

Resistance Report Austria AURES 2014

Summary



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The members of the editorial team of the full report "AURES 2014" can be found at [AURES 2014](#).

FOREWORD

The AURES – the report on antimicrobial resistance in Austria – has been published by the Federal Ministry of Health for the last ten years. We would like to thank all authors as without their efforts and expertise the collection, analysis and assessment of the data for the publication of the annual report would not have been possible.



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The continuous publication of the AURES 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 in the future.

With the publication of the summary of the AURES, there has been established for the Austrian population a simple access to information regarding antibiotic resistance. In this way, the importance of antimicrobial resistance in view of patient safety may be explained to a bigger audience. Like in the years before, further details may be accessed via the full version of the AURES.



Dr.ⁱⁿ Sabine Oberhauser, MAS
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 (Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH)
ART	Antiretroviral therapy (Antiretrovirale Therapie)
AT	Austria (Österreich)
BIOHAZ	Biological Hazards (biologische Gefahr/-en)
BMGF	Federal Ministry of Health and Women's Affairs (Bundesministerium für Gesundheit und Frauen)
CLSI	Clinical and Laboratory Standards Institute
EARS-Net	European Antimicrobial Resistance Surveillance Network
ECDC	European Centre for Disease Prevention and Control (Europäisches Zentrum für Seuchenbekämpfung)
EFSA	European Food Safety Authority (Europäische Behörde für Lebensmittelsicherheit)
ESAC-Net	European Surveillance of Antibiotic Consumption Network
ESBL	Extended spectrum beta-lactamase
ESVAC	European Surveillance of Veterinary Antimicrobial Consumption
EU	Europe/European (Europa, europäisch/-e)
EUCAST	European Committee on Antimicrobial Susceptibility Testing
HIV	Human immunodeficiency virus (Humane Immundefizienz-Virus)
MDR	Multidrugresistance
MIC (MHK)	Minimum inhibitory concentration (Minimale Hemm-Konzentration)
MRSA	Methicillin-resistant Staphylococcus aureus (Methicillin resistenter Staphylococcus aureus)
NNRTI	Non-nucleoside reverse transcriptase inhibitors (Nichtnukleosidische Reverse-Transkriptase-Inhibitoren)
NRTI	Nucleoside reverse transcriptase inhibitors (Nukleosidische Reverse-Transkriptase-Inhibitoren)
OIE	World Organization for Animal Health (Weltorganisation für Tiergesundheit)
QGV	Quality Poultry Association (Qualitätsgeflügelvereinigung)
STD	Sexual transmitted diseases (sexuell übertragbare Erkrankungen)
TB	Tuberculosis (Tuberkulose)
TDR-Tuberkulose	Totally drug-resistant tuberculosis
VRE	Vancomycin-resistant enterococci (Vancomycin resistente Enterokokken)
WHA	World Health Assambly (Welt gesundheitsversammlung)
WHO	World Health Organization (Weltgesundheitsorganisation)
XDR-Tuberkulose	Extensively drug-resistant tuberculosis

INTRODUCTION

The present summary of the AURES 2014 has resulted from the full version of the AURES 2014, 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 2014 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 2014.

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 already in treatment as well as with persons infected with these resistant viruses.

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 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 through 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 area 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) already 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].

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 Austrian-wide resistance surveillance.

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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 antimicrobial resistance within the scope of participation in the European Antimicrobial Resistance Surveillance Network (EARS-Net)

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The Austrian EARS-Net data represent a data base illustrating currently 142 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 with the antibiotic substances selected. As it concerns human antimicrobial susceptibility testing methodology, Austrian microbiology laboratories switched from CLSI to EUCAST consecutively in 2011, a process that was successfully completed in 2012. The Austrian results may be summarised for 2014 as follows:

In the case of *S. pneumoniae* there was again a very positive situation for penicillin. Only 7 invasive isolates proved to be not resistant to penicillin in the year 2014 (1.9%). According to EUCAST, different threshold values are used subject to clinical indication and intended medication. Isolates with MIC > 2 mg/l would be regarded as "highly resistant". In 2014 only one of them has been detected in Austria (0.2%). The situation of the resistance rate in regard to macrolides, which significantly increased to 17% in 2012, shows a notable decrease to 10% in 2013 and remained stable in 2014 (10.5%). The three most frequent serotypes of invasive isolates in the year 2014 were 3, 7F and 14. With children younger ≤ 2 years, type 15A was the most frequent one. In the age group of 60+, the most frequent serotypes were 3, 7F and 14.

The **MRSA rate** showed an upward trend until 2013 (9.1%) and decreased to 7.8% in 2014. No reduced sensitivity to (resistance against) vancomycin was also detected in the year 2014 in any invasive *S. aureus* isolate.

In the case of *E. coli*, the resistance rate of aminopenicillins (50%) has remained unchanged since 2010. In comparison with 2013 the resistance rates of fluoroquinolones (from 22.0% to 19.8%), 3rd generation cephalosporins (from 9.9% to 9.4%) and aminoglycosides (from 7.3% to 7.2%) were decreasing. In 2014 the rate of isolates especially tested for ESBL (approx. 1/3 of all) was 24.4%.

With *enterococci* no change of the resistance rates against aminopenicillin and aminoglycosides in comparison with the years before was detected. The VRE rate was still below 1% with *E. faecalis* and was 4.4% with *E. faecium*.

In the case of *K. pneumoniae* the resistance rates of fluoroquinolones and 3rd generation cephalosporins showed a notable declining trend, whereas the resistance rate of aminoglycosides

has remained stable since 2010. In comparison with 2013 the resistance rates of fluoroquinolones (from 15.8% to 10.4%) and 3rd generation cephalosporins (from 10.7% to 8.2%) were significantly decreasing. The resistance rate of aminoglycosides increased slightly from 5.3% to 5.5%. In 2014 the rate of isolates especially tested for ESBL (approx. 1/3 of all) was 16.8%.

Carbapenemase producing isolates: In 2014 1 *E. coli* invasive isolate and 7 *K. pneumonia* invasive isolates were isolated, which produced carbapenemase.

With *P. aeruginosa* a decrease of the resistance rates in connection with the following substance classes was recorded in 2014: fluoroquinolones 10.9% (-4.3%), piperacillin/tazobactam 11.8% (-1.5%), ceftazidime 8.7% (-0.8%), and aminoglycosides 6.6% (-0.8), with the exception of the resistance for carbapenems increasing to 12.7% (+0.6%).

Acinetobacter sp. showed resistance rates against aminoglycosides for 8.9%, against fluoroquinolones for 5.3% and against carbapenems for 6.4%. Only 79 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, showing a slightly declining trend concerning many pathogen/substance class combinations. Compared to other

The full report can be found in the long version of the AURES 2014 from page 16 to page 87 ([AURES 2014](#)).

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 2010 to 2014. 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 2014:

1. **Group A streptococci** (n=2,387) from the lower and upper respiratory tract demonstrated lower resistance rates for macrolides compared to **pneumococci** (n=1,379) in both out- and in-patient settings (5.4% / 8.7% versus 14.8% / 17.6%). Pooled resistance rate for macrolides in pneumococci is above resistance of invasive *pneumococci* of EARS-net AT data: 16.1 % versus 10%. Resistance rates in *H. influenza* (n=2,670) in hospitals and the community are as follows: aminopenicillins 25.4% and 22.5%; aminopen. + betalactamaseinhibitor 6.0% and 7.5%, fluoroquinolones 0.1% and 0.2% respectively.
2. **ESBL-producing *E. coli*** (n=2,018) from urine samples remain stable with 7.2% over the last two years and do not differ whether gained from samples in (6.8%) or outside (7.6%) the hospital. Fluoroquinolones proved to have high resistance rates in all *E. coli* isolates (16.5%, n=44,880) and very high in ESBL-positive *E. coli* (74.7%) and sulfamethoxazol/trimethoprim demonstrated similar results (24.0% vs 69.7%).

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3. ***Klebsiella pneumoniae*** (n=10,325) from urine samples showed a resistance rate against 3rd generation cephalosporins of 6.7% and a carbapenem resistance of 0.8% in 2014.
 4. ***Staphylococcus aureus*/MRSA** (n=21,974/1,594): hospital associated MRSA rate was 9.4%, in out-patients the MRSA rate was 4.2%. There were no isolates identified resistant to linezolid or vancomycin.
 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=908): Carbapenems showed a rate of 17.4% and Ceftazidim 18.2%. Ear-derived isolates (as a surrogate for external otitis; n=1,281) showed a stable rate of 3.5 for aminoglycosides.

The full report can be found in the long version of the AURES 2014 from page 88 to page 101 ([AURES 2014](#)).

Resistance report *Neisseria meningitidis*

An activity of the Austrian Agency for Health and Food Safety at the Institute for Medical Microbiology and Hygiene Graz

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In 2014, the National Reference Centre for Meningococci received 49 reculturable isolates. Of these isolates, 26 were from invasive infections. The serogroups of all isolates are distributed in the following manner: 45% serogroup B, 25% polyagglutinable isolates, 12% serogroup Y, 8% serogroup C, 4% serogroup W, 4% serogroup Z and 2% serogroup X. According to EUCAST, six isolates were resistant to penicillin, and further 15 isolates showed decreased resistance to penicillin. One isolate was resistant against rifampicin. None of the strains sent to the Reference Centre in 2014 were resistant or had decreased sensitivity to ceftriaxone or ciprofloxacin.

The full report can be found in the long version of the AURES 2014 from page 102 to page 108 ([AURES 2014](#)).

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 2014, a total of 6,520 cases of campylobacteriosis was reported in Austria (data source: Statistics for notifiable infectious diseases, final annual report as of March 31, 2015). Again, a high to very high tetracycline and fluoroquinolone resistance rate, respectively, were found in *C. jejuni* and *C. coli* isolates of human and poultry meat (broiler and turkey) origin. In contrast to previous years, resistance to fluoroquinolones again considerably increased being as high as 71% (*C. jejuni*) and 80.4% (*C. coli*) in human isolates. In broiler meat fluoroquinolone resistance was found to be 71.6% in *C. jejuni* and 88.9% in *C. coli*. Resistance towards erythromycin remained low and was primarily recorded in *C. coli*. Resistance to fluoroquinolones is most prominent in *Campylobacter spp.*, followed by resistance to ampicillin and tetracyclines. Resistance to three or more antimicrobial classes is primarily observed in *C. coli*.

The full report can be found in the long version of the AURES 2014 from page 109 to page 122 ([AURES 2014](#)).

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 2014, the number of primary human isolates sent to the National Reference Centre for Salmonella increased by 14.8% as compared to 2013. This increase was mainly due to two nationwide outbreaks (*S. Stanley*, spring 2014; *S. Enteritidis* PT14b, summer/autumn 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*, *S. Infantis* 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 2014 from page 123 to page 138 ([AURES 2014](#)).

Resistance report *Shigella*

Data from the human sector

An activity of the National Reference Centre for *Shigella*

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In Austria 75 cases of shigellosis were reported to the health authorities in 2014. In the same year, a total of 76 *Shigella* isolates were received by the National Reference Centre for *Shigella*. The incidence rate was 0.87 / 100,000; in 2013 an incidence of 0.82 / 100,000 inhabitants was registered. The predominant species was *Shigella sonnei* accounting for 76.3% of all isolates. Resistance testing revealed one strain sensitive against all substances tested. We detected resistance against ciprofloxacin in 16 strains and resistance to nalidixic acid in 22 isolates. 6 *Shigella* strains were ESBL positive (7.9%).

The full report can be found in the long version of the AURES 2014 from page 139 to page 147 ([AURES 2014](#)).

Resistance report *Yersinia*

Data from the human sector

An activity of the National Reference Centre for *Yersinia*

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In 2014, the Austrian National Reference Centre for *Yersinia* examined 173 isolates of *Yersinia* spp., of which 160 were of human origin, and 13 from food samples. Of the 160 human isolates, 113 were pathogenic, 47 were non-pathogenic isolates. Among the pathogenic isolates 111 belonged to *Yersinia enterocolitica* and two strains to *Y. pseudotuberculosis*. In 2014, the incidence rate for cases confirmed by the National Reference Centre was 1.3 per 100 000 inhabitants. In vitro susceptibility testing revealed no abnormalities – 11 *Y. enterocolitica* isolates showed resistance to amoxicillin/clavulanic acid.

The full report can be found in the long version of the AURES 2014 from page 148 to page 153 ([AURES 2014](#)).

Resistance report Tuberculosis 2014

Data from the human sector

An activity of the National Reference Centre for tuberculosis

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In 2014, a total of 20 cases of MDR-tuberculosis (including 2 cases of XDR-tuberculosis) none of which were Austrian citizens, were confirmed at the national reference centre.

The full report can be found in the long version of the AURES 2014 from page 154 to page 163 ([AURES 2014](#)).

Resistance report *Neisseria gonorrhoeae*

Data from the human sector

An activity of the National Reference Centre for gonococcal

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Increasing spread of antibiotic resistant *Neisseria gonorrhoeae* poses a serious threat to the control of Gonorrhoeae. In 2013 AGES was commissioned in a collaborative project between AGES and the STD-Clinic of Vienna for quality assurance study to validate *Neisseria gonorrhoeae* testing including antimicrobial susceptibility testing among sex workers. Antimicrobial susceptibility testing was carried out among 106 isolates obtained.

All isolates showed sensitivity to Cefixim and one of the 106 (1%) was Ceftriaxon resistant. Isolates identified as resistant using E-tests included 67% (71/106) of isolates to Ciprofloxacin, 32% (34/106) to Benzylpenicillin and 8% (9/106) to Azithromycin.

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 between March 2014 and August 2015 was comparable to the European Trend. Fortunately all isolates were Cefixim sensitive and one was ceftriaxone resistant.

The full report can be found in the long version of the AURES 2014 from page 164 to page 172 ([AURES 2014](#)).

Resistance report Yeasts

Data from the human sector

An activity of the National Reference Centre for Yeasts

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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. *C. glabrata* shows the highest rate of dose dependent susceptible or resistant isolates to azoles. With the exception of *C. krusei* other *Candida* species were nearly always susceptible. Echinocandin resistance has been a rare phenomenon. Only a minor number of *C. albicans* strains have been identified as resistant. As was the case in 2012 und 2013 a higher number of resistant *C. glabrata* strains were detected. In addition, as last year and the year before an unusual high number of micafungin-resistant strains was observed. As these strains were susceptible to anidulafungin, which may be used as an indicator for all echinocandines it remains to be seen if the breakpoint's concentration established by EUCAST is too low or the method used for susceptibility testing is not suitable for micafungin. However, this question can only be answered using specific molecular methods.

The full report can be found in the long version of the AURES 2014 from page 173 to page 194 ([AURES 2014](#)).

Resistance report Mould

Data from the human sector

An activity of the National Reference Centre for Mould

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Invasive mould diseases have become increasingly common as opportunistic infections. *Candida* and *Aspergillus species* are the most important pathogens. 204 moulds out of sterile body sites and bronchoalveolar lavages were collected from the Medical University Vienna, Department of Laboratory Medicine, the Medical University Innsbruck, Division of Hygiene and Medical Microbiology and the analyse BioLab GmbH of Linz in 2014. *Aspergillus species*, which were

isolated in 74% (151/204), are still the leading causative agents of invasive mould diseases; thereof 79% (120/151) belong to the *Aspergillus fumigatus complex*.

All the tested *Aspergillus* isolates were susceptible to the recommended first line treatment of voriconazole. Apart from *Aspergillus terreus* complex isolates, which exhibit intrinsic resistance to amphotericin B, 9% (13/151) of *Aspergillus* isolates showed in vitro resistance to amphotericin B, above the mentioned all of the *Aspergillus flavus* complex isolates (1/8 isolate intermediate susceptible, 7/8 isolates resistant); 8% represented in vitro resistance to posaconazole and 5% to itraconazole, respectively.

Among the non-aspergillus isolates elevated MIC's above 1µg/ml for amphotericin B, above 0,125µg/ml for posaconazole and above 1µg/ml for voriconazole were detected in 40% (21/53), 38% (20/53) and 11% (6/53), respectively. It must be pointed out that clinical breakpoints are only available for *Aspergillus species* and interpretation of susceptibility testing of non aspergillus moulds is based on *Aspergillus* - specific data.

The full report can be found in the long version of the AURES 2014 from page 195 to page 201 ([AURES 2014](#)).

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 "

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

Strickner S.¹, Leierer G.², Rieger A.³, Steuer A.⁴, Sarcletti M.², Geit M.⁵, Haas B.⁶, Taylor N.⁷, Kanatschnig M.⁸, Zangerle R.², 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 2014 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 2817 of 4420 patients had an amplifiable resistance test. The overall prevalence of TDR was 7.4% (208 of 2817 patients; 95% CI: 6.5%-8.4%). In the CASCADE-centers, the prevalence of NRTI resistance was 3.6% (2.9%-4.5%), the prevalence of NNRTI resistance was 2.2% (1.7%-3.0%), and the prevalence of PI resistance was 2.3% (1.7%-3.0%). The relative risk of TDR in men

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who have sex with men compared to heterosexual contacts was 1.6 (95% CI: 1.1-2.2). Younger patients (<33 or <34 years, respectively) had a higher relative risk of TDR (1.4; 95% CI: 1.1-1.9) than older patients. The prevalence rate of TDR in the 622 patients with acute/recent infection was 8.3% (39 of 470 patients; 6.1%-11.1%). One patient (0.2%) showed TDR against 3 drug classes (K70R; K103N; L90M). The prevalence rate of TDR in the 2625 patients with chronic infection was 7.5% (118 of 1574 patients; 6.3%-8.9%).

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 2014 from page 202 to page¹ 212 ([AURES 2014](#)).

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

Strickner S.¹, Leierer G.², Steuer A.³, Rieger A.⁴, Sarcletti M.², Geit M.⁵, Haas B.⁶, Taylor N.⁷, Kanatschnig M.⁸, Zangerle R.², 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 "2014 Update of the Drug Resistance Mutations in HIV-1" from the International Antiviral-Society-USA (http://iasusa.org/resistance_mutations/mutations_figures.pdf).

Results: Overall 4181 patients have ever received ART, 4073 of them currently. 1310 had a resistance test after ART (31.3%). The overall prevalence of development of drug resistance was 76.6% (1003 of 1310 patients), the prevalence of NRTI resistance was 37.6%, the prevalence of NNRTI resistance was 29.2%, and the prevalence of PI resistance was 70.3%. The prevalence of 3-class-resistance was 19.5% (255 of 1310 patients). The risk factors for developing a 3-class-resistance were a CD4 nadir <50 (OR=3.8; 95% CI: 2.6-5.5), a CD4 nadir between 50 and 200 (OR=2.1; 95% CI: 1.4-3.0) and initial therapy before 1997 (OR=23.8; 95% CI: 16.0-35.4) as well as from 1997 to 2003 (OR=7.6; 95% CI: 5.1-11.5) and an age at ART-start <30 (OR=2.1; 95% CI: 1.1-3.9). The risk to develop a 3-class-resistance was lower in patients with a low viral load (for <400 copies/ml OR=0.3; 95% CI: 0.1-0.6) and in male (OR=0.5; 95% CI: 0.3-0.8) and female (OR=0.5; 95% CI: 0.3-0.95) 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 2014 from page 213 to page 231 ([AURES 2014](#)).

Antibiotic resistance for selected zoonotic and indicator bacteria

Data from the veterinary sector, 2014

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Project

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BMGF – Bundesministerium für Gesundheit und Frauen
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Sample monitoring for sampling at chicken slaughterhouses

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Sampling

Done in 6 selected slaughterhouses in Austria by appointed veterinary practitioners and public veterinary officers

Primary isolations and differentiations

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Data evaluation, analysis and reporting

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In accordance with the EU-Directive 2003/99/EC, the Federal Ministry of Health and Women's Affairs 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 2014, the flocks of broilers and turkeys had to be analysed for salmonella, *Campylobacter (C.) jejuni*, and commensal *E. coli*, the flocks of laying hens as well as carcasses of broilers and turkeys had to be tested only for salmonella, using EU-wide harmonised methods. In the respective national reference laboratories the obtained isolates were specified or typed and tested for their antimicrobial susceptibility.

In Austria, randomized, representative samples of slaughtered broiler and turkey flocks were investigated for *C. jejuni* and *E. coli*. *C. jejuni* isolates from 193 broiler flocks and 73 turkey flocks were susceptibility tested. 19.7% of chicken isolates and 20.6% of turkey isolates showed susceptibility to all nine antimicrobials tested. Isolates from both poultry species were similar in resistance to different antimicrobials, although resistance rates in isolates from broilers were higher to quinolones (ciprofloxacin: 71.5% versus 63.0%, and nalidixic acid: 67.9% versus 60.3%), and resistance rates in isolates from turkeys were higher to ampicillin (49.3% versus 35.8%) and to tetracycline (35.6% versus 23.8%). Since 2004, a significant increasing tendency in resistance can be found in isolates from broilers to ciprofloxacin, nalidixic acid and ampicillin, since 2010 (five years tendency) only to both quinolones. In 2014, turkey isolates were tested for the first time, therefore no tendency could be analysed.

Commensal *E. coli* from 176 broiler flocks and 125 turkey flocks were susceptibility tested against 14 antimicrobial substances. 21.0% of broiler isolates and 30.0% of turkey isolates were fully susceptible to all tested antimicrobials. Isolates from chicken showed higher resistance rates to ciprofloxacin (60% versus 28%), nalidixic acid (57% versus 18%), sulfamethoxazole (33% versus 19%), and trimethoprim (23% versus 12%) compared with turkey isolates, although higher

resistance rates to ampicillin (48% versus 28%) and to tetracycline (41% versus 29%) were detected in turkey isolates. Resistance rates to the other antimicrobials tested were similar in isolates from both poultry species. Since 2010, resistance rates to quinolones in chicken isolates significantly decreased a tendency that also can be observed to the substance sulfamethoxazole since 2012. In 2014, turkey isolates were analysed for the first time.

All commercially produced flocks of layers, broilers, and turkeys are controlled for salmonella. Forty-five *Salmonella* isolates were obtained from layers, 113 from broilers, and 14 from turkeys. 55.6% of isolates from layers were fully susceptible to 14 antimicrobial substances tested, 29.2% of isolates from broilers and 7.1% of isolates from turkeys. The observed increase of resistance rates in all poultry-isolates corresponded with the occurrence of certain serotypes like *S. Infantis*, *S. Typhimurium* including the monophasic variant, *S. Mbandaka*, *S. Saintpaul*, and *S. Stanley* and the decrease of fully sensitive serotypes like *S. Montevideo*. Significant tendencies in resistance rates of *Salmonella spp.* are difficult to determine because resistances are often linked to certain serotypes.

The full report can be found in the long version of the AURES 2014 from page 232 to page 325 ([AURES 2014](#)).

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 this study data on sales of veterinary antimicrobials in 2013 in Austria were collected in a standardized manner according to the recommendations of the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) project.

In 2013, the total sales of active ingredients in Austria for cattle, pigs, poultry, sheep and goats equals 54.98 tons (t), an increase of 3.3 % compared to 2012. The largest amount of the veterinary antimicrobials sold were antimicrobials for systemic use (52.40 t, 95.3 %). Oral preparations – this group includes oral powders, oral solutions, tablets and oral pasta – are with 45.28 tons (82.4 %) still the most used application form. Parenteral preparations are on second place with 5,26 tons (9.6 %), followed by premix with 2,91 tons (5.3 %). Within the group for systematic use more than half (58.4 %) were tetracyclines, followed by penicillins with extended spectrum, sulfonamides and macrolides.

The full report can be found in the long version of the AURES 2014 from page 326 to page 332 ([AURES 2014](#)).

ESAC-Net – European Surveillance of Antimicrobial Consumption Network

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Since 1998 the level of antimicrobial use expressed in prescriptions per 10.000 inhabitants shows a slightly decreasing trend. As compared to the other European countries, Austria shows a moderate use of the overall antibiotic consumption.

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

The consumption of cephalosporins has remained stable within the last ten years. Since 2009 the use of third generation cephalosporins has steadily decreased. In relation to 2013 the consumption of third generation cephalosporins notably decreased from 1.2 to 0.5 prescriptions per 10,000 inhabitants per day. Since 2002 the consumption of second generation cephalosporins shows an ongoing increase (from 0.7 to 1.2 prescriptions per 10,000 inhabitants per day).

The consumption of tetracyclines, most notably of doxycyclines, has been decreasing continuously for years. Attention shall be paid to the fact that especially in that group the price is lower than the prescription charge. Therefore, eventually not all prescriptions are included in the consumption data.

In relation to 2013 there was a notably decrease of the consumption of macrolides, lincosamides and streptogramins. Mainly macrolides are responsible for the decrease (from 4.1 to 3.5 prescriptions per 10,000 inhabitants per day in 2014).

Until 2006 the consumption of sulphonamides with trimethoprim has continuously decreased and remained stable until 2013 with 0.3 prescriptions per 10,000 inhabitants per day. In 2014 the consumption has slightly decreased to 0.2 prescriptions per 10,000 inhabitants per day. Also in this group the price is below the prescription charge, and eventually not all prescriptions are included in the consumption data.

The consumption of quinolones had notably increased until 2004, and has then remained stable. In relation to 2013 consumption decreased from 2.2 to 2.0 prescriptions per 10,000 inhabitants per day with ciprofloxacin and moxifloxacin constituting the main part.

The full report can be found in the long version of the AURES 2014 from page 333 to page 347 ([AURES 2014](#)).

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 2014 from page 348 to page 355 ([AURES 2014](#)).

OVERVIEW CONTRIBUTIONS, AUTHORS AND REVIEWERS

Table 2: Contribution summary, with authors and reviewers

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