% (-0.3). The resistance against piperacillin/tazobactam increased from 11.8% to 11.9% (+0.1%) and that against ceftazidime from 8.7% to 9.9% (+1.2%).

**Acinetobacter sp.** showed resistance rates against aminoglycosides for 6.4%, against fluoroquinolones for 16.4% and against carbapenems for 9.4%. Only 64 isolates were reported.

In total, there is still a positive and stable situation detectable in Austria, especially with nosocomial gram-positive pathogens like MRSA and VRE. Compared to other European countries, the resistance rates are low. Gram-negative pathogens still pose a rather problematic field.

The full report can be found in the long version of the AURES 2015 from page 16 to page 90 ([AURES 2015](#)).

## Project report CARBA-Net

### Data from the human sector

An activity by the National Reference Centre for nosocomial infections and antibiotic resistance

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Increasing numbers of carbapenemase producing gram negative bacteria are reported worldwide [1]. As a consequence, the surveillance project CARBA-Net was initiated in April 2015. In 68 out of 109 Enterobacteriaceae strains referred to the Austrian National Reference Laboratory due to decreased carbapenem susceptibility, a carbapenemase gene was confirmed. The enzymes could be assigned to Ambler classes A (*bla*KPC [n=7]), B (*bla*VIM [n=23] and *bla*NDM [n=18]) and D (*bla*OXA-48 like [n=20]). With regard to other gramnegative bacilli, 40 out of 86 suspected *Pseudomonas aeruginosa* isolates were positive for a metallo-beta-lactamase (*bla*VIM [n=36], *bla*NDM [n=3] and *bla*IMP [n=1]) and 17 *Acinetobacter baumannii* isolates gave a positive result for *bla*OXA-51 in combination with either *bla*OXA-23 or *bla*OXA-24.

The full report can be found in the long version of the AURES 2015 from page 91 to page 97 ([AURES 2015](#)).

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## Resistance report for selected non-invasive pathogens

### Data from the human sector

An activity of the working group resistance reporting

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The collected data of twelve centers/laboratories from all over Austria are highly reliable and represent the prevalence of antibiotic resistance of selected so called 'non-invasive isolates' from 2011 to 2015. The aim of this annual survey is also to highlight the difference in resistance rates comparing „hospital derived isolates“ with „community-derived isolates“, gained from out-patient-clinics. We report resistance-rates for the following „indicator-organisms“ for 2015:

1. **Group A streptococci** (n=2.550) from the lower and upper respiratory tract demonstrated lower resistance rates for macrolides compared to **pneumococci** (n=1.492) in both out- and in-patient settings (5.0% / 7.4% versus 14.4% / 17.8%). Pooled resistance rate for macrolides in **pneumococci** is above resistance of invasive **pneumococci** of EARS-net AT data: 16.0 % versus 8.4%. Resistance rates in *H. influenzae* (n=2.902) in hospitals and the community are as follows: aminopenicillins 25.7% and 23.8%; aminopen. + betalactamaseinhibitor 8.2% and 5.7%, fluoroquinolones 0.5% and 0.2% respectively.
2. **ESBL-producing E. coli** (n=3.105) from urine samples remain stable with 7.5% over the last two years and do not differ whether gained from samples in (7.8%) or outside(7.2%) the hospital. Fluoroquinolones proved to have high resistance rates in all *E. coli* isolates (16.5%, n=45.456) and very high in ESBL-positive *E. coli* (74.1%) and sulfamethoxazol/trimethoprim demonstrated similar results (23.9% vs 67.5%).
3. **Klebsiella pneumoniae**: (n=9.052) from urine samples showed a resistance rate against 3rd generation cephalosporins of 9.5% and a carbapenem resistance of 1.0% in 2015.
4. **Staphylococcus aureus/MRSA**(n=22.516/1.546): hospital associated MRSA rate was 8.1%, in out-patients the MRSA rate was 4.7%. There were no isolates identified resistant to linezolid or vancomycin but 0.3 resistance against Daptomycin in MSSA.
5. **Pseudomonas aeruginosa**: Stable high resistance rates of all selected substances for isolates from deep respiratory tract (as a surrogate for isolates from the ICU; n=875): Carbapenems showed a rate of 16.3% and Ceftazidim 17.8%. Ear-derived isolates (as a surrogate for external otitis; n=1.613) showed a stable rate of 3.2 for aminoglycosides.

The full report can be found in the long version of the AURES 2015 from page 98 to page 112 ([AURES 2015](#)).

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## Resistance report *Neisseria meningitidis*

An activity of the National Reference Centre for Meningococci

### Author/contact person

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The National Reference Centre for Meningococci received 48 culturable isolates in 2015. Of these, 16 isolates were from invasive infections.

Twenty-two of the 48 isolates were polyagglutinable (PA) (48.8 %), 18 serogroup B (37.5 %), 4 serogroup Y (8.3 %) and 2 were serogroup C (4.2 %). One isolat was serogroup W (2.1 %) and one strain could not be assigned to a serogroup (nt, non typable) (2.1 %).

According to EUCAST (v. 5.0), 18 isolates showed reduced sensitivity to penicillin. Four strains, including one invasive isolate, were resistant to penicillin (MHK > 0,25 mg/L). All of the strains were in vitro susceptible to rifampicin, ciprofloxacin und ceftriaxone.

The full report can be found in the long version of the AURES 2015 from page 113 to page 119 ([AURES 2015](#)).

## Resistance report *Campylobacter*

### Data from the human and food sector

An activity of the National Reference Centre for *Campylobacter*/the National Reference Laboratory for *Campylobacter* from food and feed products

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In 2015, a total of 6,259 cases of campylobacteriosis were reported in Austria (data source: statistics for notifiable infectious diseases, final annual report 2015). A high to very high tetracycline and fluorochinolone resistance rate, respectively, were found in *C. jejuni* and *C. coli* isolates of human and food (chicken and turkey) origin. Resistance to fluorochinolones continued to increase being as high as 73.9% (*C. jejuni*) and 85.1% (*C. coli*) in human isolates. In food (chicken) fluorochinolone resistance was found to be 73.1% in *C. jejuni* and 85.0% in *C. coli*. Resistance towards erythromycin remained low and was primarily recorded in *C. coli*.

The full report can be found in the long version of the AURES 2015 from page 120 to page 133 ([AURES 2015](#)).

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## Resistance report *Salmonella*

### Data from the human, food and veterinary sector

An activity of the National Reference Centre for *Salmonella*

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In 2015, the number of primary human isolates sent to the National Reference Centre for *Salmonella* decreased by 5% as compared to 2014.

Due to the decline of fully susceptible *S. Enteritidis* isolates there has been a shift towards higher resistance rates in recent years in Austria. The highest resistance rates are found against ampicillin, sulphonamides and tetracycline (resistance pattern typical for multiresistant *S. Typhimurium* and *S. Kentucky* strains) and against nalidixic acid (low-level ciprofloxacin resistance), which is typical for *S. Infantis*, *S. Stanley*, and several *S. Enteritidis* phage-types.

High level resistances against ciprofloxacin and third generation cephalosporins (cefotaxime, ceftazidime) were still extremely rare. The resistance rates among non-human *salmonella* isolates are partly considerably higher than those among human strains.

The full report can be found in the long version of the AURES 2015 from page 134 to page 148 ([AURES 2015](#)).

## Resistance report *Shigella*

### Data from the human sector

An activity of the National Reference Centre for *Shigella*

#### Author/contact person

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In Austria 96 cases of shigellosis were reported to the health authorities in 2015. In the same year, a total of 94 *Shigella* isolates were received by the National Reference Centre for *Shigella*. The incidence rate was 1.08 / 100,000; in 2014 an incidence of 0.87 / 100,000 inhabitants was registered. The predominant species was *Shigella sonnei* accounting for 68% of all isolates. We detected resistance against ciprofloxacin in 26 strains and resistance to nalidixic acid in 48 isolates. 21 *Shigella* strains were ESBL positive (22.34%).

The full report can be found in the long version of the AURES 2015 from page 149 to page 159 ([AURES 2015](#)).

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## Resistance report Yersinia

### Data from the human sector

An activity of the National Reference Centre for Yersinia

### Author/contact person

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In 2015, the Austrian National Reference Centre for Yersinia examined 173 isolates of *Yersinia* spp., of which 158 were of human origin, and 15 from food samples. Of the 158 human isolates, 121 were pathogenic, 37 were non-pathogenic isolates. Among the pathogenic isolates 120 belonged to *Yersinia enterocolitica* and one strain to *Y. pseudotuberculosis*. In 2015, the incidence rate for cases confirmed by the National Reference Centre was 1.42 per 100 000 inhabitants. In vitro susceptibility testing revealed no abnormalities – 17 *Y. enterocolitica* isolates showed resistance to amoxicillin/clavulanic acid.

The full report can be found in the long version of the AURES 2015 from page 160 to page 164 ([AURES 2015](#)).

## Resistance report Tuberculosis 2015

### Data from the human sector

An activity of the National Reference Centre for tuberculosis

### Authors/contact persons

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In 2015, a total of 583 cases of tuberculosis (451 confirmed, 52 probable and 80 possible cases) were notified in Austria, which corresponds to an incidence of 6.8/100,000 population. A total of 184 (31%) cases were found among native Austrians, 178 cases (30%) among Austrian residents born in the WHO region Europe, and 221 cases (38%) among persons born outside of the WHO region Europe. In 2015, a total of 12 cases of MDR-tuberculosis (including 1 case of XDR-tuberculosis in a person from Georgia), were confirmed at the national reference centre, all of them affecting non-native Austrians.

The full report can be found in the long version of the AURES 2015 from page 165 to page 177 ([AURES 2015](#)).

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## Resistance report *Neisseria gonorrhoeae*

### Data from the human sector

An activity of the National Reference Centre for gonococcal

### Authors/contact persons

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Increasing spread of antibiotic resistant *Neisseria gonorrhoeae* poses a serious threat to the control of Gonorrhoeae.

In 2013 AGES was mandated in a collaborative quality assurance project between Institute of medical microbiology and hygiene (IMED)/AGES and the STD-Clinic of Vienna to validate the antimicrobial resistance testing of *Neisseria gonorrhoeae* obtained from clinical specimens in STD-Clinic clients. In 2015 the antimicrobial resistance testing was carried out for all 61 isolates, obtained from clinical specimens of clients at the STD-clinical, Vienna.

All isolates showed sensitivity to Cefixime and Ceftriaxone. Isolates identified as resistant using E-tests included 66% (40/61) of isolates to Ciprofloxacin, 38% (23/61) to Benzylpenicilline, 3% (2/61) to Azithromycin and 51% (31/61) to Tetracycline.

The frequency of resistance to Ciprofloxacin, Benzylpenicillin, Azithromycin and Tetracycline among *Neisseria gonorrhoeae*, isolated from clinical samples of clients of the STI-clinic of Vienna in 2015 was comparable to the European trend. Fortunately all isolates were Cefixime and Ceftriaxone sensitive.

The full report can be found in the long version of the AURES 2015 from page 178 to page 185 ([AURES 2015](#)).

## Resistance report Yeasts

### Data from the human sector

An activity of the National Reference Centre for Yeasts

### Author/contact person

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Up to now resistance in *Candida* doesn't seem to be a real threat. In general, the situation in Austria is in concordance with globally reported data. In total, 33 resistant strains were found. Although a new center has been included in 2015 and a higher number of candidemia has been observed, the number of resistant strains is below the numbers of previous years. Only a small number of strains was resistant against azoles with itraconazole showing the majority of resistant strains.

Echinocandin resistance has been a rare phenomenon. Only a minor number has been identified as resistant in 2015. Only five resistant strains were observed, two isolates of *C. parapsilosis* and one *C. tropicalis* isolate were resistant against anidulafungin, two *C. albicans* isolates were resistant against micafungin. In contrast to previous years, when a high number of micafungin resistant strains were observed, only two micafungin resistant strains were found in 2015.

The full report can be found in the long version of the AURES 2015 from page 186 to page 208 ([AURES 2015](#)).

## Resistance report of the Austrian HIV Cohort Study Part 1: Transmission of drug-resistant HIV in Austria

An activity of the association "Austrian HIV Cohort Study "

### Authors/contact persons

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Dr.<sup>in</sup> Gisela Leierer

Univ.-Prof. Dr. Robert Zangerle

University Clinic of Dermatology and Venereology

### Prevalence of Transmitted Drug Resistance is Stabilising at a Low Rate in Austria

Strickner S.<sup>1</sup>, Leierer G.<sup>2</sup>, Rieger A.<sup>3</sup>, Steuer A.<sup>4</sup>, Sarcletti M.<sup>2</sup>, Geit M.<sup>5</sup>, Haas B.<sup>6</sup>, Taylor N.<sup>7</sup>, Kanatschnig M.<sup>8</sup>, Zangerle R.<sup>2</sup>, for the AHIVCOS Study Group

**Objective:** To determine the prevalence of transmitted drug resistance (TDR), temporal trends in resistance, and predictors for TDR.

**Method:** Newly diagnosed patients from 2001 to December 2015 from seven centres were analyzed. Mutations were judged as resistant according to Bennett et al. (WHO 2009 mutation list). For patients with acute or recent infection the year of infection was obtained by the date of primary HIV infection or the median point in time between negative and positive HIV test. For patients with chronic infection the rate of resistance was plotted against the year of the HIV diagnosis.

**Results:** Overall 2952 of 4732 patients had an amplifiable resistance test. The overall prevalence of TDR was 7.5% (220 of 2952 patients; 95% CI: 6.6%-8.5%). In the CASCADE-centers, the prevalence of NRTI resistance was 3.8% (3.1%-4.7%), the prevalence of NNRTI resistance was 2.4% (1.8%-3.1%), and the prevalence of PI resistance was 2.4% (1.8%-3.1%). The relative risk of TDR in men who have sex with men compared to heterosexual contacts was 1.6 (95% CI: 1.2-2.3). The prevalence rate of TDR in the 640 patients with acute/recent infection was 8.5% (41 of 481

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patients; 6.4%-11.4%). One patient (0.2%) showed TDR against 3 drug classes (K70R; K103N; L90M). The prevalence rate of TDR in the 2867 patients with chronic infection was 7.9% (132 of 1681 patients; 6.7%-9.2%).

Conclusions: The prevalence of TDR among newly diagnosed patients was found to be stabilizing. No difficult to treat cases of TDR has been observed.

**Conclusions:** The prevalence of TDR among newly diagnosed patients was found to be stabilizing. No difficult to treat cases of TDR has been observed.

The full report can be found in the long version of the AURES 2015 from page 209 to page<sup>1</sup> 219 ([AURES 2015](#)).

## Resistance report of the Austrian HIV Cohort Study part 2: Resistance development under antiretroviral therapy

An activity of the association "Austrian HIV Cohort Study "

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Dr.<sup>in</sup> Gisela Leierer

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### Prevalence of Development of Drug Resistance in HIV infected patients in Austria

Strickner S.<sup>1</sup>, Leierer G.<sup>2</sup>, Steuer A.<sup>3</sup>, Rieger A.<sup>4</sup>, Sarcletti M.<sup>2</sup>, Geit M.<sup>5</sup>, Haas B.<sup>6</sup>, Taylor N.<sup>7</sup>, Kanatschnig M.<sup>8</sup>, Zangerle R.<sup>2</sup>, for the AHIVCOS Study Group

**Objective:** To determine the prevalence of development of drug resistance, predictors and temporal trends in resistance.

**Method:** Patients who have ever been on antiretroviral therapy (ART) from seven centres were analyzed. Mutations were judged as resistant according to "2015 Update of the Drug Resistance Mutations in HIV-1" from the International Antiviral-Society-USA ([http://iasusa.org/resistance\\_mutations/mutations\\_figures.pdf](http://iasusa.org/resistance_mutations/mutations_figures.pdf)).

**Results:** Overall 4275 patients have ever received ART, 4257 of them currently. 1275 had a resistance test after ART (29.8%). The overall prevalence of development of drug resistance was 75.9% (968 of 1275 patients), the prevalence of NRTI resistance was 36.4%, the prevalence of NNRTI resistance was 28.2%, and the prevalence of PI resistance was 69.3%. The prevalence of 3-class-resistance was 18.4% (235 of 1275 patients). The risk factors for developing a 3-class-resistance were a CD4 nadir <50 (OR=3.4; 95% CI: 2.3-5.1), a CD4 nadir between 50 and 200 (OR=2.0; 95% CI: 1.4-2.9) and initial therapy before 1997 (OR=27.9; 95% CI: 18.5-42.1) as well as from 1997 to 2003 (OR=7.8; 95% CI: 5.1-12.0) and an age at ART-start <30 (OR=2.0; 95% CI: 1.04-3.7). The risk to develop a 3-class-resistance was lower in patients with a low viral load (for <400 copies/ml OR=0.4; 95% CI: 0.2-0.8) and in male (OR=0.5; 95% CI: 0.3-0.9) and female (OR=0.4; 95% CI: 0.2-0.9) patients infected through intravenous drug use.

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Conclusions: The overall prevalence of development of drug resistance is at a rather high level, while the prevalence of 3-class-resistance was found to be stabilizing at a low level. The risk for developing resistance is small in those who initiated therapy in recent years.

The full report can be found in the long version of the AURES 2015 from page 220 to page 238 ([AURES 2015](#)).

## Report of antibiotic resistance monitoring according to the commission implementing decision 2013/652/EU in Austria, 2015

### Authors/contact persons

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In accordance with the EU-Directive 2003/99/EC, the Federal Ministry of Health in cooperation with the Austrian Agency for Health and Food Safety (AGES) and officially designated veterinary practitioners conducted annual programs in order to monitor the prevalence and the antimicrobial resistance of certain zoonotic and indicator bacteria in different Austrian farm animal species. Since 2014, based on the Commission Implementing Decision (2013/652/EU) the member states had to monitor and report antimicrobial resistance in zoonotic and commensal bacteria isolated from samples of food producing animals and from food. In 2015, representative samples of slaughtered fattening pigs – each from a different holding – were investigated for indicator *E. coli*, *Salmonella* and enzyme-producing *E. coli* as well as different batches of fresh pork and beef from retail were investigated for enzyme-producing *E. coli*. The collected samples had to be sent to the AGES-laboratory within two days arriving at a temperature between 2–8°C. In the respective national reference laboratories the obtained isolates were specified or typed and tested for their susceptibility to a given number of antimicrobial substances applying epidemiological Cut-OFFs according to EUCAST.

Indicator *E. coli*-isolates from 163 fattening pigs were susceptibility tested. 48% of isolates from pigs showed no microbiological resistance. High resistance rates were found towards tetracycline (47%) and sulfonamides (23%), moderate resistance rates towards ampicillin (13%) and trimethoprim (10%). Resistance rates towards all other antimicrobials tested were below 5%. Three indicator *E. coli*-isolates were confirmed as ESBL-producing *E. coli*.

257 caecal samples from fattening pigs, 224 samples of fresh pork and 234 samples of fresh beef were examined for ESBL-/AmpC-producing *E. coli* using selective media. Putative ESBL- or AmpC-producing *E. coli* were identified in 134 (52.1%) caecal-samples, in 22 pork samples (9.8%) and seven beef samples (3.0%) and these were susceptibility tested. The detailed analyses revealed ESBL-producing *E. coli* in 124 samples (48.3%) from pigs, 19 samples (8.5%) from pork and seven samples (3.0%) from beef, whereas in 10 samples from fattening pigs, one sample from pork but any sample from beef AmpC-producing *E. coli* were identified.

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One isolate of indicator *E. coli* and one ESBL-producing *E. coli* showed resistance to colistin. The colistin resistance in the ESBL-producing *E. coli*-isolate was conveyed by the plasmid mediated, transferrable *mcr-1*-gene.

Carbapenemase-producing *E. coli* could neither be identified in 247 caecal samples of fattening pigs, 216 pork samples nor in 226 beef samples from retail.

In 2015, no *Salmonella* could be detected in any pig slaughter house in carcasses after dressing but before chilling in term of controlling process hygiene criteria; no susceptibility testing could be performed with any isolate of *Salmonella*.

The full report can be found in the long version of the AURES 2015 from page 239 to page 284 ([AURES 2015](#)).

## European Surveillance of Veterinary Antimicrobial Consumption (ESVAC)

An activity of AGES – Agency for Health and Food Safety  
Department data, statistics and risk assessment

### Authors/contact persons

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In 2015, the total sales of active ingredients in Austria for livestock equal 48.78 tons (t), a decrease of 9.1 % compared to 2014. The largest amount of veterinary antimicrobials was for systemic use (45.74 t, 93.8 %). Within the group for systematic use more than half were tetracyclines, followed by penicillins with extended spectrum, sulfonamides and macrolides.

Oral preparations – this group includes oral powders, oral solutions, tablets and oral paste – are with 39.54 tons (81.1 %) still the most used application form. Parenteral preparations are on second place with 5.44 tons (11.2 %), followed by premix with 2.42 tons (5.0 %).

The full report can be found in the long version of the AURES 2015 from page 285 to page 291 ([AURES 2015](#)).

## ESAC-Net – European Surveillance of Antimicrobial Consumption Network

National Reference Centre for Nosocomial Infections and Antibiotic Resistance

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The level of antimicrobial use expressed in prescriptions per 10,000 inhabitants remained last year the same as in 2014. Compared to other European countries, Austria shows a moderate use within the range of overall antibiotic consumption.

Until 2013 a continuous increase of the consumption of penicillins had been observed, mainly aminopenicillins with beta-lactase inhibitors. In 2014 the consumption was significantly decreasing (from 7.6 to 6.7 prescriptions per 10,000 inhabitants per day), but in 2015 the consumption was slightly increasing again to 6.8 prescriptions per 10,000 inhabitants per day).

The consumption of the preparations of the cephalosporin group has remained relatively stable during the last ten years. Since 2009 the use of third generation cephalosporins has steadily been decreasing. Since 2013 the consumption of third generation cephalosporins has notably decreased from 1.2 to 0.4 prescriptions per 10,000 inhabitants per day. Since 2002 the consumption of second generation cephalosporins has shown an ongoing increase (from 0.7 to 1.2 prescriptions per 10,000 inhabitants per day).

The consumption of tetracycline preparations, most notably of doxycycline, has been decreasing continuously for years in Austria. It is to be noted, however, that especially in that group the price is frequently lower than the prescription charge. For this reason, possibly not all prescriptions are included in the consumption data.

For the group of macrolides, lincosamides and streptogramins, consumption has been notably decreasing since 2013, with mainly macrolides being responsible for this downward trend (from 4.1 to 3.5 prescriptions per 10,000 inhabitants per day in 2015).

Until 2006 the consumption of sulfonamides with trimethoprim had continuously decreased, remaining stable with 0.3 prescriptions per 10,000 inhabitants per day until 2013. Since 2013, the consumption has slightly decreased to 0.2 prescriptions per 10,000 inhabitants per day. Also in this group the price is lower than the prescription charge, which is why possibly not all prescriptions are included in the consumption data.

The consumption of quinolones had notably increased until 2004, and has then remained stable in the last years. Since 2013 consumption decreased from 2.3 to 2.0 prescriptions per 10,000 inhabitants per day, with ciprofloxacin and moxifloxacin constituting the main portion of the fluoroquinolone consumption.

The full report can be found in the long version of the AURES 2015 from page 292 to page 306 ([AURES 2015](#)).

## Resistance report *Erwinia amylovora*

An activity of AGES –Austrian Agency for Health and Food Safety  
Sector Food security  
Institute of sustainable plant production

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Fire blight is caused by the plant pathogenic bacterium *Erwinia amylovora*. The use of streptomycin as a plant production agent constitutes one part of the Austrian strategy to combat this plant disease in fruit growing. In order to determine the prevalence of streptomycin resistant *E. amylovora* strains at an early stage, surveillance activities have been carried out since 2006. Up to date, all *E. amylovora* isolates from treated orchards have been tested as susceptible to streptomycin. The comparison of the distribution of minimum inhibitory concentrations between wild-type strains and test-strains did not reveal any shifting of the sensitivity range of the test isolates.

The full report can be found in the long version of the AURES 2015 from page 307 to page 314 ([AURES 2015](#)).

## OVERVIEW CONTRIBUTIONS, AUTHORS AND REVIEWERS

Table 2: Contribution summary, with authors and reviewers

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