

# ESAC – European Surveillance of Antimicrobial Consumption

## **Final Management Report** **2009-2010**

Grant Agreement 2007/001  
Specific Agreement ECD.1702





## TABLE OF CONTENTS

<b>LIST OF ABBREVIATIONS AND RELATED PROJECTS .....</b>	<b>5</b>
<b>SUMMARY FINAL MANAGEMENT REPORT 2010 .....</b>	<b>7</b>
<b>1. ESTABLISHMENT OF THE ESAC NETWORK.....</b>	<b>9</b>
ESAC Organisation chart anno 2010 .....	9
ESAC Management Team .....	10
ESAC National Networks .....	12
ESAC Advisory Board Members .....	23
ESAC Audit Committee Members.....	24
<b>2. OBJECTIVES AND METHODOLOGICAL APPROACH .....</b>	<b>25</b>
Aims and Objectives .....	25
Data collection protocol version 2009 .....	25
Data collection protocol version 2010 .....	27
Collect Manager and Dataset Manager .....	34
<b>3. RESULTS OF THE 2008 DATA COLLECTION .....</b>	<b>35</b>
Ambulatory care .....	35
Hospital care .....	39
Antimycotic and antifungal use in Europe .....	41
Antiviral use in Europe.....	42
Antituberculosis use in Europe .....	44
Regional data in Europe .....	45
<b>4. PREPARATION OF THE SCIENTIFIC ADVISORY BOARD .....</b>	<b>47</b>
<b>5. DISSEMINATION ACTIVITIES .....</b>	<b>49</b>
Papers published in peer reviewed journals (see Annex V).....	49
Abstracts accepted for oral presentation (see Annex VI) .....	49
Abstracts accepted for poster presentation (see Annex VII).....	50
Abstracts accepted for publication only .....	52
Website .....	52
Interactive database.....	55
Newsletters (see Annex VIII).....	55
<b>6. IN-DEPTH ANALYSES .....</b>	<b>57</b>
Ambulatory Care subproject .....	57
Hospital Care subproject .....	59
Nursing Homes subproject.....	62
Socio-Economics subproject .....	67
<b>7. MANPOWER FOR THE EXECUTION OF ACTIVITIES .....</b>	<b>75</b>
<b>8. LIST OF DELIVERABLES YEAR 3 .....</b>	<b>77</b>
<b>9. LIST OF MILESTONES YEAR 3.....</b>	<b>79</b>
<b>10. MINUTES OF THE MEETINGS .....</b>	<b>81</b>
Minutes of the Scientific Advisory Board, Paris, France, Nov 27, 2009 .....	81
Minutes of the Audit Committee Meeting, May 18, 2010 .....	89
Minutes of the Annual ESAC Meeting, Stockholm, Sweden, May 27-28, 2010 .....	93
Minutes of the Management Team Meetings (2x/month) .....	102

<b>ANNEX I: AVAILABILITY OF DATA FOR PROTOCOL A .....</b>	<b>121</b>
<b>ANNEX II: LIST OF HOSPITAL CARE COUNTRIES PPS &amp; LS 2009.....</b>	<b>123</b>
<b>ANNEX III: LIST OF NURSING HOMES COUNTRIES 2<sup>ND</sup> PPS 2009 .....</b>	<b>127</b>
<b>ANNEX IV: INVENTORY OF SOCIO-ECONOMIC DETERMINANTS .....</b>	<b>129</b>
<b>ANNEX V: ABSTRACTS OF PAPERS IN PEER-REVIEWED JOURNALS .....</b>	<b>135</b>
<b>ANNEX VI: ABSTRACTS ACCEPTED FOR ORAL PRESENTATION .....</b>	<b>139</b>
<b>ANNEX VII: ABSTRACTS ACCEPTED FOR POSTER PRESENTATION.....</b>	<b>145</b>
<b>ANNEX VIII: ESAC NEWSLETTERS.....</b>	<b>153</b>

## **LIST OF ABBREVIATIONS AND RELATED PROJECTS**

ABS International	Antibiotic Strategies International
AB	Antibiotic
AC	Ambulatory Care
AMU	Antimicrobial Use
ATC	Anatomical Therapeutic Chemical
BAPCOC	Belgian Antibiotic Policy Coordination Committee
BURDEN	Burden of Resistance and Disease in European Nations
CHAMP	Changing behaviour of Health care professionals and the general public towards a More Prudent use of antimicrobial agents
DDD	Defined Daily Dose
DID	Defined Daily Doses per 1000 inhabitants per day
DPP	DDD per package
DRG	Disease related groups
EARSS	European Antimicrobial Resistance Surveillance System
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EFTA	European Free Trade Association
ESAC	European Surveillance of Antimicrobial Consumption
ESCMID	European Society of Clinical Microbiology and Infectious Diseases
ESF	European Science Foundation
EuroDURG	European Drug Utilisation Research Group
GP	General Practitioner
GRACE	Genomics to combat Resistance against Antibiotics in Community-acquired LRTI in Europe
GRIN	General Practice Respiratory Infections Network
HC	Hospital Care
ICD	International Statistical Classification of Diseases and Related Health Problems
ICPC	International Classification of Primary Care
IPH	Institute of Public Health Brussels
IPSE	Improving Patient Safety in Europe
LNR	Lead National Representative
LTC	Long Term Care Facility
MOSAR	Mastering Hospital Antimicrobial Resistance and its spread into the community
MS	Member State
MT	Management Team
NH	Nursing Homes
NN	National Network
NR	National Representative
PID	Packages per 1000 inhabitants per day
PPS	Point Prevalence Survey
RoA	Route of Administration
SAR	Self-Medication with Antibiotics and Resistance Levels in Europe
TB	Tuberculosis
TC	Total Care
WHO	World Health Organisation



## **SUMMARY FINAL MANAGEMENT REPORT 2010**

ESAC (European Surveillance of Antimicrobial Consumption) is an international network of national surveillance systems, collecting comparable and reliable antibiotic use data granted by ECDC (European Centre for Disease Prevention and Control; Grant Agreement GRANT/2007/001, Specific Agreement ECD.1018).

ESAC aims to maintain a continuous, comprehensive and comparable (using ATC/DDD classification) database on antimicrobial consumption for all EU Member States, EU candidate countries and European Economic Area – European Free Trade Association (EEA-EFTA) countries, ensuring high standards of data collection, collation and validation (using national registers) in a timely fashion. ESAC aims to improve and expand the scope of the database on consumption data in consultation with ECDC. Additionally, the project aims to deepen the knowledge of antibiotic consumption by focusing on specific consumption groups and/or patterns in collaboration with those countries where the appropriate data are available.

The overall aim of the project is to consolidate the continuous collection of comprehensive antimicrobial consumption data, from ambulatory and hospital care, from the 27 EU Member States, 3 EEA/EFTA countries (Iceland, Norway and Switzerland), 3 candidate countries (Croatia, Former Yugoslavian Republic of Macedonia and Turkey) and 2 other countries (Russian Federation and Israel).

Delivery by the countries of the 2008 data has started in October 2009 and has been round up. A total of 31 countries have submitted 2008 data of which 6 countries have also included previously missing and/or updated data for the years 2006 and 2007.

The ESAC final management report 2009-2010 provides an overview of the aims and objectives as well as the methodology used in ESAC, including the previously developed Collect Manager and Dataset Manager for the collection of the core data. The updated ESAC Network is presented, including the Management Team, the National Networks, Scientific Advisory Board and Audit Committee. Also the preparation of the Scientific Advisory Board meeting held in November is highlighted.

The dissemination activities, such as papers published in peer reviewed journals, abstracts accepted for presentation, the updated ESAC website and the 2009-2010 editions of the newsletter are discussed in detail.

The final management report 2009-2010 contains a summary of the current status of the Ambulatory Care, Hospital Care, Nursing Homes and the Socio-economics subprojects. The data availability for protocol A & B for Ambulatory Care, the list of Hospital Care countries that participated in the PPS 2009 and the LS 2009, the list of nursing homes participating in the second PPS 2009, and the inventory of socio-economic determinants are presented in Annexes I, II, III, and IV respectively.

An overview of the manpower which was needed to execute all activities performed during the third year is provided.

In the list of deliverables and the list of milestones it is clearly marked which DLs and MSs have been met. For those that are delayed an explanation and a new deadline is provided.

The minutes of the ESAC meetings, including the third Scientific Advisory Board meeting, the Audit Committee meeting, the ESAC annual meeting, and the Management meetings held during the third year are presented.

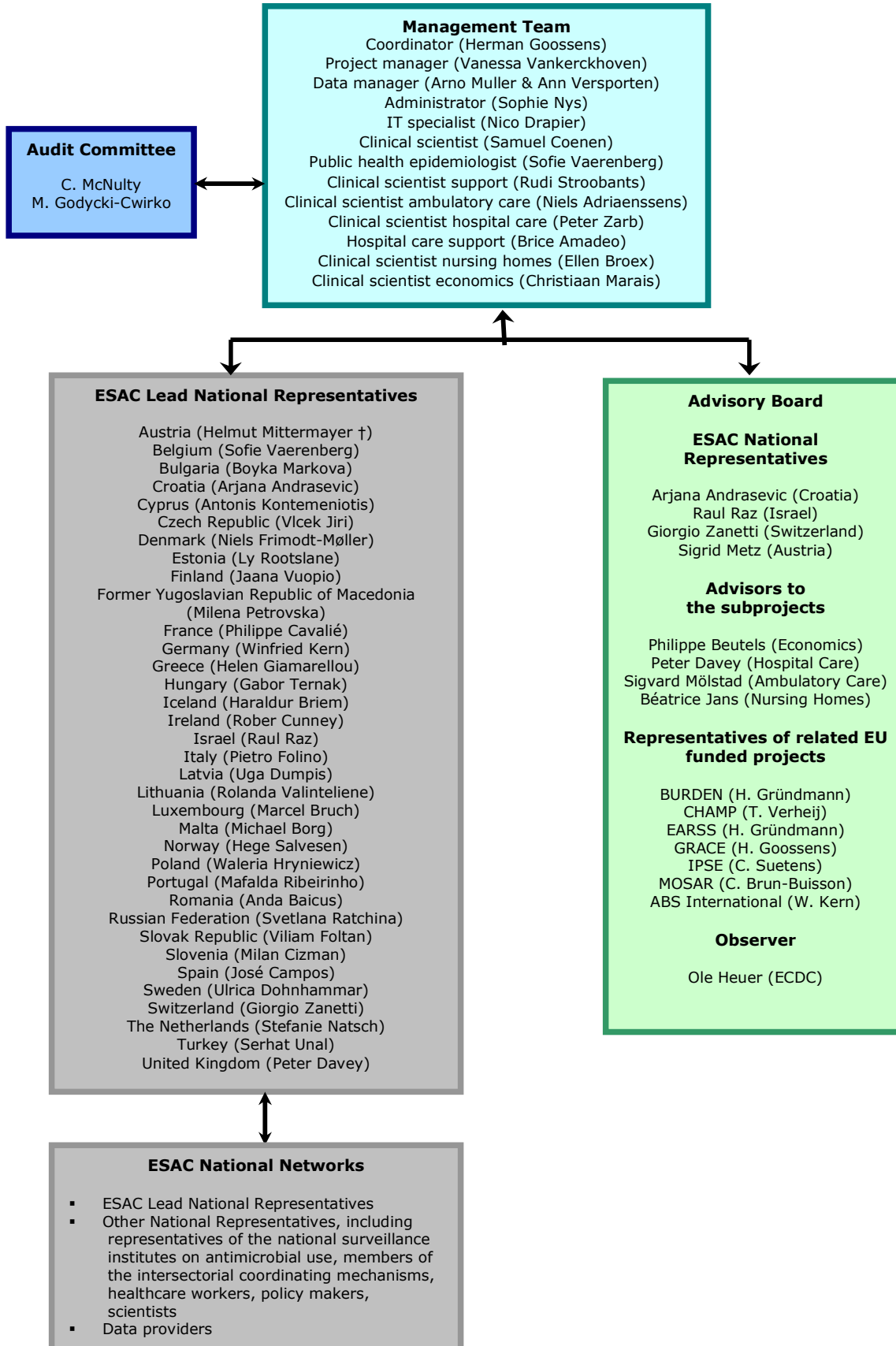
Finally, the abstracts of the papers and those accepted for oral and poster presentation have also been listed in Annexes V, VI, and VII, respectively. In Annex VII the 2009-2010 editions of the ESAC newsletter are presented.

- Summary -



## 1. ESTABLISHMENT OF THE ESAC NETWORK

### ESAC Organisation chart anno 2010



A multidisciplinary Management Team (MT) was established at the University of Antwerp, Belgium, but also has members in Brussels, the UK and Slovenia. The MT consists of a project coordinator, a project manager, a communication manager, an administrator, a public health epidemiologist, a clinical scientist, and thus combines expertises such as in information technology, data management, microbiology, infectious diseases, epidemiology, ambulatory care medicine, hospital care medicine, pharmacology, and health economics. The MT ensures day-to-day management and monitoring of the network activities. Each of the participating was asked to establish their own National Network (NN) consisting of a Lead National Representative (LNR) who coordinates the NN, other National Representatives and Data providers and importantly relevant experts in the field of antimicrobial consumption. An Advisory Board was established which (i) provides scientific support to the MT and (ii) liaises with ECDC as well as EU funded projects on antimicrobial use and resistance. Next to an Advisory Board, an Audit Committee was established which monitors the progress of the project and helps resolve problems.

### ESAC Management Team

<b>FUNCTION</b>	<b>NAME</b>	<b>E-MAIL</b>
<b>Project Coordinator</b>	Herman Goossens	herman.goossens@uza.be
<b>Project Manager</b>	Vanessa Vankerckhoven	vanessa.vankerckhoven@ua.ac.be
<b>Data Manager</b>	Arno Muller	arno.muller@ua.ac.be
<b>Data Manager</b>	Ann Versporten	ann.versporten@ua.ac.be
<b>Administrator</b>	Sophie Nys	sophie.nys@ua.ac.be
<b>IT specialist</b>	Nico Drapier	nico.drapier@ua.ac.be
<b>Clinical Scientist</b>	Samuel Coenen	samuel.coenen@ua.ac.be
<b>Public Health Epidemiologist</b>	Sofie Vaerenberg <sup>a</sup>	Sofie.vaerenberg@wiv-isp.be
<b>Clinical scientist support</b>	Rudi Stroobants	rudi.stroobants@ua.ac.be
<b>Clinical scientist Ambulatory Care</b>	Niels Adriaenssens	niels.adriaenssens@ua.ac.be
<b>Clinical scientist Hospital Care</b>	Peter Zarb <sup>b</sup>	peter.zarb@ua.ac.be
<b>Hospital Care support</b>	Brice Amadeo <sup>c</sup>	brice.amadeo@gmail.com
<b>Clinical scientist Nursing Homes</b>	Ellen Broex <sup>a</sup>	ellen.broex@wiv-isp.be
<b>Clinical scientist Socio-Economics</b>	Christiaan Marais	christiaan.marais@ua.ac.be

**ADDRESSES:**

ESAC – Laboratory of Microbiology, University of Antwerp, Universiteitsplein 1, B-2610 Wilrijk-Antwerpen, Belgium /  
Phone +32-3-820 27 50 – Fax +32-3-820 27 52

<sup>a</sup>Scientific Institute of Public Health, Brussels, Belgium.

<sup>b</sup>Mater Dei Hospital, Infection control Unit, Malta.

<sup>c</sup>Service d'hygiène hospitalière, Groupe Hospitalier Pellegrin, Bordeaux cedex, France

## ESAC National Networks

<b>Austria</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Helmut Mittermayer (†July 6, 2010)	Institute for Hygiene, Microbiology and Tropical Medicine, Elisabethinen Hospital Linz	helmut.mittermayer@elisabethinen.or.at
Other representative	Sigrid Metz (maternity leave as of April 2010) Gerhard Fluch	Institute for Hygiene, Microbiology and Tropical Medicine, Elisabethinen Hospital Linz	Sigrid.metz@elisabethinen.or.at Gerhard.fluch@elisabethinen.or.at
National Representative Ambulatory Care	Helmut Mittermayer (†July 6, 2010)	Institute for Hygiene, Microbiology and Tropical Medicine, Elisabethinen Hospital Linz	helmut.mittermayer@elisabethinen.or.at
	Sigrid Metz (maternity leave as of April 2010) Gerhard Fluch	Institute for Hygiene, Microbiology and Tropical Medicine, Elisabethinen Hospital Linz	Sigrid.metz@elisabethinen.or.at Gerhard.fluch@elisabethinen.or.at
National Representative Hospital Care	Helmut Mittermayer (†July 6, 2010)	Institute for Hygiene, Microbiology and Tropical Medicine, Elisabethinen Hospital Linz	helmut.mittermayer@elisabethinen.or.at
	Sigrid Metz (maternity leave as of April 2010) Gerhard Fluch	Institute for Hygiene, Microbiology and Tropical Medicine, Elisabethinen Hospital Linz	Sigrid.metz@elisabethinen.or.at Gerhard.fluch@elisabethinen.or.at
National Representative Economics	Sigrid Metz (maternity leave as of April 2010) Gerhard Fluch	Institute for Hygiene, Microbiology and Tropical Medicine, Elisabethinen Hospital Linz	Sigrid.metz@elisabethinen.or.at Gerhard.fluch@elisabethinen.or.at
<b>Belgium</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Sofie Vaerenberg	Scientific Institute of Public Health	sofie.varenberg@wiv-isp.be
Other representatives	Herman Goossens	University of Antwerp	herman.goossens@uza.be
	Béatrice Jans	Scientific Institute of Public Health	beatrice.jans@wiv-isp.be
	Marc Struelens	Université libre de Bruxelles	marc.struelens@ulb.ac.be
	Samuel Coenen	University of Antwerp	samuel.coenen@ua.ac.be
	An De Sutter	Ghent University Hospital Department of General Practice and Primary Health Care	an.desutter@ugent.be
National Representative Ambulatory Care	Samuel Coenen	University of Antwerp	samuel.coenen@ua.ac.be
	An De Sutter	Ghent University Hospital Department of General Practice and Primary Health Care	an.desutter@ugent.be
National Representative	Herman Goossens	University of Antwerp	herman.goossens@uza.be

Hospital Care	Hilde Jansens	University Hospital Antwerp	Hilde.Jansens@uza.be
National Representative Nursing Homes	Béatrice Jans	Scientific Institute of Public Health	Beatrice.jans@wiv-isp.be
National Representative Economics	Sofie Vaerenberg	Scientific Institute of Public Health	Sofie.vaerenberg@wiv-isp.be
<b>Bulgaria</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Boyka Markova	University Multipurpose Hospital for Active Treatment "Aleksandrovska"	boyka_markova@yahoo.com
National Representative Hospital Care	Boyka Markova	University Multipurpose Hospital for Active Treatment "Aleksandrovska"	boyka_markova@yahoo.com
National Representative Nursing Homes	Violeta Voynova	National Centre of Infectious and Parasitic Diseases, Sofia	villievoynova@ncipd.netbg.com
National Representative Economics	Boyka Markova	University Multipurpose Hospital for Active Treatment "Aleksandrovska"	boyka_markova@yahoo.com
<b>Cyprus</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Antonis Kontemeniotis	Director of the Department of Clinical Pharmacy in Pharmaceutical Services of the Ministry of Health of Cyprus	akontemeniotis@phs.moh.gov.cy
Other representative	Christiana Hatzioannou	Department of Clinical Pharmacy in Pharmaceutical Services of the Ministry of Health of Cyprus	ckontemeniotou@phs.moh.gov.cy
National Representative Hospital Care	Antonis Kontemeniotis	Director of the Department of Clinical Pharmacy in Pharmaceutical Services of the Ministry of Health of Cyprus	akontemeniotis@phs.moh.gov.cy
	Kontemeniotou Christiana	Department of Clinical Pharmacy in Pharmaceutical Services of the Ministry of Health of Cyprus	ckontemeniotou@phs.moh.gov.cy
<b>Croatia</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Arjana Tambic Andrasevic	University Hospital for Infectious Diseases Zagreb	arjana.tambic@bfm.hr / arjana.andrasevic@zg.t-com.hr
Other representative	Igor Francetic	Clinical Hospital Center Zagreb	igor.francetic@inet.hr
National Representative Hospital Care	Arjana Tambic Andrasevic	University Hospital for Infectious Diseases Zagreb	arjana.tambic@bfm.hr / arjana.andrasevic@zg.htnet.hr

- Establishment of the ESAC Network -

National Representative Nursing Homes	Ana Budimir	Faculty Of Pharmacy And Biochemistry, University Of Zagreb	abudimir@kbc-zagreb.hr / abudimir@hi.t-com.hr
National Representative Economics	Vlasta Dečković-Vukres	Croatian Public Health Institute	v.deckovic-vukres@hzjz.hr
<b>Czech Republic</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Vlcek Jiri	Faculty of Pharmacy, Charles University	vlcek@faf.cuni.cz
Other representatives	Zemkova Marcela	Faculty of Pharmacy, Charles University	Marcela.zemkova@faf.cuni.cz
	Matoulkova Petra	Faculty of Pharmacy, Charles University	Petra.matoulkova@faf.cuni.cz
National Representative Ambulatory Care	Vlcek Jiri	Faculty of Pharmacy, Charles University	vlcek@faf.cuni.cz
National Representative Hospital Care	Vlcek Jiri	Faculty of Pharmacy, Charles University	vlcek@faf.cuni.cz
	Petra Matoulkova	Faculty of Pharmacy, Charles University	Petra.matoulkova@faf.cuni.cz
National Representative Nursing Homes	Petra Matoulkova	Faculty of Pharmacy, Charles University	Petra.matoulkova@faf.cuni.cz
<b>Denmark</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Niels Frimodt-Møller	Statens Serum Institut, National Center for Antimicrobials and Infection Control	nfm@ssi.dk
Other representative	Jan Poulsen	Danish Medicines Agency, Pharmacoeconomic Division	jpo@dkma.dk
National Representative Ambulatory Care	Ulrich Stab Jensen	Statens Serum Institut, National Center for Antimicrobials and Infection Control	uje@ssi.dk
National Representative Hospital Care	Niels Frimodt-Møller	Statens Serum Institut, National Center for Antimicrobials and Infection Control	nfm@ssi.dk
National Representative Nursing Homes	Christian Stab Jensen	Statens Serum Institut, National Center for Antimicrobials and Infection Control	csj@ssi.dk
<b>Estonia</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Ly Rootslane	State Agency of Medicines Bureau of Drug Statistics	Ly.rootslane@sam.ee
National Representative Hospital Care	Piret Mitt	Department of Infection Control, Tartu University Hospital	Piret.Mitt@kliinikum.ee

<b>Finland</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Jaana Vuopio	National Institute of Health	Jaana.vuopio@thl.fi
Other representative	Pirkko Paakkari	National Agency for Medicines	pirkko.paakkari@nam.fi
National Representative Ambulatory Care	Outi Lyytikäinen	National Public Health Institute	outi.lyytikainen@ktl.fi
	Jaana Martikainen	Head of Drug Research, National Insurance Institution.	Jaana.martikainen@kela.fi
National Representative Hospital Care	Nina Elomaa	Vaasa Central Hospital	Nina.Elomaa@vshp.fi
National Representative Nursing Homes	Maija Rummukainen	Jyväskylä Central Hospital	Maija-Liisa.Rummukainen@ksshp.fi
<b>Former Yugoslavian Republic of Macedonia</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Milena Petrovska	Microbiology and Parasitology Medical Faculty	milena.petrovska@microbiology.com.mk
<b>France</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Philippe Cavalie	Direction de l'Evaluation de la Publicité et des Produits Cosmétiques et Biocides Agence Française de sécurité sanitaire des produits de santé	philippe.cavalié@afssaps.sante.fr
Other Representative	Didier Guillemot	Unité des agents antibactériens, Institut Pasteur	guillemo@pasteur.fr
National Representative Ambulatory Care	Philippe Cavalie	Direction de l'Evaluation de la Publicité et des Produits Cosmétiques et Biocides Agence Française de sécurité sanitaire des produits de santé	philippe.cavalié@afssaps.sante.fr
National Representative Hospital Care	Xavier Bertrand	CHU Besancon	xavier.bertrand@univ-fcomte.fr
	Isabelle Patry	CHU Besancon	ipatry@chu-besancon.fr
National Representative Nursing Homes	Gaetan Gavazzi	Centre Hospitalier Universitaire A. Michallon	GGavazzi@chu-grenoble.fr
National Representative Economics	Philippe Cavalie	Direction de l'Evaluation de la Publicité et des Produits Cosmétiques et Biocides Agence Française de sécurité sanitaire des produits de santé	philippe.cavalié@afssaps.sante.fr

<b>Germany</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Winfried V. Kern	Freiburg University Hospital Abteilung Medizin, Infektiologie	kern@if-freiburg.de
Other Representative	Helmut Schröder	Wissenschaftliches Institut der AOK (WidO)	helmut.schroeder@wido.bv.aok.de
National Representative Ambulatory Care	Helmut Schröder	Wissenschaftliches Institut der AOK (WidO)	helmut.schroeder@wido.bv.aok.de
National Representative Hospital Care	Katja de With	Infektiologie/Med. Klinik II Universitätsklinikum Freiburg	deWith@if-freiburg.de
National Representative Nursing Homes	Nicoletta Wischnewski	Robert Koch Institut	WischnewskiN@rki.de
National Representative Economics	Katja de With	Infektiologie/Med. Klinik II Universitätsklinikum Freiburg	deWith@if-freiburg.de
<b>Greece</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Helen Giamarellou	4th Department of Internal Medicine of Athens Medical School, University General Hospital ATTIKON	hgiama@ath.forthnet.gr
Other Representative	Anastasia Antoniadou	4th Department of Internal Medicine of Athens Medical School, University General Hospital ATTIKON	ananto@med.uoa.gr
National Representative Hospital Care	Anastasia Antoniadou	4th Department of Internal Medicine of Athens Medical School, University General Hospital ATTIKON	ananto@med.uoa.gr
<b>Hungary</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Gabor Ternak	Univ. of Pecs, Institute of Infectiology, Disaster-medicine and Oxyology	ternak@t-online.hu / gabor.ternak@aok.pte.hu
Other representatives	Ria Benko	Colleges of Clinical Pharmacy Department, University of Szeged, Clinical Pharmacy, Department	benko@clph.szote.u-szeged.hu
	Maria Matuz	Colleges of Clinical Pharmacy Department, University of Szeged, Clinical Pharmacy, Department	matuz@clph.szote.u-szeged.hu
	Edit Hajdú	University of Szeged,	hajdu@mlab.szote.u-szeged.hu



		Faculty of Medicine, Institute of Clinical Microbiology	
National Representative Ambulatory Care	Gabor Ternak	Univ. of Pecs, Institute of Infectiology, Disaster- medicine and Oxyology	ternak@t-online.hu / gabor.ternak@aok.pte.hu
National Representative Hospital Care	Gabor Ternak	Univ. of Pecs, Institute of Infectiology, Disaster- medicine and Oxyology	ternak@t-online.hu / gabor.ternak@aok.pte.hu
National Representative Nursing Homes	Karolina Borocz	National Centre for Epidemiology, . Budapest	borocz@oek.antsz.hu
<b>Iceland</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Haraldur Briem	Directorate of Health	hbriem@landlaeknir.is
<b>Ireland</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Robert Cunney	Sta National Disease Surveillance Centre	robert.cunney@hse.ie
Other Representative	Ajay Oza	Sta National Disease Surveillance Centre	Ajay.oza@hse.ie
National Representative Hospital Care	Robert Cunney	Sta National Disease Surveillance Centre	robert.cunney@hse.ie
National Representative Nursing Homes	Robert Cunney	Sta National Disease Surveillance Centre	robert.cunney@hse.ie
<b>Israel</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Raul Raz	Clalit Health Services Infectious Diseases Unit	Raz_r@clalit.org.il
National Representatives Ambulatory Care	Raul Raz	Clalit Health Services Infectious Diseases Unit	Raz_r@clalit.org.il
	Hana Edelstein	Clalit Health Services Infectious Diseases Unit	Hana_e@clalit.org.il
National Representative Economics	Raul Raz	Clalit Health Services Infectious Diseases Unit	Raz_r@clalit.org.il
<b>Italy</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Pietro Folino Gallo	Agenzia Italiana del Farmaco Ufficio Centro Studi	p.folino@aifa.gov.it
Other representatives	Annalisa Pantosti	Dipartimento Malattie Infettive, Parassitarie e Immunomediate Istituto Superiore di Sanità	annalisa.pantosti@iss.it
	Maria Grazia Pompa	Ufficio V Direzione Generale Prevenzione Sanitaria Ministero della Salute	m.pompa@sanita.it
	Maria Luisa Moro	Area di Programma Rischio Infettivo Agenzia Sanitaria	mlmoro@regione.emilia-romagna.it

- Establishment of the ESAC Network -

	Giuseppe Cornaglia	Regionale Facoltà di Medicina e Chirurgia Istituto Microbiologia Università di Verona	giuseppe.cornaglia@univr.it
National Representative Ambulatory Care	Roberto Raschetti	Centro Nazionale di Epidemiologia, Sorveglianza e Promozione della Salute Istituto Superiore di Sanità	roberto.raschetti@iss.it
National Representative Hospital Care	Silvio Brusaferrò	Department of Experimental and Clinical Pathology and Medicine, School of Medicine, University of Udine	brusaferrò.silvio@aoud.sanita.fvg.it
National Representative Nursing Homes	Maria Luisa Moro	Area di Programma Rischio Infettivo Agenzia Sanitaria Regionale	mlmoro@regione.emilia-romagna.it
National Representative Economics	Pietro Folino Gallo	Agenzia Italiana del Farmaco Ufficio Centro Studi	p.folino@aifa.gov.it
<b>Latvia</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Uga Dumpis	P.Stradins University	ugadumpis@stradini.lv
Other Representative	Sandra Edite Berzina	P.Stradins University	
National Representative Ambulatory Care	Uga Dumpis	P.Stradins University	ugadumpis@stradini.lv
National Representative Hospital Care	Uga Dumpis	P.Stradins University	ugadumpis@stradini.lv
	Elina Pujate	P.Stradins University	elina.pujate@stradini.lv
National Representative Nursing Homes	Elina Pujate	P.Stradins University	elina.pujate@stradini.lv
<b>Lithuania</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Rolanda Valinteliene	Institute of Hygiene	rolanda.valinteliene@hi.lt
National Representative Hospital Care	Asta Palekauskaite	Institute of Hygiene	asta@hi.lt
National Representative Nursing Homes	Rolanda Valinteliene	Institute of Hygiene	rolanda.valinteliene@hi.lt
<b>Luxembourg</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Bruch Marcel	Direction de la Santé	Marcel.Bruch@ms.etat.lu
Other representative	Hemmer Robert	Centre Hospitalier de Luxembourg	Hemmer.Robert@chl.lu
National Representative Ambulatory Care	Bruch Marcel	Direction de la Santé	Marcel.Bruch@ms.etat.lu
National Representative	Bruch Marcel	Direction de la Santé	Marcel.Bruch@ms.etat.lu

Hospital Care			
National Representative Economics	Bruch Marcel	Direction de la Santé	Marcel.Bruch@ms.etat.lu
<b>Malta</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Michael Borg	Mater Dei Hospital Infection Control Unit	michael.a.borg@gov.mt
Other representative	Peter Zarb	Mater Dei Hospital Infection Control Unit	peter.zarb@gov.mt
National Representative Hospital Care	Peter Zarb	Mater Dei Hospital Infection Control Unit	Peter.zarb@gov.mt
National Representative Nursing Homes	Peter Zarb	Mater Dei Hospital Infection Control Unit	Peter.zarb@gov.mt
<b>Norway</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Hege Salvesen Blix	Norwegian Institute of Public Health	hegesbl@ulrik.uio.no / Hege.Salvesen.Blix@fhi.no
National Representative Hospital Care	Jon Birger Haug	Aker University Hospital	Jonbirger.haug@akersykehus.no
National Representative Nursing Homes	Hanne-Merete Eriksen	Norwegian Institute of Public Health	hanne.merete.eriksen@fhi.no
National Representative Economics	Hege Salvesen Blix	Norwegian Institute of Public Health	Hege.Salvesen.Blix@fhi.no
<b>Poland</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Waleria Hryniewicz	National Medicines Institute	waleria@cls.edu.pl
Other representative	Paweł Grzesiowski	National Medicines Institute	paolo@cls.edu.pl
National Representative Ambulatory Care	Anna Olczak-Pieńkowska	National Medicines Institute	aniaolczak@cls.edu.pl
National Representative Hospital Care	Janina Pawlowksa Adriana Chromy	University's Children Hospital of Cracow.	aptekausd@wp.pl
<b>Portugal</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Mafalda Ribeirinho	Instituto Nacional da Farmacia e do Medicamento (INFARMED), OMPS – Observatório do Medicamento e Produtos de Saúde	Mafalda.ribeirinho@infarmed.pt
Other representative	Luis Caldeira	Instituto Nacional da Farmacia e do Medicamento (INFARMED), OMPS – Observatório do Medicamento e Produtos de Saúde	luis.caldeira@infarmed.pt
National Representative Hospital Care	Mafalda Ribeirinho	Instituto Nacional da Farmacia e do Medicamento	Mafalda.ribeirinho@infarmed.pt

- Establishment of the ESAC Network -

		(INFARMED), OMPS – Observatório do Medicamento e Produtos de Saúde	
National Representative Economics	Mafalda Ribeirinho	Instituto Nacional da Farmacia e do Medicamento (INFARMED), OMPS – Observatório do Medicamento e Produtos de Saúde	Mafalda.ribeirinho@infarmed.pt
<b>Romania</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Băicuș Anda	Director, National Institute of Research Development for Microbiology and Immunology	abaius@cantacuzino.ro
Other representative	Mircea Ioan Popa	“Carol Davila” University of Medicine and Pharmacy, Bucharest	mircea.popa@pmu-wb-gf.ro
<b>Russian Federation</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Svetlana Ratchina	Department of Clinical Pharmacology, Smolensk State Medical Academy	svetlana.ratchina@antibiotic.ru
Other representative	Roman Kozlov	Institute of Antimicrobial Chemotherapy, Smolensk State Medical Academy	roman@antibiotic.ru
Data management	Alexander Fokin	Department of Clinical Pharmacology, Smolensk State Medical Academy	Alex.Fokin@antibiotic.ru
	Roman Pavlukov	Institute of Antimicrobial Chemotherapy, Smolensk State Medical Academy	Roman.Pavlukov@antibiotic.ru
National Representative Economics	Svetlana Ratchina	Department of Clinical Pharmacology, Smolensk State Medical Academy	svetlana.ratchina@antibiotic.ru
<b>Slovakia</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Viliam Foltan	Comenius University, Faculty of Pharmacy,	foltan@fpharm.uniba.sk
Other representative	Adela Lagin	Comenius University, Faculty of Pharmacy,	lagin@fpharm.uniba.sk
National Representative Nursing Homes	Maria Stefkovicova	State Institute of Health, Hospital Trencin	stefkovicova@stonline.sk
<b>Slovenia</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Milan Čížman	University Medical Centre, Department of Infectious Diseases	milan.cizman@mf.uni-lj.si
National Representative	Milan Čížman	University Medical Centre, Department of	milan.cizman@mf.uni-lj.si

Ambulatory Care		Infectious Diseases	
National Representative Hospital Care	Milan Čížman	University Medical Centre, Department of Infectious Diseases	milan.cizman@mf.uni-lj.si
National Representative Nursing Homes	Tatjana Lejko	Head of Infection Control Service at University Medical Centre Ljubljana	tatjana.lejko@kclj.si-subproject
National Representative Economics	Milan Čížman	University Medical Centre, Department of Infectious Diseases	milan.cizman@mf.uni-lj.si
<b>Spain</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	José Campos	Centro Nacional de Microbiología, Instituto de Salud Carlos III.	jcampos@isciii.es
Other representatives	Francisco de Abajo	División de Farmacoepidemiología y Farmacovigilancia	fabajo@agemed.es
	Edurne Lazaro	Agencia Española de Medicamentos y PS	elazaro@agemed.es
	Juan Luis Moreno	Dirección General de Farmacia	jmorenog@msps.es
	Jesús Oteo	Centro Nacional de Microbiología, Instituto de Salud Carlos III	jesus.oteo@isciii.es
National Representative Hospital Care	Mercedes Sora	Servicio de Farmacia, Hospital de Bellvitge, Barcelona	msora@bellvitgehospital.cat
<b>Sweden</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Ulrica Dohnhammar	Strama	Ulrica.dohnhammar@strama.se
Other representatives	Otto Cars	Strama	Otto.cars@strama.se
	Gunilla Stridh	Strama	Gunilla.stridh@strama.se
National Representative Ambulatory Care	Gunilla Stridh	Strama	Gunilla.stridh@strama.se
	Sigvard Mølsted	Research and Development in Primary Care, Jönköping.	Sigvard.Molstad@lj.se
National Representative Hospital Care	Mats Erntell	Infection disease control Halland	mats.erntell@lthalland.se
National Representative Nursing Homes	Lars Kärvestedt	Stockholms Sjukhem	Lars.karvestedt@stockholmssjukhem.se
National Representative Economics	Ulrica Dohnhammar	Strama	Ulrica.dohnhammar@strama.se
<b>Switzerland</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Giorgio Zanetti	Service de Médecine Préventive Hospitalière, Lausanne University Hospital	Giorgio.Zanetti@chuv.ch
Other representative	Christian Ruef	Division of Infectious Diseases and Hospital Epidemiology University Hospital of	christian.ruef@usz.ch

- Establishment of the ESAC Network -

		Zürich	
	Giuliano Masiero	Institute of Microeconomics and Public Economics University of Lugano	Giuliano.masiero@lu.unisi.ch
	Catherine Suard	Pharmacy Lausanne University Hospital	Catherine.Suard@chuv.ch
National Representative Ambulatory Care	Giorgio Zanetti	Service de Médecine Préventive Hospitallière, Lausanne University Hospital	Giorgio.Zanetti@chuv.ch
National Representative Hospital Care	Giorgio Zanetti	Service de Médecine Préventive Hospitallière, Lausanne University Hospital	Giorgio.Zanetti@chuv.ch
National Representative Economics	Giorgio Zanetti	Service de Médecine Préventive Hospitallière, Lausanne University Hospital	Giorgio.Zanetti@chuv.ch
<b>The Netherlands</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Stephanie Natsch	Radboud University Nijmegen	s.natsch@akf.umcn.nl
National Representative Ambulatory Care	Theo Verheij	Julius Centre for Health and Primary care	t.j.m.verheij@umcutrecht.nl
	Paul van der Linden	Tergooiziekenhuizen	p.vanderlinden@tergooziekenhuizen.nl
National Representative Hospital Care	Stephanie Natsch	Radboud University Nijmegen	s.natsch@akf.umcn.nl
National Representative Nursing Homes	Marie-José Veldman	RIVM-centrum	Marie-jose.veldman@rivm.nl
<b>Turkey</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Serhat Unal	Hacettepe University, Department of Medicine, School of Medicine	sunal@hacettepe.edu.tr
Other representative	Deniz Gür	Hacettepe University	dgur@hacettepe.edu.tr
National Representative Hospital Care	Serhat Unal	Hacettepe University	sunal@hacettepe.edu.tr
	Yesim Cetinkaya Sardan	Hacettepe University	ycetinka@hacettepe.edu.tr
<b>UK</b>			
<b>Function</b>	<b>Name(s)</b>	<b>Affiliation</b>	<b>E-mail</b>
Lead National Representative	Peter Davey	University of Dundee	p.g.davey@chs.dundee.ac.uk
Other representatives	Tracey Guise	British Society for Antimicrobial Chemotherapy	Tguise@bsac.org.uk
	Hayley Wickens	UK Clinical Pharmacy Association Infection	Hayley.wickens@imperial.nhs.uk
	Jonathan Cooke	Department of Health's Advisory Committee on AMR & HAI	jonathan.cooke@smuht.nwest.nhs.uk

	Maggie Heginbothom	Welsh Antimicrobial Research Programme: Surveillance Unit	Maggie.Heginbothom@nphs.wales.nhs.uk
	Hugh Webb	Northern Ireland Antimicrobial Resistance Action Plan	Hugh.Webb@bll.n-i.nhs.uk
	Jacqueline Sneddon	Scottish Antimicrobial Pharmacists	Jacqueline.sneddon@nhs.uk
National Representative Ambulatory Care	Peter Davey (UK)	University of Dundee	p.g.davey@chs.dundee.ac.uk
	Sally Wellsted	Department of Health, England	Sally.Wellsted@doh.gsi.gov.uk
	Tracey Guise	British Society for Antimicrobial Chemotherapy	Tguise@bsac.org.uk
	Hugh Webb (Northern Ireland)	Northern Ireland Antimicrobial Resistance Action Plan	Hugh.Webb@bll.n-i.nhs.uk
	Margaret Heginbothom (Wales)	Welsh Antimicrobial Research Programme: Surveillance Unit	Margaret.Heginbothom@nphs.wales.nhs.uk
	William Malcolm	NHS National Services Scotland	
	Jonathan Cooke (England)	Department of Health's Advisory Committee on AMR & HAI	jonathan.cooke@smuht.nwest.nhs.uk
	Peter Davey (UK)	University of Dundee	p.g.davey@chs.dundee.ac.uk
National Representative Hospital Care	Hugh Webb (Northern Ireland)	Northern Ireland Antimicrobial Resistance Action Plan	Hugh.Webb@bll.n-i.nhs.uk
	Margaret Heginbothom (Wales)	Welsh Antimicrobial Research Programme: Surveillance Unit	Margaret.Heginbothom@nphs.wales.nhs.uk
	William Malcolm	NHS National Services Scotland	
	Jacqueline Sneddon	Scottish Antimicrobial Pharmacists	Jacqueline.sneddon@nhs.uk
	Conor Jamieson (England)	Antimicrobial Therapy, Sandwell and West Birmingham NHS Trust	Conor.Jamieson@heartofengland.nhs.uk
	Hayley Wickens	UK Clinical Pharmacy Association Infection	Hayley.wickens@imperial.nhs.uk
National Representative Nursing Homes	Peter Davey (Scotland)	University of Dundee	p.g.davey@chs.dundee.ac.uk
National Representative Economics	Peter Davey	University of Dundee	p.g.davey@chs.dundee.ac.uk

### ESAC Advisory Board Members

Name	Affiliation	On behalf of	Country
Arjana Tambic Andrasevic	University Hospital for Infectious Diseases, Zagreb	Lead National Representative	Croatia
Raul Raz	Infectious Diseases Unit, Afula	Lead National Representative	Israel
Giorgio Zanetti	Service de Médecine	Lead National	Switzerland

- Establishment of the ESAC Network -

	Préventive Hospitalière, Lausanne University Hospital	Representative	
Sigrid Metz (maternity leave)	Elisabethinen Hospital Linz	Other Representative	Austria
Philippe Beutels	University of Antwerp	Scientific advisor of the Economics subproject	Belgium
Peter Davey	University of Dundee	Scientific advisor of the Hospital Care subproject	UK
Sigvard Mölsted	University of Linköping	Scientific advisor of the Ambulatory Care subproject	Sweden
Béatrice Jans	Institute of Public Health	Scientific advisor of the Nursing Home subproject	Belgium
Hajo Gründmann	RIVM	BURDEN/EARSS	The Netherlands
Theo Verheij	University of Utrecht	CHAMP	The Netherlands
Herman Goossens	University of Antwerp	GRACE	Belgium
Christian Brun- Buisson	Université Paris Val de Marne	MOSAR	France
Winfried V. Kern	Freiburg University Hospital Abteilung Medizin, Infektiologie	ABS International	Germany
Carl Suetens	ECDC	IPSE	Sweden
Ole Heuer	ECDC	ECDC	Sweden

**ESAC Audit Committee Members**

<b>Name</b>	<b>Affiliation</b>	<b>Country</b>
Clodna McNulty	Gloucestershire Royal Hospital	UK
Maciek Godycki-Cwirko	Medical University of Lodz	Poland



## **2. OBJECTIVES AND METHODOLOGICAL APPROACH**

### **Aims and Objectives**

The overall aim of the project is to consolidate the continuous collection of comprehensive antimicrobial consumption data, from ambulatory and hospital care, from the 27 Member States, 3 EEA/EFTA, 3 candidate countries (Croatia, Former Yugoslavian Republic of Macedonia and Turkey) and 2 other countries (Russian Federation and Israel). The project aims to provide the community with timely information, on antimicrobial consumption. The European database is used to develop (i) health indicators of antimicrobial use. and (ii) evidence-based guidelines and educational tools to manage the risk of infections and antimicrobial resistance. The project provides regular feed-back to the relevant authorities of the participating countries.

Additionally, the project aims deepen the knowledge of antibiotic consumption by focusing on specific consumption groups and/or patterns in collaboration with those countries where the appropriate data are available. For hospital care, data will be collected for individual hospitals with a linkage of the consumption to the DRG (Disease Related Groups). For ambulatory care, detailed data will be collected on the consumption in specific age and sex categories, specific prescriber groups, specific high consumers groups and for specific indications (in collaboration with existing networks of sentinel practices). For nursing homes, detailed information will be collected on the frequency, indications, characteristics and seasonal variations of antibiotic prescriptions, as well as on the institutional determinants of antibiotic use. Additionally, the effects of socio-economic determinants on antimicrobial consumption of European countries will be explored, and regional variation within a particular country will be studied, by means of econometric models.

### **Data collection protocol version 2009**

The 2008 data on antibiotic use, for ambulatory care (AC) and hospital care (HC), according the ATC/DDD classification, 2008 version, should be delivered at the product level, expressed in number of packages. Moreover, a valid national register of available antibiotics and population data covering the dataset should also be delivered.

Alternatively, in the participating countries that are not able to deliver data on a product level due to objective constraints, data on volume of antibiotic consumption for 2008 should be collected at the ATC5 + Route of Administration (RoA) level. As the number of antibiotics with multiple DDDs for an "Oral" and "Parenteral" is increasing over the time, antibiotic consumption data for all ATC codes should be split up according to the route of administration.

### ***Scope of the 2008 data collection***

Similar to 2007, the 2008 data will include sub-national data. The NUTS classification ([http://ec.europa.eu/eurostat/ramon/nuts/splash\\_regions.html](http://ec.europa.eu/eurostat/ramon/nuts/splash_regions.html)) will be used to collect the data. For optimal analysis of the data, we ask the participating countries to deliver data at the NUTS 3 level. But depending on the availability of the data, the participating countries can deliver data as well as at higher levels (NUTS 2, NUTS 1 or even at the country level). The antimicrobials to be collected are: J01, J02, J04A, J05 and additional substances (P01AB, D01BA, A07AA09).

Until 2006, ESAC used the WHO Mid-year population as reference for the denominator except in some participating countries. Since 2007, all the participating countries have to provide the population covering the datasets e.g. the population data are to be collected at the same level as the consumption data. If you collect consumption data at the NUTS 3 level, you need to provide also the population at this level. This would mean for example the collection of consumption and population data at the level of the arrondissements.

Each type of data (register, consumption data, population data) has to be delivered using its respective template.

### ***ESAC Templates for data collection***

ESAC provides one template for the register, one template for the population data and two templates for the consumption data.

Two templates are available to submit the consumption data:

- template 1 for data expressed in packages at the product level (default format)
- template 2 for data expressed in DDDs at the ATC substance level

Each template is provided in a separate excel file.

If you choose template 1, you have to deliver a valid register, the consumption data using the template 1 and the population data. Conversely, if you choose template 2, you have to deliver the consumption data using the template 2 and the population data.

#### *Parameters of the template for the register:*

- Country
- Year
- Medicinal Product Package Code Value: the Medicinal Product Package Code Value (MPPCV) has to be a unique identifier of the medicinal product package (MPP). Because it is a key value in many tables it has to be stable in time, so MPP's that are no longer available on the market or that are no longer registered still can be identified for historical purposes (like prescription history).
- Label: Medicinal Product Package Label e.g.: Lanoxin compr 60 X 0,125 mg
- Size of the package: Content Quantity (e.g.: 60)
- Unit measurement of the size of the package: National Content Unit (e.g.: pcs, mg,...)
- Form: Galenic form (eg. Capsules, Solution, Injection) Quid abbreviations?
- Route of administration: Oral, Parenteral, Rectal, Inhalation
- Strength: Quantity of the ingredient in each unit. In case of multi-ingredient Medicinal products this field has to contain the ingredient strength in which the DDD is expressed. E.g.: Amoxicillin/Clavulanic acid combinations: Strength expresses the strength of the amoxicillin. Strengths of parenteral fluids are expressed as the content of 1 ampulla or 1 perfusion package. Conversely, strengths of sirups are expressed as the content of 1 measure of sirup, this can be 5 ml, 2 ml...
- Unit measurement of strength: units of strength (mg, U, ...)
- WHO ATC Code
- Salt: for methenamin, the associated salt (hippurate or mandelate) should be specified. For erythromycin, if the associated salt is ethylsuccinate and the galenic form is tablet, ethylsuccinate has to be specified, in all other cases (even ethylsuccinate and any other form than tablet), the salt should be left empty.
- Ingredient name: In case of multi-ingredient Medicinal products this field has to contain the ingredient in which the DDD is expressed.
- Product name: Medicinal Product name e.g.: LANOXIN, LANITOP
- National DDD when the WHO DDD does not exist or specific DDDs are used at the national level.
- Unit measurement of the National DDD (mg, g, unit dose, fixed dose, ...)
- DDDs Per Package
- Content of the package: i.e. the total amount of the first ingredient in the medicinal product package
- Unit measurement of the package content
- Basic ingredient quantity: (INBASQ: e.g. 200 mg/10 ml), used for describing concentration of fluids. It is very important to fill this field properly. To obtain good

results one must apply the following rules for sirups/suspensions and ampullae/perfusion fluids: In sirups and solutions INBASQ describes the basic strength unit. Concerning perfusion fluids or ampullae this value is always 1 because the strength has to be expressed per amp or per perfusion package (see Strength rules)

- Unit measurement of the Basic ingredient quantity

*Parameters of the template 1 for the consumption data:*

- Country
- Year
- Sub-area level: NUTS Level (0= country, 1=NUTS1, 2=NUTS2, 3=NUTS3)
- Sub-area identifier: when the sub-area level is 0 (country level), the ISO Country code has to be used. For the other sub-area levels, the NUTS code has to be used.
- Sector: AC (ambulatory) / HC (hospital) / TC (total)
- Periodicity: quarterly for AC / TC, annually for HC (quarterly if available)
- Medicinal Product Package Code Value: Same code as the MPPCV in the register.
- Volume: number of packages per medicinal product (used in a given period, sub-area and sector) for the four quarters and the complete year.

*Parameters of the template 2 for the consumption data:*

- Country
- Year
- Sub-area level: NUTS Level (0= country, 1=NUTS1, 2=NUTS2, 3=NUTS3)
- Sub-area identifier: when the sub-area level is 0 (country level), the ISO Country code has to be used. For the other sub-area levels, the NUTS code has to be used.
- Sector: AC (ambulatory) / HC (hospital) / TC (total)
- Periodicity: quarterly for AC / TC, annually for HC (quarterly if available)
- WHO ATC Code
- WHO ATC Name
- Route of administration: O, P, R, I (Oral, Parenteral, Rectal, Inhalation) or X when the route of administration is not available
- Salt
- Volume: number of DDDs (WHO ATC version 2008) for the corresponding substance (used in a given period, sub-area, sector, route of administration and salt) for the four quarters and the complete year.

*Parameters of the template for the population data:*

- Country
- Year
- Sub-area level: NUTS Level (0= country, 1=NUTS1, 2=NUTS2, 3=NUTS3)
- Sub-area identifier: when the sub-area level is 0 (country level), the ISO Country code has to be used. For the other sub-area levels, the NUTS code has to be used.
- population

## **Data collection protocol version 2010**

***Scope of the 2009 data collection:***

1. The 2009 data on antibiotic use, for ambulatory care (AC) and hospital care (HC) settings, has to be done according the **ATC/DDD classification, 2010 version**.
2. **ESAC aims to collect the core data at the product level**, expressed in number of packages (= using template 1). Therefore, ESAC needs 1) a "valid national historical exhaustive register file" including the available antibiotics at product level; 2) a

consumption file including the number of packages consumed for each product (by product ID number) and 3) a population file whereby the population covers the dataset. Alternatively, if participating countries are not able to deliver data at product level due to objective constraints, data on volume of antibiotic consumption for 2009 should be collected at the ATC5 level whereby also the Route of Administration (RoA) have to be provided (= using template 2). As the number of antibiotics with multiple DDDs for an "Oral" and "Parenteral" is increasing over the time, use data for all ATC codes should be split up according to the route of administration.

3. The 2009 data will include **sub-national data**. ESAC uses the three-level hierarchical **NUTS classification** which follows existing administrative borders<sup>1</sup>. This classification should **preferably be used** for data collection. Depending on the availability of the data, the participating countries can deliver data at NUTS 1 (covers between 3 and 7 million inhabitants), NUTS 2 (covers between 800000 and 3 million inhabitants) or NUTS 3 (covers between 150000 and 80000 inhabitants) level or alternatively at the country level. Only the finest available level of data should be included. When another classification is used, please provide us the necessary information.
4. The **antimicrobials to be collected** are:
  1. antibacterials for systemic use (ATC therapeutic subgroup J01),
  2. antimycotics for systemic use (ATC therapeutic subgroup J02),
  3. antifungals for systemic use (ATC chemical subgroup D01BA),
  4. drugs for treatment of tuberculosis (ATC pharmacological subgroup J04A),
  5. antivirals for systemic use (ATC therapeutic subgroup J05),
  6. oral and rectal nitroimidazole derivates as antiprotozoals use (ATC chemical subgroup P01AB),
  7. oral vancomycin as intestinal antiinfectives use (ATC chemical substance A07AA09) for the ambulatory and/or the hospital care sector or total care sector.
5. **Information on prices at product level** (template 1).
6. **Denominator data:**

The participating countries have to provide the population data covering the consumption datasets, so that the population data are collected at the same level as the consumption data. If you collect consumption data at the NUTS 3 level, you need to provide the population also at this level.

ESAC uses for the denominator the WHO mid-year population for the population at national level except in some participating countries where it is not applicable or justified<sup>2</sup>.

---

<sup>1</sup> [http://ec.europa.eu/eurostat/ramon/nuts/splash\\_regions.html](http://ec.europa.eu/eurostat/ramon/nuts/splash_regions.html)

<sup>2</sup> <http://data.euro.who.int/hfad/>

**Important notes on the ATC/DDD classification, 2010 version:**

- ATC updates (see also added excel file : ESAC\_ATC\_list\_2009.xlsx)

J01DD17	cefcapene
J01DE03	cefozopran
J01DH05	biapenem
J01DI01	ceftobiprole medocaril
J01EA03	iclaprim
J01XA04	dalbavancin
J01XA05	oritavancin
J01XX10	bacitracin
J05AR07	stavudine, lamivudine and nevirapine
J05AX10	maribavir

- DDD updates

ATC code	ATC level name	New DDD		
A06AH01	methylnaltrexone bromide	6	mg	P
A07AA05	polymyxin B	3	MU	O
A10BX08	mitiglinide	30	mg	O
B01AC22	prasugrel	10	mg	O
B01AE07	dabigatran etexilate	0.22	g	O
B01AX06	rivaroxaban	10	mg	O
B02BX04	romiplostim	30	mcg	P
C01EB19	icatibant	30	mg	P
D11AX19	alitretinoin	20	mg	O
G04BX14	dapoxetine	30	mg	O
J01DC07	cefotiam	1.2	g	O
J01DD17	cefcapene	0.45	g	O
J01DE03	cefozopran	4	g	P
J01DH04	doripenem	1.5	g	P
J01DH05	biapenem	1.2	g	P
J02AX05	micafungin	0.1	g	P
J05AG04	etravirine	0.4	g	O

Reference: [http://www.whocc.no/atc\\_ddd\\_index/updates\\_included\\_in\\_the\\_atc\\_ddd/](http://www.whocc.no/atc_ddd_index/updates_included_in_the_atc_ddd/)

- Attention: Also include antifungals for systemic use (D01B):
  - D01BA01 griseofulvine
  - D01BA02 terbinafine
- Attention for the DDD's on combined products : list included in annex
- Attention:
  - vancomycine!
    - J01XA01 : route administration=P
    - A07AA09 : route administration=O
  - Metronidazole!
    - J01XD01: route administration=P
    - P01AB01: route administration=O and R

### **ESAC Templates for data collection:**

Please note that every type of data (register, consumption data, population data) has to be delivered using its respective excel template. Other excel files than the template will not be accepted.

If you choose **template 1**, you should deliver 3 files:

1. a valid national exhaustive *register file* including the available antibiotics at product level
2. *template 1 version of the consumption file* including the number of packages consumed at product level (by product ID number)
3. a *population file*

Alternatively, if you choose **template 2**, you should deliver 2 files:

1. *template 2 version of the consumption file* including data expressed in DDDs at ATC5 substance level + the route of administration
2. a *population file*

Parameters for the antibiotic register file: data at product level = Template 1

- Country: use ISO code
- See: [http://www.iso.org/iso/english\\_country\\_names\\_and\\_code\\_elements](http://www.iso.org/iso/english_country_names_and_code_elements)
- Year of data collection
- Medicinal Product Package Code Value: the Medicinal Product Package Code Value (MPPCV) has to be a unique identifier of the medicinal product package (MPP). Because it is a key value in many tables it has to be stable in time, so MPP's that are no longer available on the market or that are no longer registered still can be identified for historical purposes (like prescription history).
- Label: Medicinal Product Package Label e.g.: Lanoxin compr 60 X 0,125 mg
- Size of the package: Content Quantity (e.g.: 60)
- Unit measurement of the size of the package: National Content Unit (e.g.: pcs, mg,...)
- Form: Galenic form (eg. Capsules, Solution, Injection)
- Route of administration: O, P, R, I for Oral, Parenteral, Rectal, Inhalation
- Strength: Quantity of the ingredient in each unit. In case of multi-ingredient Medicinal products this field has to contain the ingredient strength in which the DDD is expressed. E.g.: Amoxicillin/Clavulanic acid combinations: Strength expresses the strength of the amoxicillin. Other examples :
  - if J01DH51 (imipenem and enzyme inhibitor) : refer only to imipenem
  - if J01CR05 (piperacillin and enzyme inhibitor) : refer only to piperacillin
  - if J01CR02 (amoxicillin and enzyme inhibitor) : refer only to amoxicillin
- Strengths of parenteral fluids are expressed as the content of 1 ampulla or 1 perfusion package. Conversely, strengths of syrups are expressed as the content of 1 measure of sirup, this can be 5 ml, 2 ml...
- Unit measurement of strength: units of strength (mg, g, IU, UD, MU)
- WHO ATC Code at substance level (ATC5) + see remarks above.
- Salt: for methenamin, the associated salt (hippurate or mandelate) should be specified. For erythromycin, if the associated salt is ethylsuccinate and the galenic form is tablet, ethylsuccinate has to be specified, in all other cases (even ethylsuccinate and any other form than tablet), the salt should be left empty.
- Coding of Ethylsuccinate, mandelate and hippurate respectively as ESUC, MAND, HIPP.
- DPP: defined daily doses per package.
- Ingredient name: In case of multi-ingredient Medicinal products this field has to contain the ingredient in which the DDD is expressed.
- Product name: Medicinal Product name e.g.: LANOXIN, LANITOP
- National DDD when the WHO DDD does not exist or specific DDDs are used at the national

level.

- Unit measurement of the National DDD (mg, g, IU, MU, ...)
- Content of the package: i.e. the total amount of the first ingredient in the medicinal product package
- Unit measurement of the package content
- Basic ingredient quantity: (INBASQ: e.g. 200 mg/10 ml), used for describing concentration of fluids. It is very important to fill this field properly. To obtain good results one must apply the following rules for syrups/suspensions and ampullae/perfusion fluids: In syrups and solutions INBASQ describes the basic strength unit. Concerning perfusion fluids or ampullae this value is always 1 because the strength has to be expressed per amp or per perfusion package (see Strength rules)
- Unit measurement of the Basic ingredient quantity

Price information which should be added to the "register file" is described below. Please note that providing price data is voluntary as the data may not be available for your country in detail as requested here. We would ideally want price information to be provided for hospital and non-hospital based pharmacies separately, but prices can also be provided for only hospital or non-hospital pharmacies if both are not available.

1. **Ex-factory price**: The total payment received by the pharmaceutical company for providing one package of the medication. This excludes distribution costs and the markup charged by the pharmacy for dispensing the medication. This can be provided in separate columns for hospital and / or ambulatory care pharmacies. If these prices differ between pharmacies, please provide the weighted average cost per package with the weight being consumption. For example, if the price is €10 at pharmacy A and €25 at pharmacy B with pharmacy A dispensing 10 packages and pharmacy B dispensing 20 packages, the weighted price is  $10/(10+20)*€10 + 20/(10+20)*€25 = €20$ .
2. **Ex-pharmacy price**: The total payment received by an average non-hospital-based pharmacy for providing one package of the medication. This is equivalent to the price tag on the package at the pharmacy. This can be provided in separate columns for hospital and / or ambulatory care pharmacies. Please use the same methodology described for ex-factory prices if the price differs by pharmacy.
3. **Wholesale price**: The price per package for drugs that are distributed from pharmaceutical companies by wholesalers to pharmacies. This price will be between ex-factory and ex-pharmacy price. This can be provided in separate columns for hospital and / or ambulatory care pharmacies. Please use the same methodology described for ex-factory prices if the price differs by pharmacy.
4. **Out of pocket price**: The total amount faced by an average patient for purchasing a package of the medication at a pharmacy. This amount should not include the amount reimbursed by the national health insurance, but may include the amount covered by private insurers. This can be provided in separate columns for hospital and / or ambulatory care pharmacies. Please use the same methodology described for ex-factory prices if the price differs by pharmacy.
5. **Other**: Any other price per package not covered by the four price definitions described above. This can be provided in separate columns for hospital and / or ambulatory care pharmacies. Please use the same methodology described for ex-factory prices if the price differs by pharmacy.

*Parameters for the consumption data: Template 1*

- Country: ISO code
- Year of data collection
- Sub-area level: NUTS Level (0=country, 1=NUTS1, 2=NUTS2, 3=NUTS3, 99=other classification)
- Sub-area identifier: when the sub-area level is 0 (country level), the ISO Country code has to be used. For the other sub-area levels, the NUTS code has to be used or the other

classification.

- **Sector:** AC (ambulatory care) / HC (hospital care) / TC (total care)
- **Periodicity:** Q (quarterly for AC / TC), Y (annually for HC (+quarterly if available))
- **Medicinal Product Package Code Value:** Same code as the MPPCV in the register.
- **Volume:** number of packages per medicinal product (used in a given period, sub-area and sector) for the four quarters or the complete year.

*Parameters for the consumption data: template 2*

- **Country:** ISO code
- **Year** of data collection
- **Sub-area level:** NUTS Level (0=country, 1=NUTS1, 2=NUTS2, 3=NUTS3, 99=other classification)
- **Sub-area identifier:** when the sub-area level is 0 (country level), the ISO Country code has to be used. For the other sub-area levels, the NUTS code has to be used or the other classification.
- **Sector:** AC (ambulatory care) / HC (hospital care) / TC (total care)
- **Periodicity:** Q (quarterly for AC / TC), Y (annually for HC (+quarterly if available))
- **WHO ATC code** at substance level (ATC5)
- **WHO ATC name** at substance level (ATC5)
- **Route of administration:** O, P, R, I (Oral, Parenteral, Rectal, Inhalation) or X when the route of administration is not available
- **Salt**
- **Volume:** number of DDDs (WHO ATC/DDD version 2010) for the corresponding substance (used in a given period, sub-area, sector, route of administration and salt) for the four quarters or the complete year.

*Parameters for the population data: Template 1 and 2*

- **Country :** ISO code
- **Year** of data collection
- **Sub-area level:** NUTS Level (0=country, 1=NUTS1, 2=NUTS2, 3=NUTS3, 99=other classification)
- **Sub-area identifier:** when the sub-area level is 0 (country level), the ISO Country code has to be used. For the other sub-area levels, the NUTS code has to be used or the other classification.
- **Population** covering the consumption data.

### **Annex : List of DDD's combined products**

Reference : [http://www.whocc.no/ddd/list\\_of\\_ddds\\_combined\\_products/](http://www.whocc.no/ddd/list_of_ddds_combined_products/)

J01AA20	Deteclor	Tab	Tetracycline 115.4 mg/Chlortetracycline 115.4 mg/ Demeclocycline 69.2 mg	2 UD (=2 tab)
J01CA20	Miraxid	Tab	Pivampicillin 0.25 g/Pivmecillinam 0.2 g	3 UD (=3 tab)
J01CA20	Miraxid mite	Tab	Pivampicillin 0.125 g/Pivmecillinam 0.1 g	6 UD (=6 tab)
J01CE30	Bicillin C-R, Bicillin A-P, Bicillin	Powder for inj	Comb. of Benzylpenicillin/Procain-benzylpenicillin/ Benzathine benzylpenicillin	3.6 g expressed as benzylpenicillin
J01CR50	Ampiclox	Tab	Ampicillin 0.25 g/Cloxacillin 0.25 g	4 UD (=4 tab)



J01CR50	Amproxium	Powder for inj	Ampicillin 0.66 g/Oxacillin 0.33 g	2 UD (= 2 g)
J01CR50	Amproxium	Caps	Ampicillin 0.125g/Oxacillin 0.125 g	8 UD (= 8 caps)
J01CR50	Co-fluampicil	Tab	Ampicillin 0.25 g/Flucloxacillin 0.25 g	4 UD (=4 tab)
J01EC20	Trisulfamid	Tab	Sulfacarbamide 0.167 g/Sulfadiazine 0.167 g/ Sulfadimidine 0.167 g	4 UD (=4 tab)
J01EE01	Bactrim, Eusaprim, Trimetoprim-sulfa	Inf.conc	Sulfamethoxazole 80 mg/Trimethoprim 16 mg	20 UD (=20 ml)
J01EE01	Bactrim, Eusaprim, Trimetoprim-sulfa	Mixt	Sulfamethoxazole 0.2 g/Trimethoprim 40 mg	8 UD (= 40 ml)
J01EE01	Bactrim, Eusaprim Trimetoprim-sulfa	Tab	Sulfamethoxazole 0.4 g /Trimethoprim 80 mg	4 UD (=4 tab)
J01EE02	Triglobe, Trimin Sulfa	Mixt	Sulfadiazine 0.205 g/Trimethoprim 45 mg	4 UD (=20 ml)
J01EE02	Triglobe, Trimin Sulfa	Tab	Sulfadiazine 0.41 g/Trimethoprim 90 mg	2 UD (=2 tab)
J01EE03	Lidaprim	Tab	Sulfametrole 0.8 g/Trimethoprim 0.16 g	2 UD (=2 tab)
J01EE03	Lidaprim	Powder for inj	Sulfametrole 0.8 g/ Trimethoprim 0.16 g per vial	2 UD (defined as 2 vials)
J01EE06	Sterinor	Tab	Sulfadiazin 0.25 g/Tetroxoprim 0.1 g	2 UD (=2 tab)
J01EE07	Berlocombin	Tab	Sulfamerazin 0.12 g/Trimethoprim 80 mg	4 UD (=4 tab)
J04AM02	Rifinah	Tab	Rifampicin 0.3 g/Isoniazid 0.15 g	2 UD (=2 tab)
J04AM02	Rifinah	Tab	Rifampicin 0.15 g/Isoniazid 0.1 g	4 UD (=4 tab)
J04AM02	Rimactazid	Tab	Rifampicin 0.15 g/Isoniazid 75 mg	4 UD (=4 tab)
J04AM05	Rifater	Tab	Rifampicin 0.12 g/Isoniazid 50 mg/ Pyrazinamide 0.3 g	6 UD (=6 tab)
J04AM05	Rimcure	Tab	Rifampicin 0.15 g/Isoniazid 75 mg/ Pyrazinamide 0.4 g	4 UD (=4 tab)
J04AM06	Rimstar	Tab	Rifampicin 0.15 g/Ethambutol 0.275 g/ Isoniazid 75 mg/Pyrazinamide 0.4 g	4 UD (=4 tab)
J05AR01	Combivir	Tab	Lamivudine 0.15 g/Zidovudine 0.3 g	2 UD (=2 tab)
J05AR02	Kivexa	Tab	Abacavir 0.6 g/Lamivudine 0.3 g	1 UD (=1 tab)
J05AR03	Truvada	Tab	Emtricitabine 0.2 g/ Tenofovir disoproxil 0.245 g	1 UD (=1 tab)
J05AR04	Trizivir	Tab	Zidovudine 0.3 g/Lamivudine 0.15 g/ Abacavir 0.3 g	2 UD (=2 tab)
J05AR06	Atripla	Tab	Emtricitabine 0.2 g/Tenofovir disoproxil 0.245 g/ Efavirenz 0.6 g	1 UD (=1 tab)

## Collect Manager and Dataset Manager

ESAC has changed its method of data submission to comply with ECDC surveillance systems requirements and to prepare the take-over by ECDC. ESAC has therefore developed two applications. A web application, Collect Manager (Figure 2.1) which allows the countries to submit their data for the core database and the AC database as well as to trace data exchange between the countries and the ESAC Management Team.

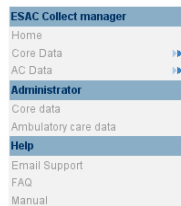
**Figure 2.1 Collect Manager**



### ESAC Collect Manager

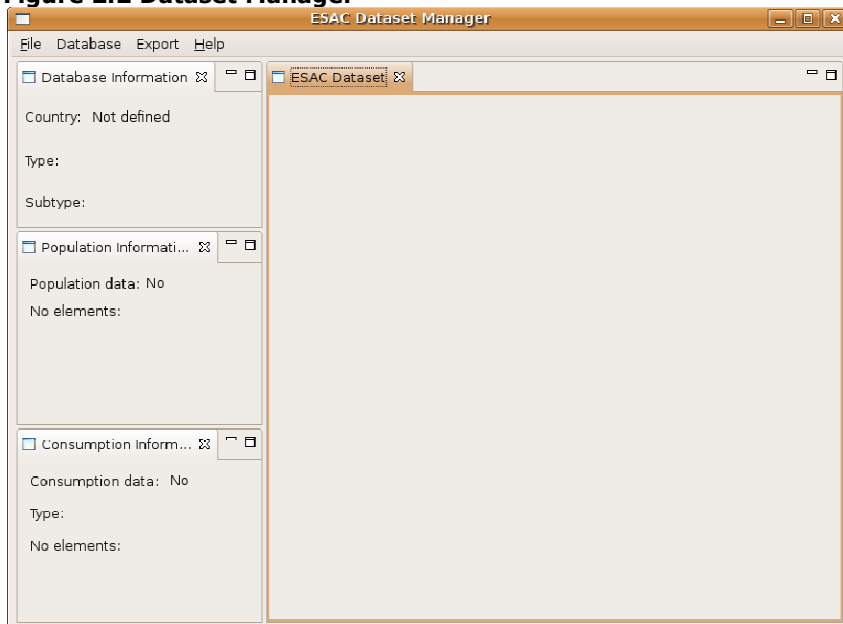
#### Welcome to the ESAC Data Collection Manager

The Collectmanager application is a web-based tool. Created for the ESAC project. The application is a non public website, so in order to use this website you first should be registered by ESAC. The application helps you to send the data generated with the XML Dataset manager program.



A second application, the Dataset Manager (Figure 2.2) allows the translation of data in excel format to an xml format. Since the 2007 data, the collection process is subdivided in three steps. Firstly, the countries use an excel template provided by ESAC to fill the dataset. Secondly, countries translate the data in an xml format using the Dataset Manager that is also used as a first validation check of the data. Third and last, the countries send the generated xml file to the Management team using Collect Manager. The data but also general information on the data is automatically saved in a database ready for processing by the Management Team.

**Figure 2.2 Dataset Manager**



### 3. RESULTS OF THE 2008 DATA COLLECTION

In 2009, ESAC collected 2008 data on:

8. antibacterials for systemic use (ATC therapeutic subgroup J01),
9. antimycotics for systemic use (ATC therapeutic subgroup J02),
10. antifungals for systemic use (ATC chemical subgroup D01BA),
11. drugs for treatment of tuberculosis (ATC pharmacological subgroup J04A),
12. antivirals for systemic use (ATC therapeutic subgroup J05),
13. oral and rectal nitroimidazole derivatives as antiprotozoals use (ATC chemical subgroup P01AB),
14. oral vancomycin as intestinal anti-infectives use (ATC chemical substance A07AA09) in the ambulatory and/or hospital care sector in 30 out of 35 participating countries.

The 2008 data on antibiotic use, for ambulatory care (AC) and hospital care (HC) was asked to be delivered at the product level, expressed in number of packages. Therefore, a valid national register of available antibiotics was needed. Fourteen out of the 30 participating countries were able to deliver valid data on antibiotic consumption by providing the number of packages consumed, using the ESAC template 1 format for data collection. Those countries were able to provide us with an exhaustive antibiotic consumption register. Eleven countries delivered data using DDD as volume of antibiotic consumption (template 2). Five countries delivered an antibiotic register which was not suitable for data processing, as such, data were processed using DDD at ATC5 level (template 2). Worth noting however, we encountered a lot of difficulties using the antibiotic register due to various mistakes made in requested packsize, strength, strength unit and DPP (DDD per package).

Since 2006, Bulgaria was able to provide data for ambulatory care (AC) and hospital care (HC) sectors separately, it was the consequence of a change of their data provider. Estonia could provide data for ambulatory and hospital care sectors separately in 2008 and an update of their total care (TC) 2007 data into AC and HC data. Since 2006, Greece delivered total care data, this year corresponded also to a change of their reporting system but not of their data provider. Poland provided data retrospective data for 2007 and 2008 as well as United Kingdom that provided retrospective data from 2006 to 2008.

In this report, data on ATC subgroups J01, J02, D01BA and J05 will be presented. The detailed results of the 2008 data collection have been presented in the ESAC Yearbook 2008.

#### Ambulatory care

Of the 35 participating countries (27 EU Member States, 3 EEA/EFTA countries, 3 candidate countries, and 2 others), 30 countries were able to deliver 2008 outpatient data on antibiotic use, while Cyprus, Lithuania and Greece provided total data, covering both ambulatory care and hospital care use. Malta could deliver for the first time 2007 outpatient data. The total outpatient use varied from 9.96 DID in the Russian Federation to 45.20 DID in Greece (total care) (Table 3.1). The median use and interquartile range (25%-75%) were respectively 19.70 DID and [15.10-23.08] DID. Additionally, Figure 3.1 shows a map of Europe presenting the total outpatient antibiotic use in Europe in 2008.

The change of data reporting for Greece had an effect of a shift from 35 DID to 43 DID in 2005 to 41 DID and 43 DID in 2006 and 2007 respectively (Table 3.1).

Since 2004, in addition to Belgium, France, Portugal, Slovenia and Sweden, many countries have implemented or plan to implement actions to control the antimicrobial resistance through the rational use of antimicrobials. The effect of those antibiotic campaigns however seems difficult to quantify using only DID. To enable this exercise, next to this measurement unit, we aimed at valid calculations of PID (number of daily packages per 1000 inhabitants per day). Next to the ATC/DDD classification system, that simple unit of measurement could be helpful because it disregards changes in package size or changes in dosing. Using information on packages of antibiotic consumption will enable us to better understand and interpret, complementary to the ATC/DDD classification, differences found between and within countries over the years.

**Table 3.1: Total outpatient antibiotic use in Europe from 1999 to 2008 expressed in DDD per 1000 inhabitants and per day**

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	<b>2008</b>
Austria	13.1	12.3	11.8	11.8	12.5	12.5	14.5	14.3	14.7	<b>14.6</b>
Belgium	26.2	25.3	23.7	23.8	23.8	22.7	24.3	24.2	25.4	<b>27.7</b>
Bulgaria <sup>4)</sup>	15.1	20.2	22.7	17.3	15.5	16.4	18.0	18.1*	19.8*	<b>20.6</b>
Croatia		18.4	18.5	22.6	23.4	23.0	23.4	21.2	22.5	<b>23.4</b>
Cyprus <sup>1)</sup>								31.9	33.9	<b>32.8</b>
Czech Rep.	18.6				16.7	15.8	17.3	15.9	16.8	<b>17.4</b>
Denmark	12.1	12.3	12.8	13.2	13.5	14.1	14.6	15.2	16.0	<b>16.0</b>
Estonia				11.7	11.1	10.4	11.7		12.7*	<b>11.9</b>
Finland	18.4	19.0	19.8	17.9	18.7	17.2	18.1	17.4	18.3	<b>18.4</b>
France	34.1	33.2	33.2	32.2	28.9	27.0	28.9	27.9	28.6	<b>28.0</b>
Germany	13.6	13.6	12.8	12.7	13.9	13.0	14.6	13.6	14.5*	<b>14.5</b>
Greece <sup>1)</sup>	30.7	31.7	31.8	32.8	33.6	33.0	34.7	41.1*	43.2*	<b>45.2</b>
Hungary	23.5	18.5	18.6	17.1	19.1	18.2	19.5	17.2	15.5	<b>15.2</b>
Iceland <sup>2)</sup>	21.7	20.5	20.0	20.6	20.3	21.4	23.2	20.0	20.1*	<b>20.6</b>
Ireland	18.0	17.6	18.7	18.7	20.1	20.2	20.5	21.2	23.0	<b>22.5</b>
Israel				19.6	20.1	19.6	20.5	22.2	20.2	<b>22.0</b>
Italy	24.5	24.0	25.5	24.3	25.6	24.8	26.2	26.7	27.6	<b>28.5</b>
Latvia				11.0		11.8	12.1	12.0	13.0	<b>11.0</b>
Lithuania <sup>1)</sup>								22.7*	24.11	<b>25.1</b>
Luxembourg	26.8	25.9	26.5	26.4	27.5	24.1	25.2	23.9	25.6	<b>25.1</b>
Malta									18.0*	
Norway			15.6	15.7	15.6	15.7	16.8	14.8*	15.5*	<b>15.5</b>
Poland	22.2	22.6	24.8	21.4		19.1	19.6		20.9*	<b>20.7</b>
Portugal	25.2	24.9	24.5	26.5	25.1	23.8	24.5	22.7	21.8	<b>22.6</b>
Russian Federation					9.8	9.3	9.1	9.6	10.2	<b>10.0</b>
Slovakia	25.7	27.6	29.1	26.7	27.6	22.5	25.1	22.5	24.8	<b>23.4</b>
Slovenia	19.8	18.0	17.4	16.3	17.0	16.7	16.3	14.7	16.0	<b>15.0</b>
Spain <sup>3)</sup>	20.0	19.0	18.0	18.0	18.9	18.5	19.3	18.7	19.9	<b>19.7</b>
Sweden	15.8	15.5	15.8	15.2	14.7	14.5	14.9	15.3	15.5	<b>14.6</b>
Switzerland						9.0				
The Netherlands	10.0	9.8	9.9	9.8	9.8	9.7	10.5	10.8	11.0	<b>11.2</b>
United Kingdom	14.8	14.3	14.8	14.8	15.1	15.0	15.4	15.3*	16.5*	<b>17.0</b>

1) Cyprus, Greece, Lithuania: total use, including the hospital sector.

2) Iceland: total use until 2005, outpatient use from 2006.

3) Spain: reimbursement data, does not include over-the-counter sales without prescriptions.

4) Bulgaria: total use until 2005, outpatient use from 2006. Change of data provider in 2006.

\* updated data

**Figure 3.1: Map of Europe showing total outpatient antibiotic use in 2008 in the participating countries**

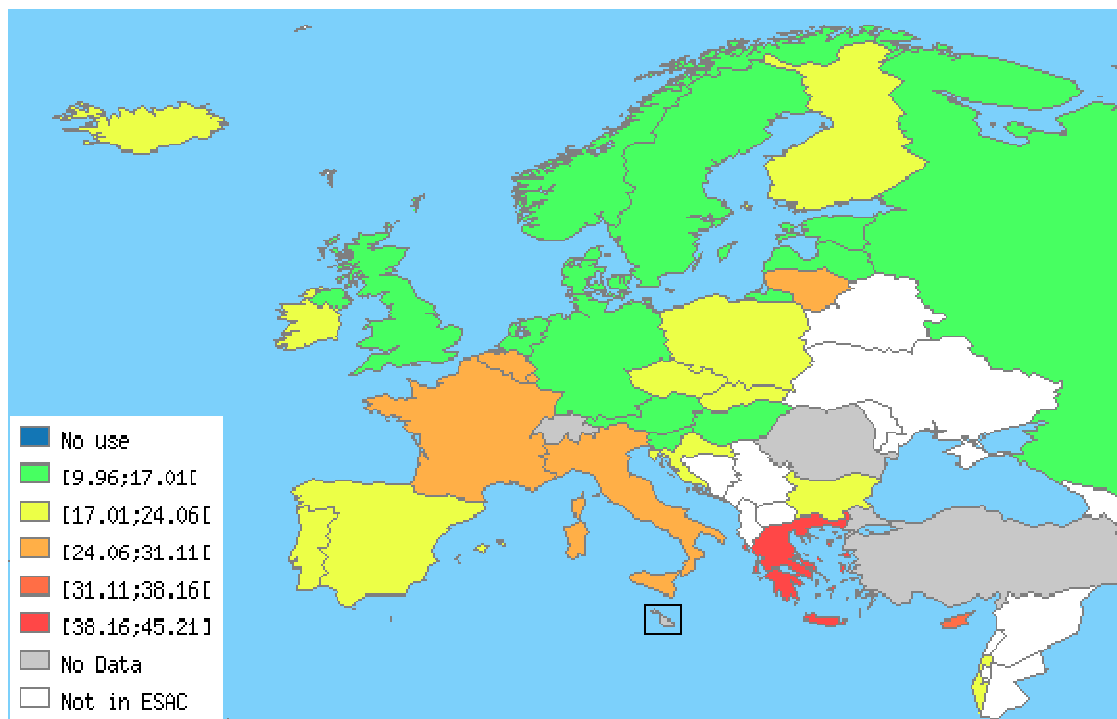


Table 3.2 and Figure 3.2 present the outpatient antibiotic use broken down into seven major antibiotic pharmacological subgroups according to the ATC classification: penicillins (J01C), cephalosporins and other beta-lactams (J01D), macrolides, lincosamides and streptogramins (J01F), tetracyclines (J01A), quinolones (J01M), sulphonamides and trimethoprim (J01E) and the other antibiotics including amphenicols (J01B), aminoglycosides (J01G), combinations (J01R) and other antibacterials (J01X).

Penicillins represented the most frequently prescribed antibiotic in all countries, ranging from 30.1% (Germany) to 62.6% (Denmark) of the total outpatient antibiotic use. For cephalosporins, the proportional use ranged from 0.2% in Denmark to 21.1% in Greece, from 1.9% in Italy to 25.6% in Iceland for tetracyclines, from 3.1% in Sweden to 25.5% in Greece for macrolides, and from 3.1% in the United Kingdom to 17,0% in the Russian Federation for quinolones.

**Table 3.2: Outpatient antibiotic use in 2008 subdivided into the major antibiotic classes according to ATC classification**

Country	Penicillins (J01C)	Cephalosporins and other beta-lactams (J01D)	Tetracyclines (J01A)	Macrolides, lincosamides and streptogramins (J01F)	Quinolones (J01M)	Sulfonamides and trimethoprim (J01E)	Other J01 classes	Total J01
Greece*	14.92	9.51	2.41	11.54	3.05	0.42	3.35	<b>45.20</b>
Cyprus*	14.86	6.57	2.74	3.45	4.29	0.41	0.46	<b>32.78</b>
Italy	15.17	2.78	0.54	5.27	3.44	0.50	0.75	<b>28.45</b>
France	14.73	2.53	3.43	4.14	2.08	0.47	0.61	<b>27.99</b>
Belgium	15.48	2.02	2.19	2.78	2.41	0.38	2.39	<b>27.66</b>
Luxembourg	11.98	3.99	2.02	3.16	2.61	0.34	1.04	<b>25.13</b>
Lithuania*	13.04	3.20	2.36	2.04	1.56	0.01	2.89	<b>25.10</b>
Slovakia	9.53	3.89	1.54	5.93	2.00	0.48	0.04	<b>23.41</b>
Croatia	10.99	3.99	1.77	3.32	1.44	1.20	0.65	<b>23.37</b>
Portugal	11.60	1.98	0.82	3.87	3.05	0.43	0.85	<b>22.61</b>
Ireland	11.34	1.56	3.18	4.11	1.04	0.99	0.20	<b>22.42</b>
Israel	11.70	4.08	1.18	1.80	1.39	0.00	1.89	<b>22.04</b>
Poland	10.13	2.21	2.49	3.66	1.21	0.95	0.05	<b>20.69</b>
Iceland	10.88	0.26	5.29	1.61	0.77	1.35	0.48	<b>20.64</b>
Bulgaria†	9.75	2.08	2.16	3.20	2.08	0.99	0.30	<b>20.56</b>
Spain**	12.23	1.65	0.60	1.92	2.42	0.30	0.58	<b>19.70</b>
Finland	6.11	2.32	4.03	1.55	0.88	1.43	2.04	<b>18.36</b>
Malta^	8.81	2.99	0.93	3.22	1.71	0.20	0.14	<b>18.00</b>
Czech Republic	7.25	1.39	2.51	3.33	1.24	0.87	0.83	<b>17.41</b>
United Kingdom	7.95	0.71	3.72	2.47	0.52	1.13	0.42	<b>16.93</b>
Denmark	9.99	0.03	1.55	2.32	0.52	0.77	0.79	<b>15.97</b>
Norway	6,76	0,14	2,79	1,89	0,50	0,77	2,68	<b>15,53</b>
Hungary	6,14	1,86	1,39	3,06	1,75	0,69	0,29	<b>15,18</b>
Slovenia	9.37	0.44	0.52	2.47	1.11	1.12	0.00	<b>15.03</b>
Austria	6.17	1.70	1.33	3.65	1.31	0.29	0.20	<b>14.64</b>
Sweden	7.37	0.30	3.22	0.45	0.83	0.57	1.87	<b>14.60</b>
Germany	4.38	1.92	3.21	2.39	1.42	0.81	0.41	<b>14.54</b>
Estonia	4.73	0.85	2.17	2.25	0.88	0.47	0.52	<b>11.88</b>
The Netherlands	4.42	0.04	2.63	1.48	0.90	0.58	1.17	<b>11.24</b>
Latvia	5.01	0.49	2.28	0.95	0.98	0.84	0.39	<b>10.95</b>
Russian Federation	3.30	0.37	0.90	1.53	1.89	0.86	1.11	<b>9.96</b>

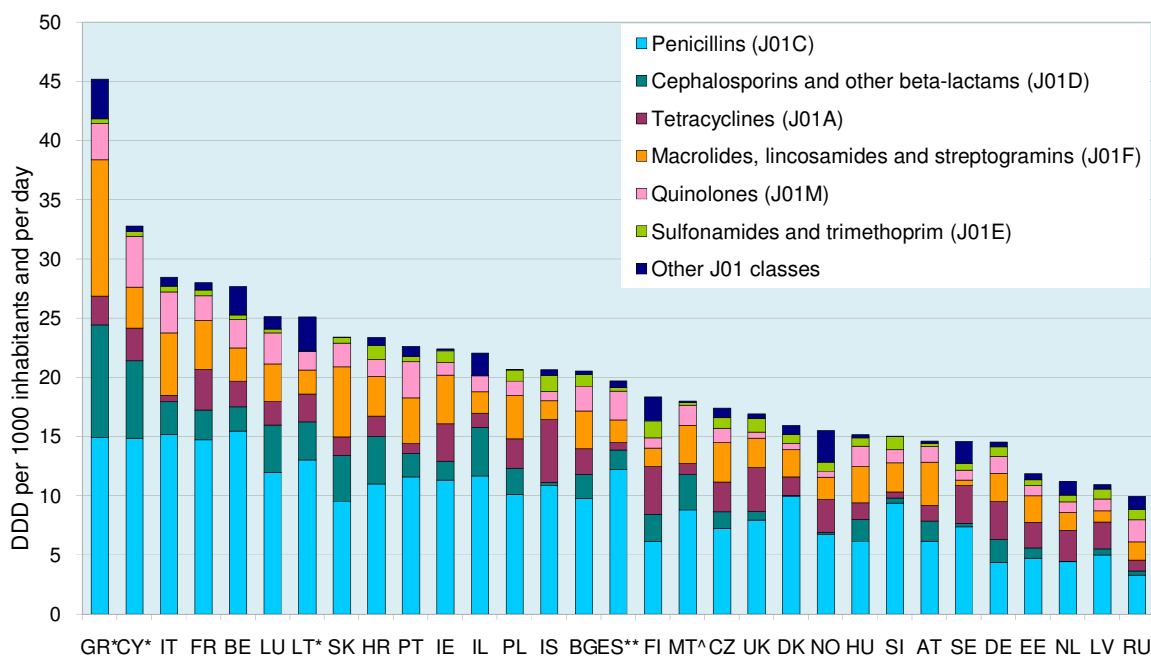
\* Cyprus, Greece, Lithuania: total use, including the hospital sector.

\*\* Spain: reimbursement data, does not include over-the-counter sales without prescription.

† Bulgaria: total use until 2005, outpatient use from 2006.

^ Malta: data for the year 2007.

**Figure 3.2: Outpatient antibiotic (J01) use in 2008 subdivided into the major antibiotic classes according to ATC classification**



\* Cyprus, Greece, Lithuania: total use, including the hospital sector.  
 \*\* Spain: reimbursement data, does not include over-the-counter sales without prescription.  
 ^ Malta: 2007 displayed.

## Hospital care

Of the 35 participating countries 19 were able to deliver data on antibiotic use in hospitals in 2008, Belgium however delivered 2007 data. Table 3.3 and Figure 3.3 present the hospital use of the major antibiotic groups according to the ATC classification (penicillins (J01C), cephalosporins (J01D), macrolides (J01F), quinolones (J01M), tetracyclines (J01A), sulphonamides (J01E), and other antibiotics [concatenation of amphenicols (J01B), aminoglycosides (J01G), combinations of antibacterials (J01R) and other antibacterials (J01X)] within the hospital antibiotic use.

The proportion of penicillins use ranged from 17,9% in Finland to 56,9% in France. Nine out of 17 countries had a proportion of use of penicillins greater than one third. The proportion of cephalosporins use was high in Bulgaria (44,5%), and low in Ireland (8,4%). Tetracycline use was the highest in Sweden (12,4%). Macrolide use ranged from 3,2% in Latvia to 15,7% in Malta; and quinolone use from 6,9% in Norway to 21,8% in Hungary. Sulfonamide use was the highest in Finland (6,5%) and low in Bulgaria (0,7%). The use of other classes was high in Finland (22,0%) and the Russian Federation (20,6%).

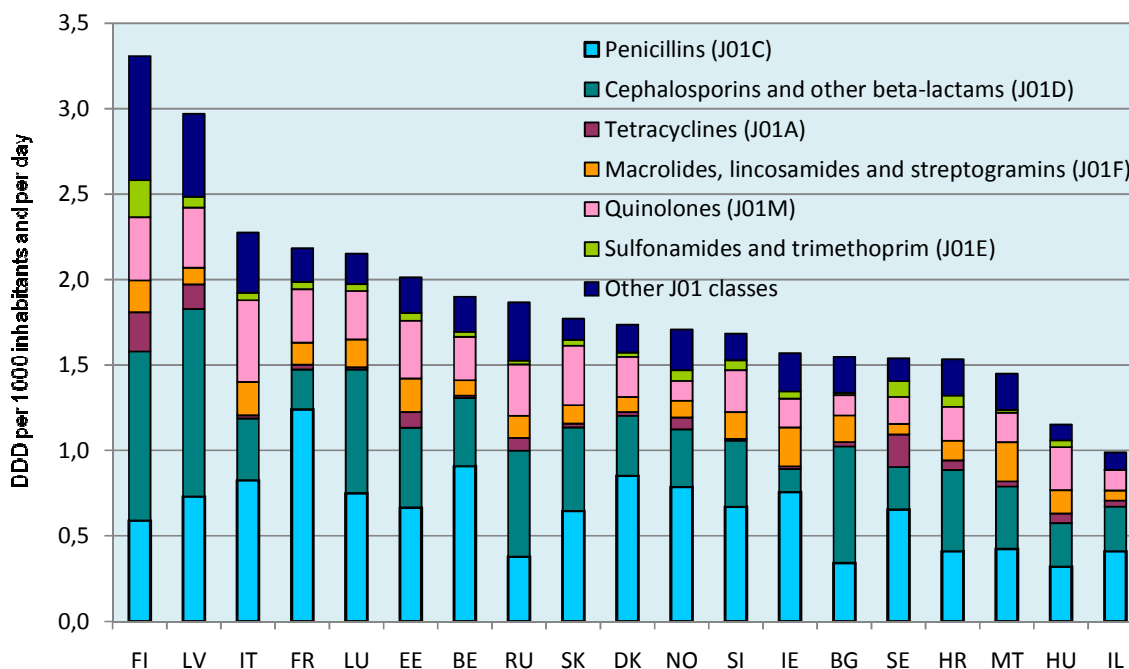
Nevertheless, the reliability of the estimation of national aggregates of hospital antibiotic consumption must be critically evaluated. All the reporting countries derive a reliable estimate for national hospital exposure to antibiotics from wholesale data or from detailed consumption registration in all hospitals. Moreover the validity of the hospital data is much more vulnerable for biases in ambulatory/hospital case mix. Specifically in Finland, where some remote primary health care centres and nursing homes were included into the hospital data, proportional use of "other antibiotics" was 22%, predominantly due to the use of oral methenamine and nitrofurantoin.

**Table 3.3: Hospital use of antimicrobials for systemic use (ATC group J01) in 2008 in the participating countries**

Country	Penicillins (J01C)	Cephalosporins and other beta-lactams (J01D)	Tetracyclines (J01A)	Macrolides, lincosamides and streptogramins (J01F)	Quinolones (J01M)	Sulfonamides and trimethoprim (J01E)	Other J01 classes	Total J01
Finland	0.59	0.99	0.23	0.19	0.37	0.22	0.73	<b>3.31</b>
Latvia	0.73	1.09	0.15	0.10	0.35	0.06	0.48	<b>2.97</b>
Italy	0.83	0.36	0.02	0.19	0.48	0.04	0.35	<b>2.27</b>
France	1.24	0.23	0.03	0.13	0.31	0.04	0.20	<b>2.18</b>
Luxembourg	0.75	0.72	0.01	0.16	0.28	0.04	0.18	<b>2.15</b>
Estonia	0.67	0.47	0.09	0.20	0.34	0.05	0.21	<b>2.01</b>
Belgium*	0.91	0.40	0.01	0.09	0.25	0.03	0.21	<b>1.90</b>
Russian Federation	0.38	0.62	0.07	0.13	0.30	0.02	0.34	<b>1.87</b>
Slovakia	0.65	0.49	0.02	0.11	0.35	0.04	0.12	<b>1.77</b>
Denmark	0.85	0.35	0.02	0.09	0.24	0.02	0.16	<b>1.74</b>
Norway	0.79	0.34	0.07	0.10	0.12	0.06	0.24	<b>1.71</b>
Slovenia	0.67	0.39	0.01	0.16	0.25	0.06	0.16	<b>1.68</b>
Ireland	0.76	0.13	0.02	0.23	0.17	0.04	0.22	<b>1.57</b>
Bulgaria	0.34	0.68	0.03	0.15	0.12	0.01	0.21	<b>1.55</b>
Sweden	0.66	0.25	0.19	0.06	0.16	0.09	0.13	<b>1.54</b>
Croatia	0.41	0.48	0.06	0.11	0.20	0.06	0.21	<b>1.53</b>
Malta	0.43	0.36	0.03	0.23	0.17	0.02	0.21	<b>1.45</b>
Hungary	0.32	0.25	0.06	0.14	0.25	0.04	0.09	<b>1.15</b>
Israel	0.41	0.26	0.04	0.06	0.12	0.00	0.10	<b>0.99</b>

\* Belgium: 2007 data

**Figure 3.3: Hospital use of antimicrobials for systemic use (ATC group J01) in the participating countries in 2008**





## Antimycotic and antifungal use in Europe

Table 3.4 and Figure 3.4 present the outpatient antimycotic use in 2008 for 23 European countries expressed in DID and subdivided into the main used substances. Twenty countries provided both J02 and D01B data. Greece, Slovenia and Lithuania did not report D01B use.

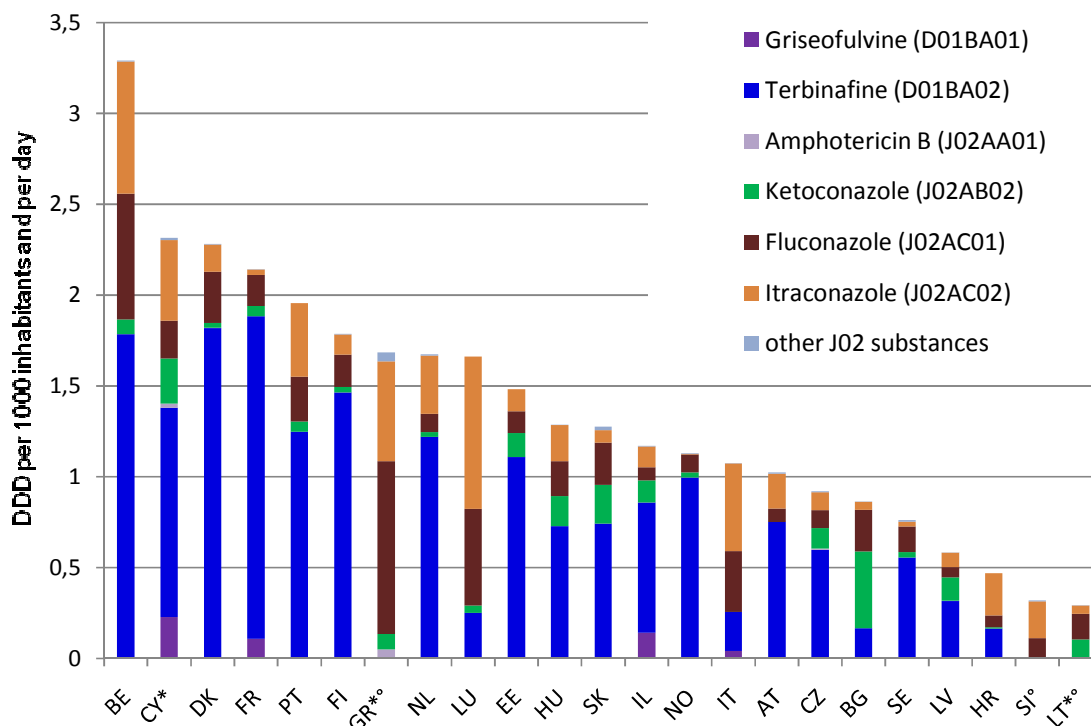
Among those countries who provided J02 and D01B data, total outpatient antimycotic and antifungal use varied with a factor 7.0 between the country with the highest (3.29 DID in Belgium) and lowest (0.47 DID in Croatia) use. The proportion of terbinafine use varied between 88.1% and 15.2% in Norway and Luxembourg respectively. Terbinafine use represented more than 50% of the total systemic antimycotic and antifungal use in 16 out of the 20 countries.

**Table 3.4: Outpatient antimycotic and antifungal (J02 & D01B) use in 2008 subdivided into the main substances according to ATC classification**

Country	Griseofulvine (D01BA01)	Terbinafine (D01BA02)	Amphotericin B (J02AA01)	Ketoconazole (J02AB02)	Fluconazole (J02AC01)	Itraconazole (J02AC02)	Other J02	Total J02 & D01B
Belgium	-	1.78	0.00	0.08	0.69	0.73	0.01	<b>3.29</b>
Cyprus*	0.23	1.15	0.02	0.25	0.21	0.44	0.01	<b>2.31</b>
Denmark	-	1.82	0.00	0.03	0.28	0.15	0.00	<b>2.28</b>
France	0.11	1.78	-	0.06	0.17	0.03	0.00	<b>2.14</b>
Portugal	0.00	1.25	-	0.05	0.25	0.40	-	<b>1.95</b>
Finland	-	1.47	0.00	0.03	0.18	0.11	0.00	<b>1.79</b>
Greece*	-	-	0.05	0.08	0.95	0.55	0.05	<b>1.68</b>
The Netherlands	0.00	1.22	0.00	0.03	0.10	0.32	0.01	<b>1.67</b>
Luxembourg	-	0.25	0.00	0.04	0.53	0.84	-	<b>1.66</b>
Estonia	0.00	1.11	0.00	0.13	0.12	0.12	-	<b>1.48</b>
Hungary	-	0.73	-	0.17	0.19	0.20	0.00	<b>1.29</b>
Slovakia	-	0.74	0.00	0.21	0.23	0.07	0.02	<b>1.28</b>
Israel	0.14	0.72	0.00	0.12	0.07	0.11	0.00	<b>1.17</b>
Norway	0.00	0.99	0.00	0.03	0.10	0.00	0.00	<b>1.13</b>
Italy	0.04	0.21	-	0.00	0.34	0.48	0.00	<b>1.07</b>
Austria	-	0.75	0.00	-	0.07	0.19	0.01	<b>1.02</b>
Czech Republic	-	0.60	0.01	0.11	0.10	0.10	0.00	<b>0.92</b>
Bulgaria	-	0.17	-	0.42	0.23	0.04	0.00	<b>0.86</b>
Sweden	0.000	0.56	-	0.03	0.14	0.03	0.01	<b>0.76</b>
Latvia	-	0.32	0.00	0.13	0.06	0.08	0.00	<b>0.58</b>
Croatia	-	0.16	0.00	0.01	0.06	0.23	-	<b>0.47</b>
Slovenia	-	-	-	-	0.11	0.20	0.01	<b>0.32</b>
Lithuania*	-	-	-	0.10	0.14	0.05	0.00	<b>0.29</b>

\* Cyprus, Greece, Lithuania: total use, including the hospital sector.

**Figure 3.4: Outpatient antimycotic and antifungal (J02 & D01B) use in 2008 subdivided into the main substances according to ATC classification**



\* Cyprus, Greece, Lithuania: total use, including the hospital sector.

° Greece, Slovenia, Lithuania : provided no D01B data.

### Antiviral use in Europe

Table 3.5 and Figure 3.5 present data on total (out- and inpatient) use of all antivirals for systemic use (ATC J05) aggregated at the level of the chemical subgroup, expressed in DDD (WHO ATC/DDD, version 2008) per 1000 inhabitants per day (DID).

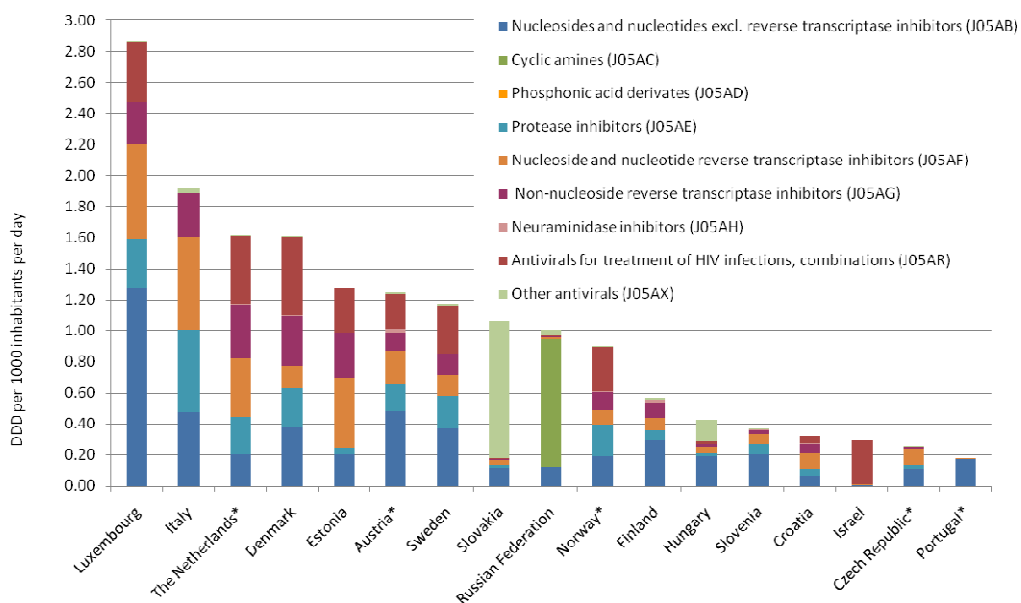
Total systemic antiviral use in 2008 in 12 European countries varied by a factor of 9.8 between the country with the highest (2.9 DID in Luxembourg) and the country with the lowest (0.29 DID in Israel) use. 5 countries (the Netherlands, Austria, Norway, Czech Republic and Portugal) provided outpatient data only. For 11 countries, more than 50% of the systemic antiviral use is represented by substances to treat HIV/AIDS and hepatitis B (ATC J05AE, J05AF, J05AG, J05AR), namely for Israel (97%) the Netherlands (87%), Estonia (83%), Croatia (78%), Norway (77%), Denmark (75%), Italy (73%), Sweden (67%) Austria (58%), the Czech Republic (56%), and Luxembourg (55%). The use of neuraminidase inhibitors (ATC J05AH) was the highest in Austria and Finland (0.03 DID) and varied from 4.2% in Finland to no use reported in Portugal and Israel.

**Table 3.5: Total use of antivirals for systemic use (J05A) for 17 participating European countries in 2008.**

Country	Nucleosides and nucleotides excl. reverse transcriptase inhibitors (J05AB)	Cyclic amines (J05AC)	Phosphonic acid derivatives (J05AD)	Protease inhibitors (J05AE)	Nucleoside and nucleotide reverse transcriptase inhibitors (J05AF)	Non-nucleoside reverse transcriptase inhibitors (J05AG)	Neuraminidase inhibitors (J05AH)	Antivirals for treatment of HIV infections, combinations (J05AR)	Other antivirals (J05AX)	all antivirals (J05A)
Luxembourg	1.27		0.00	0.32	0.62	0.27	0.00	0.39	0.01	<b>2.87</b>
Italy	0.47		0.00	0.53	0.60	0.29	0.00	0.00	0.03	<b>1.92</b>
The Netherlands*	0.20		0.00	0.24	0.38	0.35	0.00	0.44	0.01	<b>1.62</b>
Denmark	0.38			0.25	0.14	0.32	0.01	0.50	0.01	<b>1.61</b>
Estonia	0.20	0.00		0.04	0.45	0.28	0.00	0.29		<b>1.27</b>
Austria*	0.48			0.17	0.22	0.11	0.03	0.22	0.01	<b>1.25</b>
Sweden	0.37		0.00	0.21	0.14	0.13	0.00	0.31	0.01	<b>1.18</b>
Slovakia	0.12			0.01	0.04	0.00	0.00	0.01	0.88	<b>1.06</b>
Russian Federation	0.12	0.83		0.00	0.01	0.00	0.00	0.01	0.03	<b>1.00</b>
Norway*	0.19		0.00	0.20	0.09	0.12	0.00	0.29	0.01	<b>0.90</b>
Finland	0.29			0.07	0.08	0.09	0.03		0.01	<b>0.57</b>
Hungary	0.19		0.00	0.02	0.04	0.02	0.00	0.02	0.14	<b>0.43</b>
Slovenia	0.21		0.00	0.06	0.06	0.03	0.00		0.00	<b>0.36</b>
Croatia	0.07			0.04	0.10	0.06	0.00	0.04		<b>0.32</b>
Israel	0.01		0.00	0.00	0.00	0.00	0.00	0.28		<b>0.29</b>
Czech Republic*	0.11			0.03	0.10	0.02	0.00	0.00	0.00	<b>0.25</b>
Portugal*	0.17				0.01					<b>0.18</b>

\*Outpatient use only for the Netherlands, Austria, Norway , the Czech Republic and Portugal

**Figure 3.5: Total (out- and inpatient) antiviral consumption (J05A) for 17 participating European countries in 2008.**



\*Outpatient use only for the Netherlands, Austria, Norway, the Czech Republic and Portugal

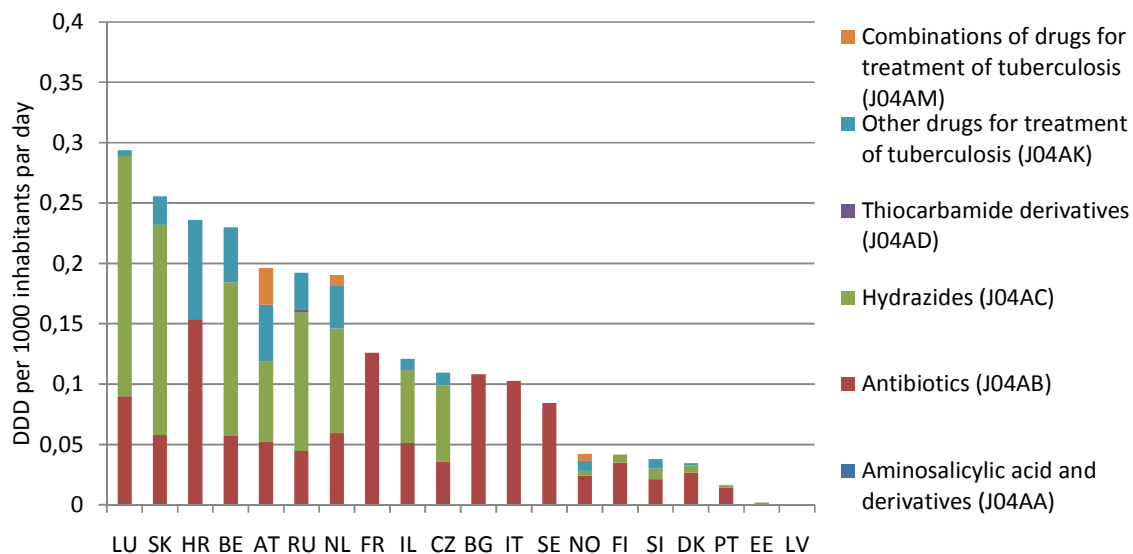
## Antituberculosis use in Europe

Figures 3.6 and 3.7 present data on outpatient use and use in hospital settings of all drugs for treatment of tuberculosis (ATC J04A) aggregated at the level of the chemical subgroup, expressed in DDD (WHO ATC/DDD, version 2008) per 1000 inhabitants per day (DID). France, Bulgaria, Italy, Sweden and Latvia only reported antibiotic use (J04AB). Concerning the hospital settings, Ireland only reported antibiotic use as well.

Among those countries reporting outpatient use of all drugs for the treatment of tuberculosis (n=14), antibiotic use (ATC J04AB) represented on average 47% of the total outpatient antituberculosis drugs use, whereas hydrazides (J04AC) represented on average 36% and other drugs for the treatment of tuberculosis (J04AK) on average 14% of the total outpatient antituberculosis drugs use. Results are shown in Figure 3.6.

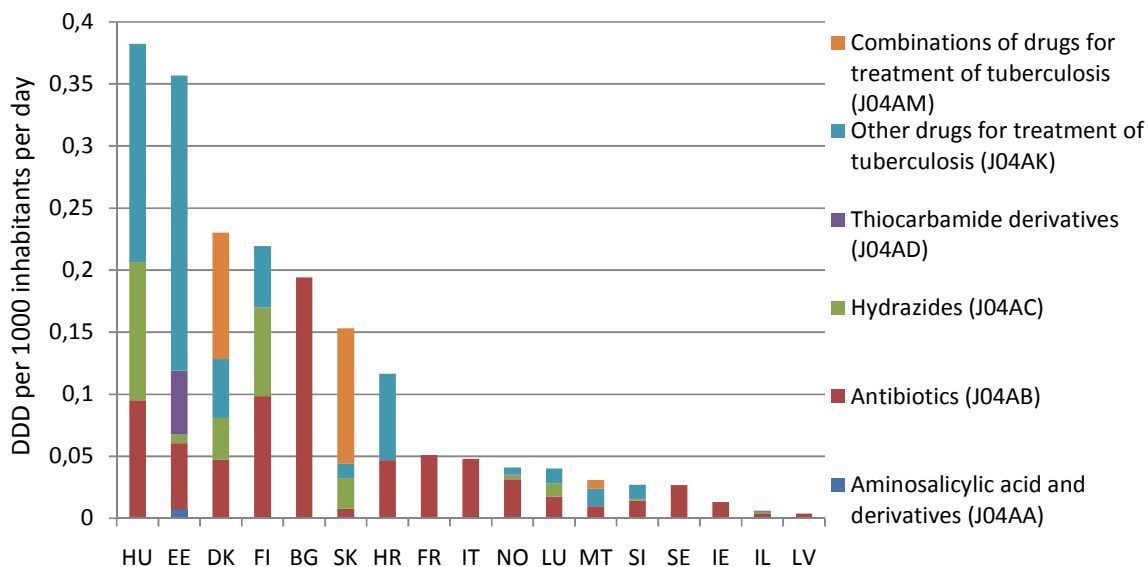
Among those countries reporting hospital use of all drugs for the treatment of tuberculosis (n=11), antibiotic use (ATC J04AB) represented on average 39% of the total outpatient antituberculosis drugs use, whereas hydrazides (J04AC) represented on average 14% and other drugs for the treatment of tuberculosis (J04AK) on average 34% of the total outpatient antituberculosis drugs use. Results are shown in Figure 3.7.

**Figure 3.6: Drugs for treatment of tuberculosis (J04A) in outpatient settings for 20 participating European countries in 2008.**



HR: omitted figure for hydrazides (J04AC)

**Figure 3.7: Drugs for treatment of tuberculosis (J04A) in hospital settings for 17 participating European countries in 2008.**



HR: omitted figure for hydrazides (J04AC)

### Regional data in Europe

Four countries provided ESAC with regional data for the year 2008. Ireland and Sweden provided regional data at NUTS level 3, Italy at NUTS level 2 and the United Kingdom at NUTS level 1.



#### **4. PREPARATION OF THE SCIENTIFIC ADVISORY BOARD**

On November 27, 2009, a very important Scientific Advisory Board meeting was held in Paris, France in order to discuss and facilitate the ESAC take-over by ECDC. Decisions needed to be taken on what activities would be transferred to ECDC. ECDC had already informed the Management Team that ESAC would be extended for an additional 4 months (September-January; ESAC-4), therefore also deliverables and milestones to be met during ESAC-4 had to be discussed and agreed upon during the SAB meeting. ESAC will be transferred to ECDC on January 1, 2011.

A total of 2 preparatory half a day meetings were held by the entire ESAC Management Team. The first was held in October to discuss the content of the different presentations for Paris:

1. Core Data
2. Ambulatory Care Subproject
3. Hospital Care Subproject
4. Nursing Homes Subproject
5. Socio-Economics Subproject

The ESAC Coordinator decided to prepare a powerpoint template in order to streamline all presentations. Following items were to be addressed in each of the presentations:

- Objectives ESAC-3
- Deliverables and milestones ESAC-3
- Summary of results
- (Planned) Publications
- Expected achievements by September 2010
- Objectives ESAC-4
- Deliverables and milestones ESAC-4
- SWOT (strengths, weaknesses, opportunities, threats)
- To be continued...
  - by ECDC
  - by subcontractor(s)

During the second preparatory meeting in November the different presentations were discussed by the Management Team and improved. Especially activities to be taken over by ECDC versus activities to be subcontracted were carefully reviewed. Objectives, deliverables and milestones for ESAC-4 were defined next to the achievements expected by the end of ESAC-3. Also the SWOT analyses were discussed in great detail and recommendations for the take-over were made for ECDC.

After this second meeting all final presentations were sent to all members of the SAB and to ECDC in a timely fashion so all participants of the SAB meeting could prepare this important meeting well in advance.

The minutes of this SAB meeting can be consulted in Chapter 9.





## 5. DISSEMINATION ACTIVITIES

### Papers published in peer reviewed journals (see Annex V)

Brice Amadeo, Peter Zarb, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Anne-Marie Rogues, Peter Davey, Herman Goossens; on behalf of the ESAC III Hospital Care Subproject Group. *European Surveillance of Antimicrobial Consumption (ESAC) point prevalence survey 2008: paediatric antimicrobial prescribing in 32 hospitals in 21 countries*. J. Antimicrob. Chemother. Chemotherapy 2010; doi: 10.1093/jac/dkq309.

Adriaenssens N, Coenen S, Muller A, Vankerckhoven V, Goossens H, on behalf of the ESAC Project Group. *European Surveillance of Antimicrobial Consumption (ESAC): Outpatient systemic antimycotic and antifungal use in Europe*. J Antimicrob Chemother 2010; 65(4):769-74.

Adriaenssens N, Coenen S, Muller A, Vankerckhoven V, Goossens H, on behalf of the ESAC Project Group. *European Surveillance of Antimicrobial Consumption (ESAC): Gebruik van antischimmelpreparaten in de ambulante praktijk in Europa*. Huisarts Nu 2010;39(5):186-91.

Jans B, Coenen S, Vankerckhoven V, Stroobants R, Goossens H for the ESAC Nursing Homes subprojectgroep. *Het concept 'nursing home' in Europa. European Surveillance of Antimicrobial Consumption (ESAC)*. Huisarts Nu 2009;38: 417-23.

Ansari F, Erntell M, Goossens H, Davey P. *The European surveillance of antimicrobial consumption (ESAC) point-prevalence survey of antibacterial use in 20 European hospitals in 2006*. Clin Infect Dis 2009; 49(10): 1496-1504.

Adriaenssens N, Goossens H, Coenen S, on behalf of the ESAC Project Group. *Comment on: Developments in outpatient parenteral antimicrobial therapy (OPAT) for Gram-positive infections in Europe, and the potential impact of daptomycin*. J Antimicrob Chemother 2009;64:1347.

Cavalié, P, Amadeo, B, Goossens, H, Muller, A. *Antibiotic consumption in French hospital system over an 11-year period (1997-2007): Results of the ESAC retrospective data collection*. Antibiotiques 2009;11(4): 212-17.

Coenen S, Muller A, Adriaenssens N, Vankerckhoven V, Hendrickx E, and Goossens H. *European Surveillance of Antimicrobial Consumption (ESAC): outpatient parenteral antibiotic treatment in Europe*. J Antimicrob Chemother 2009; 64: 200-5.

Coenen S, Adriaenssens N, Muller A, Vankerckhoven V, Hendrickx E, and Goossens H. *European Surveillance of Antimicrobial Consumption (ESAC): outpatient antibiotic use in children in Europe [Abstract]*. Pediatr Infect Dis J 2009; 28: e1.

### Abstracts accepted for oral presentation (see Annex VI)

B. Jans, K. Latour, E. Broex, R. Stroobants, A. Muller, V. Vankerckhoven, H. Goossens on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject group. *The European Surveillance of Antimicrobial Consumption: point prevalence survey of antimicrobial prescriptions in 270 European nursing homes*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010. (Oral presentation by B. Jans)

K. Latour, E. Broex, N. Drapier, A. Muller, V. Vankerckhoven, R. Stroobants, H. Goossens, B. Jans on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject group. *Impact of medical care and coordination on antibiotic policy and consumption: preliminary results of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010. (Oral presentation by K. Latour)

E. Broex, K. Latour, A. Muller, N. Drapier, V. Vankerckhoven, R. Stroobants, H. Goossens, B. Jans on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject group. *The European Surveillance of Antimicrobial Consumption (ESAC) survey of wound prevalence and antibiotic use in 270 European nursing homes in 2009*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010. (Oral presentation by E. Broex)

B. Amadeo, P. Zarb, G. Gavazzi, A. Muller, V. Vankerckhoven, P. Davey, H. Goossens on behalf of the ESAC Hospital Care Subproject Group. *The ESAC point prevalence survey: Antimicrobial prescribing in 2 age groups of elderly patients from 49 hospitals in 28 European countries in 2008*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010. (Oral presentation by B. Amadeo)

P. Zarb, B. Amadeo, A. Muller, V. Vankerckhoven, P. Davey, H. Goossens on behalf of the ESAC Hospital Care Sub-project Group. *Systemic antifungal therapy in European hospitals. Data from the ESAC point prevalence surveys 2008 and 2009*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010. (Oral presentation by P. Zarb)

N. Adriaenssens, S. Coenen, A. Muller, V. Vankerckhoven, H. Goossens and the ESAC Project Group. *European Surveillance of Antimicrobial Consumption (ESAC): Outpatient systemic antiviral use in Europe*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010. (Oral presentation by N. Adriaenssens)

P. Zarb, B. Amadeo, A. Muller, V. Vankerckhoven, P. Davey, H. Goossens, on behalf of the ESAC Hospital Care Sub-project Group. *ESAC Point Prevalence Survey of Antibiotic Use in 134 European Hospitals in 2009*. 5th Decennial International Conference on Healthcare-Associated Infections, Atlanta, US, 18-22 Mar, 2010. (Oral presentation by P. Zarb)

### **Abstracts accepted for poster presentation (see Annex VII)**

B. Jans, K. Latour, E. Broex, R. Stroobants, A. Muller, V. Vankerckhoven, H. Goossens on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject group. *The European Surveillance of Antimicrobial Consumption: point prevalence survey of antimicrobial prescriptions in 116 Belgian nursing homes*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010.

K. Latour, E. Broex, N. Drapier, A. Muller, V. Vankerckhoven, R. Stroobants, H. Goossens, B. Jans on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject group. *Infection control resources in European nursing homes and their relation to antibiotic use: data of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010.

G. Gavazzi, P. Gilbert, L. Fontaine, R. Stroobants, E. Hendrickx, A. Muller, V. Vankerckhoven, H. Goossens, B. Jans on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject group. *Antibiotic consumption in 30 French nursing homes: a point prevalence study from the European Surveillance of Antimicrobial Consumption nursing*

*home subproject*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010.

V. Vankerckhoven, A. Muller, A. Versporten, S. Coenen, N. Adriaenssens, S. Vaerenberg, P. Zarb, B. Amadeo, P. Davey, E. Broex, B. Jans, C. Marais, P. Beutels, N. Drapier, S. Nys, and H. Goossens. *European Surveillance of Antimicrobial Consumption (ESAC)*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010, EU Corner.

Arno Muller, Nico Drapier, Brice Amadeo, Peter Zarb, Bea Jans, Vanessa Vankerckhoven, Peter Davey, Herman Goossens, on behalf of the ESAC Hospital Care Sub-project Group. *The ESAC-WebPPS application: Point Prevalence Surveys on Antimicrobial Prescribing Made Online*. 5th Decennial International Conference on Healthcare-Associated Infections, Atlanta, US, 18-22 Mar, 2010.

Béatrice Jans, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Rudi Stroobants, Katrien Latour, Ellen Broex, Herman Goossens, on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Project Group. *Are frequent catheter use and presence of wounds related to higher antimicrobial prescription frequencies in nursing home populations? Data from the first point prevalence survey on antibiotic use in European nursing homes in 2009*. 5th Decennial International Conference on Healthcare-Associated Infections, Atlanta, US, 18-22 Mar, 2010.

Béatrice Jans, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Rudi Stroobants, Katrien Latour, Ellen Broex, Herman Goossens, on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Project Group. *A methodology for a Point Prevalence Survey on antimicrobial prescriptions in a network of high skilled nursing homes in Europe, European Surveillance of Antimicrobial Consumption (ESAC), 2007- 2010*. 5th Decennial International Conference on Healthcare-Associated Infections, Atlanta, US, 18-22 Mar, 2010.

Ellen Broex, Katrien Latour, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Rudi Stroobants, Herman Goossens, Béatrice Jans, on behalf of the ESAC Nursing Home subproject group. *The European Surveillance of Antimicrobial Consumption (ESAC) Survey of Parenteral Antibiotic Use in 270 European Nursing Homes in 2009*. 5th Decennial International Conference on Healthcare-Associated Infections, Atlanta, US, 18-22 Mar, 2010.

Katrien Latour, Ellen Broex, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Rudi Stroobants, Herman Goossens, Béatrice Jans, on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home subproject group. *The European Surveillance of Antimicrobial Consumption (ESAC) Point Prevalence Survey of Indications for Antibiotic Treatment in 270 European Nursing Homes in 2009*. 5th Decennial International Conference on Healthcare-Associated Infections, Atlanta, US, 18-22 Mar, 2010.

Pamela McClean, Carmel Hughes, Michael Tunney, Herman Goossens, & Beatrice Jans, On Behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Project Group. *The European Surveillance of Antimicrobial Consumption (ESAC) Point Prevalence Survey of Antimicrobial Usage in 261 European Nursing Homes*. 5th Decennial International Conference on Healthcare-Associated Infections, Atlanta, US, 18-22 Mar, 2010.

Béatrice Jans, Katrien Latour, Ellen Broex, Arno Muller, Vanessa Vankerckhoven, Rudi Stroobants, Herman Goossens voor de European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home projectgroep. *Het antibioticumvoorschrift in Belgische woon- en zorgcentra in 2009: Resultaten van de eerste ESAC nursing home studie*. 33rd Geriatrics and Gerontology Winter Meeting, Ostend, Belgium, Feb 26-27, 2010.

Katrien Latour, Ellen Broex, Arno Muller, Vanessa Vankerckhoven, Rudi Stroobants, Herman Goossens, Béatrice Jans namens de European Surveillance of Antimicrobial Consumption

(ESAC) Nursing Home subprojectgroep. *Antibiotica voor urineweginfecties in Belgische woon-zorgcentra: data van het European Surveillance of Antimicrobial Consumption (ESAC) subproject*. 33rd Geriatrics and Gerontology Winter Meeting, Ostend, Belgium, Feb 26-27, 2010.

## Abstracts accepted for publication only

Broex E, Latour K, Muller A, Drapier N, Vankerckhoven V, Stroobants R, Goossens H, Jans B on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject group. *Comparison of antibiotic prescription behaviour between general practitioners and specialists: data from the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject*. 20th European Congress of Clinical Microbiology and Infectious Diseases, Vienna, Austria, April 10-13, 2010.

## Website

The ESAC website is accessible through the following link: <http://www.esac.ua.ac.be>.

The ESAC website contains 4 parts:

- An area for general information on the ESAC project.
- An area for the dissemination of results and knowledge.
- A password-protected area.
- An area for the general public/press

Figure 4.1: Screenshot of the ESAC homepage

The screenshot shows the ESAC homepage with a navigation menu at the top: Home, About ESAC, Who is Who?, Subprojects, Data, Dissemination, E-library, Meetings, Links, Contact, Log in. Below the menu is a row of European flags. The main content area features a large map of Europe with the title "EUROPEAN SURVEILLANCE OF ANTIMICROBIAL CONSUMPTION". To the left is a "Public/Press" sidebar with links like "What is ESAC", "Who to contact in The United Kingdom", "DISCOVER ANTIBIOTICS", "Bugs", "CONSUMPTION ANTIBIOTICS", "In Europe", "In The United Kingdom", "Defined Daily Dose", "RESISTANCE ANTIBIOTICS", "What is resistance", "What are the consequences", "USEFUL LINKS", "PHOTO GALLERY", and "VACANCIES". To the right is a blue box for the "ESAC Final MEETING" on May 19-20, 2011, with location TBA. Below the map, text states: "On this website, you will find information on antimicrobial (antibiotic, antiviral and antimycotic) consumption in European countries. These data are publicly available. ESAC is a project funded by the European Centre for Disease Prevention and Control (ECDC)." At the bottom, logos for ECDC and a university are shown, along with "website hosted by", "© ESAC. 2001-2010", and "Last Modified :02/08/2010". A footer at the very bottom reads "Developed by @nDr-Soft - Nico Drapier".

Since beginning 2009, the ESAC website has been revised and improved by our IT specialist, Nico Drapier. On the homepage important upcoming events are announced. Secondly, the pages for the general public/press are immediately shown. On the right-hand side different flags for each of the participating countries are shown, through which the pages for the general public can be consulted.

## 1. Area for general information on the ESAC project

### *Three headings:*

- About ESAC: this part contains information on ESAC-1, ESAC-2, ESAC-2.5 and ESAC-3. For the previous ESAC projects (1, 2 and 2.5) the final report can be downloaded from the website.
- Who is Who?: The ESAC Network is presented in an organization chart. The different subpages provide detailed information, including contact details of the members of the Management Team (MT), of the members of each of the participating National Networks, of the Audit Committee, and of the Scientific Advisory Board. For the latter two their specific tasks are also mentioned.
- Contact: contact details of the ESAC MT are provided here.

## 2. Area for the dissemination of results and knowledge

### *Five headings:*

- Subprojects: Information on the 4 different subprojects as well as results can be found here.
- Data: Results on the 2006 data collection can be consulted here (static pages) as well the interactive database (see below). Results on the 2007 data will be uploaded as soon as available.
- Dissemination: These pages contain all scientific publications, including papers, abstracts, presentations and posters, by the ESAC MT. Also the ESAC Yearbooks and Newsletters can be found here. A more detailed overview of international publications and projects in relation to antimicrobial consumption, can be consulted through the E-library.
- E-library: The ESAC Electronic Library contains international publications and projects covering antimicrobial consumption (Fig. 4.2). Currently all publications by the ESAC MT are available. Interestingly, all National Networks can add relevant article and projects on the E-library. Please note that the library is not a subject of scientific review.
- Links: Links to related projects and institutions can be found here.

Figure 4.2 Screenshot of the electronic library

Home  
Publications  
Projects

## Publications

Authors  Year

Title  Journal

Keywords  
-Please Select-

28 items found, displaying 1 to 20. [First/Prev] 1, 2 [Next/Last]

Year	Author	Title	Journal	
2004	Vander Stichele RH	European surveillance of antimicrobial consumption (ESAC): data collection performance and methodological approach.	British journal of clinical pharmacology	<a href="#">details</a>
2005	Goossens H	Outpatient antibiotic use in Europe and association with resistance: a cross-national database study.	Lancet	<a href="#">details</a>
2005	Johnson A	Outpatient consumption of antibiotics is linked to antibiotic resistance in Europe: results from the Euro surveillance European Surveillance of Antimicrobial Consumption.	Euro surveillance	<a href="#">details</a>
2005	Dziurda DR	Antibacterial drug prescription for outpatients: age, seasonal and pulmonary disease dependency.	Acta poloniae pharmaceutica	<a href="#">details</a>
2006	Coenen S	European Surveillance of Antimicrobial Consumption (ESAC): outpatient macrolide, lincosamide and streptogramin (MLS) use in Europe.	The Journal of antimicrobial chemotherapy	<a href="#">details</a>
2006	Ferech M	European Surveillance of Antimicrobial Consumption (ESAC): outpatient antibiotic use in Europe.	The Journal of antimicrobial chemotherapy	<a href="#">details</a>

### 3. Password-protected area

- Each of the LNRs and the NRs of the different subprojects have received a login and a password.
- Under the heading minutes, the minutes and presentations of the different meetings, ie kick-off meeting, the second annual meeting, subprojects meetings and management team meetings can be consulted here. A different level is given depending on the position within the ESAC Network: the members of the management team have full access to the entire website, whereas the LNRs cannot access the minutes of the management team meetings.
- Under the heading Data, submit data was created for the data collection 2007 and 2008. Here the Collect Manager Application (See Objectives and Methodological Approach) and the Dataset Manager (See Objectives and Methodological Approach) can be found.

### 4. Area for the general public/press

Pages for the general public/press should be easy to understand for lay people. Each of the LNRs have been asked to check the translation of the currently existing English version in their native language and to provide a text on the comparison of antibiotic use in their country versus use in Europe. The pages can also be consulted by the press. The following information is provided on the pages: What is ESAC, Why ESAC, Who to contact in your country, What is

the antibiotic use in your country and in Europe, What are viruses and bacteria, What is resistance and useful links to relevant websites in your country. The new interface which was built by our IT specialist, Nico Drapier, in 2009 makes the pages more attractive for lay people and the press (Fig. 4.1). The website is continuously evaluated and SEO (search engine optimisation) using Google Analytics is being implemented for the entire website.

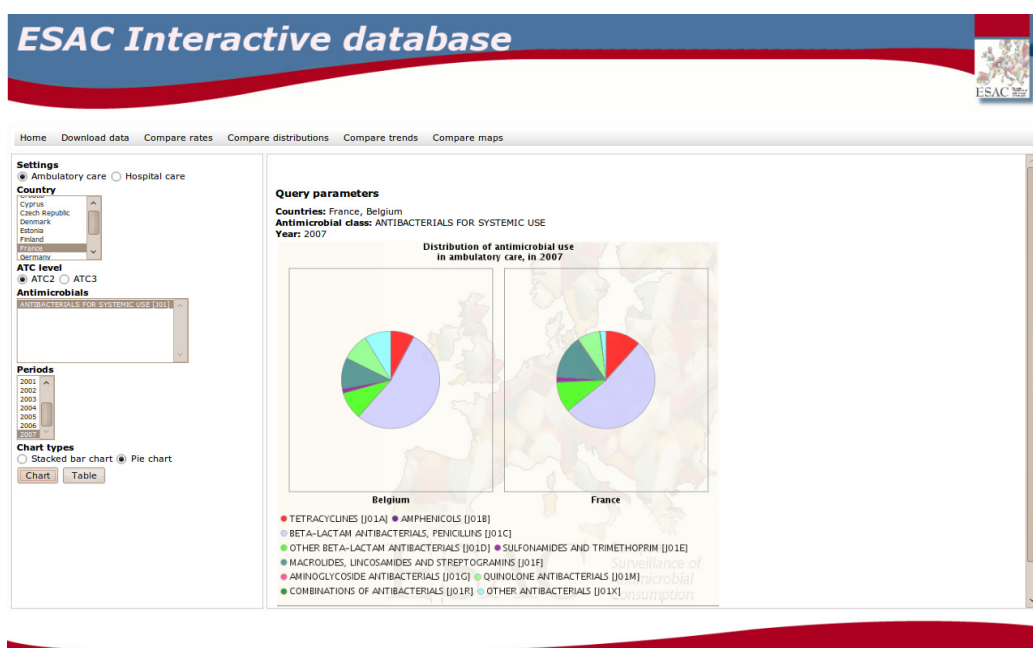
## Interactive database

A new, easier to use interactive database containing ESAC data on antibiotics for the participating European countries has been released on our website. You can explore the database in 3 ways:

1. By comparing countries for one year
2. By comparing yearly trends for one country
3. By visualizing maps of Europe

The interactive database was updated with 2008 data.

**Figure 4.3 Screenshots of the ESAC interactive database**



## Newsletters (see Annex VIII)

The latest edition of the ESAC newsletter was published in August 2010. Three editions were published during the third year (December 2009, April 2010 and August 2010).

In our December 2009 edition, we presented our recently recruited data manager, Ann Versporten. We also provided some information on a new European project, APRES and published an update on the Hospital Care (HC) Point Prevalence Survey (PPS) 2009 as well as on the PPS performed in the Nursing Homes. We gave an overview of abstract submissions for the SHEA/CDC conference (Atlanta, US, March 2010) and ECCMID (Vienna, Austria, April 2010). The plan for the take-over of ESAC by ECDC in January 2011 agreed upon by the ESAC Scientific Advisory Board was presented and in line with previous editions, we presented 5 of the ESAC National Networks.

In April 2010, we published a special edition of our ESAC Newsletter for the ECCMID conference, in which we highlighted the major results of the different ESAC subprojects.

In August 2010, we introduced the 4 reports which we made available: a report on ambulatory care antibiotic prescribing quality indicators, on nursing homes characteristics, on the first nursing homes PPS and on the hospital care PPS 2009. We announced the kick-off of two new European projects, ARPEC (funded by DG Sanco) in which ESAC is a partner and the EU HAI-AB PPS pilot (funded by ECDC), which coordinated by Herman Goossens and builds on the ESAC PPS expertise. In line with previous editions, we presented 6 of the ESAC National Networks.

A PDF version of all editions of the ESAC Newsletter can be downloaded from the ESAC website (<http://www.esac.ua.ac.be>).



## 6. IN-DEPTH ANALYSES

### Ambulatory Care subproject

*Ambulatory Care Scientific Advisor: Sigvard Mölsted, SE; Samuel Coenen, BE*

*Clinical Scientist Ambulatory Care: Niels Adriaenssens, BE*

In ESAC-3 the Ambulatory Care Subproject aims to:

- collect national dispensing data linked to the patients' age and gender and the prescribers' speciality (protocol A)
- collect national or sample data of prescriptions by GPs linked to the patients' age and gender and to the indication (protocol B)
- collect recommendations from evidence-based clinical guidelines, including antibiotic guides, developed for and applicable to the participating countries (guideline protocol).
- validate further the available set of twelve indicators developed to assess the quality of antibiotic use in ambulatory care (quality indicators protocol)

#### Quality indicators protocol

Based on the presentations and discussions during two earlier ESAC AC Subproject Meetings (2008, 2009) a proposed set of Outpatient Disease-specific Antibiotic Prescribing Quality Indicators (see Table 6.1) was developed. For each of the 6 main indications for antibiotic prescribing (acute otitis media, acute upper respiratory infection, acute/chronic sinusitis, acute tonsillitis, acute bronchitis/bronchiolitis, cystitis/other urinary infection) and for pneumonia (labelled by ICPC codes: H71, R74, R75, R76, R78, U71, and R81, respectively), 3 quality indicators were proposed, i.e. *a.* the percentage of patients (with age and/or gender limitation) prescribed an antibiotic; *b.* the percentage of patients (with age and/or gender limitation) prescribed an antibiotic, and receiving the recommended antibiotic; *c.* the percentage of patients (with age and/or gender limitation) prescribed an antibiotic, and receiving quinolones. This set of 21 disease-specific quality indicators was scored by 40 experts in this field, i.e. in antibiotic prescribing in primary care in Europe, from 25 countries. For each of the proposed indicators they were asked to score its relevance to 1. reducing antimicrobial resistance, 2. the patient health benefit, 3. cost-effectiveness, 4. policymakers and 5. individual prescribers, 6. its evidence base, and 7. its range of acceptable use, using a scale ranging from 1 (= completely disagree), over 5 (= uncertain) to 9 (= completely agree). According to the UCLA-RAND appropriateness method, proposed indicators were judged relevant if the median score was not within the 1-6 interval and if there was consensus, i.e. the number of scores within the 1-3 interval was less than one third of the panel. Already after one scoring round, all indicators were rated as relevant antibiotic prescribing indicators on all seven dimensions, except 3a. [The percentage of female patients older than 18 years with cystitis/other urinary infection (ICPC-2-R: U71) prescribed antibacterials for systemic use (ATC: J01)] which was scored 6 on cost- effectiveness.

In conclusion, all 21 (7x3) proposed disease-specific quality indicators outpatient antibiotic prescribing seem to have face validity and to be potentially applicable. In line with the main objectives of antimicrobial use surveillance at the European level, this set of indicators could be used to better describe antibiotic use and assess the quality of national antibiotic prescribing patterns in ambulatory care.

#### Protocol A & B

The third call for data collection according to protocol A and the second call for data collection according to protocol B were sent out August 3<sup>rd</sup> 2010. Data for protocol A & B can be submitted online using ESAC Collect Manager. Participants are also asked to complete an online questionnaire on data characteristics of the protocol A and B data, respectively.

During the ESAC annual meeting in Stockholm (May 2010), it was however decided to make the data collection according to protocol A optional and no longer a deliverable, because of difficulties in data collection. But, countries that are able to provide data according to protocol A will send in data together with core data.

The data collection for protocol B has proven to be even more challenging. Only Belgium has been able to provide data using the ESAC template. For that reason, we are very happy that we can collaborate with APRES (The appropriateness of prescribing antibiotics in primary health care in Europe with respect to antibiotic resistance), a European project lead by NIVEL in the Netherlands. Among other objectives, APRES aims to establish the pattern of prescribed antibiotics in primary care practices and its variation between nine European countries using a protocol similar to that our protocol B.

The data availability for protocol A can be found in Annex I.

### Guideline collection protocol

For guidelines on otitis media, sore throat, sinusitis and lower respiratory tract infections collaboration with CHAMP has been very successful. For guidelines on urinary tract infections as well as on skin and soft tissue infection from ESAC countries, we had to rely on the ESAC National Networks (NN) and an update of previous ESAC guideline review work. In addition, also in the APRES project guideline collection will be deliverable and a collaboration has been established to update the ESAC materials including guidelines regarding to urinary tract infections.

**Table 6.1: List of proposed disease-specific antibiotic prescribing quality indicators**

N°	Title	Label
1a.	The percentage of patients aged between 18 and 75 years with acute bronchitis/bronchiolitis (ICPC-2-R: R78) prescribed antibacterials for systemic use (ATC: J01)	[R78_J01_%]
1b.	= 1a. receiving the recommended antibacterials (ATC: J01CA or J01AA)	[R78_RECOM_%]
1c.	= 1a. receiving quinolones (ATC: J01M)	[R78_J01M_%]
2a.	The percentage of patients older than 1 year with acute upper respiratory infection (ICPC-2-R: R74) prescribed antibacterials for systemic use (ATC: J01)	[R74_J01_%]
2b.	= 2a. receiving the recommended antibacterials (ATC: J01CE)	[R74_RECOM_%]
2c.	= 2a. receiving quinolones (ATC: J01M)	[R74_J01M_%]
3a.	The percentage of female patients older than 18 years with cystitis/other urinary infection (ICPC-2-R: U71) prescribed antibacterials for systemic use (ATC: J01)	[U71_J01_%]
3b.	= 3a. receiving the recommended antibacterials (ATC: J01XE or J01EA or J01XX)	[U71_RECOM_%]
3c.	= 3a. receiving quinolones (ATC: J01M)	[U71_J01M_%]
4a.	The percentage of patients older than 1 year with acute tonsillitis (ICPC-2-R: R76) prescribed antibacterials for systemic use (ATC: J01)	[R76_J01_%]
4b.	= 4a. receiving the recommended antibacterials (ATC: J01CE)	[R76_RECOM_%]
4c.	= 4a. receiving quinolones (ATC: J01M)	[R76_J01M_%]
5a.	The percentage of patients older than 18 years with acute/chronic sinusitis (ICPC-2-R: R75) prescribed antibacterials for systemic use (ATC: J01)	[R75_J01_%]
5b.	= 5a. receiving the recommended antibacterials (ATC: J01CA or J01CE)	[R75_RECOM_%]
5c.	= 5a. receiving quinolones (ATC: J01M)	[R75_J01M_%]
6a.	The percentage of patients older than 2 years with acute otitis media/myringitis (ICPC-2-R: H71) prescribed antibacterials for systemic use (ATC: J01)	[H71_J01_%]
6b.	= 6a. receiving the recommended antibacterials (ATC: J01CA or J01CE)	[H71_RECOM_%]
6c.	= 6a. receiving quinolones (ATC: J01M)	[H71_J01M_%]
7a.	The percentage of patients aged between 18 and 65 years with pneumonia (ICPC-2-R: R81) prescribed antibacterials for systemic use (ATC: J01)	[R81_J01_%]
7b.	= 7a. receiving the recommended antibacterials (ATC: J01CA or J01AA)	[R81_RECOM_%]
7c.	= 7a. receiving quinolones (ATC: J01M)	[R81_J01M_%]

## Hospital Care subproject

*Hospital Care Scientific Advisor: Peter Davey, UK*

*Clinical Scientist Hospital Care: Peter Zarb, MT*

*Hospital Care support: Brice Amadeo, FR*

*Clinical Scientist Support: Rudi Stroobants, BE*

### Introduction

The Hospital care subproject had 2 main branches, the PPS and the LS. The PPS consisted of 2 surveys, one in 2008 and one in 2009 and has now been finalised. However, based upon demand another PPS in 2010 is available for hospitals wanting to carry out the PPS without any support from the University of Antwerp/ ESAC Management Team. The LS branch is still in the data collection stage. In fact a formal request to ECDC's EARS-Net has been submitted at the end of August 2010.

### Hospital Care PPS 2009

The ESAC Point Prevalence Survey (PPS) is the only European multicentre survey of antimicrobial prescriptions in hospitals. This survey has previously been successfully implemented in 20 hospitals during the 2006 PPS and in 50 hospitals in 2008. The aim of PPS-2009 was to perform a PPS in a larger sample of European hospitals compared to the previous 2 PPS.

Data was collected during a maximum of two weeks from May-July and in November 2009. A total of 179 hospitals from 25 European countries were included. The protocol was quasi identical to the protocol of PPS 2008, with the addition of 'Compliance with Guidelines' and removal of 'Relevant samples taken for culture'. The web-based application or a PDA was used for data entry and upload. Antimicrobial prescriptions were recorded using the ATC classification. Demographic data on treated patients, indications, diagnoses, culture pre-therapy and reasons for treatment recorded in notes were collected.

A large number of hospitals from the United Kingdom (namely England [46] and Scotland [32]), Belgium [21] and Ireland [21] participated. In order to eliminate possible bias by these countries a sample of hospitals, not exceeding 5/country were randomly selected. Thus from a total of 179 hospitals from 25 countries a sample of 75 hospitals was used in this analysis.

Among the 37,555 admitted patients, 10,677 (28.4%) received antimicrobials for a total of 14,742 therapies. The majority of treated patients (69%) received monotherapy. This was different in intensive-care, which had the highest proportion of treated patients (57%) with 95 therapies/100 patients. The combination penicillins including  $\beta$ -lactamase inhibitors were the most popular across all specialties and indications. However, in intensive-care, hospital-specific agents (e.g., carbapenems, glycopeptides and aminoglycosides) ranked high in use. These drugs are mainly used via the parenteral route which was 93% for intensive-care. Community-acquired-infections (CAI) accounted for 51% of all indications. A third (32%) of CAI was due to respiratory-tract-infections, which was the most common site also in hospital-acquired infections (24%). Pneumonia (16%), skin and soft-tissue infections (11%) and intra-abdominal infections (7%) were the most common diagnoses. Prolonged duration (>1 day) of surgical prophylaxis was practised in more than half (54%) of the cases. At ATC level 4, 39 drug-classes were used as monotherapy whilst combination therapy included 550 different combinations.

The PPS 2009 results are concordant with the 2006 and 2008 PPS data. The survey confirmed that duration of surgical prophylaxis is a key quality indicator in the surgical departments. The ESAC web-based tool can be rolled out in the near future to other continents with interest expressed from North America, Africa and Oceania.

The list of countries that have participated in the PPS 2009 can be consulted in Annex II.

## **Hospital Care LS 2009**

The aims of LS 2009 were to: develop indicators to describe characteristics of antimicrobial consumption in hospitals; to identify clinical activity denominators for monitoring time trends in antimicrobial use; explore the relationship between antimicrobial consumption and hospital structure and; identify targets for interventions aimed at improving antimicrobial prescribing.

### **Setting**

At least two hospitals should be selected from each country. These hospitals must be able to support both the LS and PPS components of the HC sub-project. The participating hospitals will collect retrospective data on antimicrobial use, on hospital structure and on activity indicators for the previous 4 years and fill a questionnaire on the characteristics of the institution for the last year. Separate data for general wards, ICU and paediatrics are asked where available.

### **Methodology**

The study will focus on systemic antibacterials J01 and antimycotics J02, alimentary tract antimicrobials A07AA, and specific substances P01AB01, D01BA02, and J04AB02 according to the ATC classification by the WHO Collaborating Centre for Drug Statistics. This will be used as numerator data. The project will compare trends of antimicrobial use with and without adjustment for two denominators: bed days and admissions. Monthly data will be collected for 4 years starting from January 2005 to December 2008. Participants will submit their data (online) using an excel template from November until the end of December 2009. In practice this deadline had to be extended to June 2010 due to poor response.

### **Outcomes**

DDD/100 bed-days and DDD/100 admissions will be the outcome indicators studied. The Length of Hospital Stay will be estimated based on the model used in the ESAC-2 HC subproject. Regression analysis of time series will be applied to crude consumption data, adjusted for clinical activity denominators, length of stay, and the hospital characteristics. Finally the established models should allow the possibility to: group the hospitals; predict hospital antimicrobial use; propose indicators for hospital antimicrobial use.

The list of countries that have participated in the LS 2009 can be consulted in Annex II.

### **ESAC-EARSS ecological survey**

The aims of this novel survey to ESAC are to:

- analyse the relationship between antimicrobial use and resistance in hospitals at an ecological level
- identify common patterns of resistance for hospital policy makers
- identify patterns of use that determine specific resistances
- identify possible interventions to reduce antimicrobial resistance
- provide simple anonymous benchmarking at European level
- develop methods to analyse resistance data in relationship with antimicrobial use data
- roll out a method for collecting meaningful data on antibiotic use and resistance in European hospitals and; investigate the feasibility of collecting data about surveillance of *Clostridium difficile* infections.

All the hospitals participating in the ESAC LS survey will also be recruited for the ecological survey. The consumption data will be collected using the ESAC LS protocol whereas the resistance data will be collected using the EARSS protocol.

The consumption and activity data are those submitted for the LS 2009. Resistance data will be provided by EARSS. The panel of collection of bacteria and resistance will be the ones currently collected by EARSS. Therefore, no specific resistance data submission to ESAC is required for the ecological survey as the data will be extracted from the EARSS database. Antimicrobial use/ resistance correlation will be analysed for a selected specific drug class with a specific species. An example is the use of quinolones and MRSA.

**Results (data collection)**

The number of hospitals which submitted valid data was lower than the original maximum aimed for which included all hospitals that participated in the PPS-2008. In total 28 hospitals, from 19 countries, submitted some form of LS consumption data, 2 of which did not fill in the hospital questionnaire even after various reminders. The other 23 hospitals were unable, for some reason or another, to submit any LS data. Out of the remaining 26 hospitals, 2 submitted only yearly data, whilst the data had to be ideally monthly or at least quarterly. Another 2 hospitals only submitted data for 2008 and another 7 had some other issue for which the data could not be utilized, even after contacting the hospitals for clarifications. Thus the final number of hospitals which submitted valid data was 17.

The availability of resistance data for the respective hospitals was also an issue. The 28 hospitals that submitted some form of consumption data were contacted to confirm whether they participated in EARSS (EARS-Net). 17 replied with their respective EARSS hospital code. 3 never replied to our emails, 4 never participated in EARSS, 2 are not in EARS-Net (not EU MS) and 1 was not willing to share the resistance data. Thus data analysis for use and resistance will be only carried out on the 12 hospitals that submitted consumption data and have agreed to the use of their resistance data.

**Results (Questionnaire summary)**

A total of 24 (out of 50) hospitals answered the LS2009 questionnaire. The summary of the replies is shown in Tables 6.2 and 6.3. The type, size, number of specialized 'infection management personnel', number of specialties within the hospitals and methods of data collection varied greatly.

**Summary of LS2009 Questionnaire response**

**Table 6.2 - showing range and median values for respective parameters**

Criterion	Min	Max	1st Quarter	3rd Quarter	Median
Population covered	5180	4100297	278775.3	1306895	476500
Number of Beds (2008)	216	2274	413	1191.5	622
Number of Deaths (2008)	97	2157	378.5	963.25	639
Number of ICU beds	0	201	8.75	39	24
Number of Haematology beds	0	70	0	25.5	10.5
Number of ID beds	0	70	0	20	8.5
Number of Oncology beds	0	75	0	26	10
Number of Dialysis beds	0	30	0	19.25	9
Number of Transplant beds	0	11	0	0	0
Number of Paediatric beds	0	231	14	74.25	32.5
Number of Paediatric ICU beds	0	37	0	12.25	6.5
Number of Paediatric Haematology beds	0	21	0	5.5	0
Full time pharmacists	1	96	3.75	22.75	11.5
Full time ID physicians	0	56	0	6.25	2.5
Full time Infection Control Nurses	0	22	1	3	2
Full time Microbiologists	0	9	1	5	2

**Table 6.3 – showing the number of hospitals having particular characteristics.**

Criterion	Number
Number of Teaching Hospitals	18
Number of General Hospitals	14
Number of Referral Hospitals	17
Number of District Hospitals	11
Number of Urban Hospitals	23
Hospitals with ICU	24
Hospitals with Haematology Unit	18
Hospitals with ID Unit	15
Hospitals with Oncology Unit	14
Hospitals with Dialysis Unit	15
Hospitals with Transplant Unit	5
Hospitals with paediatrics	20
Hospitals with Neonatal/Paediatric ICU	18
Hospitals with Paediatric Haematology	8
Hospitals with Pharmacy as only source of drugs	22
Hospitals which excluded out-patient treatment	18
Hospitals which excluded waste	10
Hospitals which excluded returns	12
Hospitals with drug shortages reported	5
Hospitals which introduced new drugs	14
Hospitals which counted day cases as 'admissions'	7
Hospitals which excluded 'transfers'	15

### **Nursing Homes subproject**

*Nursing Homes Scientific Advisor: Béatrice Jans, BE*

*Clinical Scientist Nursing Homes: Laetitia Fontaine, BE (until June 1, 2009), Ellen Broex (since 19/10/2009)*

*Clinical Scientist Support: Rudi Stroobants, BE*

### **PPS-1, APRIL 2009**

The aim of the 2009 EASAC NH PPS-1 (April 2009) is to create a European network of NHs in order to describe AB prescriptions and antibiotic use among NH residents and to explore determinants of AB use on institutional and resident level.

### **Participation**

This report includes data from 304 nursing homes from 19 countries, considering the UK (England and Northern Ireland) as only one country.

**Table 6.4: Countries with data delivery for the NH PPS-1 (April 2009): number of participating NHs and eligible residents by country**

COUNTRY	Nursing Homes (n)	Eligible residents (n)
Belgium	116	12085
Croatia	5	1290
Czech Republic	6	691
Denmark	5	319
Finland	8	1706
France	29	2211
Germany	8	425
Ireland	18	1662
Italy	30	2820
Latvia	5	1195

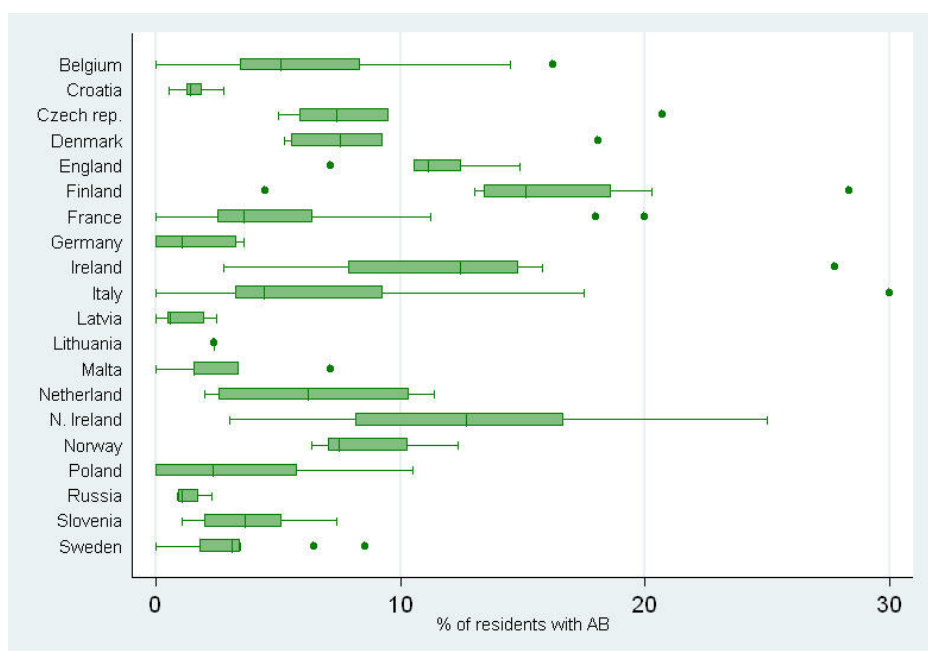
COUNTRY	Nursing Homes (n)	Eligible residents (n)
Lithuania	1	126
Malta	5	320
The Netherlands	4	712
Norway	5	568
Poland	5	692
Russian federation	4	1740
Slovenia	6	1421
Sweden	9	508
UK : England	5	230
UK : Northern Ireland	30	970
<b>TOTAL</b>	<b>304</b>	<b>31691</b>

**Number of residents with antimicrobial therapy and prevalence of AB use**

Of the 31,691 eligible residents, 1,873 (5.9%) received an antimicrobial on the day of the survey. On total, 1,951 molecules were prescribed. The crude mean prevalence of antimicrobial use reached 6.9% (median:5.4%, range: 0 – 30%).

In 6.6% of all participating NHs no antimicrobials were used. Most residents (96%) used only one molecule.

**Figure 6.1: Number of residents with antimicrobial use per 100 eligible residents in NHs in Europe, distribution by country**

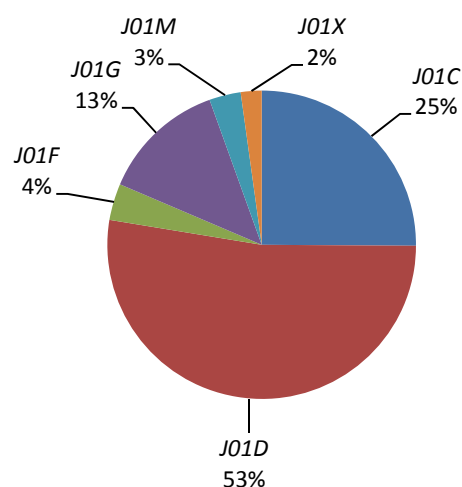


**Administration route**

Among all prescribed regimens, 89.7% (n=1,750) were administered orally, 9.4% (n=183) were for parenteral use (IM/IV) and 0.9% (n=18) concerned a nasal application of mupirocin for decolonization of MRSA carriers.

Among residents with parenteral antimicrobial therapy, the most important classes were other beta-lactam antibacterials (J01B), beta-lactam penicillins (J01C) and aminoglycosides (J01G).

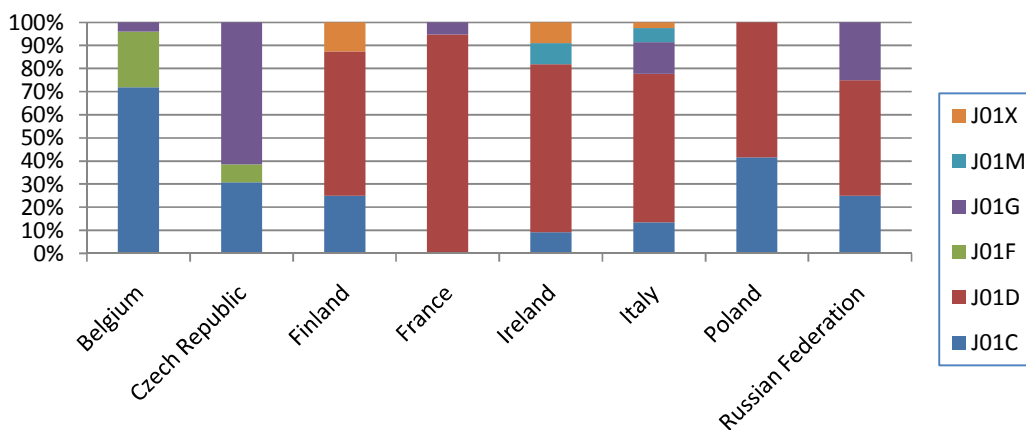
**Figure 6.2: Antimicrobials for parenteral use: proportions for the different classes of prescribed antibacterials**



J01C: beta-lactam penicillins,  
 J01D: other beta-lactam antibacterials,  
 J01F: macrolides, lincosamides and streptogramins,  
 J01G: aminoglycoside antibacterials,  
 J01M: quinolone antibacterials,  
 J01X: other antibacterials

But large variations between countries were observed.

**Figure 6.3: Antimicrobials for parenteral use: proportions for the different classes of prescribed antibacterials by country (with min. 8 parenteral regimens/country)**



**Place of prescription and type of prescriber**

Globally the NH was the place where most Abs (88.6%) were prescribed. Only 8.1% were prescribed in the hospital and 3.3% elsewhere.

In total the general practitioner prescribed three quarter of all antimicrobials in NHs while a specialist was responsible for 18.7% of all NH prescriptions concerning antibiotics (range on country level: 0%-86.8%). 'Another person' carried out 4.5% of all prescriptions.

**Drug utilization**

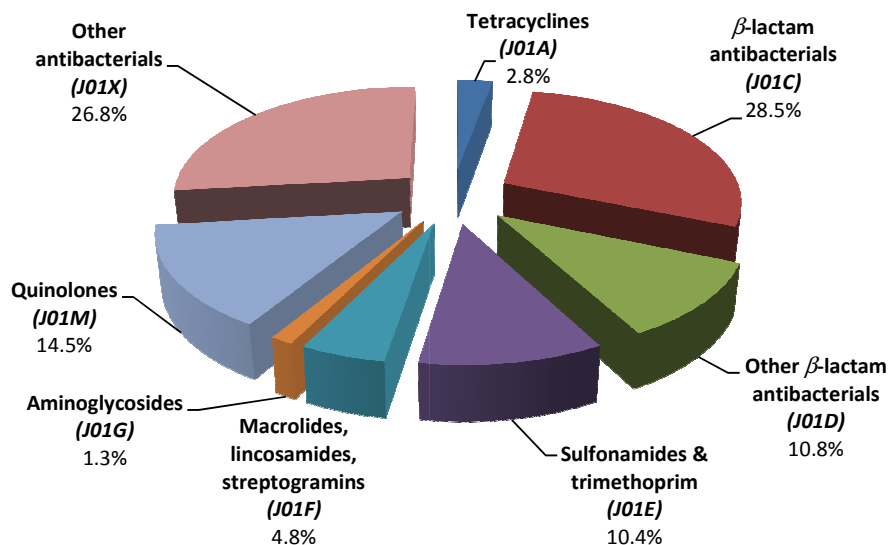
Antibacterials for systemic use (J01) represented the largest category (95.3%, n=1,859) among all prescribed substances in NHs (n=1,951). Antimycotics (J02) and tuberculostatics (J04) represented 1.6% and 0.4% of all prescribed molecules respectively.

**J01 class: Antibacterials for systemic use**

The *β-lactam penicillins* (J01C, n=530) and the *other antibacterials* (J01X, n=498) represented more than 50% of all prescribed J01 antibacterials. Other frequently prescribed AB groups were *quinolones* (J01M, n=270) and *other β-lactam antibacterials* (J01D, n=201).

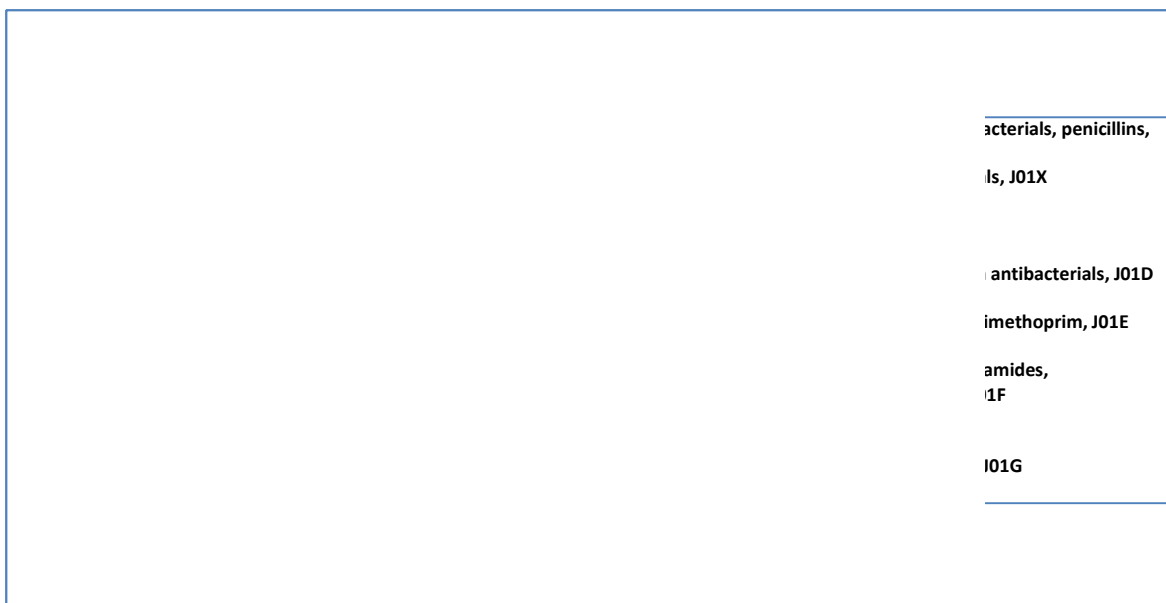


**Figure 6.4: Antimicrobials for systemic use (J01): antimicrobial groups aggregated at ATC3 level**



The proportions of the different antimicrobial groups (ATC3 level) among all J01 substances differed strongly between countries.

**Figure 6.5: Antimicrobials for systemic use (J01): antimicrobial groups aggregated at ATC3 level, by country (only for countries with at least 15 J01 molecules)**

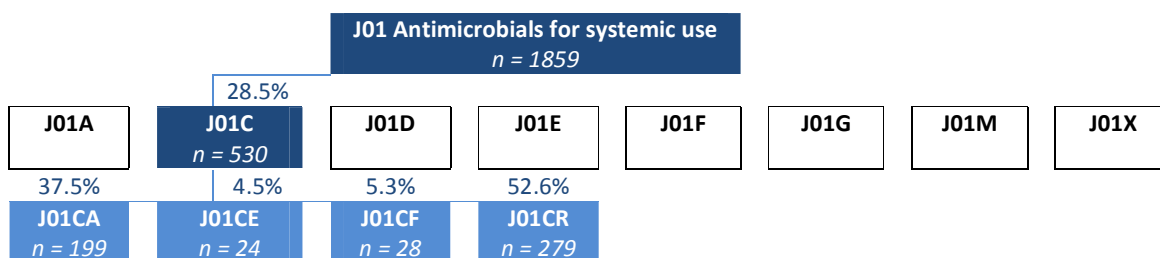


**The three most frequently prescribed J01 substances**

**β-lactam antibacterials (J01C class)**

From all β-lactam antibacterials (J01C, n=530) 52.6% were combinations of penicillins with enzyme inhibitor (J01CR) and 37.5% were extended spectrum penicillins (J01CA). β-lactamase resistant penicillins (J01CF) and β-lactamase sensitive penicillins (J01CE) represented 5.3% and 4.5% of all J01C substances respectively.

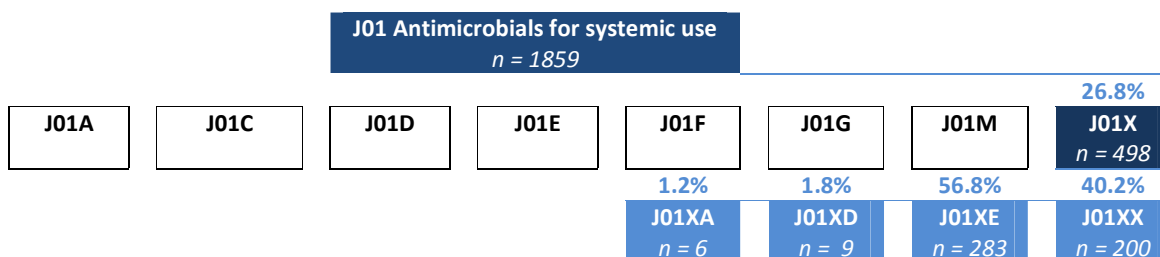
**Figure 6.6: J01C class: Beta lactam penicillins**



**Other antibacterials (J01X class)**

The group of *other antibacterials* (J01X) was composed of 4 subclasses: the two largest subclasses were the *nitrofurans derivatives* (J01XE) and the *other antibacterials* (J01XX) representing 56.8% and 40.2% of all J01X substances, respectively. *Glycopeptide antibacterials* (J01XA) and *imidazole derivatives* (J01XD) counted for 1.2% and 1.8%, respectively.

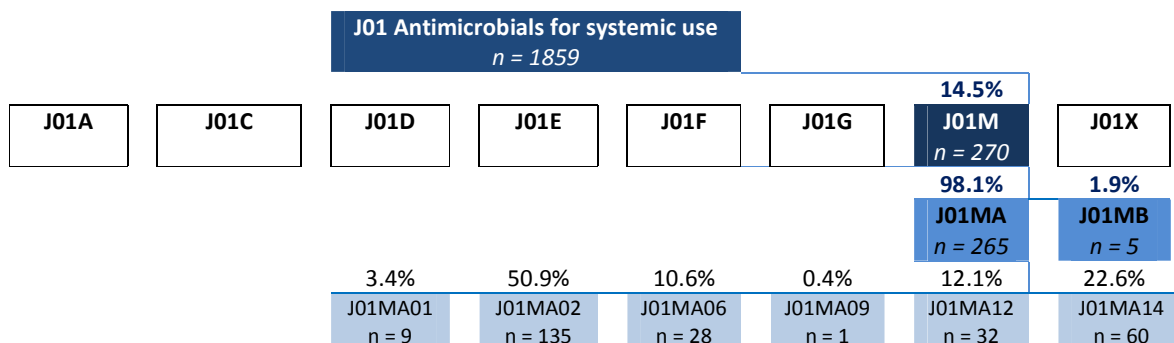
**Figure 6.7: J01X class: Other antibacterials**



**Quinolones (J01M class)**

Among all *quinolones* (J01M) 98.1% were *fluoroquinolones* (J01MA) and 1.9% were *other quinolones* (J01MB). France was the only country using both classes. Of all *fluoroquinolones* (J01MA) 50% were *ciprofloxacin* (J01MA02), while *moxifloxacin* (J01MA14) counted for 22.6%.

**Figure 6.8: J01M class: Quinolones**



**Indications for antimicrobial therapy and type of treatment**

In total 53.6% of all antimicrobial treatments (n=1033) were prescribed empirically (range by country: 16.9%- 100%). Only 16.5% (n=318) were documented treatments (range: 0%-47.1%). Prophylactic treatments represented an important proportion (29%, n=560) of the

prescribed therapy (range: 0%-71.9%). Nasal decolonization with mupirocin counted for 0.9% (n= 18, range: 0%-5.6%).

On total 1,911 infectious conditions were treated or prevented. Among these 49.8% were related to the urinary tract and 31.9% to the respiratory tract. A major part of all prophylactic and documented treatments concerned the urinary tract: 88.6% and 71.4%, respectively. More than half (54.6%) of all empirical regimens were related to respiratory tract infections.

**Table 6.5: Treated/prevented infections by type of treatment**

Infections	PROPHYLACTIC n=560		EMPIRICAL n=1033		DOCUMENTED n=318		
	n (%)	n	%	n	%	n	%
SSI	70 (3.7%)	7	1.3	37	3.6	26	8.2
RTI	610 (31.9%)	30	5.4	564	54.6	16	5
UTI	951 (49.8%)	496	88.6	228	22.1	227	71.4
GI	24 (1.3%)	0	0	9	0.9	15	4.7
BSI/SEP	11 (0.6%)	1	0.2	2	0.2	8	2.6
Not specified	84 (4.4%)	12	2.1	69	6.7	3	0.9
Other	161 (8.4%)	14	2.5	124	12	23	7.2

### **Discussion**

To our knowledge, the ESAC NH project was the first study involving a large number of facilities and European countries, by using a standardized methodology.

This study showed a relatively low incidence of antimicrobial, probably partially due to the chosen study period (spring).

Nearly half of all prescribed antimicrobials were prescribed for the urinary tract only and a major part concerned prophylaxis. Possibly, asymptomatic bacteriuria was treated with antimicrobials, as a precaution. Studies on the management of asymptomatic bacteriuria and recurrent urinary tract infections in NH populations are needed to investigate how physicians deal with these conditions. The development of a coherent policy concerning the management of conditions related to the urinary tract could significantly reduce antimicrobial use in European NHs

## **PPS-2, NOVEMBER 2009**

### **Participation**

In November 2009, a second ESAC NH PPS was organized together with the pilot HALT PPS: Healthcare associated infections, AB-use (=ESAC-project), antimicrobial resistance and Infection control resources in LTCFs. Two new countries (Bulgaria and Hungary) joined the network (see Annex II). On total 265 nursing homes from 22 countries participated at the second ESAC NH PPS.

### **Number of residents with antimicrobial therapy and prevalence of AB use**

Of the 28,186 eligible residents, 1,429 (5.1%) received an antimicrobial on the day of the survey. On total, 1,482 molecules were prescribed. The crude median prevalence of antimicrobial use reached 5% (range: 0 – 33.3%). In 9.8% of all participating NHs no antimicrobials were used. Most residents (96,5%) used only one molecule.

Preliminary results were presented during the ESAC annual meeting in Stockholm (May 2010). Actually, analysis from the complete PPS-2 data for reporting is ongoing.

## **Socio-Economics subproject**

*Socio-Economics Scientific Advisor: Philippe Beutels, BE*

*Clinical Scientist Socio-Economics: Christiaan Marais, BE*

This is a small subproject that demands few additional data from participants. The mother list of determinants of use was shown at the Athens meeting to be extensive. Some previous analyses from the literature were reviewed, noting the differences in formulation of the regression models and the results obtained. Antibiotic consumption for the period 1999 - 2007 was extracted from the ESAC-3 dataset. The following table shows the available data per year.

**Table 6.6: Overview available DDD data per year and per country**

Abbr	Country	1999	2000	2001	2002	2003	2004	2005	2006	2007
AT	Austria	ok	ok	ok	ok	ok	ok	ok	ok	ok
BE	Belgium	ok	ok	ok	ok	ok	ok	ok	ok	ok
BG	Bulgaria	ok	ok	ok	ok	ok	ok	ok	ok	ok
CH	Switzerland	x	x	x	x	x	ok	x	x	x
CY	Cyprus	x	x	x	x	x	x	x	ok	ok
CZ	Czech Republic	ok	x	x	ok	ok	ok	ok	ok	ok
DE	Germany	ok	ok	ok	ok	ok	ok	ok	ok	x
DK	Denmark	ok	ok	ok	ok	ok	ok	ok	ok	ok
EE	Estonia	x	x	x	ok	ok	ok	ok	x	ok
ES	Spain	ok	ok	ok	ok	ok	ok	ok	ok	ok
FI	Finland	ok	ok	ok	ok	ok	ok	ok	ok	ok
FR	France	ok	ok	ok	ok	ok	ok	ok	ok	ok
GR	Greece	ok	ok	ok	ok	ok	ok	ok	ok	x
HR	Croatia	x	ok	ok	ok	ok	ok	ok	ok	ok
HU	Hungary	ok	ok	ok	ok	ok	ok	ok	ok	ok
IE	Ireland	ok	ok	ok	ok	ok	ok	ok	ok	ok
IL	Israel	x	x	x	ok	ok	ok	ok	ok	ok
IS	Iceland	ok	ok	ok	ok	ok	ok	ok	ok	x
IT	Italy	ok	ok	ok	ok	ok	ok	ok	ok	ok
LT	Lithuania	x	x	x	x	x	x	x	ok	x
LU	Luxembourg	ok	ok	ok	ok	ok	ok	ok	ok	ok
LV	Latvia	x	x	x	ok	ok	ok	ok	ok	ok
NL	Netherlands	ok	ok	ok	ok	ok	ok	ok	ok	ok
NO	Norway	x	x	ok	ok	ok	ok	ok	ok	ok
PL	Poland	ok	ok	ok	ok	x	ok	ok	x	x
PT	Portugal	ok	ok	ok	ok	ok	ok	ok	ok	ok
RU	Russian Federation	x	x	x	x	ok	ok	ok	ok	ok
SE	Sweden	ok	ok	ok	ok	ok	ok	ok	ok	ok
SI	Slovenia	ok	ok	ok	ok	ok	ok	ok	ok	ok
SK	Slovakia	ok	ok	ok	ok	ok	ok	ok	ok	ok
UK	United Kingdom	ok	ok	ok	ok	ok	ok	ok	x	x

x = no data

ok = data available

## Data collection

From January 2009 until June 2009 the database of determinants was extended by adding more variables. Furthermore the methods for the data analysis were developed by Jose Cortinas and Philippe Beutels.

The data collected up to June and the results of the analysis were presented on the 22<sup>nd</sup> of June 2009 at the AC/EC Subproject Meeting which was held in Antwerp. Philippe Beutels discussed the socio-economic determinants that were collected up to then and the rationale behind the study. Jose Cortinas shared results of the statistical analysis that was run on the dataset.

At the EC subproject meeting on June 22, 2009 it was also made clear to the LNRs that the existing dataset would be further expanded in terms of the number of potential determinants, and in the completeness of these determinants by country. Therefore following the subproject meeting, the new clinical scientist working on this subproject, Christiaan Marais, focused in the first place on these issues. Through more intensive use of global databases (including Eurostat, OECD, WHO) the database was extended to include more variables and reduce previously missing values. Amongst others, more expansive data on agricultural factors and bacterial resistance were added to the database. Following a pilot survey at the June 2009 meeting, a questionnaire was sent to the 35 ESAC LNRs to enquire about information which is not available from the data sources consulted. This questionnaire asked LNRs to answer questions relating to the following:

- Procedures for patients to consult with physicians
- Doctor remuneration
- Treatment guidelines
- Feedback on Antibiotic prescription
- Doctor – Pharmacist role
- Marketing restrictions

The LNR survey was sent out on the 7<sup>th</sup> of August 2009 and responses from 29 LNRs were received and the variables were added to the list of variables.

### **Data availability & analysis**

Data was collected for 180 variables for the period 1999 – 2007 for the 35 ESAC countries. The data is not 100% available from the sources used in the data collection and therefore missing values have to be imputed. Missing values are imputed with a weighted average of the known values with the weight being determined by the distance in time between the known and unknown values. An error term will be added to the imputed values to capture the variability of each variable. Explanatory variables in the dataset for which a country has no information will not be imputed. A biclustering technique of the availability matrix will be used to chose an optimal set of rows and variables from the imputed database so that we have a subset of the database with 100% data availability.

The variables collected are summarized below by seven groups of variable types with information on the number of variables in each group and the data availability by group, before and after the imputation of missing values. The availability of data shown here are for the same country\*year combinations as we have antibiotic consumption (see Table 6.7). A full inventory of the determinants used in the analysis is presented in Annex IV.

**Table 6.7: Availability of variables by group, before and after imputation. The availability is calculated as an average of the availability between 1999 and 2007**

<b>Group</b>	<b>Number of variables</b>	<b>Availability before imputation</b>	<b>Availability after imputation</b>
Agricultural factors	7	54.5%	92.1%
Burden of disease	35	80.7%	95.2%
Culture and perception of illness	26	42.4%	65.5%
Demographic factors	21	81.6%	96.8%
Education and knowledge about antibiotics	6	50.0%	93.2%
Healthcare system	73	71.7%	81.1%
Socioeconomic factors	12	59.3%	88.2%
Grand Total	180	68.2%	84.7%

The availability of data by country is shown below, before and after imputation of the missing values. The availability is only shown for country\*year combinations where antibiotic consumption is known from the core ESAC database (see Table 6.8).

**Table 6.8: Availability of variables by country, before and after imputation. The availability is calculated as an average of the availability between 1999 and 2007**

<b>Country</b>	<b>Availability before imputing</b>	<b>Availability after imputation</b>
Austria	76.4%	92.1%
Belgium	61.2%	89.3%
Bulgaria	59.2%	77.4%
Croatia	55.6%	68.9%
Cyprus	34.7%	39.0%
Czech Republic	62.2%	79.7%
Denmark	74.7%	91.5%
Estonia	65.7%	79.1%
Finland	82.2%	97.2%
France	75.0%	92.1%
Germany	69.9%	85.3%
Greece	71.2%	84.2%
Hungary	72.2%	92.7%
Iceland	69.7%	81.4%
Ireland	72.6%	84.7%
Israel	47.4%	61.0%
Italy	71.5%	95.5%
Latvia	58.8%	71.8%
Lithuania	61.7%	74.0%
Luxembourg	66.5%	80.8%
Netherlands	78.8%	92.1%
Norway	76.3%	94.4%
Poland	56.0%	79.7%
Portugal	70.5%	88.7%
Russia	38.8%	49.7%
Slovakia	60.4%	78.5%
Slovenia	65.9%	82.5%
Spain	78.8%	99.4%
Sweden	78.3%	93.8%
Switzerland	71.1%	87.0%
United Kingdom	71.6%	85.9%

Datamining techniques (bagged regression trees and random forests) are used to identify influential variables from the dataset. This technique was studied first to assess the influence of correlated covariates on the results. Based on this elaboration of methods, it was decided to use a backward selection approach on multiple random forests / bagged regression trees. The proposed methodology has been discussed with researchers that are currently exploring the effect of correlated variables on random forests and they have indicated that this methodology is a plausible approach.

The set of possibly important variables will then be entered with a forward selection scheme into a linear mixed model (LMM) with country as a random effect to determine a final set of important variables.

### **Preliminary results**

The datamining techniques were applied to a biclustered subset of the database with optimal availability and also a subset of the database which contains all the variables that are 100% available. The results of this analysis were shared at the yearly ESAC meeting in Stockholm on the 27<sup>th</sup> of May 2010. A list of 37 potentially important variables which were identified in the datamining exercise was shared with the participants of the meeting. From the list of 37 variables, the following four variables were indicated as the most important variables in explaining antibiotic consumption with a LMM:

<b>Significant variables</b>	<b>Beta</b>	<b>P-value</b>
Death rate due to other acute respiratory infections	0.026817	0.0007
Most people can be trusted (1=Yes,2=No)	0.654451	0.0002
% of population aged 25 - 64 that attained upper secondary school	-0.005260	0.0007
Number of women per 100 men	-0.026136	0.0039

The fit of the LMM is not yet satisfactory and therefore the inclusion of a time effect into evolution of antibiotic consumption per country is currently being investigated. First attempts indicate that the women to men ratio may not be important in predicting antibiotic consumption, but the other three variables remain important.

The sources used in the database were validated after the May 2010 meeting which led to an increase in the availability of data. The availability of data shown in Table 6.7 and Table 6.8 are representative of the most current version of the dataset. The datamining techniques are now being run on the most recent database. The analysis will then also focus on the consumption of separate groups of antibiotics, and according to certain country groups. The analysis will also be run with the inclusion of resistance as covariate and with IMS data for consumption.

An email was sent to all LNRs after the Stockholm meeting in which they were asked to verify the information we have for the LNR survey. The LNRs were also asked to indicate which of the list of 37 potentially important variables they will be able to collect on a regional level. The LNRs of Croatia and Switzerland answered the question of the availability of regional data and it was indicated that Croatia can supply regional data and Switzerland cannot. No other LNRs gave an indication of the availability of regional data. The analysis of determinants at a regional level, will depend on the ability of LNRs to collect regional data which at the moment does not look feasible.

## Analysis of cost of antibiotics

The difficulties with obtaining price information for antibiotics from IMS were discussed at the MT meeting on the 27<sup>th</sup> of November 2009. There it was decided that further efforts needed to be taken to obtain price information from other sources. Individual emails were sent to all LNR's on the 16<sup>th</sup> of December 2009 requesting the LNR's to indicate to which extent they will be able to provide data on the cost of antibiotics from local sources. LNR's were asked to indicate which of the following data they can provide:

- **EX-FACTORY PRICE:** The total payment received by the pharmaceutical company for providing one package of the medication. This excludes distribution costs and the markup charged by the pharmacy for dispensing the medication
- **EX-PHARMACY PRICE:** The total payment received by an average non-hospital-based pharmacy for providing one package of the medication.
- **OUT OF POCKET PRICE:** The total amount faced by an average patient for purchasing a package of the medication at a pharmacy. This amount should not include the amount reimbursed by the national health insurance, but may include the amount covered by private insurers .

We have received responses from 24 of the LNR's. Some LNRs indicated that wholesale prices are available. These prices are understood to be greater than ex-factory prices and less than ex-pharmacy prices. The data that have been collected up to August 2010 is described below.

**Table 6.9: Price data collected**

Country	Data available	Time period
Belgium	Ex-pharmacy	1999-2009
	Out of pocket	2001-2009
Bulgaria	Ex-factory	2005 - 2009
Croatia	Ex-factory	2009
	Out of pocket	
Denmark	Ex-pharmacy	2000-2009
Estonia	Ex-pharmacy	2006-2009
	Wholesale price	2003-2009
France	Wholesale price	1999-2008
	Out of pocket prices	
	Ex-pharmacy	
Ireland	Ex-factory	2002-2008
	Ex-pharmacy	
	Out of pocket	
Malta	Wholesale price (Hospital)	2010
Norway	Wholesale prices	1999- 2009
	Out of pocket	
	Ex-pharmacy	
Portugal	Ex-pharmacy	2002 -2009
Slovakia	Ex-factory	1999; 2001; 2004 - 2010
	Ex-pharmacy	2001; 2004 -2010
	Out-of-pocket	1999; 2001; 2004 - 2010
Slovenia	Ex-pharmacy	2007 - 2010
	Ex-factory	
Spain	Ex-factory	2009-2010



<b>Country</b>	<b>Data available</b>	<b>Time period</b>
	Ex-pharmacy	
Sweden	Ex-pharmacy	2006-2009
	Out-of-pocket	2006-2009
Switzerland	Ex-factory	2003-2009
	Ex-pharmacy	

The price analysis will start now with the data that is shown in Table 6.9. We have received data for Israel which was requested from a health insurance company in Israel, but we need more clarity on what price types the data contains before we can use it.

- In-depth analyses -

## 7. MANPOWER FOR THE EXECUTION OF ACTIVITIES

Person	Position	Affiliation	Man/days	Activities	Total Cost
Herman Goossens	Project Coordinator	University of Antwerp	10	Overall coordination Liason with ECDC	NA
Vanessa Vankerckhoven	Project Manager	University of Antwerp	17	Overall Management Liason with ECDC Communication Dissemination Financial Coordination	7,140.34
Arno Muller	Data Manager	University of Antwerp	216	Data Management core data & subproject PPS Support	47,882.88
Ann Versporten	Data Manager	University of Antwerp	153	Data Management core data & subproject PPS Support	34,936.02
Sophie Nys	Administrator	University of Antwerp	173	Finances Administration Minutes of Meetings Updates websites Organization of events	41,258.77
Nico Drapier	IT Specialist	University of Antwerp	197	Development web-PPS HC + NH Development Software core data collection Online report PPS Development e-library Improvement website IT support	98,500.00
Samuel Coenen	Clinical Scientist	University of Antwerp	10	Coordination AC subproject Set-up AC subproject Recruitment countries Analysis AC data	3,024.30
Niels Adriaenssens	Clinical Scientist AC	University of Antwerp	126.5	Set-up AC subproject Recruitment countries Analysis AC data	27,184.85
Peter Davey	Advisor HC	University of Dundee	10	Support/supervisor HC subproject	NA
Sofie Vaerenberg	Clinical Epidemiologist	Institute of Public Health	41.5	Support/supervisor HC subproject Support/supervisor NH subproject	11,147.73
Peter Zarb	Clinical Scientist HC	Mater Dei Hospital, Malta	110	PPS 2008 & 2009 Recruitment countries Analysis HC data Database HC	22,000.00
Béatrice Jans	Advisor NH	Institute of Public Health	42	Coordination NH subproject Set-up NH subproject Recruitment countries Analysis NH data	19,768.98
Ellen Broex	Clinical Scientist NH	Institute of Public Health	97	Set-up NH subproject Recruitment countries Analysis NH data	17,784.95
Philippe Beutels	Advisor EC	University of Antwerp	32	Coordination EC subproject Set-up EC subproject Recruitment countries	10,746.88
Christiaan Marais	Clinical Scientist EC	University of Antwerp	149	Inventory of socio-economic determinants Analysis of EC data	54,234.51
Rudi	Clinical	University of Antwerp	82	Validation drug lists HC	28,267.86

- Manpower for the execution of activities -

<b>Person</b>	<b>Position</b>	<b>Affiliation</b>	<b>Man/days</b>	<b>Activities</b>	<b>Total Cost</b>
Stroobants	scientist support	Antwerp		PPS Validation registers Core data Pilot studies PPS NH & HC	
Paul Van Royen	Supervisor	University of Antwerp	24	Supervision AC subproject	11,095.44
Brice Amadeo	Hospital Care Support	Groupe Hospitalier Pellegrin, Bordeaux	25	PPS 2008 & 2009 Recruitment countries Analysis HC data Database HC	NA

### 8. LIST OF DELIVERABLES YEAR 3

<b>Deliverable number</b>	<b>Description</b>	<b>Responsible</b>	<b>Due Date</b>
34	Disease Specific Outpatient Antibiotic Prescribing Quality Indicators	ESAC MT	month 21 → M27
35	Quality indicators on hospital antimicrobial-consumption in collaboration with BSAC	ESAC MT	month 26 → M32
36	Updated Detailed Ambulatory Care Database A (2008 data)	ESAC MT	month 27
37	Report on Quality indicators on hospital antimicrobial-consumption	ESAC MT	month 27 → M33
38	ESAC Core Database 2008	ESAC MT	month 28
39	ESAC Hospital PPS 2009 Database	ESAC MT	month 28
40	Automatic individual reports of the 2009 PPS to participating hospitals	ESAC MT	month 28 → M33
41	Annual Report 2009	ESAC MT	month 28 → M33
42	Report Advisory Board meeting 2009	ESAC MT	month 28 → M36
43	Report Audit Committee meeting 2009	ESAC MT	month 28 → M36
44	Programs for automated multilingual feedback of specific PPS results to participating countries and institutions, national feedback reports	ESAC MT	month 29 → M33
45	Detailed Ambulatory Care Database B (2008 data)	ESAC MT	month 29
46	Final ESAC-NH database established	ESAC MT	month 30 → M36
47	Report on Disease Specific Quality of Outpatient Antibiotic use in Europe	ESAC MT	month 33 → M36
48	A database containing socio-economic determinants	ESAC MT	month 33
49	Final Report on AC	ESAC MT	month 36
50	Final Report on HC	ESAC MT	month 36
51	Final Report on NH	ESAC MT	month 36
52	Final Report on EC	ESAC MT	month 36
53	Third Report ESAC (ESAC Yearbook 2008)	ESAC MT	month 36 → M33
53b	Final Management Report 2009-2010	ESAC MT	month 36
54	Report Advisory Board meeting 2010	ESAC MT	month 36

DLs which have been delivered are marked in blue.



### 9. LIST OF MILESTONES YEAR 3

Milestone number	Description	Responsible	Due Date
23a	HC Longitudinal Survey	Hospitals	Month 13 → M27
32	Second PPS in nursing homes	ESAC MT	Month 19 → M27
39	Data Delivery of the second PPS in nursing homes	ESAC MT	Month 21 → M29
44	Delivery Core ESAC 2008 raw data	LNRs + NNs	month 25
45	Data Delivery Data Collection Protocol A & B (2008 data)	LNRs + NNs	month 25
46	<del>Workshop on HC indicators</del>	ESAC MT	<del>month 25 → M32</del>
47	<del>Fourth PPS in nursing homes</del>	ESAC MT	<del>month 25</del>
48	EC Analysis of the between-country determinants	ESAC MT	month 26 → M36
49	EC Analysis of the within-country determinants	ESAC MT	month 26 → M36-44
50	Evaluation of the cost of antimicrobial consumption	ESAC MT	month 26 → M44
51	<del>Fifth Meeting Advisory Board</del>	<del>ESAC MT + Advisory Board</del>	<del>month 27</del>
52	Second Conference Call Audit Committee	ESAC MT + Audit Committee	month 27 → M33
53	Validation Core ESAC 2008 data	ESAC MT + LNRs + NNs	month 27 → M32
54a	<del>Data Delivery of the fourth PPS in nursing homes</del>	ESAC MT	<del>month 27</del>
54b	Data Delivery of the final PPS Database	ESAC MT	month 30
55a	Intermediate NH meeting with presentation and discussion of preliminary results	ESAC MT	month 32 → M33
55b	Intermediate HC meeting with presentation and discussion of preliminary results	ESAC MT	month 30 → M33
56	Third Annual Meeting	ESAC MT + LNRs	month 33
57	<del>Sixth Third Meeting Advisory Board</del>	<del>ESAC MT + Advisory Board</del>	<del>month 33</del>
58	<del>Third Meeting Audit Committee</del>	<del>ESAC MT + Audit Committee</del>	<del>month 33</del>
59	Call Core ESAC 2009 data	ESAC MT + ECDC	month 33 → M34
60	Transfer In-depth Ambulatory Care Data Collection to ECDC	ESAC MT	month 33 → M46
61	Data collection request B (2009 data)	ESAC MT + ECDC	month 33
62	Final Meeting AC	ESAC MT	month 33 → M45
63	Final Meeting HC	ESAC MT	month 33 → M45
64	Final Meeting NH	ESAC MT	month 33 → M45
65	Final Meeting EC	ESAC MT	month 33 → M45

MSs which have been achieved have been marked in blue.

- List of Milestones -



## 10. MINUTES OF THE MEETINGS

### Minutes of the Scientific Advisory Board, Paris, France, Nov 27, 2009

<p style="text-align: center;"><b>ESAC Scientific Advisory Board Meeting</b></p>
--

<p style="text-align: center;">France, Paris Friday November 27, 2009</p>
---

#### Programme

- 08h30 Welcome (Herman Goossens)
- 08h40 Objectives, deliverables and timetable SAB (Herman Goossens)
- 08h50 Feedback second year ESAC-3 & recommendation regarding take-over and future activities (All):
- 08h50 Core data (Arno Muller)
1. Assessment data collection methodology 2007 & 2008
  2. Publication plan
  3. Future activities & take-over plan
- 09h30 Ambulatory Care Subproject (Samuel Coenen & Niels Adriaenssens)
1. In depth AC data collection
  2. Collaboration with CHAMP, HAPPY AUDIT and APRES
  3. Publication plan
  4. Future activities & take-over plan
- 10h30 *Coffee*
- 10h45 Hospital Care Subproject (Peter Davey & Peter Zarb)
1. Assessment PPS 2006, 2008 & 2009 methodology
  2. Collaboration with ARPEC
  3. Publication plan
  4. Future activities & take-over plan
- 11h45 Nursing Homes Subproject (Béatrice Jans & Rudi Stroobants)
1. Assessment 1<sup>st</sup> PPS 2009
  2. Colaboration with HALT
  3. Publication plan
  4. Future activities & take-over plan
- 12h45 *Lunch*
- 13h30 Socio-Economics Subproject (Philippe Beutels & Christiaan Marais)
1. Assessment socio-economics data collection
  2. Publication plan
  3. Future activities & take-over plan
- 14h30 ESAC: where did we succeed and where dit we fail? (Herman Goossens)
- 15h00 Future activities of ESAC at ECDC (All)
- 16h00 Plan and timing for take-over (Herman Goossens & Ole Heuer)
- 16h30 *End of the meeting*

### **Participants**

<b>Name</b>	<b>Country</b>
Niels Adriaenssens	Belgium
Philippe Beutels	Belgium
Christian Brun-Buisson	France
Samuel Coenen	Belgium
Peter Davey	UK
Carlo Gagliotti	Belgium
Herman Goossens	Belgium
Hajo Grundmann	The Netherlands
Sigrid Metz	Austria
Ole Heuer	ECDC
Béatrice Jans	Belgium
Brice Amadeo	Germany
Rudi Stroobants	Belgium
Sofie Vaerenberg	Belgium
Arno Muller	Belgium
Sophie Nys	Belgium
Arjana Tambic Andrasevic	Croatia
Theo Verheij	The Netherlands
Vanessa Vankerckhoven	Belgium
Giorgio Zanetti	Switzerland
Christiaan Marais	Belgium
<b>Total</b>	<b>21</b>

### **Apologies**

Carl Suetens, ECDC  
Raul Raz, Israel  
Winfried kern, Germany  
Sigvård Mölsted, Sweden  
Peter Zarb, Malta

### **Discussions**

#### **1) Core data ( Arno Muller)**

Theo Verheij: Please explain the use of DDDs vs PDDs?

Herman Goossens: Combination of measures is needed, DDDs is not sufficient.

Ole Heuer: double counts in 2 countries in case of parallel export?

Herman Goossens: Yes: e.g. country A = sales data & country B= reimbursement

ABs will be counted twice in case of parallel export

Christian Brun-Buisson: proportion of countries only reimbursement or only sales → about half of the countries (FR + ES have both), what is the bias? 1/3 higher use for ES when sales data are compared to reimbursement data

Arjana Tambic: DDDs + PDDs remain important for scientific purposes, but how many exposed to ABs is important for governments and the press = prescription data

Giorgio Zanetti: Mix of sales & reimbursement data?

Arno Muller: Yes eg J05: No data for oseltamivir from Belgium = reimbursement data →for Oseltamivir (=sales data)

Herman Goossens: What about stock piling data?

→ No record of this "third mechanism"

### **Publications**

A JAC supplement could be issued next year: 10 years of data. The negotiated price is £6000, we should add this to budget (ESAC-4).

Update core data + subproject data.

- Important paper: assessment of how to measure antibiotic use (by S.Coenen et al)

### **Senior expert @ECDC**

Ole Heuer explains that a new senior expert will be recruited at ECDC to take-over and follow-up the ESAC project after take-over.

Herman Goossens suggests recruiting the new senior expert @ ECDC asap. He should also work in Antwerp to understand data and work with it.

Ole Heuer asks whether a data manager is needed instead of senior expert? Sounds like a good idea to have a person co-located at University of Antwerp & ECDC.

Theo Verheij stipulates that both a data manager and an expert is needed.

Herman Goossens states that the job content of senior expert @ ECDC should perhaps be revised.

Peter Davey stipulates that a contact person in the countries is very important to identify focal point.

Arno Muller suggests recruiting a transversal data manager = working on ESAC & EARSS.

Ole Heuer mentions that at ECDC they have the Tessa team and IT people. Tessa team should take care of this, but now sees that this is not feasible: more complex than AMR surveillance, but currently only 1 person will be recruited @ ECDC.

Hajo Grundmann agrees that a combined person ESAC-EARSS would be a good idea.

#### **SWOT:**

Ole Heuer mentions that letters were sent to the ministries to appoint a contact point for EARSS, but only few countries had mismatches. Same will be done for ESAC: try to keep current contact persons as much as possible.

Arno Muller asks what about the take-over of the interactive database? Data submission tool? Core database? E-library? Website?

Ole Heuer explains that a Tessa team member will come to Antwerp, but what will definitely be taken over are:

- Interactive database
- Data submission tool
- Core database.

Sigrid Metz: what about the validation of the data and the quality of the raw data. This is a challenge for ECDC, but is a strength of ESAC (quality & expertise of the ESAC MT)

Ch. Brun-Buisson: Regional data → what do you expect from this approach?

Arno Muller: same as North & South, but regional data points out that there is a north-south gradient. Cross border difference can be seen.

Ole Heuer: overall aim is to combine the data → resistance and use at the same level.

Sigrid Metz: feedback + value of the networks: people need to understand what the added value is → methodological questions need to be addressed.

Peter Davey: we need more info at all levels → determine relationships. Can be used for intervention studies.

Theo Verheij: what are the future needs → link between use & indications → one of the biggest challenges.

Hajo Grundmann: what about regional data → NUTS is not the best measure?

Ole Heuer suggests adding an additional DL:

Detailed description for each country: all knowledge from AM should be transferred and not get lost!

Make up **country manuals**: type of data available, problems + contact person + trouble guide: problems encountered? Solutions?

Arno Muller: new surveillance started ESVAC: European Surveillance of Veterinary Antimicrobial consumption

Herman Goossens: perhaps consider ESHAC as an acronym instead of ESAC

Ole Heuer: excellent suggestion: sounds the same

#### **Consensus was reached on:**

- The objectives and DLs for ESAC-4
- Take-over by ECDC of
  - Core data (J01/J02/J04/J05)
  - Regional data
  - Interactive Database
  - Data submission tool
- Subcontract
  - J04 TB
  - J05 HIV
- Also collect PDD data next to DDD data
- Keep current LNRs as much as possible
- Publication of ESAC data in JAC supplement
- Making of country manuals
- Explore new name for ESAC after transfer to ECDC: ESHAC (European Surveillance of Human Antimicrobial Consumption)
- Expert(s) ECDC: should be co-located at ECDC & UA

#### **2) Ambulatory Care Subproject (Samuel Coenen).**

##### **Protocol A**

Samuel Coenen suggests collecting age & gender together with the J01 core data. Moreover to evaluate the EAAD age categories will be needed in order to see what's happening in children (in case only DDDs are collected) or move to PDDs on top of DDDs.

Herman Goossens agrees that PDDs will have to be collected on top of DDDs.

## **Guidelines**

Database on guidelines (CHAMP) should go to ECDC! Database on awareness campaigns, developed at Geneva, should also go to ECDC!

Sigrid Metz: the database should also be expanded to countries that don't have national guidelines (AT) → database is very helpful. Eg for some Abs, the packsize was changed, but nobody knows why? → problem because no guidelines.

Arjana Tambic: perhaps an educational workshop can be given on guideline writing?

Ole Heuer: this is part of the country visits activities, but it will take a long time because there are many countries to be visited. Another possibility would be to set-up an expert working group.

Arjana Tambic: important to have good quality guidelines! Important role for ECDC.

### **National Networks: too few GPs involved**

Christian Brun Buisson: How can the lack of GP involvement be improved?

Samuel Coenen: GRIN network was established by Theo, information was distributed to countries on ESAC AC subproject → not sure what happened afterwards, GP involvement was also stressed during AC meetings also happy audit networks were contacted. Thus, a number of actions have been taken, but still too few involvement of GPs.

Christian Brun Buisson: is there a network or association of GPs?

Theo Verheij: yes, there are and they would indeed be very willing to help.

Sigrid Metz: it's rather a question of definition – what is their role & part of the national network? In AT, they are involved but not actively in the national networks.

Samuel Coenen: pity they were not present at the AC meeting.

Sigrid Metz: difficult to get active contribution, no academic GPs, the GPs are self-employed, which is also the case same for most countries.

### **Protocol B**

Carlo Cagliotti: how many countries are participating in AC for protocol B?

Samuel Coenen: only a handful: DK-NL-BE: available but need to be made comparable + only sample data, not possible to compare at a national level.

Herman Goossens: protocol B needs more work → too premature to move to ECDC.

Hajo Grundmann: we should keep the motivation within the networks → not mention end is near → give the challenge to ECDC.

Ole Heuer: SAB were stay – knowledge will not exist at ECDC: SAB ESAC & SAB EARSS will be asked to continue after the EARSS and ESAC take-over

Herman Goossens: send message to NNs → everything is going well – very good meeting with the SAB + ESAC will continue.

Hajo Grundmann: sustainability is very important.

Theo Verheij: disease-specific indicators? Important to do this correctly and to have experts around the table.

Herman Goossens thanks Samuel Coenen for his excellent work on this most difficult subproject.

### **Consensus was reached on:**

- The objectives and DLs for ESAC-4
- Take-over by ECDC of
  - Protocol A: collect age and gender together with core data
  - Guideline databases
  - Evaluation of EAAD
- Subcontract:
  - Protocol B
  - Disease-specific antibiotic prescribing QI
- Need for ESAC-SAB

### **3) Hospital Care ( Peter Davey)**

#### **Results PPS**

Hajo Grundmann: why is participation for UK, IE & BE that high?

Peter Davey: UK: discovered networks that were doing PPS anyway; networking is important.

Suggestion: country report for UK, IE, BE. (large number of hospitals that have participated).

#### **Results LS**

Herman Goossens: LS2006: literature is a mess. ESAC LS2006 is an important paper – will explain antimicrobial trends in EU.

Hajo Grundmann: are you only looking at 1 variable?

Peter Davey: no: time series analysis → all variables are in; confident about analysis, gives a good idea on what drives AB consumption + we understand why extreme changes occur: admission – length of stay – others?

Theo Verheij: indications for hosp. admissions? Differs between countries – populations are not comparable.

Peter Davey: there are indeed not yet comparable: 2006 only 1 hospital per country= not representative. We have mainly been looking for a way of analyzing the huge amount of data.

Arno Muller: in the LS2009 we will be able to split the hospitals at the department level.

**Belgian presidency: 8-10 Nov 2010.**

Herman Goossens explains the purpose of the BE presidency:

4 workshops will be organised:

- 1) Hand hygiene
- 2) Hospitals indicators
- 3) PPS in hospitals
- 4) PPS in nursing homes

**PPS Software**

What about the PPS software? HELICS software (stand-alone) and ESAC software.

ESAC can develop the software PPS for AM use and HCAI. Pilot is necessary in number of countries (May 2010) → final software should be ready by Belgian Presidency. Next to software also helpdesk is needed.

Hajo Grundmann: EARSS also gets a lot of questions, helpdesk needs knowledge on HCAI, AM use and resistance and protocol

Arno Muller: He and Nico Drapier have been dealing with IT questions; scientific questions have been dealt with by Peter Zarb.

Hajo Grundmann: definitions on HCAI? Are they differently defined by ECDC & national level? The helpdesk needs to be able to answer these questions.

Herman Goossens: no solutions today, conference call on Monday (Belgian Government & ECDC) → Herman will raise these issues.

**Transfer LS to ECDC?**

Herman Goossens suggests subcontracting the LS

Hajo Grundmann: able to collate data at every level?

Peter Davey: more difficult than one would expect:

- 1) Pharmacy system → hospitals like to use their own software
- 2) Own supply codes → difficult to sort out, not possible to have hospitals to process their own data.

Sigrid Metz: no sustainable network for LS in AT: only 1 hospital that was willing to participate; unable to validate data from the other hospitals.

Hajo Grundmann: it should be possible to have a central software system; individual interfaces needed; takes some time, but will be helpful in the long run.

Sigrid Metz: not only IT problems occur, but data are often mess, manual work is needed: e.g. own formulations, parallel import

Peter Davey: local input is needed to sort out data – some countries have started a central system, but not there yet.

Arno Muller: e.g. France: 700 hospitals in a central system, 1 year data is collected (=annual survey).

Herman Goossens suggests developing LS structure → perhaps a call can be launched by ECDC?

Ole Heuer: what manpower & timeframe would be needed for an LS project?

Arno Muller: depends on how frequent data do you want? Below the year, even quarterly → IT system should be developed to collect these data

Peter Davey: we need to take step back, what are countries doing? What data is missing? What are the problems?

Herman Goossens: funding for a meeting by ECDC → have people come together that have experience in LS: discuss problems & opportunities

Arno Muller: ABCalc not solution → interface needed.

Sigrid Metz: suggests collecting a selection of substances that should be reported, 75% of consumption is about 10 substances.

Hajo Grundmann: perfect is the enemy of the good.

Sigrid Metz: ESAC efforts need to be continued!

Herman Goossens: ECDC should decide whether they want hospitals to develop an LS system? If yes: fund a meeting. DL of that meeting: how to develop a LS system? Next have a call could be launched to fund a project.

Ole Heuer: good suggestion, but we need a frame idea before the group meets. Hospital data is needed & needs to be analyzed. Currently only resistance is monitored. Also consumption data is needed.

Herman Goossens: important to support countries submitting their data

**Use of templates – to be continued?**

Herman Goossens: should we develop template or give everything you have & we will process this. Beginning of ESAC: there were no templates. Next: template was made by Arno Muller → this was not that successful, it was difficult for some countries to use the template.

Arjana Tambic: ESAC: scientific approach / ECDC: strategic & policy making approach on national level. More on intervention, have as much hospitals involved as possible.

Herman Goossens: next step = endorsement by national authority.

Arno Muller: countries want the data first at the country level (national level) than to ECDC. Question on ownership of the data?

Theo Verheij: have you done an analysis on why some countries do not deliver data or did not deliver good data?

Herman Goossens: there are different explanations for this:

- Motivation of the LNR
- Location of the data
- Change in data provider (not always a track record of this).

Samuel Coenen: we have moved to National Networks (NNs), but it is a virtual network in several of the countries.

Theo Verheij: make an inventory on what the problems are?

Herman Goossens: there are no systematic errors! Databases are there, problems are linked to the contact person.

Peter Davey: we should not leave data collection up to the government:

- Policy can change
- Government can change
- ...

Samuel Coenen: problems for data delivery are well-known.

Herman Goossens: personal contact is very important, ECDC should keep this in mind.

Hajo Grundmann: not nominate shareholders & opinion makers in the country.

Peter Davey: build a sustainable network.

Ole Heuer: mandatory reporting is not feasible. But encourage countries to increase coordination at the national level, build a sustainable NN & encourage networking.

#### **Consensus was reached on:**

- The objectives and DLs for ESAC-4
- Take-over by ECDC of
  - PPS (together with HCAI PPS)
- Subcontract
  - LS

#### **4) Nursing Homes (Beatrice Jans).**

##### **Presentation Béatrice Jans**

##### ***Preliminary results***

1740 residents and 1757 molecules are due to treatment with several (2 or 3) molecules for just 1 infection/patient. Fosfomycine (Monuril) seems to be typical Belgian, but it is not (also Germany).

Some further investigations on treatment prophylaxis are requested: what is prophylaxis? Why so often used prophylactic therapy in NH? Why so big differences per country?

##### ***Risk factors***

Main goal is making an evaluation on the AB use in order to care load of different patient risk profiles. If major risk factors are present, does prophylactic AB use increase?

Are risk factors also linked to morbidity? In the HALT study, the ESAC PPS (2) will also include infection signs. In May 2010 a second HALT will result in a third ESAC PPS (Nov 2009 = pilot HALT). Please do not release data before the final HALT.

##### ***Online submission vs OCR***

Two data collections (paper and Dbase) because informatisation is not always present in all NH nurse services. Five NH per country does not allow to determinate national data collections. Often no information on AB resistance available due to absence of antibiograms (and the financial impact).

##### ***Definition NH***

As for the definition used "what is a NH ?", all countries were asked to select their NH's as closed as possible to "chronic, long term residential care". In many countries, an intermediate care NH exist, in many other countries they are absent. Anyhow, a permanent stay in the NH is not always necessary. In a long term care study, PPS have to be repeated many times, data collections have to be hold by the NH themselves although this workload cannot be measured at this moment yet.

##### ***Discussion on Nursing Homes***

Béatrice Jans: Important to further investigate prophylactic treatment of UTI

Hajo Grundmann: are risk factors indicators for inappropriate use?

Peter Davey: risk for C. diff

Theo Verheij: risk factors are important but select the correct one, e.g. co-morbidity.

Hajo Grundmann: SNIV network in NL = ca 25 NHs → could participate in HALT. Data will be available for EAAD (ESAC & HALT data). → lot of media attention on this type of data.

Herman Goossens congratulates Béatrice Jans on the impressive job.

Bea Jans: highly motivated group, too early to move the NH subproject to ECDC.

Ole Heuer: could not agree more, will stay outsourced. No information on HALT-2.

Bea Jans: no EU-PPS planned yet.

Peter Davey: acute care of the elderly = 30% of all different subpopulations.

Hajo Grundmann: health care for the elderly has high political impact.

Herman Goossens: future council recommendations are needed (by eg DG Sanco).

Ole Heuer: what timeframe + manpower would be needed? + set an output that is useable.

Bea Jans: will work this out.

**Consensus was reached on:**

- The objectives and DLs for ESAC-4
- Take-over by ECDC of
  - Too premature!
- Subcontract
  - NH PPS (HALT-2?)
  - Survey on management of UTI, guidelines for the management of urinary catheters, wound prevention and wound care in LTCFs

**5) Socio – economic subproject (Philippe Beutels).**

**Presentation Philippe Beutels**

**Database**

Philippe Beutels presented the database that has been constructed within the EC Subproject. PB added that the variables include bacterial resistance and that this will be used as dependent and independent variables in the data analysis. PB was asked to elaborate more on the type of data and he said that the data contains continuous and categorical data. The burden of disease variables contains 35 different variables which include death rates. PB added that the fact that the data is available for 9 years makes this unique since previous studies have only looked at one time point when capturing the data. PB mentioned that a survey was conducted amongst the lead national representatives which aimed to source information on the healthcare system of each country that is not readily available through standard databases.

**Preliminary results**

In terms of the preliminary results on the influential variables of antibiotic consumption, PB stressed the fact that this is only preliminary results and that the methodology is currently under investigation due to the correlated covariates. PB also added that the graphs do not show the direction of the relationship between the variables and antibiotic consumption. One of the influential discussed is the power distance index. Peter Davey (PD) said that this variable helped to explain differences between Northern Ireland and the Republic of Ireland in a previous study.

**Usage AB vs cost**

PD said that the usage of antibiotics follows a U shape for the UK. Arno Muller (AM) added that he has seen this in many countries. Carlo Gagliotti (CG) suggested that this may be due to generics coming into the market which reduces the price of the medication and thereby increasing sales. PD responded that the price of medication does not make a difference to the patients in the UK and that he does not think this is the reason for the U-shape in antibiotics consumption. PD added that they have observed differences between the four countries of the UK and he would like to do research on the influence of the administrations of the four countries in the UK to see if this explains the differences in antibiotic usage.

**EC database**

Ole Heuer mentioned that they find the database interesting and would like to continue working on it when the ESAC project ends. He asked if EMEA was involved and PB responded that it was not.

**Price analysis**

Herman Goossens: analysis of price information on antibiotics is very important and must be done even if this is restricted to the countries for which price data is available. **Report on price analysis** must be added to the deliverables and milestones of ESAC-4.

Peter Davey: will also look to include price information for the study they intend to do.

Peter Davey suggested that it will be interesting to use cost data to assess if antibiotic usage campaigns lead to a reduction in sales which can be used to measure the cost-effectiveness of antibiotic campaigns.

Theo Verheij suggested that price information should be available for some countries.

Peter Davey agreed and added that even though it may be available it is difficult to access. He suggested that the availability of cost data be relooked.

Herman Goossens: mentioned that in the first ESAC project the possibility of collecting price information was discussed, but that many countries objected for reasons which were not entirely clear (as confirmed by PD).

Philippe Beutels: agreed that ideally price information would need to be included in both the determinants-of-use analyses and, of course, the cost estimation part of the subproject. New attempts would need to be made to obtain price information through IMS and through the core data collection Report on price analysis.

Peter Davey will check whether price data is available in an accurate fashion & can it be found for previous years?

Herman Goossens: database should not get lost.

Hajo Grundmann: cost might fall between competencies of authorities, someone at the regulatory level should put his shoulders under this.

Peter Davey: important for the ministries to find out about costs.

Hajo Grundmann: health cost is important for all governments.

Herman Goossens: currently insufficient awareness.

Theo Verheij: looking for reliable sources to collect data on price (through LNRs?).

Peter Davey: politically sensitive but not clear why.

Herman Goossens: things have changed; should be easier and less resistance against it.

Peter Davey: invest in action → persuade the government.

Theo Verheij: next to analysis of cost, also look at well being.

### **Diagnostic tests**

Arjana Tambic: cost of diagnostics: ranking first:

- Important to investigate this further
- What type of tests – differences in countries?

Peter Davey: persuade more investment from government in diagnostic tests.

Arjana Tambic: make up a hypothesis, look at what should be invested in and what not.

Herman Goossens: not an EMEA matter – should be linked to public health.

### **Consensus was reached on:**

- The objectives and DLs for ESAC-4
  - Additional DL: collect information on cost (report on price analysis)
- Take-over by ECDC of
  - EC Database
  - Collect information on price
- Subcontract
  - To link cost of antimicrobials and resistance
- Collect additional information on diagnostic tests

### **Additional items addressed by SAB:**

#### **Complication rates**

Theo Verheij: link to complication rates; GPs talk to hospital people. The latter are scared that they will have to clean-up the mess. ESAC database: hospital admission rates + link to complication rates.

Samuel Coenen: project was discussed with ECDC representative → using BE data.

Theo Verheij: comparison between BE and NL?

Herman Goossens: feasible for ESAC-4?

Theo Verheij: few months necessary.

Samuel Coenen: EAAD: will also have to address complications if you want to reduce AB use.

#### **ESAC reports**

Sigrid Metz: feedback to NN is important, make sure reports are ready in time.

Samuel Coenen: what kind of feedback is expected?

Sigrid Metz: Individual hospital data is too big file and too complex to make a national report.

Arno Muller: not clear to us what the hospitals exactly expect from the report.

Sigrid Metz: EC report with most important conclusions.

Vanessa Vankerckhoven: we can do this for all reports: summary page with most important conclusions.

Peter Davey: completely agree, we promised immediate feedback to the hospitals, highlight the key features for the hospitals. Focus on choice of AB for the main indications.

Sigrid Metz: we need info on what experts say? What do they think we should do with the data?

Peter Davey: give top line information to the hospitals, they like to compare themselves with similar hospitals e.g. Scotland: compare with other Scottish hospitals, but we don't have the time to do this.

Sigrid Metz: once ESAC has been transferred to ECDC → this should be decided upon → feedback should also then be given.

Arjana Tambic: how to use the ESAC data for interventions? QI (Quality Indicators)! Also EC subproject could lead to QIs → recommendations! HR is still candidate country – important to get feedback and be part of the group.

Christian Brun-Buisson: have comparable data all over Europe. Most important variable: have common methods, not sure whether data are truly comparable, but we need to understand what's going on → this we don't know yet.

Deliverable ESAC-4: feedback results.

#### **Information on duration of treatment**

Herman Goossens: duration of treatment for 4 countries: not published, should look at this.

#### **Impact of H1N1 on AB use**

Giorgio Zanetti: Influence of H1N1 on use of AB → ideal opportunity to look at impact of pandemic on AB use.

Herman Goossens: Yes, add as Deliverable for ESAC-4.

#### **Use of DDDs/PDDs/Other outcome measures**

Samuel Coenen: actions on ATC/DDD?

Peter Davey: should write up, recommendation for WHO.

Samuel Coenen: also mention in critical assessment paper.

### **Consensus was reached on:**

- Additional DLs for ESAC-4:
  - Impact of H1N1 on AB use
- Investigate duration of treatment
- Focus on feedback to countries on core data and subproject results



- Add summary page to all reports for clarity
- Urge countries to make up national reports
- Look at complications (not as DL)

**ANNUAL ESAC MEETING WILL BE 27-28 MAY 2010 in Stockholm, SE**  
**FINAL ESAC MEETING WILL BE 12-13 DECEMBER 2010 in MADRID, ES.**

### Minutes of the Audit Committee Meeting, May 18, 2010

Attendants: *Maciek Godycki-Cwirko, Clodna Mc Nulty*  
*Herman Goossens (chair), Vanessa Vankerckhoven, Arno Muller, Brice Amadeo, Peter Zarb, Christiaan Marais (EC part only), Béa Jans, Ellen broex, Katrien Latour, Ann Versporten*  
Minutes: *Sophie Nys.*

Herman Goossens opened the conference call at 13 PM CET.  
 All participants introduce themselves.

#### **Agenda:**

1. Approval of the minutes of the previous Audit Committee meeting
2. Assess Interim Management Report 2009-2010
3. Assess deliverables and review list of deliverables Y3 + Y4
4. Assess milestones and review list of milestones Y3 + Y4
5. Assess Yearbook 2008
6. Review of the communication/dissemination activities
  - a. Website: <http://www.esac.ua.ac.be>
  - b. Newsletters (December 2009 and April 2010)
  - c. Abstracts/Posters/Publications
7. Review of the development activities
  - a. Web-PPS & online reports NH+HC subproject
8. Review of the subprojects
  - a. Ambulatory Care
  - b. Hospital Care
  - c. Nursing Homes
  - d. Economics
9. AOM

#### **1. Review of the minutes of last meeting.**

The minutes of last meeting (3 July 2008) were approved.

#### **2. Asses Interim Management report 2009-2010 & Management report 2008**

No comments, both were approved.

#### **3. Asses Deliverables and review list of Deliverables Y3+Y4**

Herman Goossens explains about the extension of ESAC requested by ECDC till June 2011.

Note: we are now in Month 33.

#### **List of Deliverables YEAR 3**

Deliverable number	Description	Responsible	Due Date
34	<a href="#">Disease Specific Outpatient Antibiotic Prescribing Quality Indicators</a>	ESAC MT	month 21 → M27
35	<a href="#">Quality indicators on hospital antimicrobial-consumption in collaboration with BSAC</a>	ESAC MT	month 26 → M32
36	<a href="#">Updated Detailed Ambulatory Care Database A (2008 data)</a>	ESAC MT	month 27
37	<a href="#">Report on Quality indicators on hospital antimicrobial-consumption</a>	ESAC MT	month 27 → M33
38	<a href="#">ESAC Core Database 2008</a>	ESAC MT	month 28
39	<a href="#">ESAC Hospital PPS 2009 Database</a>	ESAC MT	month 28
40	<a href="#">Automatic individual reports of the 2009 PPS to participating hospitals</a>	ESAC MT	month 28 → M33
41	<a href="#">Annual Report 2009</a>	ESAC MT	month 28 → M33
42	Report Advisory Board meeting 2009	ESAC MT	month 28 → M36
43	Report Audit Committee meeting 2009	ESAC MT	month 28 → M36

- Minutes of the meeting -

44	Programs for automated multilingual feedback of specific PPS results to participating countries and institutions, national feedback reports	ESAC MT	month 29 → M33
45	Detailed Ambulatory Care Database B (2008 data)	ESAC MT	month 29
46	Final ESAC-NH database established	ESAC MT	month 30 → M33
47	Report on Disease Specific Quality of Outpatient Antibiotic use in Europe	ESAC MT	month 33 → M34
48	A database containing socio-economic determinants	ESAC MT	month 33
49	Final Report on AC	ESAC MT	month 36 → M46
50	Final Report on HC	ESAC MT	month 36 → M46
51	Final Report on NH	ESAC MT	month 36 → M46
52	Final Report on EC	ESAC MT	month 36 → M46
53	Third Report ESAC (ESAC Yearbook 2008)	ESAC MT	month 36 → M33
53b	Final Management Report 2010	ESAC MT	month 36
54	Report Advisory Board meeting 2010	ESAC MT	month 36

**List of Deliverables YEAR 3 bis (ESAC-4)**

49	Final Report on AC	ESAC MT	month 36 → M46
50	Final Report on HC	ESAC MT	month 36 → M46
51	Final Report on NH	ESAC MT	month 36 → M46
52	Final Report on EC	ESAC MT	month 36 → M46
54	Report Advisory Board meeting 2010	ESAC MT	month 36 → M46
55	Final Management Report 2010	ESAC MT	month 36 → M46
56	Final ESAC 10 Years report + JAC supplement	ESAC MT	Month 46
57	Update Core database up to 2009	ESAC MT	Month 46
58	Tools for data submission	ESAC MT	Month 46
59	Country manuals: type of data available, problems, contact person, trouble shooting	ESAC MT	Month 46
60	Interactive database updated up to 2009	ESAC MT	Month 46
61	Procedures for migration core database to ECDC	ESAC MT + ECDC	Month 46
62	Template on feedback reports on antimicrobial use	ESAC MT	Month 46
64	Updated Detailed Ambulatory Care Database A (2009 data)	ESAC MT	Month 46
65	Detailed Ambulatory Care Database B (2009 data)	ESAC MT	Month 46
66	Report on Protocol A data collection, incl SOPs	ESAC MT	Month 46
67	Report on Protocol B data collection, incl SOPs	ESAC MT	Month 46
68	Methods for Measuring Antimicrobial use in hospitals	ESAC MT	Month 46
69	Feed-back report on antimicrobial use in hospitals	ESAC MT	Month 46
70	Report on multivariable fixed-effects analysis of regional variation of core AC data for 4 UK-administrations.	ESAC MT	Month 46
71	Model for adjustment for hospital characteristics	ESAC MT	Month 46
72	Report on joint actions on AB policy and Infection Control in EU NHs/LTCFs	ESAC MT	Month 46
73	Report on availability of regional determinants in other EU countries	ESAC MT	Month 46
74	Report on price analysis in AC by country	ESAC MT	Month 46

DL 34: done

DL 35 & 37: deleted, meeting was cancelled and therefore not feasible to deliver quality indicators. Next week 27+28 May : annual ESAC meeting in Stockholm.

DL36: done

DL38 & 39: Done

DL40: postponed till Month 33.

DL41: done, ready for printing.

DL42: done, SAB minutes → agree on DL + MS for extension of ESAC.

DL43 & 44: postponed.

DL45: database is available, only with data from BE → hopefully we can populate the database with APRES data (FP7 project on AM prescribing).

DL46 & 48: done.

DL47: postponed to Month 34

All other DLs were postponed due to the extension.

Clodna suggest adding newsletters as a DL.

Year 3 BIS DLs + MS + budget were submitted yesterday to ECDC. We are waiting for approval from ECDC.

HG explains the budget cut imposed by ECDC (from €500.000 till €390.000), which is the reason why some DL (70,71) were deleted.

Clodna: Which are the most important DLs + MS, were they approved by SAB & MT?

Herman: List of DLs + MS was made in agreement with SAB. Peter Davey was not very happy, but budget cut was imposed by ECDC.

#### **4. Asses Milestones Y3 + Y4 and review list of milestones:**

##### **List of Milestones YEAR 3**

<b>Milestone number</b>	<b>Description</b>	<b>Responsible</b>	<b>Due Date</b>
23a	HC Longitudinal Survey	Hospitals	Month 13 → M27
32	Second PPS in nursing homes	ESAC MT	Month 19 → M27
39	Data Delivery of the second PPS in nursing homes	ESAC MT	Month 21 → M29
44	Delivery Core ESAC 2008 raw data	LNRs + NNs	month 25
45	Data Delivery Data Collection Protocol A & B (2008 data)	LNRs + NNs	month 25
46	<del>Workshop on HC indicators</del>	ESAC MT	<del>month 25 →</del> M32
47	<del>Fourth PPS in nursing homes</del>	ESAC MT	<del>month 25</del>
48	EC Analysis of the between-country determinants	ESAC MT	month 26 → M36
49	EC Analysis of the within-country determinants	ESAC MT	month 26 → M36-44
50	Evaluation of the cost of antimicrobial consumption	ESAC MT	month 26 → M44
51	<del>Fifth Meeting Advisory Board</del>	<del>ESAC MT +</del> Advisory Board	<del>month 27</del>
52	Second Conference Call Audit Committee	ESAC MT + Audit Committee	month 27 → M33
53	Validation Core ESAC 2008 data	ESAC MT + LNRs + NNs	month 27 → M32
53	Validation Core ESAC 2008 data	ESAC MT + LNRs + NNs	month 27 → M32
54a	<del>Data Delivery of the fourth PPS in nursing homes</del>	ESAC MT	<del>month 27</del>
54b	Data Delivery of the final PPS Database	ESAC MT	month 30
55a	Intermediate NH meeting with presentation and discussion of preliminary results	ESAC MT	month 32 → M33
55b	Intermediate HC meeting with presentation and discussion of preliminary results	ESAC MT	month 30 → M33
56	Third Annual Meeting	ESAC MT + LNRs	month 33
57	<del>Sixth</del> Third Meeting Advisory Board	ESAC MT + Advisory Board	month 33
58	<del>Third Meeting</del> Audit Committee	<del>ESAC MT +</del> Audit	<del>month 33</del>

		Committee	
59	Call Core ESAC 2009 data	ESAC MT + ECDC	month 33
60	Transfer In-depth Ambulatory Care Data Collection to ECDC	ESAC MT	month 33 → M46
61	Data collection request A & B (2009 data)	ESAC MT + ECDC	month 33
62	Final Meeting AC	ESAC MT	month 33 → M45
63	Final Meeting HC	ESAC MT	month 33 → M45
64	Final Meeting NH	ESAC MT	month 33 → M45
65	Final Meeting EC	ESAC MT	month 33 → M45

**List of Milestones YEAR 3 bis (ESAC-4)**

49	EC Analysis of the within-country determinants	ESAC MT	month 26 →M36-44
50	Evaluation of the cost of antimicrobial consumption	ESAC MT	month 26 →M44
66	Collection of price information in AC by country	ESAC MT	Month 37
67	Analysis of price information in AC by country	ESAC MT	Month 40
68	<del>Analysis of multivariable fixed effects of regional variation of core AC data for 4 UK administrations.</del>	ESAC MT	Month 38
69	Analysis of availability of regional data in other EU countries	ESAC MT	Month 40
70	Final meeting	ESAC MT	Month 45

MS68: no longer feasible due to budget cut

All MS sounds reasonable especially because they were approved by the SAB.

**5. Yearbook 2008:**

The Audit Committee agrees that the ESAC yearbook is fine.

Clodna enjoyed reading the yearbook. She also wonders if everyone reads the large reports such as the management reporting.

Vanessa explains that this is imposed by ECDC to prove that all the DLs + MS were met and is only sent to ECDC. The yearbook contains mainly graphics on the available data + country sheets to give the countries an idea on their consumption. For some countries it goes back to 1997.

Clodna asks whether the yearbooks are publicly available?

Vanessa: explains that they are publicly available on the website + hard copy will be sent to members audit committee. It also has an ISBN number: available in public catalogues.

**6. Review of the communication/dissemination activities**

(treated by Vanessa Vankerckhoven)

Vanessa explains the different parts of the website and the last 2 Newsletters.

No comments from Maciek and Clodna. Both website and newsletters look good.

Publications:

Herman explains that there are a large number of publications in the pipeline especially for the subprojects.

JAC supplement on care data + other data (cfr. e-Bug).

Maciek is impressed. Clodna thinks it is a good idea to publish a supplement.

**7. Review of the web PPs and development activities.**

(treated by Arno Muller)

Arno Muller explains the development activities.

Clodna asks for a password so she can access the password-protected area. Arno will send her a password.

**8. Review of the subprojects**

**a. Ambulatory Care:**

Samuel Coenen explains the AC subproject.

Clodna: Pity there are few available data sources.

Samuel: explains the availability of GPRP data, but these are difficult to convert and we do not have money available for this.

Clodna: suggests contacting Gillian Smith in the UK.

Samuel: explains that we are currently in contact with M. Ashworth, but is pleased with Clodna's suggestion and will contact Gillian.

**b. Hospital care:**

Peter Zarb explains the HC subproject; most important is duration of surgical prophylaxis.

Clodna: asks whether any actions will be taken? Is it not one of the outcomes of ESAC to look at actions taken by the hospitals?

Peter: explains that this is out of the scope of ESAC and that will be up to the hospitals.

Herman: unfortunately we do not know what hospitals do with it. We do know that Scotland has now implemented national indicators based on the ESAC indicators: > 95% of AB given prophylactic should be less than 24H. He agrees that it is not enough to run the programme but we should also look at impact.

Herman: PPS software has proven very successful → lots of countries want to implement this system.

ECDC will now be conducting an EU PPS. We will also use the data & improve quality of care which is in line with suggestions by Clodna.

Clodna: suggests that these suggestions should go back to ECDC; to set-up European recommendations.

Macieck: supports this.

**c. Nursing Homes:**

Beatrice Jans explains the NH subproject.

Clodna: asks whether there are big variations in urinary tract catheters? Attitudes? By country ?

Béatrice: explains that there is indeed a big difference, it is difficult to see whether it is linked to habits in a country.

Clodna: asks whether these differences also seen within one country?

Béatrice: explains that the workload might be higher depending on nursing home.

Clodna: asks whether interventions are planned.

Béatrice: Not planned, but she is convinced that it is important to do an intervention study; when prophylaxis, when treatment?

Clodna: asks whether data on catheter use is available at nursing home level or at patient level?

Béatrice: both.

Clodna: asks for ethical implications in some countries.

Béatrice: explains that the data are at aggregated level, not at patient level and therefore there are no ethical implications.

**d. Economic subproject:**

Christiaan Marais explains the EC subproject.

Clodna: asks what is meant by cultural factors?

Christiaan: explains that this entails religion, people's view of science, etc..., but also do people trust people? He explains the questionnaires that were used to assess these determinants.

Clodna: asks where the data comes from?

Christiaan: explains that there are different data sources, such as EUROSTAT –OECD – WHO database and these were complemented with a survey among the ESAC LNR's.

**9. AOM**

1) Maciek wants more to be done from ECDC than collecting data. Also what happens afterwards is important. We should discuss with ECDC.

2) Maciek is very impressed by all the work.

3) No other comments from Clodna, she wishes us a very good meeting next week.

**10. Action items:**

Arno: send password and log-in for the website to Clodna.

Clodna: send contact details Gillian Smith to Samuel.

Samuel: contact Gillian Smith.

Sophie: send slides from Annual meeting to Clodna & Maciek.

Vanessa: add newsletter as a DLs

## **Minutes of the Annual ESAC Meeting, Stockholm, Sweden, May 27-28, 2010**

### **Programme**

#### **Thursday 27 May.**

#### **Plenary session 1 Chair: Herman Goossens & Sigvard Mölsted**

09.00-09.10 **Welcoming and objectives (Herman Goossens)**

09.10-09.20 **Introduction of participants (All)**

09.20-10.50 **Results 2009 core data collection**

- AC/HC data (Arno Muller & Ann Versporten)

- Minutes of the meeting -

- Antimycotics/antivirals (Niels Adriaenssens)
- Collaboration UHasselt (Samuel Coenen)
- Interactive database (Arno Muller)

**10.50-11.10 Coffee break**

**11.10-11.20 Communication & Dissemination (Vanessa Vankerckhoven)**

**11.20-11.30 Publication strategy (Herman Goossens)**

**11.30-11.40 Evaluation of national campaigns (Samuel Coenen)**

**11.40-12.10 Presentation ESVAC project (antimicrobial use in animals) (Jordi Torren)**

**12.10-12.20 Future of ESAC: ESAC-4 (Herman Goossens)**

**12.20-12.30 Future of ESAC at ECDC (Ole Heuer)**

**12.30-13.30 Lunch**

### **Plenary Session 2 Chair: Samuel Coenen & Philippe Beutels**

**13.30-15.30 In-depth data collection ambulatory care (Samuel Coenen & Niels Adriaenssens)**

**13.30-14.00**

Antibiotic prescribing quality indicators (Samuel Coenen)

**14.00-14.30**

Preliminary results and discussion (Niels Adriaenssens)

**14.30-15.00**

Update on protocol A and B data collection (Samuel Coenen)

**15.00-15.20**

APRES (The appropriateness of prescribing antibiotics in primary health care in Europe with respect to antibiotic resistance) (Samuel Coenen)

**15.20-15.30**

Publication strategy

**15.30-16.00 Coffee break**

**16.00-18.00 In-depth data collection Economics (Philippe Beutels & Christiaan Marais)**

**16.00-16.20**

Rationale and overview of database of potential determinants of use (Philippe Beutels)

**16.20-17.00**

Methods and main results of determinants of use analyses (Christiaan Marais)

**17.00-17.40**

Overview of antibiotics price information and proposed methods (Christiaan Marais)

**17.40-18.00**

Future plans & publication strategy & discussion (Philippe Beutel)

### **Friday 28 May.**

### **Plenary Session 3 Chair: Herman Goossens & Béatrice Jans**

**8.30-12.00 In-depth data collection nursing homes (Béatrice Jans, Ellen Broex, Katrien Latour, Rudi Stroobants)**

**08.30-08.40**

Introduction and welcoming (Béatrice Jans)

**08.40-09.00**

PPS-2: Participating countries and nursing homes: characteristics (Ellen Broex)

**09.00-09.50**

Prevalence of antibiotic use in EU NHs, November 2009 (Béatrice Jans).

**09.50-10.20 Coffee**

**10.20-11.10**

Prescribed molecules and indications for treatment (Béatrice Jans)

11.10-11.40

Results from the first HALT-PPS (Katrien Latour)

**11.40-11.50**

PPS web-report for NH/country (Arno Muller)

11.50-12.00

Publication strategy (Béatrice Jans)

**12.00-12.15**

EU PPS 5 (Carl Suetens)

**12.15-13.15 Lunch**

**13.15-16.10 In-depth data collection hospital care (Peter Zarb, Brice Amadeo, Arno Muller, Herman Goossens)**

13.15-13.25

Introduction and welcoming (Herman Goossens)

13.25-13.35

PPS 2009 hospital selection (Brice Amadeo)

13.35-14.15

PPS 2009 final data (Peter Zarb)

14.15-14.30

PPS 2009 web-report for hospital/country/type (Arno Muller)

14.30-14.45

Quality Indicators – Scottish Experience (Herman Goossens)

14.45-15.00

ESAC Web-PPS 2010 (Arno Muller)

15.00-15.15

ARPEC (Herman Goossens)

15.15-15.40

LS2006 Hospital determinants (Herman Goossens)

15.40-16.00

LS2009 (Niel Hens)

16.00-16.10

Publication Strategy (Herman Goossens)

**16.10-16.25 Closing remarks (Herman Goossens & Ole Heuer)**

**List of participants.**

Adela Lagin		Slovakia
Anastasia Antoniadou	AA	Greece
Ann Versporten		Belgium
Antonis Kontemeniotis		Cyprus
Arno Muller	AM	France
Asta Jurkeviciene		Lithuania
Beata Mazinska		Poland
Beatrice Jans		Belgium
Brice Amadeo		France
Carl Suetens		Sweden
Christiaan Marais	CM	South-Africa
Christian Stab Jensen		Denmark
Christiana Kontemeniotou		Cyprus
Elisabeth Fleet	LF	England
Ellen Broex		Belgium
Gaetan Gavazzi	GG	France
Gerlinde Oegger		Austria

- Minutes of the meeting -

Giorgio Zanetti	GZ	Switzerland
Hanne Merete Eriksen		Norway
Hayley Wickens		UK
Hege Salvesen Blix	HSB	Norway
Helmut Mittermayer	HM	Austria
Herman Goossens	HG	Belgium
Iva Butic		Croatia
Jiri Vlcek	JV	Czech Republic
Jordi Torren	JT	UK
Katja de With		Germany
Katrien Latour	KL	Belgium
Klaus Weist		Sweden
Laura Calligaris		Italy
Luisa Muscolo		Italy
Ly Rootslane	LR	Estonia
Mafalda Ribeirinho		Portugal
Maggie Heginbothom		Wales
Marcel Bruch	MB	Luxembourg
Mark Struelens		Sweden
Martina Klimkova		Czech Republic
Milan Cizman	MC	Slovenia
Nico Drapier		Belgium
Nicoletta Wischnewski	NW	Germany
Niel Hens	NH	Belgium
Niels Adriaenssens	NA	Belgium
Noemi Bartha		Hungary
Ole Heuer	OH	Sweden
Outi Lyytikäinen	OL	Finland
Pamela McClean	PMC	Northern Ireland
Peter Zarb		Malta
Philippe Beutels	PB	Belgium
Philippe Cavalie	PC	France
Rastislav Binder		Slovakia
Rimas Jan Kunas		Lithuania
Rita Szabo		Hungary
Rudi Stroobants		Belgium
Ruxandra Calin		Romania
Samuel Coenen	SC	Belgium
Sigvard Mølstad	SM	Sweden
Sofie Vaerenberg		Belgium
Sophie Nys	SN	Belgium
Stephanie Natsch	SNa	Netherlands
Tatjana Lejko Zupanc		Slovenia
Theo Verheij	TV	Nederland
Uga Dumpis	UD	Latvia
Ulrica Dohnhammar		Sweden



Ulrich Stab Jensen		Denmark
Vanessa Vankerckhoven		Belgium
Waleria Hryniewicz		Poland
William Malcolm		Scotland
Yuliya Stoyanova		Bulgaria

### **Plenary session 1**

#### **1) Welcoming**

HG welcomes participants and gives overview of the objectives and the agenda of the meeting.

#### **2) Presentation of participants**

All participants present themselves: their background and role in ESAC.

#### **3) 2009 core data collection**

Discussions:

##### **A) AC/HC data**

AA: explained that parallel export in Greece (=confidential data) is about 1.3%, which is quite low. This does not explain the high use in Greece, she has no idea which countries import these ABs.

Probably all countries have parallel export (i.e. higher sales), but how to record this? It is difficult to get a hold of this data.

AM: asks whether the high macrolide use in GR is use in AC or HC?

AA: replies that high macrolide use in Greece is for AC (Greece reports TC data).

One of the participants asks what the coverage of hospitals for HC is?

AM: replies that for France this is 100%.

*Questions were raised concerning packages:*

*Is 1 package 1 treatment? Should we adjust for size of package?*

HSB: we need to know how this is done in each country.

TV: we now need to look at the register and compare the ESAC data with IMS data.

SNa: hospital pharmacy: take out 7 pills of a package

HG: explains that indeed DDD is not enough, other indicators needed to give full spectrum. For Belgium: packages are a good proxy for prescriptions.

UK: Children: gives a different image.

HSB: Should we ask for prescriptions? Not possible for many countries.

MC: Slovenia has comparable data for packages, DDDs, prescriptions, cost.

*Questions were raised concerning the IMS data used.*

PC: is this sales data?

AM: Yes, wholesales data, but IMS is not well-covered in FR.

JV: need to be clear what type of data is being sent and collected by IMS in each country

AA: IMS collects pharmacy data for Greece. 21-pill package for macrolides → might explain high use+ it is easy to get clarithromycin over the counter.

LR: IMS collects pharmacy data for Estonia.

Arno Muller will check the data sources used by IMS

HSB: asks why use is so low in Russia? Is there an adjustment for age? Does not seem correct.

AM: explains that consumption might be different depending on the region → size is the problem (i.e. denominator problem) but stable data throughout the years.

##### **B) Antimycotics**

AA: explains that in Greece terbinafine use is only for topical use, very small use for systemic use.

JV: lot of local treatment might explain difference between countries. He suggests asking dermatologists for more information.

NA: mentions that an advertisement by Novartis led to 20% increase in terbinafine in BE.

JV: replies that patients are interested in treatment, they ask for it.

QH: asks about the link between consumption and resistance for antimycotics → more info is needed, also resistance might be a problem for antimycotics.

AA: explains that the epidemiology of Candida changes, in Greece there was a shift from C. albicans → C. krusei

HG: replies that horizontal gene transfer does not take place, but there might be a link with resistance.

##### **C) Antivirals**

HSB: suggests sending the proposed DDDs to WHO → these will be discussed in August.

Especially when the products are being used, WHO should discuss DDDs.

Problem occurs for combination products for J04 & J05.

LR: suggests asking for data at the package level

NA: confirms this would be helpful but clarifies not every country is able to provide data at the package level.

**D) Collaboration with University of Hasselt**

JV: asks whether there is a link at substance level?

SC: replies that this analysis will be done in the future and at country level.

**E) Evaluation of national campaigns**

Denmark: asks whether pneumococcal vaccines are taken into consideration?

SC: replies that during 2001-2008 the vaccine was not yet implemented with a big coverage.

**F) ESVAC**

TV: asks whether the data are based on sales data from companies?

JT: replies that different data sources are used in different EU countries.

TV: asks whether all animals that are raised in a country are also sold in the same country?

JT: replies that this is one of the deficiencies in ESVAC.

**Plenary session 2 Ambulatory Care & Economics.**

**Ambulatory care:**

Discussion:

**1) Quality Indicators:**

TV: At the population level the quality indicators definitely have value. But will they have the same value for individual prescribers?

NA: Protocol B will test if the indicators are valid for individual prescribers, therefore we need more countries providing data according to protocol B. This will be a challenge for the AC subproject.

TV: suggest looking prospectively at patients to validate the concurrent validity.

GG: Currently the indicators have only been tested on a population in adults, but what about elderly, nursing homes? + How to define infection?

NA: the indicators have not yet been tested in adults but GPs use ICPC or ICD-10 codes to categorise diseases. These codes are well defined with inclusion & exclusion criteria.

MB: An age limit has been built-in, which is quite important; indeed for urinary tract.

NA: Age limits have indeed been built-in to exclude patients with no consensus on management. This will hopefully result in clear cut indicators.

**2) Protocol A & B:**

HSB: How long should we continue with protocol A as so few countries are currently participating and are the data collected for research or surveillance purposes? What is the added value for Europe?

SC: We considered to extend the core data collection with data on age & gender. For many countries it is not feasible to deliver data on age & gender. We should wrap up the data we have now.

MC: This data was used for educational purposes which improved the consumption in children: use dropped with at least 10%.

HM: In children up to 5 years of age there is a high % of use, median is 75%.

LR: Efforts will be needed to collect this data. What will ECDC do in 2 years?

SM: Protocol A data could be very important to better understand the use & resistance correlation: eg. RTI & pneumococcal resistance.

AM: The main problem occurs with data source: reimbursement → age & gender information available sales → age & gender information not available.

In conclusion, data collection according to protocol A will be optional and no longer a deliverable but countries that are able to provide data according to protocol A will send in data together with core data.

**Economics:**

Discussion:

**1) Determinants of use:**

Questionnaires are still missing for GE, CZ, PL, ES, and Slovakia

*It was indicated that the wrong LNRs may have been emailed for the economics subproject which is a possible result of no response to the survey. The email addresses of participants at the meeting will be used for future correspondence.*

*CM will send an e-mail to the participants of meeting in order to obtain the missing data.*

HM: remarks that there is an error for Austria: regarding physician remuneration: this should be the number of registered patients/quarter

*The responses of the LNR survey will be sent to all the LNRs so that the data can be verified and so that currently outstanding surveys can be completed.*

*An additional question will be added to the questionnaire regarding the number of days that workers can be on sick leave before requiring a letter from a physician.*

It was mentioned that number of general practitioners (GPs) per capita in each country may not be consistent for all the countries if this referred to practicing or registered GPs.

The low number of GPs per capita in Greece was questioned.

AA: explains that this may be caused by GPs being a specialty in Greece and that the equivalent of a GP in the other countries may be a resident physician in Greece.

## 2) **determinants of consumption analyses**

GG: remarks that it is not surprising that the model is not perfect – countries are very different: he asked why the analysis is not conducted for every country to see which factors influence each country?

CM: indicated that there is not enough data available within each country to investigate this but that future research include clustering countries to assess if there are different factors influencing consumption in certain country groups.

MB: asks how specific the analysis is for AB use?

PB: replies that it is specific. Also other diseases will be looked at, but this is beyond ESAC.

It was questioned if the effect of the variables on other medicine consumption will be investigated

CM: indicated that this should be interesting but not possible since only have data on antibiotic consumption is available.

GZ: questions the rationale of including bacterial resistance as dependent variable since the link between consumption and resistance is known. He asks whether predictions can be made on use & resistance?

CM: indicated that this is to assess how much more of the variation in consumption can be explained by other variables and also to assess what influences resistance, other than antibiotic consumption, when used as a response variable in the analysis.

Italy: asks whether there is an indirect relationship with use in animals?

CM: indicated that poultry consumption and production was identified as a potential important variable in a few of the analyses and asked for possible reasons of this.

It was indicated that this may be related to the link between poultry consumption and bacterial resistance and the relationship between antibacterial resistance and antibiotic consumption.

UD: asks whether TB was included in the databases?

CM: replies that death rates are unknown and that TB therefore not included

## 3) **Price information**

MR: indicated that price differences in Portugal may have been caused by policy changes and that data regarding such changes can be provided to assess the impact thereof on price

CM: mentioned that such changes in policy can be evaluated for each country separately since combining this for many countries may be difficult due to data incomparable data. Countries with information on such policy changes should send it to CM.

PMC: indicated that studying the effect of price of consumption will be hindered by people living close to country borders and buying their medicine in another country if it is cheaper. This will be difficult to include into the analysis due to data constraints and is a shortcoming of the analysis. remarks that price might be influenced by price difference between boarding countries.

PC: asks how ex-factory and wholesale prices should be obtained for hospitals because this varies between hospitals.

CM: indicated that this should only be provided if possible by means of an average price and that the price analysis will focus on ambulatory care.

HG: remarks the decrease from 210M€ → 150M€ expenditure. He wonders whether the decrease is due to a decrease in consumption or a decrease in cost? Important to understand decrease in cost → generics, policy?

*An e-mail will be send to get this information.*

Denmark: remarks that each hospital negotiates their price. Importantly, the hospitals don't charge the patient.

CM: replies that it is not possible to have this data then for Denmark. Currently only 2 countries can provide hospital data.

HSB: asks what differences are seen in reimbursement as this will have impact on price.

CM: mentions that out of pocket price would be ideal, but few countries able to give this information.

*It was made clear that the reason for no response to the request for price data may have been caused by incorrect email addresses / contact persons and the request will be sent again for countries that have not responded based on email addresses of the participants and the meeting.*

## **Plenary session 3                      Nursing Homes & Hospital care**

### **Nursing Homes:**

Discussions:

#### **1) NH Characteristics**

- Care load indicators: High skilled nursing homes (NHs), no selection by care load

- OL: explains that they have taken a convenience sample of NHs (large NHs, but not a lot)
- Care load and risk factors are very subjective.
  - UK: Depends on nurse, from time to time, interpretation differs between nurses.
  - Coordination in NHs is difficult; for nursing & medical care
  - Large variation in wards (big institutions), most NHs are mixed → not easy to classify (as opposed to hospitals)
  - The short length of stay for Italy is a surprising result.
  - Some NHs are organized like hospitals.
  - HALT includes also LTCF → more difficult to classify.
  - Turn-over-rate is influenced by the number of beds.
- Medical coordination highly influenced by Belgium, the question is whether the significance stays without Belgian results. → We need a higher participation.

## 2) Prevalence of antibiotic use

- HSB: explains that the presence of a coordinating physician (CP) is not common in Norway, this can influence the results.  
Comment on overrepresentation of Belgian NHs with respect to differences between the presence of infection control (IC) indicators and the (significant) influence of IC practices on prevalence of ABs.
- HM: comments on the results about the influence of microbiological sampling on prevalence of ABs (higher prevalence when more sampling). If you have surveillance on MRSA it is reasonable to have a higher treatment rate because you are aware of the carriers of MRSA.
- GG: mentions that the construction of the scoring of the NH-type is quite good, however you use the median of all NHs, including the large influence of Belgian results to this median. Maybe it is better to use a sample of the Belgian NHs to obtain a better median.
- PMC: (With respect to the analysis of the first paper) explains that taking a sample of 5 NHs per country results in only small differences in results in comparison to the total NH population. There is a loss of a lot of data when taking a sample.  
A possible explanation for the relatively low AB prevalence during the flu-season might be that NHs are more aware of viral causes and therefore might use less ABs.
- NH: remarks that now the population level is measured. You can look at the contribution per country with respect to the size of NHs and the type of NHs to measure the heterogeneity. The results are descriptive, there is a danger to miss things.
- HSB: remarks that it is a nice idea to make a scoring of NHs but the variables that are included in the score are dependent on the type of care. This influences the risk factor per country. In Norway typically more often NHs include residents with mental problems and less physical problems.
- PMC: mentions that the appropriateness of AB treatments is not known in this study.
- UK: mentions that most NHs are relatively small. Maybe you should look at the population with respect to for example the proportion of disorientation. Or at the number of persons with a certain type of care, for example the number of persons in end-of-life care paths.
- BJ: mentions that we should be careful for too much workload.
- OL: remarks that a high workload means high resources related to the number of and treatment of infections.
- HSB: mentions that the purpose of the survey is that NHs themselves have to evaluate their AB use. NHs should use their own data.
- BJ: explains that NHs can compare their own data in time.
- SNa: comments that you should be careful to include more data because the model is complex. Care load indicators are not independent, however in this scoring model they are treated as individual indicators. Also, there is an influence of medical care on how to diagnose an infection: lack of sampling in NHs, different symptoms in elderly. Organization of medical care is of influence on prescribing behaviour and therefore on AB use.  
You should not strive for including more NHs but you should build out your model: change the focus to better interpret the results.  
Also, there is influence of behaviour of the family of residents: there is a pressure of demand for care.

## 3) Molecules & indications

- TV: remarks that in the Netherlands the "verpleeghuisarts" (doctor employed in the NH) is considered as specialist, not as GP.
- BJ: explains that differences in interpretation of GP and specialist can explain relatively high percentage of specialist prescriptions.
- HM: comments on the remarkable use of quinolones, especially when comparing the proportion per country.
- HSB: comments on the AB use by infection site. She remarks that results are influenced by ABs from Belgium. Most common ABs in Scandinavia are not seen in the results, the results are now skewed.
- HG: mentions that there is indeed an important selection bias due to the Belgian data.

- NH: remarks that there currently is a contribution of each NH, but that you should strive for equal representation of each country. This can be done through advanced modeling, by means of clustering. You should find out about the heterogeneity of the results.
  - TV: remarks that the size of the NH population on national level should be taken into account because this will differ between countries.
  - HSB: remarks that an overall picture of Europe is currently not possible because countries do not randomly select the participating NHs.
  - BJ: explains that this is not simple: not only the number of NHs per country, but also the size of NHs per country should be taken into account.
  - NH: explains that this can be corrected for.
  - HSB: explains that a Scandinavian study showed that in Finland and Norway 17% of all DDDs are methanamine and this percentage is increasing. However, there is no or only a small problem with resistance.
  - UD: mentions that in Sweden this percentage is 8-10% and this is going down.
  - HSB: remarks that Finland has the highest use.
  - Sweden: explains that according to the national guidelines the prophylactic use of methanamine is not effective.
  - HSB: remarks that there is not enough evidence.
  - PMC: agrees, this is not good practice, it is not recommended to use, more evidence is needed.
  - TV: remarks that only 30% of the residents was tested before treatment. Is this good or bad? People have symptoms and 70% of them are treated without sampling.
  - BJ: mentions that it is preferable to test and to adapt the treatment. But there is not enough information on resistance patterns available in NHs. The availability of this information is different in the countries.
  - PZ: remarks that if samples are not taken the resistance is unknown and proper treatment is not possible.
  - GG: explains that in France resistance in NHs is as high as in hospitals.
  - TV: remarks that resistance should be known, but this should be done by means of studies, not by sampling every resident.
  - LF: mentions that it is very difficult to obtain urinary samples from demented patients. Even though a sample is requested by the physician, this does not mean in reality that the resident is sampled.
  - HSB: remarks that it is important to take dosing into account when looking at resistance.
- 4) HALT-results**
- OL: mentions that criteria are not needed for surgical site infections related to foreign bodies. These infections should be reported to operating centres, these infections cannot be prevented (in the NH).
  - HM: asks for the proportion of hospitalized residents.
  - KL: explains that there is a higher proportion of hospitalized residents in HALT-results than in ESAC. There is a possible influence of infection rate.
  - LF: asks whether prophylactic treatment has been included in AB use.
  - KL: explains that in the prevalence of AB use all treatments are included.
  - BJ: explains that only signs and symptoms of infection are registered, it is not possible to prove a clear relation with AB use.
  - HSB: remarks that the presence of respiratory tract infections is highest in the HALT-results which is strange when comparing to ESAC.
  - KL: explains that this is not strange. In ESAC a large proportion of the AB for urinary tract infections was prophylactic; also in ESAC RTI was the most treated infection.
- 5) Publication strategy**
- HSB: plans to write a paper about dosing, including use of quinolones.
  - OL: plans to write a paper combining the national data of ESAC and HALT.
  - JV: will try to publish a paper on the national results.
  - HSB: has longitudinal data, yearly data for the 5 participating NHs included in Norwegian data. Probably there are no clear results because there are so few NHs. A paper on the methodology of the national study is planned.
  - NW: together with the prevalence study a study was performed on incidence. These results will be published as soon as possible.
  - OL: is planning a publication in Finnish to compare the Finnish and European results.
  - SNa: comments on the fact that the Dutch results were excluded from the first published paper since there were less than 5 NHs.
  - PMC: The protocol prescribed a participation of at least 5 NHs and a minimum of 250 residents. There will always be problems when drawing a line: there is a great loss of Belgian data and next to that the loss of the Dutch data but this cannot be prevented when drawing such a line.
  - HG: requests the possibility to include the 4 Dutch NHs.
  - NH: You have to make certain assumptions and take them into account, the size of NHs should be taken into account.

- GG: will present the French data at local/regional congresses. Proposal to submit/publish planned papers as combined supplement to a journal.
- HG: explains that we plan to finish reports and papers, then NH-project is continued in HALT since this is the end of the ESAC subproject.

### **Hospital care:**

Discussions:

#### **1) Hospital selection**

NH: suggests repeating the random sample analysis and see whether the results stay the same.

JV: suggests comparing teaching hospitals separately

AM: explains that the current software is more flexible, so more comparison is possible.

#### **2) PPS 2009 Final results**

AA: asks about nosocomial use of antimicrobials, eg for pneumonia (CAP)

Justification of treatment was entered as compliance to guidelines.

PZ: knowing the patient → compliance to guidelines should be entered = appropriate treatment.

UK: suggests taking out ICU. This might give a different picture.

PZ: replies that he will have a look at this. For articles more in-depth analysis will be performed anyway.

PL: asks what is meant by medical prophylaxis?

PZ: explains that this refers to long-term treatment (chemotherapy, ...)

AM: mentions that more tertiary/university hospitals are included.

UD: remarks that 20-30 % was unclear (reason in notes) → this should be clarified. Prophylaxis was mentioned as unclear methodology, was not clear where to put surgical prophylaxis. He raises 2 concerns: 1) lot of work to find medical records (easy if electronic). 2) the questions were good, but he is not sure of the validity of the results.

PZ: replies that 50% of the hospitals had reason mentioned why AB was started.

SNa: mentions that "reason in notes" might give a wrong impression.

Cyprus: mentions that it difficult to find the notes: most difficult part of the survey.

HG: suggests improving this for the future.

GZ: explains that looking for the reason in notes takes about 20 minutes.

OL: asks whether local guidelines exist?

AM: replies that sometimes they indeed don't exist – PPS was used in some cases to make guidelines. Not clear how guidelines were assessed, but important to ask the question.

#### **3) Scottish experience.**

No questions raised.

#### **4) Web PPS 2010**

UK: mentions that they are very keen on using the software further and thanks ESAC for this opportunity.

AM: suggests to put the software on their own server and to have helpdesk (be medical helpdesk).

UK: replies that Hayley will be the medical helpdesk

#### **5) ARPEC**

HG invites people to join the project.

TV: asks whether primary care data will be collected?

HG: replies that these data will be collected through the ESPID network + WP leader is from the Netherlands (Rotterdam). Data will be collected retrospectively.

OL: remarks that the society for neonatology in Finland has conducted repeated surveys. Training days are being organized. A paper in J. Hosp. Infect. is currently in press explaining the methods.

*Outti will send the name of the contact person will be send to HG.*

OH: explains that for the participation of EARS-net a positive response for ARPEC was given.

#### **6) LS 2006**

HG: explains that Peter Davey would like to repeat the analysis on a larger sample. The questionnaire for 2009 was shortened which is not sufficient for this type of analysis.

OL: replies that the questionnaire was too long.

HG: explains that this needs to be discussed with ECDC

## **Minutes of the Management Team Meetings (2x/month)**

### **Minutes ESAC-3 MT Meeting dd. 01/10/2009**

**Present:** HG, SC, VVK, RS, NA.

**Excused:** SN, AM

**Minutes:** VVK

#### **1. Review of the last meeting's minutes**

##### **1.1 Pending Action Items**

BA Finalize comparison paper children-adults AB use

SC Finalize paper on ESAC-2 AC data (awaiting data from AM).

Prepare an outline for a small protocol for the core data collection.

- AM Upload ESAC-2 database (Postponed to September).  
Update interactive database with 2006 & 2007 core data (deadline: 4/9)  
Send individual country sheets 2006 & 2007 data to VVK to be posted on website (today)  
Send AC data to SC (deadline: 4/9)
- VVK Send e-mail to Ole Heuer about expenses ICAAC  
Prepare first version of management report
- SN Send draft of a letter for not selected candidates data manager to HG  
Contact Béa for the NH meetings  
Arrange travel for Peter Zarb to come to Antwerp end October  
Arrange travel for Brice Amadeo to come to Antwerp end October  
Arrange travel for Pamela
- HG Contact Carl Suetens on protocol PPS  
Make a draft for the DG Sanco paper

## **1.2 Review of the Minutes of previous MT meeting.**

### **2. Management**

#### **2.1 Agenda SAB:**

The programme was modified. The meeting will be held on 1 day (Friday 27 November).

We must send the agenda of the meeting urgently to the participants (deadline 12/10)!

We will have a meeting with the management team on 30/10 from 9:30 till 12:00 to prepare the SAB meeting). We will ask Béa and Sofie Vaerenberg to attend as well.

#### **2.2 ICAAC conference Brice Amadeo:** VVK will ask Ole Heuer to give permission to have the costs of travel & accomodation payed by ESAC.

#### **2.3 Vacancy data manager:** We selected a few candidates and invited them for an interview. The candidates that have not been selected will receive a letter. Draft was made by SN and will be send to HG for approval.

#### **2.4 Management report:** VVK will send an e-mail to gather all the information.

### **3. Finances**

- o We are finalizing ESAC-3/ Year 2.

### **4. Core Activity**

Meeting Core data: we will have a meeting on the core data on a later date. We will discuss where we are with the core data in order to be well prepared to transfer it to ECDC.

### **5. In-depth analysis.**

#### **5.1 Ambulatory Care.**

- o No updates

#### **5.2 Hospital Care.**

- o No updates

#### **5.3 Nursing Homes. (conf.call with Béa Jans)**

- o Béa is working on the minutes of the Lisbon meeting.
- o We should organize a meeting with Pamela (30/10 at 11:30)
- o SN will invite Pamela to Antwerp.
- o First the core paper should be published by Pamela.
- o NL, CZ, FR, IE: received the NH database for their country.
- o FI was contacted concerning publication strategy; they agreed that names of countries cannot be mentioned.
- o BE: coordinating GP's were satisfied.
- o We should organize 2 Belgian meetings; 2 evenings at UA. SN will contact Béa on this. The meetings will be paid by ESAC.
- o Info on BAPCOC – Béa will introduce the NH subproject on Tuesday, she will give a short briefing.

#### **5.4 Socio-Economics**

- o Christiaan Marais presented the current results. He will contact the LNR's with a few additional questions and feedback on the results thus far.

### **6. Upcoming meetings**

6.1 HC/NH meeting scheduled in February in Madrid, ES will be cancelled.

6.2 Meeting for all subprojects will be on 27-28 May in Stockholm, SE.

6.3 Final ESAC meeting: mid December 2010 in Madrid, ES.

### **7. AOM**

7.1 ESAC was selected by DG SANCO to write a paper, HG will prepare a draft.

7.2 ESPID congres Nice, France in May 2010, deadline for abstracts: December 2009. To be discussed on 30/10.

7.3 ECCMID congres Vienna, Austria April 2010, deadline for abstracts: 19 November 2009. To be discussed on 30/10.

**NEXT MT MEETING: 10/12/2009 at 9H30.**

**Minutes ESAC-3 MT Meeting dd. 10/12/2009**

**Present:** VVK, RS, AM, SV (Sofie Vaerenberg), AM, HG, SN, SC

**Excused:** CM (Christiaan Marais)

**Minutes:** SN

**1. Review of the last meeting's minutes**

**1.1 Pending Action Items**

- BA Finalize comparison paper children-adults AB use
- SC Finalize paper on ESAC-2 AC data (awaiting data from AM).  
Prepare an outline for a small protocol for the core data collection (deadline: May 2010)
- AM Upload ESAC-2 database  
Interactive database with 2006 & 2007 core data: speed up creation of figures  
Prepare AC data for Ann Versporten (Deadline Dec 18, 2009)
- VVK Finalize Newsletter December 2009  
Make budget proposal for ESAC-4 extension  
Make proposal objectives, deliverables, milestones for ESAC-4 extension  
Prepare draft interim management report  
Prepare interim financial report (Deadline Jan 17, 2010)
- SN Print Newsletter December 2009 + send out  
Finalize Christmas cards + send out  
Make final version of the slides about SAB conclusions and send to MT.  
Invite Ann Versporten to meeting January 12 at 1:30 PM  
Inform if we can have final meeting in Acadamica Belgica in Rome.  
Send a doodle to members audit committee to set a date
- HG Make a draft for the DG Sanco paper  
Ask Cleona McMulty if she wants to become a member of the ESAC Audit Committee  
Forward information on collaboration with APRES to SC.
- BA/PZ Prepare PPS meeting in January: report, slides, papers, results
- RS Give overview of errors occurred in ATC/DDD lists
- ALL Test the interactive database

**1.2 Review of the Minutes of previous MT meeting.**

- BA finalized the paper comparison AB use Children-Adults, but it was not submitted yet.
- AM is processing the ESAC-3 AC data, this must be done before Christmas (prepare for Ann).
- SC will work together on AC database with Ann Versporten as of January 15.
- The country sheets are available on the ESAC website.
- AM must still update the interactive database: AM sent it to HG, who tried the database but he found it very slow, particularly to make figures. HG asks if other members of the MT could also try the database. AM must also send the link to Sofie Vaerenberg (SV).
- VVK finished the management report for Y2 and it was sent to Ole Heuer who approved the report.
- HG still needs to find out what is exactly expected for the DG Sanco paper. He did not receive any mails from them anymore.

**2. Management**

a. Interim management report:

We can focus on the preparation of the SAB meeting

b. Newsletter December 2009:

VVK prepared a draft version, a few changes were suggested during the meeting and will be made. The newsletter will be sent to HG for final approval.

The launch meeting of APRES will be held in Utrecht on 16/3/2010: NA, SC and the new data manager should go (also to the meeting for Junior Researchers).

The place of the venue of the last ESAC meeting of December 2010 is still to be decided.

We could introduce the HALT project in the next Newsletter.

c. Extension ESAC-3:

Budget: we must make a budget proposal for the last 4 months, this is what we should take in consideration:

- ask PD what he will need for his study. (the rest of the studies will be done in Antwerp)
- Personnel: probably the same team.
- We will need more money for travel & meetings to prepare the transfer.
- Money for the final meeting.
- Dissemination: make a final (10 years !!) report.
- Money for the collaboration with ARPEC & APRES.

Deliverables: we looked at the slides from HG about the final conclusions of the SAB → we discussed them during the meeting → SN will make a final version.

d. Christmas cards ESAC:

Will be sent to the LNR + NN + coordinators other projects (together with Newsletter). SN will try to have all the signatures printed on the back side.

e. Audit committee:



Mark Struelens cannot combine the ESAC audit committee with his current employment at ECDC. We must find someone else. HG proposes Cleona McMulty (E-Bug). He will send her an e-mail. The date will be set somewhere in January or February 2010. SN will send out a doodle to set a date.

### 3. Finances

#### 3.1 Interim financial report:

Must be ready by January 17 (period 3/9/2009 till 2/12/2009).

For this report there will be no problem to find the needed co-fin of 10%, but it could become a problem in the future since VVK and SC cannot be entered as co-fin anymore (different type of appointment at the University).

Other suggestions? Bea + P.Beutels are still Ok, perhaps SV and PZ and Marc Aerts? VVK will check the possibilities.

#### 3.2 ESAC-3/Year2

The financial report of Year 2 was approved by Ole Heuer.

### 4. Core Activity

4.1 ESVAC (Kari Grave) will probably participate in the Stockholm meeting.

4.2 SAB meeting Paris 2009: it was a successful meeting, the minutes were sent out, we received no comments on the minutes.

4.3 Take over ESAC by ECDC: the slides of HG were discussed and adjusted.

There will be a call from ECDC about a Longitudinal Survey at hospital level: Ole would like to know how much budget would be needed (by 2011). When the call is launched: how will we respond? Perhaps we can set-up a consortium (Malta-France-UK-BE). Will we do the coordination from Antwerp or from Dundee? HG will discuss this with PD. How will we organize the helpdesk? National level or central? AM suggest having a central helpdesk. How much is this going to cost? We could also pilot a LS in a few countries: perhaps select the same countries as the PPS.

### 5. In-depth analysis.

#### 5.1 Ambulatory Care.

- o SC said that he is expecting some information regarding collaboration with APRES. HG received some information, he will forward it to SC.

#### 5.2 Hospital Care.

- o PPS: at this moment there are 189 registered hospitals, 140 hospitals already validated their data. We will have a meeting about the PPS in January with Peter Zarb and Brice; they should prepare this meeting, also the report will be discussed. Perhaps the new data manager can be invited.  
RS checked almost all the drug lists; it was clear that the same mistakes as for the PPS2008 were made again → in the PPS report we should insert a page with an overview of the mistakes, in order to give the hospitals some feedback about it. We pointed it out during the meeting in Athens to the LNRs but it seems that they did not pass the message to the network. ECDC will work with 1 contact point and a national helpdesk, this should also help to solve this.
- o LS: so far only a few (less than 10) hospitals have submitted data.

#### 5.3 Nursing Homes.

- o The second PPS is running. A large number of data is coming in. Pamela finished first paper (BMJ is not interested, CID might be).

#### 5.4 Socio-Economics

- o CM will not wait for the core data to start to collect information on price. Mail will be send out to LNR.

### 6. Upcoming meetings

6.1 Stockholm meeting for all subprojects and the core activities will be held over 2 days (27&28 May), same way as the annual meeting in Athens.

6.2 Final ESAC meeting will be 13 & 14 December 2010: SN will inform if we can do it in Academica Belgica in Rome.

6.3 ECCMID: pre-registration before 16/12 is much cheaper. All members of MT who will attend ECCMID should do this (except for students who have the student rate anyway).

**NEXT MT MEETING: TUESDAY 19/1/2010 at 15H00.**

#### Minutes ESAC-3 MT Meeting dd. 19/01/2009

**Present:** VVK, RS, AM, HG, SN, SC, CM, AV (Ann Versporten)

**Excused:** SV

**Minutes:** SN

We welcome Ann Versporten (new data manager) to her first MT meeting.

#### 1. Review of the last meeting's minutes

##### 1.1 Pending Action Items

SC Finalize paper on ESAC-2 AC data.

Prepare an outline for a small protocol for the core data collection (deadline: May 2010)

Give name of contact person for Belgium to Christiaan.

AM Send an e-mail to Sofie Vaerenberg about status HC Belgian data

- Send ESAC-3 AC data to SC (this week!)
- Update indicators on ESAC website
- BJ Make report PPS1 nursing homes (deadline end of February)
- Send e-mail with request on writing papers on ESAC NH (after report PPS 2008 is finished)
- VVK Make budget proposal for ESAC-4 extension (deadline is March)
- Make proposal objectives, deliverables, milestones for ESAC-4 extension
- Newsletter April edition: add Grace poster
- Send ARPEC and APRES proposal to AV
- Send template of ESAC poster to BJ
- SN Send a doodle to members audit committee to set a date
- Prepare Atlanta meeting
- Prepare proposal for venue final ESAC meeting
- HG Make a draft for the DG Sanco paper
- Ask Cleona McMulty if she wants to become a member of the ESAC Audit Committee
- Send minutes of last conf call of EU presidency to AM and AV
- RS Give overview of errors occurred in ATC/DDD lists
- Prepare papers on PPS1

### 1.2 Review of the Minutes of previous MT meeting.

- 6 BA finalized the paper comparison AB use Children-Adults, but it was rejected, they asked for a third reviewer
- 7 AM processed all the ESAC-3 AC data until 2008, he must send it to SC.
- 8 Sofie Vaerenberg is waiting for the Belgian HC data in order to start the paper that she has planned to make.
- 9 The interactive database seems fine and working very well.
- 10 HG still needs to find out what is exactly expected for the DG Sanco paper. He did not receive any mails from them anymore. He does not know what is going on.
- 11 AC data for AV: AV started working on core data, afterwards she will move on to protocol A.
- 12 VVK finalized the interim management report and the interim financial report for Y3, they were both sent to ECDC.
- 13 SN will look for possibilities for the venue of the final ESAC meeting. Academica Belgica turned out to be too small.
- 14 RS: will make overview of errors occurred in ATC/DDD lists by next meeting: also send back feedback to hospitals.

### 2. Management

- Interim management report:  
Was sent by e-mail to Ole, will be printed and send to all members of ECDC.
- Extension ESAC-3:  
The deadline that Ole gave us is March 2010. Prepare by next MT meeting.
- Audit committee:  
HG still needs to contact Cleona McMulty first.
- Meeting Drug Utilisation Research Group UK.  
Unfortunately nobody can attend.

### 3. Finances

- Interim financial report:  
SN sent it to ECDC by e-mail and by courier.

### 4. Core Activity

- From now on collaboration with UHasselt should be a fixed item on the agenda.  
We received a paper from Girma; very interesting for JAC.
- AM gave an update on the core data collection 2008: 17 countries have submitted data using the web based system or by emails. 4 countries have submitted 2007 data.

### 5. In-depth analysis.

- Ambulatory Care.
  - AM processed data together with AV
  - No data was received for protocol B.
  - After the meeting in Maastricht, SC suggest to have a pilot data collection for APRES
  - ARPEC will also look at these data for children in Rotterdam.
  - ARPEC is not yet officially approved.
- Hospital Care.
  - PPS:
    - On January 12 there was a meeting on PPS with HG/PZ/BA/AM/AV. AV made the minutes of this meeting and will send them to MT.
    - There will also be a conference call on January 20 with BA/PZ/ND/AV/HG
    - We are still missing data from a few hospitals □ database should be ready by Feb □ start data analysis.

- There will be another physical meeting with BA and PZ in the second half of Feb to prepare presentation for SHEA/ECCMID and PPS report.
- For the next PPS we will set a maximum of 5 hospitals per country.
- HG will show Belgian data on BAPCOC meeting.
- HG will send minutes of last conference call about EU presidency to AV/AM.
- ARPEC: AM should contact Mike to ask about the status of ARPEC, but he was OUT OF OFFICE
- BE, UK and IE will be asked to write a national report.
- QI on HC: PD will be organizing a meeting in Birmingham.

**LS 2009:**

6. Deadline submission: Nov 2009, however only a few hospitals have submitted data (15 out of 50).
7. PZ will send a reminder.
8. PZ will contact EARSS for AMR data
9. A meeting should be organized with UHasselt to discuss data analysis.

**Papers:**

- Paper PD: rejected by CID  re-submitted to JAC
- Papers PZ: rejected  re-submitted
- Papers BA: rejected  3<sup>rd</sup> reviewer asked.

**Nursing Homes.**

- NH project is going very well; BJ made a summary on the second PPS.
- It is sure that we will have more data from the second PPS than from the first PPS.
- PPS2: 315 NHs participated.
- BUT: no response at all from Ireland.
- Normally we should receive data from Portugal (but is not sure, responsible had an accident).
- BU, HU, LT (3 NHs): OK
- No data from IT yet.
- Prevalence of 5.2% (overrepresentation of BE & FI)
- England asked for small delay  end of the month; she sent e-mail to AM; not clear whether using web-PPS or OCR.
- BJ looked at the preliminary results from HALT and made a few small analysis (looked at AB use)
- Second PPS is finished now, except for England.
- Ellen Broex is working on a report on characteristics
- The MT suggested making 2 separate reports: 1 for the first PPS and 1 report for the second.
- It is quite urgent to finish the first report on PPS1 (similar report as Brice made for HC): deadline for BJ is End of February, must be send to LNR, NR NHs and the participating NH's.

**Papers:**

- BJ started with a methodological paper.
- The second paper will be on the results of the first PPS.
- Pamela McClean needs reviewers for her paper; HG will send an e-mail to her with suggestions: Dominique Monnet, Jehuda Carmeli, Marc Struelens, Bonomo ...
- Gaetan Gavazzi also wants to write a paper on NHS FR.
- Also Tatjana Lejko and Nicoletta Wischienski (Germany) asked to write a paper on the ESAC NH data
- Katrien Latour is working on paper.
- Rudi Stroobants will start writing his papers on PPS1
- BJ could send out an e-mail with publication table to NRs NH + LNRs and see who else is interesting to write. The e-mail will be send after February when report from BJ about PPS1 is ready.

**Socio-Economics**

- Last update was mentioned in the interim management report.
- CM sent out an e-mail to LNR about information on prices ex factory, prices ex pocket and prices ex pharmacy. He asked them to respond by end of January. 9 responses came in so far.
- SC will give a good contact person to CM for Belgium
- LV & IE: motivational letter is needed
- PZ worked on IMS data in December.

**6. Upcoming meetings**

- Stockholm meeting for all subprojects and the core activities will be held over 2 days (27&28 May), we will need 1 large meeting room for both days. Friday the meeting should end at 4PM.
- Final ESAC meeting will be 13 & 14 December 2010: SN will gather information about possible venue places.
- ECCMID: no info on submitted abstracts.
- SHEA: SN asked Ole for permission to attend the SHEA conference by BJ,PZ, Pamela and AM.

**7.AOM**

- AV is getting familiar with the ESAC project
  - 1 Databases core data & AC data
  - 2 Protocols
  - 3 Later HC data
- Interview for AM is scheduled beginning of February. He could start his new job beginning of April.
- SC mentioned a few interesting papers.
  - Prescribing medicines: "size matters"
  - Variation in outpatient AB prescribing in the USA
- SC asked to update the indicators on ESAC website □ AM

**NEXT MEETING 10<sup>th</sup> FEBRUARY 2010 at 4PM (CET)**

**Minutes ESAC-3 MT Meeting dd. 10/02/2010**

**Present:** VVK, RS, AM, HG, SN, SC, AV

**Conf.call:** NA, PZ, EB, KL, PD

**Minutes:** SN

**1. Review of the last meeting's minutes**

**1.1 Pending Action Items**

- SC Finalize paper on ESAC-2 AC data.  
Prepare an outline for a small protocol for the core data collection (deadline: May 2)
- HG Talk with Cleona McMulty next week in Copenhagen concerning ESAC Audit Committee  
Get back to PD on participation of Belgian hospitals in the Birmingham workshop.  
Confirm ESAC poster at EU Corner (ECCMID)
- BJ Make report PPS1 nursing homes (deadline end of February)  
Send e-mail with request on writing papers on ESAC NH (after report PPS 2008 is finished)
- AM Send ESAC-3 AC data to SC (this week!)  
Update indicator values on ESAC website  
Invite Niel Hens for HC meeting on Feb 22  
Prepare explanatory leaflet for online PPS HC reports together with Peter Zarb
- SN Plan audit committee meeting.  
Check flights for HG to Stockholm  
Send ATC/DDD list with and without errors as feedback to the hospitals that participated in the PPS2009
- RS Prepare papers on PPS1
- VVK Finalize budget proposal for ESAC-4 (deadline is March)  
Finalize proposal objectives, deliverables, milestones for ESAC-4  
Newsletter April edition: add Grace poster
- AV Plan meeting with HG and VVK on workplan and PhD thesis.  
Enroll for SQL training

**1.2 Review of the Minutes of previous MT meeting.**

- 15 AM sent e-mail to Sofie Vaerenberg to inform her that by the end of February the Belgian HC data will be available, there are still a few problems with some hospitals.
- 16 AM processed all the ESAC-3 AC data until 2008, he must send it to SC. This should now be OK, AM made the access on the server available for the AC data.
- 17 VVK worked out a first budget proposal for the ESAC extension.
- 18 VVK worked out DL + MS for ESAC-3 extension.
- 19 HG needs to check whether he is invited for the Atlanta meeting.
- 20 HG has no news anymore from the DG Sanco paper, we will take it off the agenda.

**2. Management**

Extention ESAC-3 bis:

2.1.1 Deliverables:

**Y3:**

DL35: Nothing has been done yet for the Birmingham meeting. HG is a little bit worried that it is not going to be easy to have this meeting. It was discussed with PD and decided to postpone this DL till November (month 39).

Discussion with PD about this meeting: Tracey is actually working on it. Marc Struelens will be present. There is still no consensus about what indicators we want to use. The programme has been made; the workshops are limited to 40 people. PD needs to know whether some Belgian hospitals will participate. HG replies that not many hospitals have experience on this, but he will think about it and reply on this to PD.

**Y3 bis:**

DL58: Tools? AM thinks that the formulation is confusing. This DL is actually about the transfer to ECDC, we should add this in the sentence to make it more clear.

DL68: Perhaps this DL is too ambitious, we will leave it out.

Additional DL for HC: multivariable analysis linking hospitals Q to PPS 2008-2009.

But PD will need help on this, the question is whether we have enough personnel budget for this. We will need to check it, this will also depend on whether AM will stay in Antwerp or not.

2.1.2 Milestones:

**Y3:** no comments.

**Y3 bis:** add multivariable analysis PPS HC as a MS.

- Audit committee:

HG will speak with Cleona McMulty next week in Copenhagen.

- Training Ann V.:

She is now working on cleaning the data in the excel files. She is also learning about the software that AM uses. Next step is the transfer to final database (this will be the latest next week).

AV installed SAS software on her computer, she is more familiar with this software. SAS is a good program to analyze data and for data cleaning.

Perhaps we can hold a separate meeting on Ann's work plan together with HG.

Ann should also enroll for SQL training (to be checked where this course is given).

**3. Finances**

- Budget extension Year-3 bis:

VVK made a proposal based on what we will definitely need.

Personnel will again be the biggest cost. We will reduce SN and ND. SC will be added.

Travel & subsistence: based on Athens meeting but more participants (ca 120 vs 80).

MT meetings: travel and subsistence cost for Peter and Brice (Antwerp meetings).

Lectures on ESAC will not be included (period too short & not enough budget).

Budget for PD: he needs a total of 90.000€ (30.000€ for PPS analysis and 60.000€ for primary care data analysis UK). This will probably be very difficult to obtain. We must find out from Ole what he is willing to pay.

Newsletters: no more newsletters during the extension

Yearbook + reports: will be an additional cost.

We received an e-mail from Ole that he wants to extend ESAC beyond 2010. HG will phone him about this.

**4. Core Activity**

- Update core data:

Ongoing: import 2008 data (still no data from Poland yet - retrospective data was obtained from LT and UK)

- Collaboration with UHASSELT:

They are busy with multilevel analysis on AC data. We can show these results in Stockholm.

Girma submitted an abstract for a conference on statistics.

Agreement on when data available for UHasselt → **by March.**

**5. In-depth analysis.**

- Ambulatory Care.

- Still poor response data linking age/gender/indication.

- NA is in contact with someone from Eindhoven who has a database available.

- Also Sigvard wants to help.

- APRES: will do a pilot.

- If we go on with ESAC in 2011, we need budget to buy data for the AC subproject.

- Hospital Care.

PPS:

- PPS 2009 data + report will be discussed during the meeting on February 22.

- PZ must go through protocol that Carl Suetens has sent; it will also be discussed during the meeting on February 23 (4PM).

LS 2009:

- Data submission is ongoing; some hospitals uploaded it on the website, some sent it to PZ. Then PZ submits to website.

- During the meeting of Monday 22 February (3PM) we will discuss where we are with the LS data. AM will invite Niel Hens for this meeting.

Papers:

▪ Publication strategy will also be discussed during the meeting in February.

Overview most common errors on ATC/DDD lists:

▪ The list prepared by RS was discussed.

▪ The purpose is to send this to hospitals + corrected version of their list. SN will send these to the different hospitals.

▪ We will also put this list as an Annex in the PPS2009 report.

- Nursing Homes.

- Report: Ellen is finishing it this week. BJ will read it next week.

- Report on PPS1: What should be in the report? Nico checked the database that was sent. Nico is working with Katrien to improve this. It will be ready by the end of the week.

- PPS2: we received almost all data (not from IT yet). In general we had a good collaboration with countries.
- HALT is going fine; also except IT, we have data from all countries.
- In addition to the online report there will be an explanatory leaflet in pdf with more info about the indicators. This should also be done for the online PPS reports for HC.

Papers:

- Everything is on hold due to illness of BJ.

**Socio-Economics**

- CM is receiving answers on his request about pricing. Also information from France (Philippe Cavalie is interesting in collaboration).
- We still need to find a way to express prices in 1 DDD.

**6.Upcoming meetings**

- Stockholm meeting:  
NA + SC take the 17:25 flight. HG will need to get back to Paris on Friday night, so he will probably have to fly to Arlanda. SN will check this.  
Katrien and Ellen will also attend.  
We will have a meeting to prepare the Stockholm meeting on MAY 18 at 9:30.
- ECCMID:  
AV will also attend.

**7.AOM**

7.1 Discussion from NA about J05 antiviral paper.  
He must add seasonal variation and add AC.

Combine both: first a total overview describing dataset than in detail for some substances. The paper should be as correct and as complete as possible.  
Similar lay-out as Lancet paper.

7.2 HG received an e-mail from ECCMID concerning the EU corner and presenting ESAC at this corner. The MT agrees that we want to present an ESAC poster in the European Network corner at the ECCMID. HG will confirm.

**NEXT MEETING: 5<sup>th</sup> of March 2010 at 11AM (CET)**

**Minutes ESAC-3 MT Meeting dd. 05/03/2010**

**Present:** VVK, RS, AM, HG, SN, SC, AV, NA

**Conf.call:** PZ, PD, BJ

**Minutes:** SN

**1.Review of the last meeting's minutes**

**1.1 Pending Action Items**

- SC Finalize paper on ESAC-2 AC data.  
Prepare an outline for a small protocol for the core data collection (deadline: May 2)
- HG Check with SN to plan audit committee meeting.
- BJ Make report PPS1 nursing homes (deadline end of February)  
Send e-mail with request on writing papers on ESAC NH (after report PPS 2008 is finished)  
Prepare e-mail to send to participating NH to inform them that the web based reports are online.
- AM Update indicator values on ESAC website  
Prepare explanatory leaflet for online PPS HC reports together with Peter Zarb (this week)  
Contact Ole Heuer to obtain data on resistance (EARSS) (put PZ in cc)  
Forward the e-mail from Egypt to PZ  
Send data to Niel Hens (end of April)
- SN Plan audit committee meeting. (check with HG)  
Send ATC/DDD list with and without errors as feedback to the hospitals that participated in the PPS2009 (check with RS and AM)
- RS Prepare papers on NH PPS1
- VVK Newsletter April edition: add Grace poster  
Prepare ESAC poster at EU corner (ECCMID)  
Send e-mail to Ole and ask for 1 contract for ESAC-4.
- AV Submit file for PhD to student administration  
Enroll for SQL training  
Enroll for access training  
Send table with core data at ATC3 level to HG before submission to Ole Heuer  
Send core data at ATC3 level to Ole Heuer (End of March)

PZ & BA Finish PPS2 report (HC) by May.

**1.2 Review of the Minutes of previous MT meeting.**

- 21 HG talked with Cleona McNulty and she agreed with becoming a member of the ESAC-3 audit committee.
- 22 The meeting in Birmingham was cancelled. It was too difficult to be organized at such a short notice.

**2.Management**

- Extension ESAC-4:  
The list of DL and MS for ESAC-4 was finalized by VVK.  
This new table will be included in the new contract for ESAC-4. Ole proposed to HG during the Stockholm meeting to make 2 contract-extensions each for 5 months. This is a big workload for the ESAC team. VVK will send an e-mail to Ole and explain this to him. She will ask to have one contract for the total duration.
- Audit committee:  
HG spoke with Cleona McMulty last week in Copenhagen.  
She agreed on becoming a member of the audit committee. HG and SN must discuss when we could have our next audit committee meeting.
- Training Ann V.:  
HG, VVK, SC and AV will have a short meeting after the MT meeting. Her work plan and subject for her PhD thesis will be discussed. It is important for AV that she submits her PhD proposal as soon as possible. Enrollment for this academic year end on May 31 (procedure has to be finalised by then).

### **3.Finances**

- Budget extension Year-4.  
HG discussed the budget proposal with Ole during his stay in Stockholm last week. Basically they would like to reduce it. (< €500.000). The budget that was asked for PD for UK analyses is a problem (€60.000). €30.000 is not a problem because this work is related to ESAC, but the extra €60.000 for the UK survey will probably not be granted. HG asked Carl Suetens to talk about this directly with PD.

### **4.Core Activity**

- Update core data:  
AV is working on the update of the core data. 23 countries are OK (Polish data not OK yet). We still need to integrate this data in the final database. Preliminary data will be send to Ole by the end of March.  
Excel table with total use at ATC3 level.  
The table should first be send to HG before it is send to Ole.
- Collaboration with UHASSELT:  
No updates.

### **5.In-depth analysis.**

- Ambulatory Care.
  - Will be discussed next meeting.
- Hospital Care.
  - PPS report:
    - Brice is working on it for the moment, after ECCMID PZ will start working on it. The report should be ready by May.
    - Nico Drapier is working on the updated version of the automatic web report for PPS2.
  - LS + PPS 2009:
    - AM had a meeting with the people from UHasselt. They will start to work on the data analysis in May. They will receive all data from AM in April. It will be the same analyses as for the AC data.
    - Also analyzing resistance will be very interesting. We should ask Ole Heuer about the resistance data. AM will contact Ole about this (and put PZ in cc) as EARSS has been taken over by ECDC.
    - PZ wants to finalize the list of the participating hospitals for the LS.
    - We received an e-mail from Egypt with the question if they can use the ESAC PPS methodology for a PPS in Egypt. AM will forward this e-mail to PZ.

#### **EU PPS on hospitals:**

The EU-PPS protocol was agreed upon at ECDC. This survey will be performed in 2011, HG proposed a light version of the PPS as the extended version is a lot of work for the hospitals as it is very complicated. For the large version only 1 hospital per country will participate due to the workload. Some countries have even cancelled their participation due to the workload. There is a budget of €100.000 for this survey. There will be a pilot in June/July (even a few in May), the data will be analyzed in September and the final results will be presented in November during the Antibiotic Awareness Day.

Call for the PPS will be send out by Carl next week. As soon as the call is published we will organize a conference call with HG and AM and Boudewijn Catry and we will submit a proposal. AM will take the lead in writing the proposal. HG will talk about the EU-PPS with PZ in Atlanta.

#### **Papers:**

- o HG congratulated PD because the JAC paper was accepted.
  - o PZ has no luck with his papers, they were turned down. PZ says that the comments were useful and that he will take them in consideration for his re-submission.
- Nursing Homes.
  - BJ introduced Marc Goossens, he is a new collaborator at WIV and he will partly work on the ESAC project together with Sofie Vaerenberg.
  - Report on PPS1: BJ is working on it, but not finished yet.

- PPS2: the questionnaire must be scanned, but there is a problem with the scanning machine at the moment.
- HALT is going fine; nearly definitive data, 150 additional NHs will be injected in ESAC from HALT. Invitation for second HALT PPS will be sent shortly.
- BJ will present the PPS1 results at IPS/WIV next week
- BJ & Katrien Latour presented 2 posters during a congress (geriatrics and gerontology) in Oostend.
- Ellen Broex finished her part of the PPS1 report → BJ has had no time to read it yet, VVK suggested that she could also send it to the MT for comments.
- HG noted that he heard some scepticism about the NH project in Stockholm. We are already collecting the next data and don't have a report ready on the previous PPS.
- Nico Drapier worked on a web based PPS report, it is available next week. BJ should prepare an e-mail to send out to all NH. Send this e-mail to VVK and HG to see if everything is clearly mentioned. After that it should be out to all participating NH. If they have problems with password, they should ask SN. For questions concerning the scientific results they can contact BJ.

Papers:

- Article on ESAC NH methodology is in progress, but not finished yet.

- **Socio-Economics**

- Update next meeting.

**6.Upcoming meetings**

- Stockholm meeting:  
SN sent out the invitations to the ESAC partners. A few have already responded.  
PD made his travel arrangements, if UK will send more than 4 representatives, they will pay for themselves.
- ECCMID:  
SN will organize a dinner on Sunday evening in Vienna for LMM.

**7.AOM**

No comments.

**NEXT MEETING: 25<sup>th</sup> of March 2010 at 10:30AM (CET)**

<b>Minutes ESAC-3 MT Meeting dd. 25/03/2010</b>
---

**Present:** VVK, RS, AM, HG, SC, AV, SV

**Conf.call:** BJ, EB, KL

**Minutes:** SN

**1.Review of the last meeting's minutes**

**1.1 Pending Action Items**

- SC Finalize paper on ESAC-2 AC data.  
Prepare an outline for a small protocol for the core data collection (deadline: May 2)
- HG Call Ole Heuer about ESAC-4.
- BJ Make report PPS1 nursing homes (deadline end of April)  
Send e-mail with request on writing papers on ESAC NH (after report PPS 1 is finished)  
Prepare e-mail to send to participating NH to inform them that the web based reports are online.
- AM Update indicator values on ESAC website  
Prepare explanatory leaflet for online PPS HC reports together with Peter Zarb (this week)  
Contact Ole Heuer to obtain data on resistance (EARSS) (put PZ in cc)  
Send data to Niel Hens (end of April)
- SN Send ATC/DDD list with and without errors as feedback to the hospitals that participated in the PPS2009 (check with AM)  
Send out Doodle for audit committee meeting first week of May.
- RS Prepare papers on NH PPS1 (will be discussed during meeting of 23/4)
- VVK Newsletter April edition: add Grace poster  
Prepare ESAC poster at EU corner (ECCMID)  
Finalize agenda annual meeting Stockholm (after meeting about this with PD, PZ, PB)
- AV Enroll for SQL training  
Enroll for access training  
Send core data at ATC3 level to Ole Heuer (End of March)
- PZ & BA Finish PPS2 report (HC) by May.

**1.2 Review of the Minutes of previous MT meeting.**

- 2 There will be a meeting with HG, BJ, EB, KL, RS and Boudewijn Catry on April 23, 2010. The topics will be the PhD of Ellen and Rudi (they should prepare an outline) and also discussion of the PPS1 report, which should be finished by then.
- 3 VVK sent an e-mail to Ole Heuer to ask if it is possible to have the complete extension of ESAC-4 in 1 contract. Ole will check.



- 4 The table with core data at ATC3 level for submission to Ole Heuer will be discussed this afternoon with AV, HG, SC, VVK, AM.

## 2. Management

- Extension ESAC-4:  
VVK sent a mail to Ole Heuer about ESAC-4, but we have no response yet. HG noted that Ole has probably been very busy because of the election of a new director at ECDC (Marc Sprenger got the position). HG will call him.
- Audit committee:  
It was decided to have the next audit committee meeting in the first week of May (2 hours). SN will send out a Doodle.
- Training Ann V.:  
She is getting a better grip on the complexity of the data.
- Newsletter April:  
Newsletter will be a combination of ESAC & GRACE + subprojects.  
BA and PZ can also work on the newsletter next week when they are in Antwerp.
- Poster ECCMID  
ESAC poster will be prepared by VVK and will describe the core data 2008 (preliminary).
- SHEA Atlanta March 2010:  
It was a very successful congress for ESAC.  
USA is interested in ESAC, also Middle East and Australia wants to use the PPS software and methodology. ECDC will support this.

## 3. Finances

- Budget extension Year-4.  
Also no news on the budget from Ole. It is important that we know if the budget is approved for the final meeting in May 2011.

## 4. Core Activity

- Update core data:  
The AC data was presented by AV, but will be discussed in detail during the meeting this afternoon at 3PM.
- Collaboration with UHASSELT:  
No updates.

## 5. In-depth analysis.

- Ambulatory Care.
  - SC will try to have a presentation ready about indicators for our meeting in Stockholm
- Hospital Care.
  - o Next week BA and PZ will come to Antwerp, we will discuss the HC subproject.
- Nursing Homes.
  - No update
- Socio-Economics
  - No update

## 5. Upcoming meetings

- Stockholm meeting:  
Agenda: VVK will adjust according to discussion.  
SC suggested we could invite John Paget from APRES and Mike Sharland from ARPEC. HG will invite them after the programme has been finalized.
- ECCMID:  
Presentation of all the ECCMID posters and abstracts will be discussed during a meeting on the 7<sup>th</sup> of April (12H to 14H) in the presence of HG, VVK, AM, BJ, EB, KL.  
SN will make reservation of meeting room S4.11 and beamer.  
ESAC poster will be prepared by VVK and will describe the core data 2008 (preliminary).

## 6. AOM

No comments.

**NEXT MEETING: 20<sup>th</sup> of April 2010 at 10:30AM (CET)**

### Minutes ESAC-3 MT Meeting dd. 20/04/2010

**Present:** VVK, AM, HG, SC, AV, NA, SN

**Conf.call:** PZ

**Apologies:** SV, RS, BJ

**Minutes:** SN

#### 1. Review of the last meeting's minutes

- **Pending Action Items**
- SC Finalize paper on ESAC-2 AC data.  
Prepare an outline for a small protocol for the core data collection (deadline: May 2)
- BJ Make report PPS1 nursing homes (deadline end of April)  
Send e-mail with request on writing papers on ESAC NH (after report PPS 1 is finished)  
Prepare e-mail to send to participating NH to inform them that the web based reports are online.

- AM Update indicator values on ESAC website  
Prepare explanatory leaflet for online PPS HC reports together with Peter Zarb (this week)  
Send data to Niel Hens (end of April)  
Make e-lib on ESAC website operational again  
Discussion communication to the hospitals of the ATC/DDD error list with Rudi  
Keep HG informed about the EARSS data from Ole.
- SN Send ATC/DDD list with and without errors as feedback to the hospitals that participated in the PPS2009 (check with AM)  
Finalize audit committee date.  
Invite Niel Hens to participate Stockholm meeting.
- RS Prepare papers on NH PPS1 (will be discussed during meeting of 23/4)
- VVK Resend e-mail about budget to PD and put HG in cc.  
Send out list of DLs & budget to MT.  
Make a preliminary budget for ECDC call EU-PPS.  
Finalize agenda Stockholm.  
Prepare contract for use of PPS by outsiders.
- AV Enroll for SQL training  
Enroll for access training  
Send core data at ATC3 level to Ole Heuer (End of March)  
Contact Stefan Bartolomeeussen.  
Ask LNRs to check validated core data.
- PZ & BA Finish PPS2 report (HC) by May.

### 1.2 Review of the Minutes of previous MT meeting.

- 23 ND is still working on update of the NH web report (uploading the NH reports), therefore AM is not ready yet with the explanatory leaflet for online PPS.
- 24 AM updated the indicator values on ESAC website, but he still needs to make the link with the interactive database and the distinction between AC and TC.
- 25 AM contacted Ole Heuer about EARSS data, but received no reply yet. He should keep HG informed about this.
- 26 AM still needs to send data to Niel Hens; IMS data is under analysis (very high use for Greece). AC data is validated, should be send to Niel. JAC series need to be updated based on the 2008 data.
- 27 AV asked to participate in an access training in June. SC thinks that it would be a good training for AV to meet with Stefan Bartolomeeussen from the HALT project.
- 28 PZ and BA are working on the HC report, but the database is not ready yet. AM sent the final database to BA. AM still needs to make a query on multitherapy per patient. By the end of April they will have gathered enough information for final report. BA is working on the SAS analysis.
- 29 SN should check with Cliodna whether May 18 is a good date for the audit committee meeting.

### 2. Management

- Extension ESAC-4:  
Since VVK received no response from Peter Davey concerning the budget.  
VVK will resend the e-mail to PD with HG in cc and also send the list of deliverables for comments to everybody of the MT. As soon as the MT agrees upon the proposed DLs and budget, VVK will send these to Ole Heuer.
- Audit committee:  
Check with Cliodna Mc Nulty for the 18th of May.
- Training Ann V.:  
Was discussed earlier.
- ECDC PPS : call for tender.
  - No co-funding of 10%
  - Mistake 2500/country? Also 2000/country mentioned in the call
  - The timing will be difficult to get ethical approval for the hospitals, therefore we will propose 2 PPS dates: May-June and September.
  - Subcontracts cannot be signed before submission, but Carl agreed that a list should be sufficient.
  - VVK will submit an e-mail to ECDC with questions regarding the call
  - It is necessary that we have a first draft by the end of the week (AM=lead, VVK & PZ =co)
  - HG already finished his part in terms of inclusion of hospitals for the pilot, he has 10 participating hospitals (5 full version, 5 light protocol)
  - There is money available to run a pilot in Belgium (€125.000) from the BE government.
  - HG planned a training meeting for the software end of May (31/5) for the hospitals, by that time the software must be ready. ND is working on it.
  - After the test in Belgium (beginning of June), the web-PPS software can be put online by AM for the other hospitals participating in the pilot
  - There is also budget to provide a helpdesk in Paris.
  - VVK will prepare a preliminary budget.

- Agenda Stockholm meeting:  
PZ sent his draft agenda to HG, it was discussed during the meeting.  
We will also invite Niel Hens, he can have a presentation about the results of the LS. (SN will check with him).

### **3.Finances**

- Budget extension Year-4.  
VVK will send the budget to Ole.

### **4.Core Activity**

- Update core data:  
So far, we have validated data for 9 countries (out of 25). We must push the participants, because we need the data by the end of April for the yearbook, which should be sent to the LNRs and NRs by mid May.
- Collaboration with UHASSELT:  
No updates.

### **5.In-depth analysis.**

#### **Ambulatory Care.**

- SC and NA will send a proposal on Quality Indicators to NR's.
- The database was updated with the AC data.

#### **Hospital Care.**

- o AM says that Irish people contacted him, they were interested running the PPS at a national level in 2010. We don't have time to support them, but they can use our PPS. Also Australia is interested in our PPS, but they cannot use it for commercial purposes. VVK will prepare a contract for this.

#### **Nursing Homes.**

- Web reports are ready. BJ should send an e-mail to the participating NHs.

#### **Socio-Economics**

- No update

### **6.Upcoming meetings**

- Stockholm meeting:  
Agenda: was discussed, VVK will finalize the agenda. A preparatory meeting will be held on May 18 as Brice and Peter Zarb will be in Antwerp on May 18 and 19.
- ECCMID: feedback  
It was an excellent meeting.

### **7.AOM**

No comments.

**NEXT MEETING: 18<sup>th</sup> of MAY 2010 at 09:30AM (CET)**

### **Minutes ESAC-3 MT Meeting dd. 18/05/2010**

**Present:** VVK, AM, HG, SC, AV, NA, SN, BJ, EB, KL, PZ, BA, RS

**Conf.call:** PD

**Apologies:** SV

**Minutes:** SN

#### **1.Review of the last meeting's minutes**

##### **1.1 Pending Action Items**

- ALL Finalize presentations for Stockholm meeting by **Friday May 21.**
- SC Finalize paper on ESAC-2 AC data.  
Prepare an outline for a small protocol for the core data collection (deadline: June 2010)
- PD Send presentation Stockholm meeting to HG by May 20, 2010
- HG Review PPS2009 report HC
- BJ Prepare report PPS1 nursing homes (deadline: Stockholm meeting)  
Send e-mail with request on writing papers on ESAC NH (after report PPS 1 is finished)  
Send e-mail to participating NH to inform them that the web-based reports are online  
Prepare report PPS2 (deadline: End of June 2010)
- AM Send list of participating LS hospitals to Ole (this week)  
Prepare explanatory leaflet for online PPS HC reports together with Peter Zarb (this week)  
Send data to Niel Hens (end of April)  
Make e-lib on ESAC website operational again  
Discussion communication to the hospitals of the ATC/DDD error list with Rudi  
Keep HG informed about the EARSS data from Ole.  
Review PPS2009 report HC
- SN Send ATC/DDD list with and without errors as feedback to the hospitals that participated in the PPS2009 (check with AM)  
Prepare final agenda Stockholm meeting  
Prepare handouts Stockholm meeting  
Prepare USB stick containing presentations Stockholm meeting + HC PPS 2009 report  
Ask for the presentations of Niel Hens, Jordi Torren and Ole Heuer.

- Ask Sigvard if he wants to be chair of plenary session 1 together with HG.
- Send HC PPS 2009 for printing and send to participating hospitals
- Send NH PPS1 report for printing and send to participating nursing homes
- RS Prepare 2 papers on NH PPS1
- VVK Prepare contract/software license for use of PPS by outsiders.
- Review PPS2009 report HC
- Ask Carl Suetens to present the EU-PPS call for tender
- AV Enroll for SQL training
- Enroll for access training
- Contact Stefan Bartolomeeussen to set-up meeting

### 1.2 Review of the Minutes of previous MT meeting.

- Discussion communication to the hospitals of the ATC/DDD error list with Rudi; database is cleaned.
- AM contacted Ole Heuer about the EARSS database. There should be no problem to receive the data. But first AM needs to send a list of participating hospitals to Ole. He will do this tomorrow.
- RS will write 2 papers on the NH PPS1.
- VVK is waiting on AM final input to prepare a contract/software license for the use of the PPS system by outsiders.
- VVK send the final DLs + MS + budget ESAC-4 to HG who send it to Ole Heurer and Carl Suetens. We are awaiting a reply from ECDC.
- AV contacted Stefan Bartolomeeussen, but a date for a meeting was not set up yet. This should be done very urgently.
- PZ and BA prepared the PPS2009 report. Should now be revised by the MT and finalised asap. If possible a PDF version of the report will be included on the USB stick for the Stockholm. Also hard copies will be printed and send to the hospitals.

### 2. Management

- Training Ann V.:  
She is still waiting for access courses. For the time being she can work with AM programme, but if there is a problem or a bug, she is unable to fix the bug. However, ND can help.  
To process the 2009 data will not be a problem.
- ECDC PPS : call for tender.
  - Was submitted on May 5, 2010.
  - It seems that 2 other proposals were submitted; we had lots of response to the EU-PPS questionnaire about participation, only 2 NCP's did not reply.
  - We are awaiting the evaluation (probably available by mid June).
- ESAC 2008 Yearbook.  
It was send to the printing office, a number of copies will be ready by Friday, so we can hand them out during the Stockholm meeting.

### 3. Finances

No update.

### 4. Core Activity

- Update core data:  
Updated for 2008 yearbook (UK is complete, Poland still problem with 2006 data).  
For several countries we were also able to include previous years.
- Collaboration with UHASSELT:  
No update.

### 5. In-depth analysis.

- Ambulatory Care.
  - Discussion of the presentations for Stockholm
- Hospital Care.
  - Conf call Peter Davey: he will not be attending the Stockholm as he fears that he will not be able to return to Scotland. HG will take over his presentation. PD will send his presentations to HG tomorrow.
  - Discussion of the presentations for Stockholm
- Nursing Homes.
  - Discussion of the presentations for Stockholm.
- Socio-Economics
  - Discussion of the presentations for Stockholm

### 6. Upcoming meetings

- Stockholm meeting:  
Agenda: was discussed, final version will be prepared by SN and send to the MT. VVK will ask Carl Suetens to give a presentation on the EU-PPS call for tender.  
SN will also ask the presentations of Niel Hens, Jordi Torren and Ole Heuer.  
SN will ask Sigvard if he wants to be chair of the plenary session.

**All presentations should be ready and send to SN by Friday May 21, 2010.**

## 7.AOM

No comments.

### Minutes ESAC-3 MT Meeting dd. 28/06/2010

**Present:** VVK, AM, HG, SC, AV, NA, SN, RS

**Conf.call:** PZ, SV, EB

**Apologies:** BJ, BA

**Minutes:** SN

#### 1.Review of the last meeting's minutes

##### 1.1 Pending Action Items

- ALL Send input for management report to VVK !!!!!
- SC Finalize paper on ESAC-2 AC data.  
Prepare an outline for a small protocol for the core data collection (deadline: June 2010)
- HG Call BJ about the NH papers
- BJ Finalise report PPS1 nursing homes (deadline: end July)  
Finalise report NH characteristics (deadline: end of July)  
Send e-mail with request on writing papers on ESAC NH (after report PPS 1 is finished)  
Send e-mail to participating NH to inform them that the web-based reports are online  
Prepare report PPS2 (deadline: End of August 2010)
- AM Prepare explanatory leaflet for online PPS HC reports together with Peter Zarb (July)  
Make e-lib on ESAC website operational again
- SN Send HC PPS 2009 for printing and send to participating hospitals  
Send NH PPS1 report for printing and send to participating nursing homes  
Send NH characteristics report for printing and send to participating nursing homes  
Send the minutes of the annual meeting to HG for review.  
Send final minutes of the annual meeting to the participants, LNRs and NRs.
- RS Prepare 2 papers on NH PPS1
- VVK Prepare contract/software license for use of PPS by outsiders.
- AV Enroll for SQL training  
Enroll for access training
- ND Solve problems with e-lib ESAC website.

##### 1.2 Review of the Minutes of previous MT meeting.

- AV sent out the protocol for the core data (1 week ago).
- PPS report on HC is fine, no more comments. It will go to the printer. Then it will be send by e-mail to the participating hospitals and LNR's as a PDF version. We will provide hard copies on request.
- ATC/DDD error list: not send to the hospitals yet, but it is a lot of work to send an e-mail to every hospital. The common errors are already listed in the PPS report and to avoid that hospitals make the same mistakes in the future, we could adapt the programming.
- VVK has almost finalised the software license for use of PPS by outsiders.
- Nico Drapier will look at the problems with the e-lib.
- AM received the list of hospitals participating in EARSS from Ole. Still there occurred a problem: the list only mentioned laboratory numbers, but we need hospital numbers to identify the hospitals. Peter Zarb will contact the hospitals to obtain the numbers.
- AM sent core data to Niel Hens, IMS was also sent. PZ sent input on IMS → values have been corrected → comparable with ESAC now. Also info on sample size and data sources was sent.

#### 2.Management

- Training Ann V.:  
AV and Stefaan Bartholomeeusen had a meeting with regard to the APRES data management. This system could also be applied for ESAC.
- EU Pilot PPS:  
On 6/7/2010 there will be a conference call with the members of the support team. SN will send the list with the participating hospitals to the support team.
- ESAC management report Year 3  
VVK would like to work as much as possible on the management report before she leaves on maternity leave (September 15).  
AV will finalize it.  
The report must be submitted to ECDC before October 17, 2010.  
The report will be discussed in detail during the next MT meeting (end of August).

#### 3.Finances

- Financial report Year 3.  
VVK cannot work on this report before she leaves in maternity leave, so SN and Leen Verreyt will make the report. A meeting has been planned beginning of September with Leen Verreydt to discuss the financial report.

#### 4.Core Activity

- Update core data:

The protocol for the core data was updated. It will be finalized by September 15.

There is a problem with the JO5 data.

- Collaboration with UHASSELT:

AM will finalize IMS data this week. Then he will send it to Niel Hens.

**5. In-depth analysis.**

- **Ambulatory Care.**

Next week SC has a meeting with Mark & Niel and Girma (UHasselt). They finished the longitudinal analysis.

SC will stay in contact with the other people from the task forces.

Jose Cortinas left UHasselt, but SC received all the feedback (link with resistance) from him.

QI: second scoring round was sent out.

- **Hospital Care.**

• AM sent preliminary LS data to Niel Hens.

• PZ is working on LS 2009 now.

- **Nursing Homes.**

• Part 1 from the report on the National Survey is done. BJ will finalize it this week and send it to the MT.

• The PPS1 report is almost finished. We decided not to include the Scottish data, because they did not follow the protocol, so they did not deliver comparable data.

• But we must send an e-mail to Scotland to explain this. Katrien Latour is preparing country reports, which they will also receive, next to the online reports that are available on the web-PPS website.

The report should be finished by the end of the month July.

• Papers: they have some problems with the statistical analysis, therefore a meeting was scheduled with Niel Hens.

The papers will have a delay, perhaps we should postpone it to September. HG will phone to BJ about this.

- **Socio-Economics**

• No update

**6. Upcoming meetings**

- Stockholm meeting:

The minutes are almost finalized. Some members of the MT already returned their comments to SN.

SN will send the minutes to HG for final review.

Then SN will send the minutes to the participants of the meeting and LNRs.

**7. AOM**

• The final ESAC meeting will be held May 19-20, 2011.

• Ole agreed on the new contract for ESAC 4, but VVK did not receive a new contract yet. Ole is Out of office at the moment.

• NA had a meeting with Louis Kroes concerning the antiviral paper (at the end of the summer they will have a final draft).

• Perhaps next year we will have some data from Romania.

**NEXT MEETING FRIDAY 27 AUGUST 2010 AT 10h30.**

**Minutes ESAC-3 MT Meeting dd. 27/08/2010**

**Present:** VVK, HG, SC, AV, NA, SN, CM

**Conf.call:** PZ, EB, BJ

**Apologies:** RS, AM, SV

**Minutes:** SN

**1. Review of the last meeting's minutes**

**Pending Action Items**

PZ Send draft of explanatory leaflet to VVK

Send input Mgt report to VVK

SC Finalize paper on ESAC-2 AC data.

HG Read report on NH characteristics.

BJ Send e-mail with request on writing papers on ESAC NH (after report PPS 1 is finished)

Send e-mail to participating NH to inform them that the web-based reports are online

Prepare report PPS2 (deadline: End of August 2010)

Send input for management report to VVK

AM Prepare explanatory leaflet for online PPS HC reports together with PZ & ND

Prepare complete xls comprising all hospitals for data analysis PPS2009

Implement ATC corrections into WebPPS software together with ND

Make WebPPS software available for hospitals and third parties

SN Send HC PPS 2009 for printing and send to participating hospitals

Send NH PPS1 report for printing and send to participating nursing homes

Send NH characteristics report for printing and send to participating nursing homes.

Send out Newsletter August 2010.

- RS Prepare 2 papers on NH PPS1
- VVK Finalise ESAC Mgt report before maternity leave  
Read NH reports (PPS1 & NH characteristics)
- AV Enroll for access training
- ND Solve problems with e-lib ESAC website.

### **1.2 Review of the Minutes of previous MT meeting.**

- On 27/8/2010 BJ sent a final version of the PPS1 report on nursing homes to MT. HG said it was an excellent report, VVK will look at it this weekend.
- EB sent out the report on NH characteristics to MT; HG still need to look at it, he will do it by Monday.
- The NH web based reports are not online yet; EB must contact ND about this.
- EB is working on report PPS2, she will make a comparison of the 2 periods.
- PZ sent a first draft of the explanatory leaflet for online PPS HC reports to AM on the 6<sup>th</sup> of August. He has no reply yet. He must also send it to VVK, she will discuss this with ND.
- RS has an appointment with BJ on September 1 to discuss his 2 papers on NH PPS1.
- ND will try to resolve the software problem with e-lib.
- ATC correction list was sent to AM by RS, software must be adjusted.

### **3. Management**

- Training Ann V.:  
AV thinks that SQL training will not be feasible (not offered by the Doctoral Study Programme), but she will enroll Access training.
- ESAC management report Year 3  
VVK already received input from NA, CM, SC, SN.  
Final analysis HC PPS2009 still needs to be added.  
VVK did not receive input from BJ yet, but she is working on it. Also PZ is working on it, depends on finalization of the PPS2009.  
The report must be submitted to ECDC before October 17, 2010.  
VVK will try to finalise the report before she leaves on maternity leave.
- Availability PPS software to hospitals  
Contract license for use of PPS by outsiders is ready, but AM informed VVK that the software will not be ready before October.
- Newsletter Augustus 2010  
HG gave his comments, the rest of the MT already looked at it. VVK will finalize it. SN will take care of the printing and sending out, but we will wait till all the reports are ready.

### **4. Finances**

- Financial report Year 3.  
Is ongoing; there will be a meeting with ADFIN on 7/9. SN will finalize the financial report and send it to ECDC (deadline 17 Oct).

### **5. Core Activity**

- Update core data:  
2006 data : ES did not send data yet.  
2009 data: AV made a scheme, a few countries already sent data. AV immediately sent the validation reports to these countries (NO & MT), but she received no reply yet.  
She reminded PZ of this.
- Collaboration with UHASSELT:  
Niel Hens will start a FT position as of September 1, 2010 at the University of Hasselt. Some else will be taking over his tasks at UA, including the ESAC work. Also José Cortiñas will no longer work for the ESAC project as he has left for EFSA beginning of July 2010. We will need to see together with Niel who to proceed with the ESAC analyses.

### **6. In-depth analysis.**

- Ambulatory Care.
  - Paper on QI was sent out to MT, once this is revised it will be send to all ESAC.
  - Concerning the antivirals paper a suggestion for JAC supplement was sent around and discussed during the meeting. These are the items to be left out:
    - HC antibiotic use
    - NH antibiotic use
    - Article J.Cortiñas et al: link use & resistance
    - Adriaenssens et al: use by indication.
  - AV made an update of the Protocol A database & data-availability.
  - For Protocol B we are waiting feedback from the APRES project.
- Hospital Care.
  - Papers PPS 2009 were submitted for feedback.
  - LS paper: submission on 1<sup>st</sup> of September. (LS2009: 16 hosp., not all hospitals delivered all data/ 12 will have valid consumption data + resistance data, PZ will send an e-mail to Ole by the end of August to request for data).
  - Paper from BA was accepted (JAC).

- Minutes of the meeting -

- PPS 2009 report: AM made a new Excel list but there are still hospitals that have not been included. VVK said that the analysis need to be redone, she will discuss this urgently with AM. First we need a valid data set from AM, then PZ will rerun the analysis.
- EU PPS is running great; very nice work from PZ. There will be a meeting of the support team on Tuesday 31/8. HG will prepare an agenda. PZ must contact ND to see where we are, which hospitals already participated.

Agenda proposal:

Update participation

Discussion contracts, when should they be send (probably better after interim payment).

Dates of conf calls for Sept and Oct.

Workshop Brussels

Meeting October 6,2010 (PZ will go on EU PPS budget, HG will be invited).

- **Nursing Homes.**

- Report PPS1 NH: new version sent by BJ today, is nearly finished.
- KL and EB have finished their papers.
- PPS2 NH: Ellen is working on the report.
- We will have the HALT results by the end of September. It was suggested to also prepare a JAC supplement, because otherwise it might be difficult to publish all the data. We will await the feedback form the editor on the JAC supplement covering the core data. A similar methodology as for the e-Bug project can be persued (an introduction followed by country sheets). NA will send an example to Béa.
- Pamela has problems with getting her paper accepted; she sent it to Age & Aging, but no reply.
- Paper NH characteristics will be finalized by Monday.

- **Socio-Economics**

- Since the Stockholm meeting CM has been going through the database. He added a little bit of data and ran all the analysis again. He also added new scenario's and other methodologies (looked at it with Niel).
- A final report will be made, including new data that will be collected for 2009. CM + NH + PB will work on it, it will probably be finished by the end of the year).
- CM will leave on 1/10/2010. Adriaan will take over on price analysis.

**7.Upcoming meetings**

- Final annual meeting:

- The final meeting could be abroad if the cost is not higher than in Antwerp. SN will look at the possibilities.

**8.AOM**

**NEXT MEETING THURSDAY 16/9 at 9H00 CET.**

**FOLLOWING MEETING: THURSDAY 30/9 at 9H00 CET.**



**ANNEX I: AVAILABILITY OF DATA FOR PROTOCOL A**

**Availability of data for protocol A**

Country	year					
	2004	2005	2006	2007	2008	2009
BE	x	x	x	x	x	
DK		x	x	x	x	
EE			x	x	x	
FI		x			x	
FR					x	
IL		x			x	x
LU		x		x	x	
NL	x	x	x	x		
NO			x	x	x	
SE	x	x	x	x		
SI		x	x	x	x	
WAL			x	x		

**ANNEX II: LIST OF HOSPITAL CARE COUNTRIES PPS & LS 2009**

**List of participating countries and hospitals ESAC-HC LS2009**

Country	Institution name	Utilisable consumption data		Utilisable Resistance data	
		No	Yes	No	Yes
<b>Austria</b>	<b>Elisabethinen Hospital</b>			<b>1</b>	<b>1</b>
	University Multipurpose Hospital for Active Treatment Aleksandrovska		1		1
Bulgaria	University Hospital for Infectious Diseases		1		1
Croatia*	<b>LEFKOSIA GENERAL HOSPITAL</b>			<b>1</b>	<b>1</b>
<b>Cyprus</b>	<b>LIMASSOL GENERAL HOSPITAL</b>			<b>1</b>	<b>1</b>
Czech Republic	Teaching hospital Hradec Kralove	1		1	
	<b>Tartu University Hospital</b>			<b>1</b>	<b>1</b>
<b>Estonia</b>	<b>West Tallinn Central Hospital</b>			<b>1</b>	<b>1</b>
Finland	vaasa central hospital	1			1
Germany	Universitätsklinik Freiburg		1	1	
Hungary	University Hospital Szeged	1			1
	<b>Midland Regional Hospital Tullamore</b>			<b>1</b>	<b>1</b>
<b>Ireland</b>	<b>Tallaght Hospital</b>			<b>1</b>	<b>1</b>
Italy	Azienda Sanitaria ULSS 18 Rovigo			<b>1</b>	1
Latvia	Liepaja Regional hospital	1			1
<b>Malta</b>	<b>Mater Dei Hospital</b>			<b>1</b>	<b>1</b>
	<b>Aker University Hospital</b>			<b>1</b>	<b>1</b>
<b>Norway</b>	<b>Asker and Baerum Hospital</b>			<b>1</b>	<b>1</b>
	Hospital Infante D. Pedro E.P.E.	1		1	
<b>Portugal</b>	<b>S. Francisco Xavier Hospital</b>			<b>1</b>	<b>1</b>
	Samara Regional Hospital for War Veterans	1		1	
Russia*	Smolensk Regional Hospital	1		1	
Slovenia	University Medical Center			<b>1</b>	1
Switzerland	Centre Hospitalier Universitaire Vaudois	1		1	
*	Hôpitaux Universitaires de Genève			<b>1</b>	1
United Kingdom	<b>Conwy Denbighshire NHS Trust</b>			<b>1</b>	<b>1</b>
	Ninewells Hospital			<b>1</b>	1
	University Hospital of Wales	1		1	
Grand Total		11	<b>17</b>	11	17

Countries marked with (\*) are non EU MS. **The 12 hospitals in bold have valid consumption data and are EARS-Net registered.**

**List of participating countries and hospitals ESAC-HC PPS2009**

Country	Number of Hospitals
Austria	7
Belgium	21
Bulgaria	1
Switzerland	2
Cyprus	2
Czech Republic	4
Denmark	2
Estonia	3
England (UK)	46
Spain	2
France	3
Croatia	3
Hungary	1
Ireland	21
Israel	1
Italy	2
Latvia	2
Malta	1
Northern Ireland (UK)	4
Norway	2
Portugal	2
Russia	3
Scotland (UK)	32
Slovenia	6
Wales (UK)	6



**ANNEX III: LIST OF NURSING HOMES COUNTRIES 2<sup>ND</sup> PPS 2009**

**Number of NHs for countries who delivered data for PPS-1 and PPS-2**

<b>COUNTRY</b>	<b>PPS-1 (April 2009) Nursing Homes (n)</b>	<b>PPS-2 (November 2009) Nursing Homes (n)</b>
Belgium	116	103
Bulgaria	-	2
Croatia	5	5
Czech Republic	6	6
Denmark	5	5
Finland	8	8
France	29	8
Germany	8	5
Hungary	-	4
Ireland	18	11
Italy	30	28
Latvia	5	5
Lithuania	1	3
Malta	5	5
The Netherlands	4	4
Norway	5	5
Poland	5	8
Russian federation	4	2
Slovenia	6	6
Sweden	9	7
UK : England	5	5
UK : Northern Ireland	30	30
<b>TOTAL</b>	<b>304</b>	<b>265</b>



**ANNEX IV: INVENTORY OF SOCIO-ECONOMIC DETERMINANTS**

**List of determinants of use of antibiotics selected for further analyses**

**This list departed from the determinants used in the following papers and documents, discussed at meetings of the EC subgroup in ESAC-2:**

Harbarth S, and Monnet DL. Cultural and Socioeconomic Determinants of Antibiotic Use. In: Antibiotic Policies - Fighting Resistance (Eds Gould IM and van der Meer JWM), Springer US, 2007.

Masiero, G., Filippini, M., Ferech, M. and Goossens, H. (2007). 'Bacterial resistance and economic incentives: determinants of outpatient antibiotic consumption in Europe', ESAC-2 project.

Extensive list compiled during a "brainstorm" of a group of experts in Workshop 2: Determinants of Antibiotic Use in Primary Health Care at the European Conference on Antibiotic Use in Europe, Brussels, 15-17 November 2001, Updated (21/12/2003) and provided by Monnet DL (personal communication 2007).

All the determinants used by Harbarth & Monnet, or Masiero et al were retained in our list, but from the latter extensive list only a selection was made in order to avoid overlap between the determinants selected for analyses. The resulting list is shown below, using major headings inspired by those proposed by Harbarth & Monnet (2007).

**Agricultural actors**

- Production of poultry
- Production of chicken
- Production of pigs
- Production of turkey
- Consumption of seafood
- Consumption of meat
- Consumption of poultry

**Burden of disease**

- Unmet medical needs (% of population)
- All cause mortality (0-14 years)
- All cause mortality (15-29 years)
- All cause mortality (30-44 years)
- All cause mortality (45-59 years)
- All cause mortality (60-74 years)
- All cause mortality (>75 years)
- Probability of dying before age 5
- Death rate of Aids
- Death rate due to alcohol abuse
- Death rate due to cancer
- Death rate due to chronic diseases
- Death rate due to ischaemic heart disease
- Death rate due to chronic liver disease
- Death rate due to nervous system
- Death rate due to diseases of the respiratory system
- Death rate due to influenza
- Death rate due to pneumonia
- Death rate due to other acute respiratory infections
- Death rate due to bronchitis asthma & emphysema
- Death rate due to diabetes Mellitis
- Death rate due to chronic lower respiratory diseases
- Death rate due to Infectious, parasit.dis
- Death rate due to Influenza & pneumonia
- Microbiological foodborne diseases per 100000
- S pneumonia\_PNSP+ENSP (% infected)
- S pneumonia\_PNSP (% infected)
- S aureus\_MRSA (% infected)
- S aureus\_Vancomycin (% infected)
- E coli\_Aminoglycosides (% infected)
- E coli\_Aminopenicillins (% infected)
- E coli\_Fluoroquinolones (% infected)
- E coli\_3rd gen. ceph. (% infected)

- Crude death rate aged 0
- Crude death rate ages 1 - 4

### **Culture and perception of illness**

- % of population self-assess health good
- % of population breast Feeding at 3 Months
- Corruption Index Score
- Individualism (index score)
- Masculinity (index score)
- Power Distance Index
- Uncertainty Avoidance Index
- % of regular daily smokers in the population, age 15+
- Number cigarettes consumed per person per year
- Pure alcohol consumption, litres per capita
- Most people can be trusted (index score)
- I seek to be myself rather than to follow others (index score)
- Greater respect for authority (index score)
- Science and technology are making our lives healthier, easier, and more comfortable (index score of the degree to which the population agree with this)
- Because of science and technology, there will be more opportunities for the next generation (index score of the degree to which the population agree with this)
- We depend too much on science and not enough on faith (index score of the degree to which the population agree with this)
- The world is better off, or worse off, because of science and technology(index score of the degree to which the population agree with this)
- Trust: People you meet for the first time (index score of the degree to which the population trust people)
- Confidence: The Government (index score of the degree to which the population have confidence in the government)
- Having experts make decisions about the country (index score of the degree to which the population are happy with experts making decisions)
- Democraticness in own country (index score of the degree to which the population think the country is democratic)
- Most serious problem for own country is poor sanitation and infectious diseases ( % of respondents in survey that believe this)
- Most serious problem of the world is poor sanitation and infectious diseases ( % of respondents in survey that believe this)
- Religious person (index score indicating of people are more religious or atheist)
- Fate versus control (index score of population that think life is determined by faith or by themselves)
- I see myself as citizen of the European Union (index score of population that agree with this)

### **Demographic factors**

- Birth rate
- Female life expectancy at 65
- Male life expectancy at 65
- Male life expectancy at 60
- Female life expectancy at 60
- Male life expectancy at birth
- Female life expectancy at birth
- Women per men ratio
- Infant deaths per 1000 live births
- Disability-adjusted life expectancy
- Average Population Density per km<sup>2</sup>
- Population (on 1 January)
- % Population aged 0-14
- % Population aged 65 and above
- % of Urban Population
- Average Household Size
- Percentage of new born babies with weight > 2.5 kg
- Percentage of kids aged less than three that receive no form of formal care
- Percentage of kids aged less than three that are cared for by only their parents
- Average absolute humidity (measured in capital city)
- Standard deviation of absolute humidity (measured in capital city)

### **Education and knowledge about antibiotics**

- Usage of internet for info on goods and services (% of population)
- Educational level Attainment upper secondary
- Educational level School expectancy Years
- Individuals using the Internet for seeking health-related information in the last 3 months (% of population)
- Percentage of population that know antibiotics does not kill viruses (measured in Eurobarometer survey)
- Percentage of 15 year old know that antibiotic use leads to antibiotic resistance

### **Healthcare system**

- Bed days due to diseases of the respiratory system
- Bed days due to acute upper respiratory infections and influenza
- Bed days due to pneumonia
- Bed days due to other acute lower respiratory infections
- Bed days due to chronic obstructive pulmonary diseases & bronchiectasis
- Bed days due to diabetes mellitus
- Bed days due to infectious and parasitic diseases
- Bed days due to carcinoma in situ
- Bed days due to circulatory system
- Bed days due to Aids
- Bed days due to alcoholic liver disease
- Bed days due to diseases of the nervous system
- Long-term care beds per 1000 population
- Number of doctors' consultations per capita
- Percentage of children immunised for DTP
- Percentage of 65+ pop vaccinated against influenza
- Public expenditure on clinical laboratory as a percentage of total expenditure on health
- Public expenditure on diagnostic imaging as a percentage of total expenditure on health
- Total expenditure on private health as a percentage of total expenditure on health
- Public expenditure on prevention and public health as percentage of public expenditure on health
- Total health employment as percentage of total civil employment
- Percentage of physicians working in hospital
- Percentage of infants vaccinated against invasive disease due to Haemophilus influenzae type b
- Percentage of infants vaccinated against Mumps
- Private households' out-of-pocket payment on health as % of total health expenditure
- Percentage of infants vaccinated against Pertussis
- Percentage of infants vaccinated against Rubella
- Total inpatient expenditure as % of total health expenditure
- Hospitals per 100000
- Hospital beds per 100000
- Pharmacists per 100000
- In-patient care admissions per 100
- Inpatient surgical procedures per year, per 100000
- Outpatient contacts per person per year
- Bed occupancy rate in %, acute care hospitals only
- Average length of stay, all hospitals
- Total health expenditure, PPP\$ per capita, WHO estimates
- Expenditure on inpatient care, PPP\$ per capita
- Total pharmaceutical expenditure as % of total health expenditure
- Pharmaceutical expenditure, PPP\$ per capita
- Total capital investment expenditures on medical facilities as % of total health expenditure
- Salaries as % of total public health expenditure
- Public sector expenditure on health as % of total government expenditure, WHO estimates
- Physicians per 100 hospital beds
- Total expenditure on pharmaceuticals & other medical non-durables
- GPs per 100000
- Practising physicians per 100000
- Pediatricians per 100000
- Patients have to be registered at a GP and it is easy to change between GPs (Yes/No)
- Patients have to be registered at a GP and it is not easy to change between GPs (Yes/No)
- Patients do not have to be registered at a GP and there is a financial benefit for being registered at a GP (Yes/No)

- Patients must consult a GP before visiting a paediatrician (Yes/No)
- Patients do not have to consult a GP before visiting a paediatrician and there is a financial benefit for consulting a GP first (Yes/No)
- Patients must consult a GP before visiting a gynaecologist (Yes/No)
- Patients do not have to consult a GP before visiting a gynaecologist and there is a financial benefit for consulting a GP first (Yes/No)
- Patients must consult a GP before visiting a pulmonologist (Yes/No)
- Patients do not have to consult a GP before visiting a pulmonologist and there is a financial benefit for consulting a GP first (Yes/No)
- Main source of income for physicians
- Are there treatment guidelines available to GPs for treating respiratory track infections (Yes/No)
- Are there treatment guidelines available to paediatricians for treating respiratory track infections (Yes/No)
- Are there treatment guidelines available to pulmonologists for treating respiratory track infections (Yes/No)
- Do GPs receive individual feedback on their antibiotic prescribing behaviour versus that of their colleagues (Yes/No)
- Do paediatricians receive individual feedback on their antibiotic prescribing behaviour versus that of their colleagues (Yes/No)
- Do gynaecologists receive individual feedback on their antibiotic prescribing behaviour versus that of their colleagues (Yes/No)
- Do pulmonologists receive individual feedback on their antibiotic prescribing behaviour versus that of their colleagues (Yes/No)
- Are pharmaceutical companies prohibited from providing physicians free drug samples as part of their marketing strategies (Yes/No)
- Are pharmaceutical companies prohibited from providing physicians personal presents as part of their marketing strategies (Yes/No)
- Are pharmaceutical companies prohibited from providing physicians complementary dinners as part of their marketing strategies (Yes/No)
- Are pharmaceutical companies prohibited from providing physicians conferences as part of their marketing strategies (Yes/No)
- Are pharmaceutical companies prohibited from providing physicians breakaways as part of their marketing strategies (Yes/No)
- Role between prescribing physician and pharmacists
- Number of antibiotics available
- Total health expenditure as % of GDP

### **Socioeconomic factors**

- Hours worked per week of full time employment
- Household savings as % of income
- Inability to keep home warm
- Living Area
- Poverty rate
- Unemployment
- Inequality of income distribution
- UNDP Human Development Index (HDI)
- Average number of people per room in occupied housing unit
- GDP / capita at Purchasing power standard
- Percentage of women aged 25 - 49 with at least one child aged 0 - 5 years who are employed
- Percentage of people (aged over 15) with a BMI >= 25



**ANNEX V: ABSTRACTS OF PAPERS IN PEER-REVIEWED JOURNALS**

**European Surveillance of Antibiotic Consumption (ESAC) point prevalence survey 2008: paediatric antimicrobial prescribing in 32 hospitals of 21 European countries.**

*Amadeo B, Zarb P, Muller A, Drapier N, Vankerckhoven V, Rogues AM, Davey P, Goossens H; on behalf of the ESAC III Hospital Care Subproject Group.*

*J Antimicrob Chemother. 2010 (In press)*

**Background:** Antimicrobials are the most common medicines prescribed to children, but very little is known about patterns of hospital paediatric antimicrobial prescribing. This study aimed at describing paediatric antimicrobial prescribing in European hospitals to identify targets for quality improvement.

**Methods:** The European Surveillance of Antibiotic Consumption (ESAC) project ([www.esac.ua.ac.be](http://www.esac.ua.ac.be)) collected data during 2 calendar weeks between May and June 2008 in 32 hospitals of 21 European countries with paediatric departments, using a standardized method. The ESAC point prevalence survey included all inpatient beds and identified all patients who were receiving systemic antimicrobials on the day of the survey or had received antimicrobial surgical prophylaxis on the previous day.

**Results:** Of 1799 children, 583 (32%) received one or more antimicrobials (range 17%-100%). The indications were therapeutic in 71%, prophylactic in 26% and both indications in 3% of patients. The parenteral route was used in 82% of therapeutic indications and in 63% of prophylactic indications. Third-generation cephalosporins were the most prescribed antimicrobials for therapeutic indications (18%). A high proportion of treated children received antimicrobial combinations (37%). The most commonly treated diagnosis site was the respiratory tract for both therapeutic use (30%) and prophylaxis (25%). The duration of surgical prophylaxis was >1 day in 67%.

**Conclusions:** Targets identified for quality improvement of antimicrobial use in children included excessive use of antimicrobial combinations and a high proportion of parenteral antimicrobials, both of which require further investigation. Surgical prophylaxis for >1 day should also be curbed in order to achieve quality improvement.

**European Surveillance of Antimicrobial Consumption (ESAC): outpatient systemic antimycotic and antifungal use in Europe.**

*Adriaenssens N, Coenen S, Muller A, Vankerckhoven V, Goossens H; ESAC Project Group.*

*J Antimicrob Chemother. 2010 Apr;65(4):769-74*

**Objectives:** To assess the total outpatient systemic antimycotic and antifungal use in Europe, and to identify the antimycotic and antifungal substances most commonly used.

**Methods:** Within ESAC ([www.esac.ua.ac.be](http://www.esac.ua.ac.be)), using the anatomical therapeutic chemical (ATC) and defined daily dose (DDD) classification, data on outpatient use of all 14 antimycotics (12) and antifungals (2) for systemic use (ATC J02 and D01B, respectively), aggregated at the level of the active substance, were collected for 2007. Use was expressed in DDD (WHO ATC/DDD, version 2008) per 1000 inhabitants per day (DID). Only countries for which data on both J02 and D01B use were available were included in the analysis.

**Results:** In 20 European countries (data for Cyprus and Estonia include hospital use), total outpatient systemic antimycotic and antifungal use varied by a factor of 6.7 between the country with the highest (3.03 DID in Belgium) and the country with the lowest (0.45 in Croatia) use. Terbinafine, ketoconazole, itraconazole and fluconazole represented >94% of the total outpatient antimycotic and antifungal use in all countries. Terbinafine use represented >50% of the total systemic antimycotic and antifungal use in 16 out of 20 countries (not in Croatia, Italy, Luxembourg and Bulgaria).

**Conclusions:** We present for the first time a standardized and validated data set of outpatient systemic antimycotic and antifungal use in Europe. Our study demonstrates a variation of antimycotic and antifungal use in Europe, as striking as that of antibiotic use. The ESAC data facilitate the auditing of antimycotic and antifungal prescribing, and the evaluation of the implementation of guidelines and public health policies to promote their judicious use.

**European Surveillance of Antimicrobial Consumption (ESAC): Gebruik van antischimmelpreparaten in de ambulante praktijk in Europa.**

*Adriaenssens N, Coenen S, Muller A, Vankerckhoven V, Goossens H; ESAC Project Group.*

*Huisarts Nu 2010;39(5):186-91.*

**Doel:** Deze studie wil het totale ambulante gebruik van systemische antischimmelpreparaten beschrijven en nagaan welke substanties het meest worden gebruikt.



**Methode:** Binnen het ESAC-project ([www.esac.ua.ac.be](http://www.esac.ua.ac.be)) werden gegevens verzameld over het systemisch gebruik door ambulante patiënten in het jaar 2007, van alle veertien preparaten, twaalf antimycotica (ATC J02) en twee fungiciden (ATC D01B), volgens de ATC (Anatomic Therapeutic Chemical)/DDD (Defined Daily Dose)-methode (WHO, versie 2008) en uitgedrukt in DDD per 1000 inwoners per dag (DID). Enkel landen waarvan gegevens beschikbaar waren over zowel J02 als D01B, werden in de analyse opgenomen.

**Resultaten:** In twintig Europese landen (gegevens voor Cyprus en Estland bevatten ook het hospitaalgebruik) varieerde het gebruik van systemische antischimmelpreparaten in de ambulante praktijk met een factor 6,7 tussen het land met het hoogste gebruik (3,03 DID in België) en het land met het laagste gebruik (0,45 in Kroatië). Terbinafine, ketoconazole, itraconazole en fluconazole vertegenwoordigden 94% van het totale gebruik in alle landen samen. Terbinafine stond voor >50% van het totale gebruik in zestien van de twintig landen (niet in Kroatië, Italië, Luxemburg en Bulgarije).

**Besluit:** Dit onderzoek presenteert voor het eerst gestandaardiseerde en gevalideerde gegevens over het gebruik van systemische antischimmelpreparaten in de ambulante praktijk in Europa. Ons onderzoek toont een verschil in gebruik aan dat minstens zo frappant is als dat van het antibioticagebruik. De ESAC-gegevens maken het opvolgen van het voorschrijven van antischimmelpreparaten mogelijk, alsook de evaluatie van de implementatie van richtlijnen en gezondheidszorgmaatregelen om het oordeelkundig gebruik ervan te promoten.

### **Het concept "Nursing Home" in Europa: European surveillance of Antimicrobial consumption.**

*B. Jans, S. Coenen, V. Vankerckhoven, R. Stroobants, H. Goossens, for the ESAC Nursing Homes subprojectgroep. Het concept 'nursing home' in Europa. European Surveillance of Antimicrobial Consumption (ESAC).*

*Huisarts Nu 2009;38(10)*

**Achtergrond:** Gegevens over antibioticagebruik in 'nursing homes' in Europa zijn schaars. Een gedetailleerde beschrijving van de kenmerken van deze instellingen in Europa is evenmin beschikbaar.

**Methode:** Ter voorbereiding van de eerste puntprevalentiemeting over antibioticagebruik in 'nursing homes' in Europa voor het European Surveillance of Antimicrobial Consumption (ESAC)-project werd aan de nationale vertegenwoordigers van de 21 deelnemende landen een geschreven vragenlijst geadresseerd om de kenmerken van Europese 'nursing homes' te onderzoeken.

**Resultaten:** Het verzamelen van algemene informatie over deze instellingen op nationaal vlak in de verschillende Europese landen was geen eenvoudige zaak omdat de registers van de 'nursing homes' niet steeds gecentraliseerd beschikbaar waren. De 'nursing homes' en hun bewonerspopulaties vertoonden belangrijke verschillen: o.a. in instellingsgrootte, gemiddelde verblijfsduur, gemiddelde leeftijd van bewoners, opnamecriteria,... Er was een brede waaier aan schalen en scores in gebruik om risicofactoren, zorglast en autonomie voor de activiteiten van het dagelijks leven (ADL) te meten, maar er werd géén universeel evaluatiesysteem gebruikt in alle 'nursing homes'. In heel wat landen werd medische zorg in 'nursing homes' voornamelijk door de huisarts verstrekt. In de helft van de landen werd de medische zorg gecoördineerd door een coördinerend arts. Een specifieke vorming voor de coördinerende arts en een taakomschrijving met betrekking tot de onderwerpen die de individuele arts-patiëntrelatie overschrijden, bijvoorbeeld een antibiotica- of vaccinatiebeleid, waren zeldzaam. De verpleegkundige zorg werd meestal verstrekt door een vast aangeworven verpleegkundig team en gecoördineerd door een hoofdverpleegkundige.

**Besluit:** Er waren belangrijke verschillen in de kenmerken van de 'nursing homes'. Bij gebrek aan een universele evaluatieschaal voor het inschatten van de casemix en zorglast zal een set van eenvoudig te verzamelen indicatoren gebruikt worden om 'nursing homes' in Europa te categoriseren.

### **The European surveillance of antimicrobial consumption (ESAC) point-prevalence survey of antibacterial use in 20 European hospitals in 2006.**

*Ansari F, Erntell M, Goossens H, Davey P.*

*Clin Infect Dis 2009; 49(10): 1496-1504.*

**Background:** Point-prevalence surveys have been used to document antimicrobial use in hospitals for >20 years. However, published surveys are inconsistent with respect to population, indication, and the details of therapy that were included. We aimed to standardize a method for surveillance of antibacterial use in hospitals from different health care systems and to identify targets for quality improvement.

**Methods:** We adapted a Web-based reporting system from STRAMA, the Swedish Strategic Programme against antibiotic resistance. One hospital from each of 20 countries took part in the survey, which was completed during 2 calendar weeks during 1 April 2006 through 31 May 2006. The survey included all inpatient beds for adults and children and identified all patients who were receiving systemic antibacterial treatments on the day of survey and all patients who had received antibacterial prophylaxis for surgery on the previous day.

**Results:** On the day of survey there were 11,571 inpatients in the 20 participating hospitals, of whom 30.1% were receiving antibacterial treatment (range, 19%-59%). The most common anatomic sites of infection for which antibacterials were prescribed were respiratory tract (24%); skin, bone, and joint (18%); intra-abdominal organs (16%); and urinary tract (11%). The following 3 quality indicators were identified: indication documented in case notes (64%), prophylaxis for surgery not continued for >24 h (60%), and therapy for community-acquired pneumonia not including third-generation cephalosporins or quinolones (78.5%).

**Conclusion:** A Web-based method for a point-prevalence survey was successfully piloted in 20 hospitals across Europe and offers a standardized instrument that can identify targets for quality improvement.

#### **European Surveillance of Antimicrobial Consumption (ESAC): outpatient parenteral antibiotic treatment in Europe.**

*Coenen S, Muller A, Adriaenssens N, Vankerckhoven V, Hendrickx E, and Goossens H. J Antimicrob Chemother 2009; 64: 200-205.*

**Objectives:** To assess the proportion of parenteral treatment of the total outpatient antibiotic use in Europe, and to identify the antibiotic groups and individual antibiotics most commonly administered in this way.

**Methods:** Within the European Surveillance of Antimicrobial Consumption (ESAC; [www.esac.ua.ac.be](http://www.esac.ua.ac.be)), using the anatomic therapeutic chemical (ATC) and defined daily dose (DDD) classification, data on outpatient use of antibacterials for systemic use (ATC J01), aggregated at the level of the active substance and expressed in DDD per 1000 inhabitants per day (DID; WHO version 2007), were extracted for 2006 by route of administration and by country. Parenteral use was expressed as a percentage of the total outpatient use in DID.

**Results:** In 20 European countries, the total outpatient antibiotic use ranged from 27.91 DID in France to 9.58 DID in Russia. The proportion of outpatient parenteral antibiotic treatment ranged from 6.75% in Russia to 0.001% in Iceland. The three most commonly used antibiotic groups for parenteral treatment in Europe were the cephalosporins (J01D; 44.58%), the aminoglycosides (J01G; 25.27%) and the penicillins (J01C; 17.78%). Four antibiotics [gentamicin (J01GB03) 18.53%; ceftriaxone (J01DD04) 17.85%; cefazolin (J01DB04) 13.16%; and lincomycin (J01FF02) 5.47%] represented more than half of the use.

**Conclusions:** In all 20 European countries studied together, 2.04% of outpatient antibiotics were used for parenteral treatment. However, as for the total outpatient antibiotic use and the use of different antibiotic groups and antibiotics, there is a striking variation in the proportions of parenteral antibiotic use in Europe. More in-depth data on outpatient antibiotic use are needed to explain this variation.

**ANNEX VI: ABSTRACTS ACCEPTED FOR ORAL PRESENTATION**

**The European Surveillance of Antimicrobial Consumption: Point Prevalence Survey of Antimicrobial prescriptions in 270 European nursing homes.**

B. Jans, K. Latour, E. Broex, Rudi Stroobants, A. Muller, V. Vankerckhoven, H. Goossens. On behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes Subproject Group.

*Objectives:* Facing the threat of antimicrobial resistance in healthcare settings, optimising the use of antibiotics (AB) in the nursing home (NH) population is an important priority of quality of care. However, data on AB-use in European (EU) NHs are scarce. The European Surveillance of Antimicrobial Consumption (ESAC) NH sub-project team, funded by the European Centre for Disease Prevention and Control, carried out a methodology in order to measure and describe AB prescriptions among residents living in EU NH.

*Methods:* In April 2009, a PPS was carried out in 301 NH in 19 EU countries. Inclusion criteria for residents were to be present in the NH for at least 24 hours and to receive systemic AB on the day of the PPS. Data were obtained from nursing notes, medication administration records and staff in relation to AB prescribing, characteristics, risk factors and determinants at NH- and at resident level.

*Results:* Data were available for 17 countries and 270 NH (29.360 NH-beds). The mean number of beds by NH was 108 (20 – 621 beds). Among 27.614 eligible residents, 1740 (median 5.9%, 0 - 30%) received an AB on the PPS-day. In 20 NH no residents received AB. In the total NH-population 4% (0 - 57%) had an urinary catheter, and of these, 17% received an AB. Wounds were present in 10% of the population (0 - 75%) and AB were prescribed in 15% of them. Vascular catheters were uncommon (0.78%) but 36% of this sub-population used an AB. Among residents with AB, 24% had a recent hospital stay. In total 1757 AB molecules were used. AB were administered orally in 90%, parenteral in 9% and nasal (decolonisation MRSA) in 1%. 53% of all treatments concerned urinary tract (prophylactic: 55%) and 29% the respiratory tract (empirical: 92%). 51% of all prescribed regimens were empirical treatments (RTI: 53%, UTI: 23%), 32% was prophylactic (UTI: 89%, RTI: 5%) and 16% was for a documented infection (UTI: 72%). The prevalence of AB use was significantly lower in NH with regular training of prescribers ( $p=0.02$ ), with written guidelines for appropriate AB-use ( $p=0.01$ ) or with a NH therapeutic formulary ( $p=0.0002$ ) compared to NH without these tools.

*Conclusion:* Strong differences in AB-prevalence and device-use were observed in EU NH. Both micro (case-mix)- and macro determinants (cultural differences) partially contribute to these differences. The high proportion of AB-use for urinary tract, especially the important part of uroprophylaxis, was surprising and needs to be explored.

**Impact of medical care and coordination on antibiotic policy and consumption: Data of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home subproject**

K. Latour, E. Broex, A. Muller, N. Drapier, V. Vankerckhoven, R. Stroobants, H. Goossens, B. Jans on behalf of the ESAC Nursing Home subproject group

*Objectives:* The aim was to explore medical care and coordination in European nursing homes (NH) and their effect on antibiotic (AB) policy and use.

*Methods:* The European Surveillance of Antimicrobial Consumption (ESAC) NH subproject explored the medical care and coordination and AB policies by using a standardised questionnaire which had to be completed by participating European NHs.

*Results:* The questionnaire was completed by 270 NHs in 16 European countries. Medical care was provided by personal general practitioners (GP), by an employed medical staff or by both in 67.3%, 20.3% and 12.4% of the NH, respectively ( $n=266$ ). A NH working with GPs was visited by a median of 26.3 personal GPs per 100 NH beds (min.0.3-max.96.6 per 100 beds) while in other NHs the medical staff consisted of a median of 2 physicians (min.1-max.14). A coordinating physician (CP) of medical care was assigned in 68.4% of the NHs ( $n=256$ ). The most reported tasks of the CPs were to develop an infection prevention policy (77.7%), to train nursing staff (76.0%), and to develop medical care strategies (70.9%).

The presence of a CP in a NH did not result in a significant lower number of AB prescriptions compared to NHs without a CP (median AB prevalence 5.78% vs. 5.71%;  $p=0.46$ ). However,

NHs where the CP developed an infection prevention policy showed a significant lower rate of AB use in comparison to NHs where the CP did not have this specific task (median 5.2% vs. 8.7%;  $p=0.0097$ ). Furthermore, the presence of a CP led to a significant higher availability of a restrictive AB list compared to NHs without an assigned CP (median 17.4% vs. 6.3%;  $p=0.018$ ).

Private institutions were more likely to work with GPs than public NHs (59.2% vs. 40.8%), which in their turn had a greater tendency (84.9% vs. 15.1%) to work with an employed medical staff ( $p<0.001$ ). Working with visiting GPs in the NH made it more difficult to develop a restrictive AB list compared to NHs with a medical staff (5.6% vs. 43.1%;  $p<0.001$ ). However, the number of visiting GPs per 100 beds did not significantly influence (categorical variable: <20, 20-40, >40 GPs/100 beds; median 5.06%, 6.19% and 6.67%, respectively) the prevalence of AB use ( $p=0.15$ ).

**Conclusion:** Although an impact of an appointed CP in the NH on the prevalence of AB use could not be demonstrated, his role in developing a restrictive AB list and infection prevention policy was clearly shown in our survey.

### **Wound prevalence and antibiotic use: preliminary results from the European surveillance of antimicrobial consumption (ESAC) in nursing homes.**

E. Broex, K. Latour, A. Muller, V. Vankerckhoven, H. Goossens, R. Stroobants, B. Jans on behalf of the ESAC Nursing Home subproject group

**Objectives:** To define wound prevalence, its determinants and its relation with antibiotic (AB) use in European nursing homes (NHs).

**Methods:** A survey, including a point prevalence study, about AB use, characteristics of residents and characteristics of the NH was performed among voluntary participating NHs throughout Europe.

**Results:** Results from 270 NHs in 17 countries were available. The preliminary results indicate that from all NH residents ( $n=26,063$ ) 9.7% (median, 11.7% mean) has an undefined wound. Among AB using residents ( $n=1734$ ) 24% has a wound. However, when considering wound and AB prevalence on institutional level above and under the median value there is no significant relation ( $p=0.19$ ).

A possible determinant for wounds is admission to a hospital within the last three months. Of the AB using residents having been admitted to a hospital 35% has a wound. Of those without hospital admission 20% has a wound ( $p<0.0001$ ).

While 47% of the microorganisms (MOs) among residents without a wound consists of *Escherichia coli*, this amount is only 24% ( $p=0.0002$ ) for residents with a wound. A substantial amount of other MOs plays a role for residents with wounds, e.g. methicillin-resistant *Staphylococcus aureus* emerges more among residents with a wound (15% vs. 4%,  $p=0.00015$ ).

Residents with a wound receive more often empirical (55%,  $p=0.045$ ) and documented treatments (22%,  $p=0.0012$ ) than residents without a wound (49% and 15%, resp.). Prophylactic treatments are issued less for patients with a wound (22% vs. 36%,  $p<0.0001$ ).

Residents with wounds receive more often combinations of penicillins and beta-lactamase inhibitors (J01CR, 21% vs. 13%,  $p<0.0001$ ) and cephalosporins (J01D, 13% vs. 7%,  $p=0.012$ ). They receive other antimicrobials (J01X) much less than residents without wounds ( $p<0.0001$ ).

To conclude, residents with wounds receive less often oral ABs (83% vs. 93%,  $p<0.0001$ ) and significant more parenteral ABs ( $p<0.0001$ ).

**Conclusion:** The presence of wounds does not seem to significantly influence AB prevalence as such. However, there is a relation of the presence of a wound with recent hospital admission, the registered MOs, indication for AB, type of AB and the administration route. The influence of these variables in relation with wound prevalence on infection risk is subject for further examination.

### **The ESAC point prevalence survey: Antimicrobial prescribing in 2 age groups of elderly patients from 49 hospitals in 28 European countries in 2008**

B. Amadeo, P. Zarb, G. Gavazzi, A. Muller, V. Vankerckhoven, P., H. Goossens, on behalf of the ESAC Hospital Care Subproject Group

**Objectives:** As ageing population raises fast, elderly aged above 65 years are usually considered as a one group in literature. However, if infections are more frequent and more severe in the elderly, they also have specific features related to different subgroups of the elderly patients. This study aimed to identify and to assess the variability of antimicrobial (AM) use between 2 age groups of elderly patients.

**Methods:** Data were extracted from 49 hospitals of the European Surveillance of Antimicrobial Consumption (ESAC) Point Prevalence Survey carried out during a maximum of 2 weeks from May to June in 28 European countries in 2008. The survey included all inpatients wards and collected information on the treated patients with indications and diagnoses. The analyses were restricted to patients above 65 years which were divided into 2 age year groups (G1: [65-75]; G2:  $\geq 75$ ).

**Results:** Data for treated patients were obtained for 1,579 patients in G1 and 2,132 patients in G2. Among all the treated patients, G2 received less AM combination (G1: 33%; G2: 24%) and parenteral AM (G1: 65%; G2: 57%). The top three AM classes prescribed were similar in both groups and corresponded to combinations of penicillins with beta-lactamase inhibitors (G1: 18%; G2: 24%), fluoroquinolones (G1: 12%; G2: 14%) and third-generation cephalosporins (6% for both groups). Infections represented 74% and 83% of all indications in G1 and G2, respectively. Respiratory tract infections were the commonest infections in both groups (G1: 29%; G2: 33%) followed by skin-soft-tissues-and-bone-joint infections in G1 (18%) and urinary tract infections in G2 (23%). The proportion of surgical prophylaxis was lower in the oldest patients (G1: 69%; G2: 66%). The  $>1$  day duration of surgical prophylaxis was 54% in both groups. The prescribed doses for 5 parenteral AM, i.e. benzylpenicillin, gentamicin, cefuroxime, piperacillin-tazobactam, and vancomycin were higher in G1 whilst amoxicillin and cefazolin were higher in G2.

**Conclusion:** The results of this study showed differences between the 2 elderly age groups, particularly in the proportion of AM combination, parenteral use, and infection site. It became clear that in line with the improved quality of life of the elderly population in industrialized countries, the treatment of G1 is more comparable to that of younger adults. Importantly, future analyses on AM use should take several age groups of the elderly population into consideration.

### **ESAC Point Prevalence Survey of Antibiotic Use in 134 European Hospitals in 2009.**

Peter Zarb, Brice Amadeo, Arno Muller, Vanessa Vankerckhoven, Peter Davey, Herman Goossens, on behalf of the ESAC Hospital Care Sub-project Group.

**Background:** The European Surveillance of Antimicrobial Consumption (ESAC) collects data on antimicrobial use. Simultaneously, data on antimicrobial resistance is collected by the European Antimicrobial Resistance Surveillance System (EARSS). ESAC and EARSS provide Pan-European trends on antimicrobial use and resistance.

**Objectives:** To perform a Point Prevalence Study (PPS) on antimicrobial prescription in European hospitals.

**Methods:** Data were collected during a maximum of two calendar weeks from May to November 2009 in 134 hospitals in 21 European countries. The study protocol was based on the version of the PPS-2008. A web-based application was developed for online data entry. Antimicrobial prescriptions were recorded using the WHO ATC classification. Data on treated patients, indications, diagnoses, adherence to guidelines and 'reasons for treatment recorded in notes' were collected.

**Results:** Among the 59,700 admitted patients, 17,632 (30%) received antimicrobials for a total of 25,066 therapies of which 16,887 (67%) were monotherapy. Antibacterials (J01) represented 90% of the prescriptions (range: 58-100). The most commonly prescribed antibiotics were penicillins with  $\beta$ -lactamase inhibitor (10%, range: 0-49), cephalosporins (6.6%, range: 0-31), and fluoroquinolones (4%, range: 0-40). In contrast, in intensive care, carbapenems were the second most used class (11%, range: 0-50), followed by glycopeptides

(9%, range 0-50). The overall proportion of parenteral use was 61%. Infections represented 81% of all the indications. Among the treatments, 62% were for community-acquired-infections. Monotherapy accounted for 66% of all treatment, bi-therapy 27% and >2 drugs 7%. The most frequent combinations included a  $\beta$ -lactam antibiotic plus either metronidazole or clarithromycin. Respiratory and skin-soft-tissue-bone-joint infections were the predominant infection sites, accounting for 27% and 19%, respectively. Surgical prophylaxis represented 13% of all indications and 70% of all prophylaxis. The >1 day duration of surgical prophylaxis, even though still high (47%), was not as high as in 2006 (56%) or 2008 (65%). The use of single dose pre-operative prophylaxis was 29% (range: 0-92).

**Conclusion:** The PPS-2009 results, based on a larger sample, are in accordance with both the PPS-2006 and PPS-2008 data. The survey confirmed that excessively long duration of surgical prophylaxis remains an issue across European hospitals. The apparently unconventional combination of drugs (e.g., metronidazole and co-amoxiclav, both of which have sufficient anti-anaerobic cover) was another problem identified in this survey. This type of PPS enables the identification of inappropriate prescribing enabling the individual hospitals to intervene and improve their current practices.

### **ESAC: Outpatient systemic antiviral use in Europe**

Niels Adriaenssens, Samuel Coenen, Arno Muller, Vanessa Vankerckhoven, Herman Goossens and the ESAC Project Group.

**Objectives:** To assess the total outpatient systemic antiviral use in Europe and to identify the antiviral substances most commonly used before the outbreak of the A/H1N1 pandemic as a historical reference.

**Methods:** The European Surveillance of Antimicrobial Consumption (ESAC; [www.esac.uia.ac.be](http://www.esac.uia.ac.be)) project, now funded by the European Centre for Disease Prevention and Control (ECDC; agreement number 2007/001), continues to collect data on antimicrobial consumption for all Member States, candidate countries and European Free Trade Association-European Economic Area countries using the anatomical therapeutic chemical (ATC) classification and the defined daily dose (DDD) measurement unit. For 2007, data on outpatient use of all antivirals for systemic use (ATC J05), aggregated at the level of the active substance, was collected and use was expressed in DDD (WHO ATC/DDD, version 2008) per 1000 inhabitants per day (DID).

**Results:** Total outpatient systemic antiviral use in 2007 in 11 European countries varied by a factor of 6.9 between the country with the highest (1.5 DID in the Netherlands) and the country with the lowest (0.2 DID in Finland) use. In most countries substances to treat HIV infection (ATC J05AE, J05AF01-07, J05AF09, J05AG, J05AR, J05AX02, J05AX05 and J05AX07-09) represented more than 50% of the total outpatient systemic antiviral use. In Finland, Denmark, Italy and Luxembourg nucleosides and nucleotides excluding reverse transcriptase inhibitors (ATC J05AB) represented more than 80% of the total outpatient antiviral use. The use of neuraminidase inhibitors (ATC J05AH) was the highest in Austria (0.02 DID) and varied from 3.42% in Denmark to no use reported in Belgium.

**Conclusion:** Our study demonstrates a variation of outpatient systemic antiviral use in Europe as striking as that of outpatient systemic antibiotic, antimycotic and antifungal use. More in-depth data on outpatient systemic viral use from more countries are needed to explain this variation. The ESAC data facilitate auditing of antiviral prescribing and evaluation of the implementation of guidelines and public health policies e.g. those related to A/H1N1.

### **ESAC Point Prevalence Survey of Antibiotic Use in 134 European Hospitals in 2009**

Peter Zarb, Brice Amadeo, Arno Muller, Vanessa Vankerckhoven, Peter Davey, Herman Goossens, on behalf of the ESAC Hospital Care Sub-project Group

**Background:** The European Surveillance of Antimicrobial Consumption (ESAC) collects data on antimicrobial use. Simultaneously, data on antimicrobial resistance is collected by the European Antimicrobial Resistance Surveillance System (EARSS). ESAC and EARSS provide Pan-European trends on antimicrobial use and resistance.

**Objectives:** To perform a Point Prevalence Study (PPS) on antimicrobial prescription in European hospitals.

**Methods:** Data were collected during a maximum of two calendar weeks from May to November 2009 in 134 hospitals in 21 European countries. The study protocol was based on the version of the PPS-2008. A web-based application was developed for online data entry. Antimicrobial prescriptions were recorded using the WHO ATC classification. Data on treated patients, indications, diagnoses, adherence to guidelines and 'reasons for treatment recorded in notes' were collected.

**Results:** Among the 59,700 admitted patients, 17,632 (30%) received antimicrobials for a total of 25,066 therapies of which 16,887 (67%) were monotherapy. Antibacterials (J01) represented 90% of the prescriptions (range: 58-100). The most commonly prescribed antibiotics were penicillins with  $\beta$ -lactamase inhibitor (10%, range: 0-49), cephalosporins (6.6%, range: 0-31), and fluoroquinolones (4%, range: 0-40). In contrast, in intensive care, carbapenems were the second most used class (11%, range: 0-50), followed by glycopeptides (9%, range 0-50). The overall proportion of parenteral use was 61%. Infections represented 81% of all the indications. Among the treatments, 62% were for community-acquired-infections. Monotherapy accounted for 66% of all treatment, bi-therapy 27% and >2 drugs 7%. The most frequent combinations included a  $\beta$ -lactam antibiotic plus either metronidazole or clarithromycin. Respiratory and skin-soft-tissue-bone-joint infections were the predominant infection sites, accounting for 27% and 19%, respectively. Surgical prophylaxis represented 13% of all indications and 70% of all prophylaxis. The >1 day duration of surgical prophylaxis, even though still high (47%), was not as high as in 2006 (56%) or 2008 (65%). The use of single dose pre-operative prophylaxis was 29% (range: 0-92).

**Conclusion:** The PPS-2009 results, based on a larger sample, are in accordance with both the PPS-2006 and PPS-2008 data. The survey confirmed that excessively long duration of surgical prophylaxis remains an issue across European hospitals. The apparently unconventional combination of drugs (e.g., metronidazole and co-amoxiclav, both of which have sufficient anti-anaerobic cover) was another problem identified in this survey. This type of PPS enables the identification of inappropriate prescribing enabling the individual hospitals to intervene and improve their current practices



**ANNEX VII: ABSTRACTS ACCEPTED FOR POSTER PRESENTATION**

**The European Surveillance of Antimicrobial Consumption: Point Prevalence Survey of Antimicrobial prescriptions in 116 Belgian nursing homes.**

B. Jans, K. Latour, E. Broex, Rudi Stroobants, A. Muller, V. Vankerckhoven, H. Goossens. On behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes Subproject Group

*Objectives:* While rational antibiotic (AB) prescribing is an important measure to control the emergence of AB resistance, particularly in frail nursing home (NH) populations, European (EU) prevalence data on AB-use in NH are scarce. In April 2009, the European Surveillance of Antimicrobial Consumption (ESAC) NH sub-project, funded by the European Centre for Disease Prevention and Control, carried out a first point prevalence survey (PPS) in order to measure and describe AB prescriptions among residents living in European NH. We present the results for Belgian NH.

*Methods:* The PPS was carried out in April 2009. Inclusion criteria for residents were to be present in the NH for at least 24 hours and to receive systemic antibiotic(s) on the day of the PPS. Data were obtained from nursing notes, medication administration records and staff in relation to antimicrobial prescribing, characteristics, risk factors and determinants at NH- and at resident level.

*Results:* Data were available for 116 Belgian NH (11% of all Belgian NH). The mean number of beds by NH was 108 (25 – 324 beds). Among 12,085 eligible NH residents, 690 (median 5.1%, 0 – 16.3%) received an AB on the PPS-day. Residents with AB had a mean age of 84.3 years (35 – 109). In 7 NHs no residents received AB. In the total NH-population 2.2% (0 – 14.5%) had an urinary catheter, and of these, 21% received an AB. Wounds were present in 10.3% of the NH population (0 – 35%) and AB were prescribed in 13% of them. Vascular catheters were uncommon (0.13%). Among residents treated with an AB, 23% had a recent hospital stay (last 3 months). AB were administered orally in 94%, parenteral in 4% and nasally (decolonisation MRSA) in 2%. 46% of all treatments concerned the urinary tract (prophylactic: 43%) and 35% the respiratory tract (empirical: 92%). 55% of all prescribed regimens was an empirical treatment (respiratory tract infection (RTI): 56%, urinary tract infection (UTI): 21%), 23% was prophylactic (UTI: 86%, RTI: 7%) and 20% was for a documented infection (UTI: 72%, Gastro-intestinal infection: 8%). The most frequently prescribed molecule was amoxicillin + enzyme inhibitor (17%) followed by nitrofurantoin (13%). Ciprofloxacin represented 8% of all treatments.

*Conclusion:* The Belgian NH AB-prevalence was only 5.1%. Notwithstanding the low urinary catheter use, AB-use in this group was important. This high proportion of AB-use for urinary tract and especially the high use of uroprophylaxis was surprising and needs to be explored.

**Infection control resources in European nursing homes and their relation to antibiotic use: data of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home subproject**

K. Latour, E. Broex, A. Muller, N. Drapier, V. Vankerckhoven, R. Stroobants, H. Goossens, B. Jans on behalf of the ESAC Nursing Home subproject.

*Objectives:* The aim was to explore infection control (IC) resources in European nursing homes (NHs) and their relation to antibiotic (AB) use.

*Methods:* Within the framework of the European Surveillance of Antimicrobial Consumption (ESAC) NH subproject, NHs in European countries were asked to complete a standardised questionnaire on IC and AB policy.

*Results:* Across 16 countries 270 NHs returned the questionnaire. An IC practitioner was present in 25.3% of the NHs which responded to this question (n=261). More public institutions had an IC expert appointed in comparison to private NHs (71.2% vs. 28.8%; p=0.0035). Out of 66 NHs, 54% had a nurse as IC practitioner, 1.5% a physician and 43.9% both a nurse as well as a physician.

An IC committee was responsible for IC policies in 31.6% of the NHs (n=253), while 56.4% of the NHs (n=266) reported to have an official link with a hospital IC team.

The difference in prevalence of AB use was not significant between NHs with or without an IC practitioner (median 6.6% vs. 5.3%; p=0.12) or IC committee (median 7.1% vs. 5.7%; p=0.34). However, institutions officially collaborating with a hospital IC team showed a

significant higher rate of AB prescriptions compared to those without a hospital link (median AB prevalence 6.7% vs. 5.1%;  $p=0.0062$ ).

In relation to AB use two important tasks of the IC practitioner were documented for 61 NHs. Formulation of recommendations on and advice for good AB use, including the development of an AB policy, was part of job responsibilities of 41.9% of the IC practitioners. Feedback to the GPs on AB consumption was given by 24.2% of the experts. However, NHs where the IC practitioners exercised these tasks showed no significant differences compared to NHs where IC experts did not do these tasks ( $p=0.48$  and  $p=0.96$ , respectively).

**Conclusion:** A potential explanation for the higher median rate of AB use for NHs with an IC practitioner, an IC committee and especially with a link with a hospital IC team could be that these NHs experience a higher occurrence of infections, which justifies their need for internal or external IC expertise. However, further research on AB use and healthcare associated infections is needed to support this hypothesis.

### **Antibiotic consumption in 30 French nursing homes: A Point prevalence study from the European Surveillance of Antimicrobial Consumption nursing home subproject.**

G. Gavazzi, P. GIBert, L. Fontaine, R. Stroobants, E. Hendrickx, A. Muller, V. Vankerckhoven, H. Goossens, B. Jans on behalf of the European Surveillance of Antimicrobial Consumption

**Objectives:** Elderly individuals and particularly elderly living in Nursing home (NH) exhibit specific features for infections including diagnostic difficulties, increased multidrug resistant bacteria and high antibiotic (AB) use. Optimizing the use of ABs in the nursing home population is therefore an important priority of quality of care. However, considering AB consumption, no data are available in Europe. The objectives of the European Surveillance of Antimicrobial Consumption Nursing Home (ESAC-NH) subproject are to study AB use and prescriptions among European residents living in high skilled NH. The results presented here are from the 30 French Nursing homes participating to the ESAC-NH sub-project.

**Methods:** In accordance with the methodology of the ESAC-NH subproject, a first point prevalence survey (PPS) was carried out in 30 NH in France within a one-month-period (one day in April 2009). Inclusion criteria for residents were to be resident in the NH (> 24 hours) and to receive systemic AB(s) at the time of the PPS. Data were obtained from nursing notes, medication administration records and staff related to antimicrobial prescribing, facility and resident characteristics (e.g. prevalence of urinary and vascular catheter, wound, disorientation, and bedridden). Indication, type and dosage for AB and, microorganisms were reported. Data were entered into customised web-based software and analysed descriptively.

**Results:** ABs were administered to 112 (4.8%) of 2318 eligible elderly residents. Characteristics of the residents were as follows: presence of urinary catheter (1.4%), vascular catheter (<0.01%), urinary incontinence (56.1%), disorientation (55.9%), wound (13.6%), bedridden (35.4%). Respiratory (RTI) and Urinary tract infections (UTI) were the most frequent infections (60.3% and 25.8%, respectively). Microbial identification was only present in 1.5% of RTI, and in 65.5% of UTI. The most frequent ABs were beta-lactams for RTI (>70%, oral route 82%); quinolones(34,5%), cotrimoxazole (20,7%), and nitrofuranes (10,4%) were the most frequent ABs for UTI ( intravenous route <10%).

**Conclusion:** Surprisingly in France, antibiotic use in the NH population was moderate. Although the PPS was organised during the spring, which may explain the low rate of antibiotic use, the low prevalence of urinary catheter may have decreased the rate of AB use for UTI. This study indicates also that, to optimize antibiotic use in NH, guidelines should mainly focus on UTI and RTI.

### **The ESAC-WebPPS application: Point Prevalence Surveys on Antimicrobial Prescribing Made Online.**

Arno Muller, Nico Drapier, Brice Amadeo, Peter Zarb, Bea Jans, Vanessa Vankerckhoven, Peter Davey, Herman Goossens, on behalf of the ESAC Hospital Care Sub-project Group.

**Background:** The European Surveillance of Antimicrobial Consumption (ESAC) project, funded by the European Center for Disease Prevention and Control (ECDC), is carrying out point prevalence surveys (PPS) on antimicrobial prescribing in hospitals and nursing homes, in Europe since 2006.

**Objective:** In order to facilitate data collection of the different PPS, ESAC decided in 2007 to develop an in-house web-based application for data entry and reporting.

**Methods:** ESAC-WebPPS has been developed to manage PPS with different protocols in different settings. The design was a three-tier application including a web-based client front-end, an application server in the middle and a back-end database server. The web-based client and application server have been developed in Java whereas the database server was a Postgresql database. Only open-source programs and libraries have been used. For the nursing homes surveys, the ESAC-WebPPS has been translated into 11 languages. In parallel, an optical reading system was used for the nursing homes PPS. For all surveys, automatic real-time individual feedback was provided using online reports.

**Results:** ESAC has conducted four PPS using the ESAC-WebPPS tool: two surveys in hospitals in 2008 and 2009 and two surveys in nursing homes in 2009. In the hospital PPS 2008, 50 hospitals from 28 European countries participated using the ESAC-WebPPS tool whereas in 2009, 136 hospitals from 18 European countries participated in the survey. The nursing homes surveys were carried out during the Spring and Fall of 2009. Among 301 nursing homes participating in the spring survey, 42 (14%) used the web-based tool; this low percentage was due to the lower IT skills and resources of the nursing homes compared to the hospitals.

**Conclusions:** ESAC successfully developed an in-house flexible web-based application: ESAC-WebPPS. The individual feedback to the institutions was a very important component of the success of these PPS. The ESAC-WebPPS tool will be integrated into the first health care associated infections and antimicrobial use PPS in acute care hospitals in Europe, piloted by ECDC in 2010 and 2011. Finally, the flexibility of our application will make it possible to adapt our tool for a hospital PPS in the European pediatric population in 2010.

**Are frequent catheter use and presence of wounds related to higher antimicrobial prescription frequencies in nursing home populations? Data from the first point prevalence survey on antibiotic use in European nursing homes in 2009.**

Béatrice Jans, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Rudi Stroobants, Katrien Latour, Ellen Broex, Herman Goossens, on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Project Group.

**Background:** Antimicrobial resistance is a major threat in Nursing Homes (NH) world-wide. Rational antibiotic (AB) prescribing is an important measure to control the emergence of AB resistance, particularly in frail NH-populations. In April 2009, the European Surveillance of Antimicrobial Consumption (ESAC) NH sub-project (University of Antwerp & Scientific Institute of Public Health, Belgium), funded by the European Centre for Disease Prevention and Control, conducted the first European Point Prevalence Survey (PPS) on AB-prescriptions in NHs in Europe (EU).

**Objective:** The project aimed to study the prevalence of AB-use among NH-residents and to describe risk factors and determinants at resident- and NH-level.

**Methods:** A European NH network, including 301 NHs in 19 countries (min. 5 NHs/country) was set up. During one single day in April 2009, NHs were invited to survey AB-use among all residents. Aggregated data for 3 risk factors (presence of urinary catheter, vascular device, wounds) were collected for the total NH-population. Following ethical approval (as per national requirements) and recruitment of NHs and residents, data were obtained from nursing notes, medication administration records and staff in relation to antimicrobial prescribing, facility and resident characteristics. Data were submitted by optical reading forms or by a customised web-based software tool. Analysis was performed on a data subset of 5 afterwards randomly selected participating NHs, to avoid selection bias due to an unequal number of participants per country.

**Results:** Results include data from 16 countries and 80 NHs. The mean NH size was 121 beds (range, 26 - 606 beds). On the PPS-day, a median of 5.2% (range 0 - 28.3%) of all 9201 eligible residents received an AB. In 7 NHs, no ABs were used. In the total NH-population, the median urinary catheter use was 3.5% (range 0% - 56.6%) and the prevalence of wounds reached 7.6% (range 0% - 60%). Important urinary catheter use in the NH (>3.5%) was related to a higher prevalence of AB-use (8%), compared to NHs with low catheter use (5.6%): OR (95%CI): 2.85 [1.13-7.16], p=0.025. Also higher prevalence rates of wounds (>7.6%) were strongly related to more important AB-use (8% versus 5.6%); OR: 3.57 [1.40-9.08], p=0.008. Vascular catheter use was not frequent (mean 0.5%) but important

differences between NHs were observed (range 0% - 6.3%) and were not related to significantly higher AB-use.

Conclusion: Infection prevention policies for NHs should focus on prudent/rational use of urinary catheters since they are related to higher AB-use. Wound prevention and "good wound care practice" could lower the burden of health care related infections in NHs.

**A methodology for a Point Prevalence Survey on antimicrobial prescriptions in a network of high skilled nursing homes in Europe, European Surveillance of Antimicrobial Consumption (ESAC), 2007- 2010.**

Béatrice Jans, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Rudi Stroobants, Katrien Latour, Ellen Broex, Herman Goossens, on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Project Group.

Background: Facing the treat of antimicrobial resistance in healthcare settings, optimising the use of antibiotics (AB) in nursing homes (NH) is an important priority for quality of care. However, data on AB-use in European (EU) NHs are scarce. The European Surveillance of Antimicrobial Consumption (ESAC) NH sub-project team (University of Antwerp & Scientific Institute of Public Health, Belgium), funded by the European Centre for Disease Prevention and Control (ECDC), carried out a methodology.

Objective: The project aimed to carry out a standardised methodology for repeated Point Prevalence Surveys (PPS) in a European network of NHs in order to measure the prevalence of AB-use among residents and to describe characteristics, risk factors and determinants at the resident- and NH-level.

Methods: National representatives (NR) from all EU countries were invited to participate in the network, recruiting participating 'high skilled NH's' (IPSE-project definition): either at least 5 NHs/country (voluntary basis) with a minimum of 250 eligible residents/PPS, or a randomly selected representative sample of NHs. A national survey on NH characteristics, national/regional regulating mechanisms for AB use and infection control in NHs was set up, using a written standardised questionnaire completed by the NR from each participating country. Two consecutive PPS on AB-use were planned (April & November 2009) to measure the prevalence (one single day) of AB-use among residents present on the PPS-day for at least 24h. Antibacterials, antimycotics and tuberculostatics for systemic use and nasal decontamination of MRSA carriage were registered. A resident questionnaire collected individual determinants and characteristics of AB-treatment. An institutional questionnaire collected determinants for AB-use on NH-level and aggregated denominator data (risk factors & care load indicators) for the total NH-population at the time of survey. PPS data were collected by a local- or by an external surveyor. Paper questionnaires for optical reading were proposed. Data could also be entered using the specially developed web-based NH PPS software. All study tools were submitted to the Ethical committee. A written consent for participation was obtained from residents/proxy's. Individual feedback reports were provided to participating NHs.

Results: 21 European countries responded to the national survey on NHs and their specific antibiotic policy characteristics. Furthermore, the NH network (19 countries) collected AB data in 301 NHs during the first European NH PPS in April 2009.

Conclusion: The PPS methodology appeared to be a useful, non labour-intensive tool and feasible at European level. The national survey showed important structural and functional differences indicating that categorization of EU NHs will be an important challenge required for meaningful data comparisons.

**The European Surveillance of Antimicrobial Consumption (ESAC) Survey of Parenteral Antibiotic Use in 270 European Nursing Homes in 2009.**

Ellen Broex, Katrien Latour, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Rudi Stroobants, Herman Goossens, Béatrice Jans, on behalf of the ESAC Nursing Home subproject group.

Background: Routes of administration of antibiotics (ABs) and the determinants of parenteral AB use among nursing home (NH) residents have not been studied before in Europe.

Objectives: To analyze prevalence and determinants of the use of parenteral ABs among NH residents in Europe.

**Methods:** A point prevalence study, on AB use, characteristics of residents and features of the NH was conducted in European NHs in 2009.

**Results:** Results from 270 NHs in 17 European countries are available. Overall, 25,892 NH residents were included and data on 1760 AB treatments were collected. The distribution of the routes of administration was: 90% orally, 9% parenterally, and 1% nasally. The prevalence of vascular catheters was 0.7% for the overall residents and 3.6% for the AB treated ones (n=1740). Of the latter, 56% received AB parenterally. The indication for administration of parenteral ABs was: empirical (74%), documented infection (20%), and prophylactic use (6%). Compared with other administration routes, parenteral ABs contained more empirical and documented treatments (for oral and nasal, 49%,  $p < 0.0001$ , and 16%,  $p > 0.2$ , respectively) and less prophylactic use (34%,  $p < 0.0001$ ). Most parenteral ABs were indicated for empirical treatment of respiratory tract infections (51%). Also, a large part was indicated for documented and empirical treatment of urinary tract infections (14% and 8.5%, respectively). The most frequently used parenteral ABs were cephalosporins (J01D, 48%), combinations of penicillins and beta-lactamase inhibitors (J01CR, 13%), and extended-spectrum beta-lactam penicillins (J01CA, 12%). Cephalosporins were significantly more frequently administered parenterally ( $p < 0.0001$ ) compared to other routes of administration, while this was less for quinolones (J01M) and other antibiotics (J01X) ( $p = 0.0002$  and  $p < 0.0001$ , respectively). The prevalence of parenteral AB and catheter use corresponded only to a small extent (e.g. only three countries showed both the highest parenteral AB and vascular catheter use).

**Conclusions:** A small, but important, part of ABs in NHs is administered parenterally, mainly for respiratory and urinary tract infections. The majority of parenteral ABs is cephalosporins. A clear indication for the use of parenteral ABs is not found within vascular catheter use or NH profiles. The effect of parenteral administration of ABs on infection risk remains to be examined.

### **The European Surveillance of Antimicrobial Consumption (ESAC) Point Prevalence Survey of Indications for Antibiotic Treatment in 270 European Nursing Homes in 2009.**

Katrien Latour, Ellen Broex, Arno Muller, Nico Drapier, Vanessa Vankerckhoven, Rudi Stroobants, Herman Goossens, Béatrice Jans, on behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home subproject group.

**Background:** In the context of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home (NH) subproject the first European point prevalence survey on antibiotic (AB) use was conducted in April 2009.

**Objective** The aim was to explore the indications for prophylactic, empirical and documented AB treatment among NH residents.

**Methods:** NHs in 17 European countries were asked to complete a questionnaire for each resident treated with AB. The survey included all oral, rectal, intramuscular and intravenous treatments with antimycotics and antibacterials for systemic use, including drugs for treatment of tuberculosis. AB treatment by inhalation and topical use of mupirocin for MRSA decolonization were also recorded. Four groups of indications for AB therapy could be registered: prophylactic, empirical or documented treatment and nasal decolonization of MRSA carriage. Data were obtained from nursing notes, medication administration records and staff in relation to antimicrobial prescribing, facility and resident characteristics. Descriptive analyses were performed.

**Results:** Among 27614 eligible residents in 270 NHs, 1740 residents were treated with one or more antimicrobials. A total of 1760 ABs were prescribed for 1682 infections. Reasons for AB treatment (n=1743) involved prophylactic, empirical and documented treatment in 31.6%, 50.7% and 16.5% of the indications, respectively. Nasal decolonization was performed in 1.1% of the AB treatments. Prophylaxis (n=547) with one or more ABs was primarily given for the prevention of urinary tract infections (UTIs; 89.6%), followed by respiratory tract infections (RTIs; 4.8%) and other infections (heterogenous group; 2.4%). Empirical treatment was mostly started for a RTI (52.8%), preceding UTIs (23.3%) and other infections (12.7%). The main indications for documented treatment (n=275) were UTIs (73.1%), prior to other infections (8.0%) and surgical wound infections (6.5%). The most frequent indications for AB use concerned the urinary tract (n=891; 53%), with prophylaxis (55%) being the main

indication within this group, ranking before documented (22.6%) and empirical (22.4%) treatment. Antimicrobials from class J01X (other antimicrobials) were the primary choice of molecules for all three indications. The second most frequently reported indications were related to the respiratory tract (n=494; 29.4%). Of these, 91.9% were treated empirically, while 5.3% were managed with prophylaxis. Therapy was microbiologically-documented in only 2.8% of all RTIs. Beta-lactam penicillins (J01C) were the first choice to be used for the three indications.

*Conclusions:* The most frequently reported indications for AB treatment were related to the urinary tract with the majority of the treatments given prophylactically. However, the leading curative reasons for AB use were RTIs.

### **The European Surveillance of Antimicrobial Consumption (ESAC) Point Prevalence Survey of Antimicrobial Usage in 261 European Nursing Homes.**

Pamela McClean, Carmel Hughes, Michael Tunney, Herman Goossens, & Beatrice Jans, On Behalf of the European Surveillance of Antimicrobial Consumption (ESAC) Project Group.

*Background:* Nursing homes are unique in that they provide both medical care and a place of residence. In general, older people suffer from an increased incidence and severity of infectious diseases due to an age-related decline in immunological function and as a consequence, receive more antimicrobial treatment.

*Objective:* The purpose of this study is to investigate antimicrobial use in nursing homes for older people in Europe.

*Methods:* This project is being carried out in 17 European countries and 2 administrations in the United Kingdom (UK) under the protocols of the ESAC group. The research consists of 2 point prevalence surveys (PPS) in nursing homes, the first of which took place in April 2009 and the second which is currently underway (November 2009). Following ethical approval (as per national requirements) and recruitment of nursing homes and residents, data were obtained from nursing notes, medication administration records and staff in relation to antimicrobial prescribing, facility and resident characteristics. Data were entered into customised web-based software and analysed descriptively.

*Results:* We present the first results for the April PPS from 15 countries and 1 UK administration. In 261 nursing homes, 1685 residents were taking 1757 antimicrobials. The World Health Organisation's Anatomical Therapeutic Chemical Classification group J01 i.e. antimicrobials for systemic use, accounted for 95.0% of the total antimicrobials consumed (Figure 1), of which 28.9% were J01X antimicrobials e.g. nitrofurantoin, methenamine, nifurtinol etc. and 27.5% were J01C antimicrobials i.e. penicillins. Co-amoxiclav (J01C group) was most frequently prescribed in the participating nursing homes and represented 13.8% of all antimicrobials. This was followed by nitrofurantoin (11.6%), amoxicillin (10.3%), methenamine (8.9%), ciprofloxacin (7.7%) and trimethoprim (7.4%). Although the rate of methenamine use was high (8.9%), it was prescribed for nursing home residents in only 5 countries. In one country's nursing homes, J01X accounted for almost 60% of the total prescribed antimicrobials, while in 2 countries no residents were taking antimicrobials from this group.

*Conclusions:* To our knowledge this is the first study to have investigated antimicrobial use in nursing homes on a European scale. Previous ESAC research in hospitals and ambulatory care have demonstrated great variations in antimicrobial consumption between countries and this also seems to be the case in nursing homes. Widespread use of the broad-spectrum antimicrobial co-amoxiclav in European nursing homes corresponds with findings in the community. As the European population continues to age, concerted efforts are needed to minimise the risk of infection in nursing homes and to ensure more appropriate antimicrobial usage.

### **Het antibioticumvoorschrift in Belgische woon- en zorgcentra in 2009: Resultaten van de eerste ESAC nursing home studie.**

Béatrice Jans, Katrien Latour, Ellen Broex, Arno Muller, Vanessa Vankerckhoven, Rudi Stroobants, Herman Goossens voor de European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home projectgroep

**Doelstellingen:** Antibioticaresistentie vormt een probleem in woon- en zorgcentra (WZC). Rationeel gebruik van antibiotica (AB) wordt aanbevolen om resistentieontwikkeling af te remmen maar cijfers over AB-gebruik in WZC zijn niet beschikbaar.

**Methode:** In april 2009 voerde het ESAC nursing home (NH) project een puntprevalentiestudie uit om AB-gebruik te meten en kenmerken van AB-voorschriften in Europese NHs te beschrijven. Voor elke bewoner die op de studiedag een systemisch antibioticum, antimycoticum of tuberculostaticum gebruikte of een dekolonisatiebehandeling voor MRSA-dragerschap kreeg, werd een vragenlijst ingevuld. Een instellingsvragenlijst verzamelde gegevens m.b.t. risicofactoren, organisatie/coördinatie van medische zorg, infectiepreventie en AB-beleid in het NH.

**Resultaten:** In 19 Europese landen namen 301 NHs aan de studie deel, waarvan 116 Belgische WZC (12.085 includeerbare bewoners). Belgische WZC telden gemiddeld 108 bedden (min. 25-max. 324). Binnen de totale WZC-populatie had 3% een blaassonde, 0.2% een vasculaire katheter en 11% een wonde. AB werd gebruikt door 689 bewoners (6%, 0-16%) waarvan 9% een blaassonde had, 0.4% een vasculaire katheter en 22% een wonde. Samen werden 710 verschillende AB gebruikt, waarvan 4% parenteraal. Voorschriften waren empirisch (55%, waarvan 57% voor luchtwegeninfecties), profylactisch (22%, waarvan 86% voor urineweginfecties) of microbiologisch gedocumenteerd (21%, waarvan 73% voor urineweginfecties). Nitrofuranen vormden 25% (waarvan 58% profylaxis) en quinolones 19% van alle AB-voorschriften. De meest frequent voorgeschreven molecuule was amoxicilline met enzymremmer (17%), waarvan 84% empirisch (¾ voor een luchtwegeninfecties).

**Besluiten:** Belangrijke verschillen in prevalentie van AB-gebruik en risicofactoren werden geobserveerd in WZC. Uroprofylaxis vormde een belangrijk aandeel in de behandelingen.

### **Antibiotica voor urineweginfecties in Belgische woon- en zorgcentra: data van het European Surveillance of Antimicrobial Consumption (ESAC) subproject**

Katrien Latour, Ellen Broex, Arno Muller, Vanessa Vankerckhoven, Rudi Stroobants, Herman Goossens, Béatrice Jans namens de European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home subprojectgroep

**Doel:** Het beschrijven van profylactische, empirische en gedocumenteerde antibioticabehandelingen voor urineweginfecties in Belgische woon- en zorgcentra (WZC).

**Methodologie:** In het kader van het European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home subproject werd in april 2009 een eerste puntprevalentiestudie naar antibioticagebruik bij bewoners in Europese WZC uitgevoerd. We bespreken het antibioticagebruik voor urineweginfecties in de deelnemende Belgische WZC.

**Resultaten:** In België namen 116 WZC deel aan het Europese onderzoek. Van de 12085 geïncludeerde bewoners namen 689 residenten minstens één antibioticum in. Binnen deze groep ondergingen 310 bewoners (46.2% van de 671 bewoners waarvoor een indicatie werd ingevuld) een behandeling gerelateerd aan de urinewegen. Drie van deze 310 bewoners (0.97%) namen 2 verschillende antibiotica in. Het betrof in respectievelijk 24.8% en 32.6% van de behandelde bewoners (n=310) empirische en gedocumenteerde behandelingen. Profylaxe van urineweginfecties vormde met 42.6% echter de belangrijkste indicatie.

De belangrijkste moleculen voor profylaxe (n=132) waren nifurtoïinol (39.4%), nitrofurantoïne (34.8%) en fosfomycine (17.4%). Ciprofloxacin (29.5%), nifurtoïinol (20.5%) en nitrofurantoïne (14.1%) waren de meest voorgeschreven antibiotica voor empirische behandeling (n=78). Voor de gedocumenteerde behandelingen (n=103) waren dat nitrofurantoïne (26.2%), nifurtoïinol (17.5%) en ciprofloxacin (14.6%).

**Conclusie:** In Belgische WZC worden antibiotica voornamelijk gebruikt voor urineweginfecties. Hoewel geschikte moleculen worden gekozen, kan het aandeel van profylactische behandelingen in vraag gesteld worden. Deze studie onderzocht echter niet de aan- of afwezige symptomen, waardoor verdere onderzoek naar de motivatie tot antibioticabehandeling gewenst is. Ook het aantal empirische en gedocumenteerde behandelingen met ciprofloxacin is verontrustend. Ongepast gebruik van chinolonen wordt immers geweerd vanwege toenemende resistentievorming.



**ANNEX VIII: ESAC NEWSLETTERS**