

The main title "Summary of work activities" in a white, sans-serif font, set against a blue background.The author's name "Rita de Sousa" in a white, sans-serif font, set against a blue background.The subtitle "European Public Health Microbiology Training Programme (EUPHEM), 2012 cohort" in a white, sans-serif font, set against a blue background.The section header "Background" in a bold, blue, sans-serif font.

According to the European Centre for Disease Prevention and Control (ECDC)'s Advisory Group on Public Health Microbiology ('national microbiology focal points'), public health microbiology is a cross-cutting area that spans the fields of human, animal, food, water, and environmental microbiology, with a focus on human population health and disease. Its primary function is to use microbiology to improve health in collaboration with other public health disciplines, in particular epidemiology. Public health microbiology laboratories play a central role in detection, monitoring, outbreak response and the provision of scientific evidence to prevent and control infectious diseases.

European preparedness for responding to new infectious disease threats requires a sustainable infrastructure capable of detecting, diagnosing, and controlling infectious disease problems, including the design of control strategies for the prevention and treatment of infections. A broad range of expertise, particularly in the fields of epidemiology and public health microbiology, is necessary to fulfil these requirements. Public health microbiology is required to provide access to experts with expertise and experience in all relevant communicable diseases at the regional, national and international level in order to mount rapid responses to emerging health threats, plan appropriate prevention strategies, assess existing prevention disciplines, develop microbiological guidelines, evaluate/develop new diagnostic tools, arbitrate on risks from microbes or their products, and provide pertinent information to policy makers from a microbiological perspective.

According to Articles 5 and 9 of ECDC's Founding Regulation (EC No 851/2004) 'the Centre shall, encourage cooperation between expert and reference laboratories, foster the development of sufficient capacity within the community for the diagnosis, detection, identification and characterisation of infectious agents which may threaten public health' and 'as appropriate, support and coordinate training programmes in order to assist Member States and the Commission to have sufficient numbers of trained specialists, in particular in epidemiological surveillance and field investigations, and to have a capability to define health measures to control disease outbreaks'.

Moreover, Article 47 of the Lisbon Treaty states that 'Member States shall, within the framework of a joint programme, encourage the exchange of young workers.' Therefore, ECDC initiated the two-year EUPHEM training programme in 2008. EUPHEM is closely linked to the European Programme for Intervention Epidemiology Training (EPIET). Both EUPHEM and EPIET are considered 'specialist pathways' of the two-year ECDC fellowship programme for applied disease prevention and control.

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Stockholm, September 2014

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This report summarises the work activities undertaken by Rita de Sousa of the European Public Health Microbiology Training Programme (EUPHEM)'s 2012 cohort at the National Institute of Health and Environment (RIVM), Bilthoven, the Netherlands.

All EUPHEM activities aim to address different aspects of public health microbiology and strengthen the various roles of public health laboratory scientists within public health systems.

Material and methods

This report accompanies a portfolio detailing the outcome of different activities conducted during the EUPHEM fellowship. The activities comprised specific projects, activities and theoretical training modules.

Specific projects included epidemiological investigations (outbreaks and surveillance); applied public health research; applied public health microbiology and laboratory investigation; biorisk management; quality management; teaching and public health microbiology management; summarising and communicating scientific evidence and activities with a specific microbiological focus.

The outcomes include publications, presentations, posters, reports and teaching materials prepared by the fellow. The portfolio presents a summary of all work activities conducted by the fellow, unless prohibited due to confidentiality regulations.

Results

Objectives of these core competency domains were achieved partly through project/activity work and partly by participating in the modules. Results are presented in accordance with the EUPHEM core competencies, as per the EUPHEM scientific guide¹.

1. Epidemiological investigations

1.1. Outbreak investigations

A. Measles outbreak in the United Kingdom and the Netherlands linked to air travel and transit at a large international airport: should travellers and airport staff be vaccinated?

Supervisors: Rob Binnendijk, Susan Hahné, Marion Koopmans

In this project, Public Health England (PHE) and the Dutch National Institute for Health and the Environment (RIVM) performed a joint measles outbreak investigation. The investigation began on 1 February 2014, when PHE were informed of a passenger who had flown whilst infectious with measles from the Philippines to the UK via Taiwan and the Netherlands. An alert was raised and passenger contact tracing was initiated for passengers onboard the flight from the Netherlands to the UK. Over the following six weeks, 11 secondary measles cases were identified in both the UK and the Netherlands with an identical measles strain (MVs/Tonbridge.GBR/5.14) as the index case. The secondary cases were among passengers who were on board the same flight as the index case, household or family contacts of the index case and travellers or workers at Amsterdam Schiphol airport. This study illustrates the communicability of measles during air travel and at a large international airport among travellers and airport workers. Since some of the infected passengers were children below the age of one year, it also highlights the susceptibility of infant travellers, who are often ineligible for the measles, mumps, rubella (MMR) vaccination under their national vaccination programme. The study reinforces the extreme importance of up-to-date vaccinations for travellers and airport workers to protect against measles.

The fellow participated in the investigation in collaboration with an EPIET fellow and followed the 10-step approach for outbreak investigation: establish the existence of a real outbreak; confirm diagnosis by strain genotyping (B3 measles strain; MVs/Tonbridge.GBR/5.14); define case; search for cases and related information (e.g. questionnaires) when possible; participate in the development of the report to be published.

Educational outcome: understand the essential integration of molecular typing techniques to the epidemiological outbreak investigation; understand the need for cooperative teamwork between clinicians, microbiologists and epidemiologists. The international collaboration proved to be critical for alerts on possible multistate outbreaks.

¹ <http://ecdc.europa.eu/en/publications/Publications/microbiology-public-health-training-programme.pdf>

B. Middle East respiratory syndrome coronavirus (MERS-CoV) infections in two travellers returning to the Netherlands, May 2014

Supervisor: Marleen Kraaij and Marion Koopmans

In May 2014, two Dutch nationals returning from a pilgrimage to Mecca, Saudi Arabia, were diagnosed with Middle East respiratory syndrome coronavirus (MERS-CoV) infection. An alert was raised upon confirmation of the first case and contact tracing was initiated of the pilgrimage group that had travelled with the index case. The following day a secondary case, a relative of the index patient, was confirmed as infected with MERS-CoV. The travel itinerary of the pilgrimage was investigated through interviews with the two MERS-CoV cases, the travel agent who organised the trip and pilgrimage group members. The investigation was unable to conclusively determine the source and mode of transmission/infection of the index case, although hospital-acquired infection was considered the most likely hypothesis.

The fellow participated as a member of the MERS-CoV outbreak investigation team from the Netherlands and contributed towards the outbreak investigation, describing and summarising the available information (see publication).

Educational outcome: understand the roles of different public health professionals, clinicians, microbiologists, and epidemiologists to respond rapidly to an imported transmissible disease. Understand the importance of establishing guidelines and check lists for laboratory preparedness and response to emerging and re-emerging pathogens.

C. EPIET/EUPHEM Introductory course

The EPIET/EUPHEM introductory course familiarises participants with basic methodology and the essential measures to consider during an outbreak investigation: the 10-step approach in outbreak investigation, the principles of intervention epidemiology and the role of public health microbiology laboratories in an outbreak investigation.

D. EPIET/EUPHEM Module computer tools of outbreak investigations

In the EPIET/EUPHEM module 'Computer tools in outbreak investigations' the participants improved the knowledge acquired during the introductory course and used different software such as STATA, Microsoft Excel and EpiData. The fellow applied this knowledge to data management (entering, validating, cleaning data) and analysis of outbreak investigations. During the course, different exercises were performed including case-control studies (descriptive and cohort studies, including stratified analyses).

1.2. Surveillance

A. Molecular surveillance of methicillin-resistant *Staphylococcus aureus* (MRSA). Development of an algorithm for a web-based tool for real-time detection of MRSA clusters and outbreaks

Supervisors: Leo Schouls, Max Heck, Henk Bijlmer

Efforts to control antimicrobial resistance have led some countries to implement strict rules and policies to reduce the prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA) infections. Although the Netherlands has one of the lowest rates (proportion of MRSA in the total isolates 1.4%) for MRSA in Europe, strict and active surveillance is essential in order to maintain the low level of antimicrobial resistance in the country. Surveillance includes multi-disciplinary teams working at hospitals, such as microbiologists and hygienists, in collaboration with public health offices at the municipal level, and the Dutch National Institute for Public Health and Environment (RIVM) as a reference laboratory for MRSA. Surveillance work at RIVM includes molecular characterisation of representative collections of nationwide MRSA strains. In 2012, a database platform was developed to facilitate data sharing and aggregation of epidemiological data and molecular typing information (Type-Ned system).

The aim of this project was to develop an algorithm defining which steps in the new Type-Ned system should be followed to detect MRSA clusters in real-time and in an appropriate timeframe for successful public health intervention in outbreak investigations.

The algorithm was tested using information on spa and MLVA typing data from 2012 in the MRSA database. The algorithm simulation exercise comparing MLVA and spa typing data identified a cluster of 25 isolates designated as MT397 by MLVA. Moreover, a comparison with spa typing showed that MLVA was a more discriminatory tool than spa typing for detecting MRSA clusters. Additionally, epidemiological data associated with the typed isolates established that the MT397 cluster was linked to a nursing home. This provided important public health information for action and follow-up by the relevant health authorities.

Educational outcome: understand the public health impact of MRSA infections; improve surveillance systems; identify the roles and responsibilities of different local authorities in the public health system and surveillance infrastructure; understand ethical principles on data protection and confidentiality regarding information in databases; handle conflicts of interests between different institutions and professionals.

B. Geotagging of the hepatitis A virus: a dynamic tool for public health surveillance

Supervisors: Harry Vennema, Linda Verhoef, Annelies Kroneman, Marion Koopmans

The recent multistate foodborne and travel-related outbreaks caused by the hepatitis A virus reiterate the importance of molecular surveillance for hepatitis A in order to understand global trends in hepatitis A virus strains and to improve the capacity of laboratory response in outbreak situations.

Since 2008, RIVM has coordinated the international hepatitis A virus laboratory network (HAVNET) that has developed a database with global molecular and epidemiological information on the hepatitis A virus. Previous studies suggested that hepatitis A virus from different geographical regions could be distinguished on the basis of genomic sequence, but changes in the epidemiology of the virus over the past few decades warrant renewed validation of this assumption. The goal of the network is therefore to map the worldwide distribution of different hepatitis A virus strains as a basis for molecular surveillance and outbreak investigations. The aims of this project were to describe the available molecular data on hepatitis A virus diversity associated with metadata in the HAVNET sequence database; analyse the geographical coverage and representativeness of this data and assess the suitability of the current database for detecting diffuse international foodborne outbreaks.

This study highlighted the need to harmonise the genotyping protocols between international laboratories in order to increase the comparability of available sequences where full genome sequencing was as yet unavailable. It is essential to update and expand this database to improve sequence coverage and representativeness. During the project a website for HAVNET was developed which contains information on hepatitis A and the network (<http://www.rivm.nl/en/Topics/H/HAVNET>). A protocol for standardised genotyping was also developed and made available for the members of the network.

Educational outcome: understand the importance of a) establishing international laboratory networks to support global public health interventions; b) standardisation/harmonisation of genotyping protocols among international laboratories to allow comparison of results; c) the use of network databases for international outbreak investigations. In addition, development of a technical protocol; familiarisation with the identification and typing procedures for hepatitis A virus strains and interpretation of laboratory results.

2. Applied public health microbiology research

A. MERS coronavirus: preparedness and laboratory response

Supervisor: Marion Koopmans, Chantal Reusken

In September 2012, following the first report of the new coronavirus (MERS-CoV) infection in a patient from Saudi Arabia, an international multidisciplinary investigation team led by RIVM and Erasmus Medical Centre (MC) researchers jointly developed a serological assay to diagnose MERS-CoV infections. The assay, a microarray-based test, was vital for testing sera from various animals and highlighted camels as being potentially involved in the transmission chain of MERS-CoV to humans.

In addition to developing a serological assay, the aim was to describe and review information available on MERS-CoV and other coronaviruses against the data required for optimal laboratory response to MERS-CoV. To do this, a standard checklist for laboratory preparedness was piloted, that was being developed for emerging disease preparedness in the context of the ENIVD network. During the project detailed results of the investigation conducted by the multidisciplinary team (including the fellow) were published in international peer-reviewed journals (see publications).

Educational outcome: active participation in a large multidisciplinary team; exposure to different aspects of prognostics and health management; experience in assessing and establishing laboratory capacity and response planning for outbreak and emerging situations; participation in international teleconferences.

B. Antibody responses to pertussis vaccine antigens in two population-based studies conducted in the Netherlands, 1996–97 and 2006–2007

Supervisor: Guy Berbers

Whooping cough (*Bordetella pertussis*) remains a global health problem, despite the high vaccine coverage. Previous studies in the Dutch population (>9 years of age) showed that the number of individuals with levels of IgG antibodies against pertussis toxin (PT) which are indicative of active or recent infection in the last six to twelve months (≥ 62.5 EU/ml) had doubled from 4% in 1996 to 9.3% in 2006.

This project aimed to analyse the antibody response profiles to three other *Bordetella pertussis* vaccine antigens: filamentous haemagglutinin (FHA), fimbriae (FIM) and pertactin (PRN) and to explore any association with the different IgG-PT levels of antibodies analysed in the previously studied populations.

An analysis was made of 2 000 serum samples collected in 1996–97 and 6 386 collected in 2006–07 from two

population-based cross-sectional studies conducted in the Netherlands. We measured the levels of IgG antibodies against FHA, FIM, and PRN antigens using a fluorescent bead-based multiplex immune assay.

Since a cut-off for a specific infection of *B. pertussis* has only been established for the antibody concentration levels of PT-IgG, a comparison was made of the levels of FHA, PRN and Fim associated with different concentration levels of PT-IgG.

Preliminary analysis showed significant differences among adolescents and adults in the median level of antibodies against FHA, PRN, FIM in groups with IgG-PT levels <20 EU/ml and groups with IgG-PT \geq 62.5 EU/ml. Higher antibody levels were detected in the group with IgG-PT \geq 62.5 EU/ml. However, correlation analysis did not find a strong linear relationship between the different antibodies. This finding might be related to many factors such as: cross reactivity with other bacteria sharing the same antigens (e.g. other *Bordetella species*, *Haemophilus influenza* and *Mycoplasma pneumoniae*); exposure to different *B. pertussis* strains (some strains do not produce pertactin) and other factors.

Clinical diagnosis of pertussis is challenging and although coughing is one of the clinical signs that can alert the physician, asymptomatic cases can be difficult to identify. Our results showed that in the group of individuals with PT-IgG \geq 62.5 EU/ml, no statistical differences were found in the median of antibody levels against PT, PRN, FIM and PRN between persons who had had a cough for two weeks in the last year and those who had not had a cough.

Conclusions and recommendations: Understanding how the level of pertussis vaccine antibodies correlates with infection and clinical signs is crucial for the improvement of vaccination strategies.

Educational outcome: gaining statistical expertise on STATA software; working with a large dataset; gaining experience in vaccine-preventable diseases; understanding laboratory procedures for pertussis diagnostics; gaining experience in serological prevalence studies.

3. Applied public health microbiology and laboratory investigations

*A. Clinical and molecular characterisation of *S. pneumoniae* serotype 19A before and after introduction of conjugated vaccines in the Netherlands, 2004–2012*

Supervisor: Karin Elberse

After the introduction of PCV7 (serotypes: 4, 6B, 9V, 14, 18C, 19F, and 23F) in the Netherlands in 2006, a decrease in the incidence of vaccine-type invasive pneumococcal disease (IPD) was seen in both vaccinated and unvaccinated groups. However, the percentage of cases caused by non-PCV7 serotype strains increased, in particular serotype 19A. The introduction of PCV10 in 2011 further contributed to a decrease in the incidence of vaccine serotypes, but not non-PCV10 IPD serotypes. Neither PCV7 nor the PCV10 includes the 19A serotype and no cross protection was seen against serotype 19A with serotype 19F included in the vaccine.

Since previous studies of Dutch patient isolates had shown the circulation of different subtypes of 19A, the aim of this project was to characterise and compare the genetic background of a specific group of isolates with different capsular loci of *S. pneumoniae* serotype 19A collected before and after vaccine introduction (pre and post PCV 7 and 10) to gain insight into the appearance of 19A subtypes with different genetic backgrounds. The isolates were characterised using multilocus sequencing technique (MLST). The clinical manifestations and severity of the disease associated with the different 19A subtypes were also examined and compared. The project is ongoing and the final results will be published.

Educational outcome: identification of the use and limitations of diagnostic and typing methods for *S. pneumoniae*; understanding the importance of molecular surveillance on *S. pneumoniae* isolates to assess the type of strains circulating in the population in order to apply vaccination strategies.

B. Laboratory rotations: identification and characterisation of pathogens in bacteriology and virology

During each of the different projects, the fellow was introduced to the procedures and methods for identifying and characterising different pathogens. Activities included execution of methods such as bacterial characterisation by phage typing, spa typing, MLST, and MLVA. In the virology department, the fellow was introduced to serological and molecular diagnostic methods and sequence-based typing.

Educational outcome: application of virology, bacteriology, and immunology concepts to public health disciplines, identification of the use and limitations of diagnostic and typing methods and their interpretation in patient diagnosis, outbreak investigations, surveillance and epidemiological studies.

4. Biorisk management

EUPHEM Biorisk management module

This module covered three related topics: quality management in biomedical laboratories according to ISO 15189; WHO international regulations for shipping infectious substances and biorisk management in biomedical laboratories.

Educational outcome: application of national, European and WHO rules and regulations regarding biosafety and biosecurity; appropriate decontamination strategies and the use of personal protection in a BSL-3 lab; biosecurity in the *Mycobacterium* laboratory and international shipping of infectious substances: accreditation from WHO.

5. Quality management

A. Participation in an internal audit for influenza and *Mycobacterium tuberculosis*

RIVM IDS Department is currently accredited under EN ISO15189 standards. The fellow participated in internal audits of protocols and procedures used for antiviral susceptibility testing of influenza virus isolates, and for antimicrobial resistance typing of *Mycobacterium tuberculosis* isolates. The fellow also participated in a laboratory meeting to provide feedback on the audit results, and discuss the internal quality control procedures of the two laboratories.

Educational outcome: understand the principles and practices of quality assurance; prepare and analyse an internal quality assessment; understand local and European accreditation procedures.

6. Teaching and pedagogy

A. Lecture – Vector-borne diseases

The fellow gave a lecture as part of the international research masters winter course on immunity and infection at the Erasmus Medical Centre, University of Rotterdam, the Netherlands.

B. Lecture – MERS-coronavirus laboratory preparedness and response

The fellow gave a lecture and developed exam questions as part of the international masters summer course on immunity and infection at the Erasmus Medical Centre, University of Rotterdam, the Netherlands.

C. Lecture – Laboratory for epidemiologists: case study on Q fever

The fellow gave a lecture and facilitated a case study exercise in collaboration with a previous EPIET fellow as part of a masters course at the Medical University, St. Radboud, Nijmegen, the Netherlands

D. Facilitator during an infectious disease outbreak simulation exercise

This simulation exercise was designed to introduce master students without previous knowledge of public health to the complexities of a public health outbreak response. Participants were divided into groups representing different institutions (i.e. local municipal health services, national public health institutes, ECDC, WHO and the media). They were asked to choose a chair, and a head of communications and were given instructions on structured assessment and decision-making. They were then led through an imaginary scenario, in which pieces of information were provided to each of the groups, and the groups were challenged by journalists, through twitter feeds and occasionally by being given misleading information. The aim was to allow the students to experience specific roles and processes for public health decision-making, to understand the importance of linking up with other partners and the need of evidence-based decision making.

Educational outcome: planning and organising a course, defining learning objectives, developing the ability to communicate effectively with players and stakeholders from a number of different disciplines.

E. Development of course material for ECDC summer course 'Vaccine immunology'

Development of the teaching material for the ECDC summer course 'Vaccine immunology', 9–12 June 2014, Stockholm, Sweden.

7. Public health microbiology management

A. Initial management in public health microbiology module, ECDC, Stockholm, Sweden

This one-week module provides the participants with the knowledge and the requirements to successfully motivate and manage individuals and teams. The module focused on understanding the roles and responsibilities in public health management. Topics included the identification of different management styles, team roles and team evolution, delegation of tasks and provision of structured feedback. During the module the fellows participated in a crisis management simulation exercise to practice and learn the objectives of the module.

Educational outcome: understand the roles and responsibilities of a team manager within a public health environment; understand team roles and team evolution to ensure team success; motivate teams; manage conflicts by giving structured feedback to improve performance and by minimising disruption in a conflict; communicate with authorities, the public and the media.

B. Assessment of laboratory preparedness for chikungunya virus

Supervisors: Chantal Reusken and Marion Koopmans

After the first alert of the chikungunya outbreak in December 2013 on the island of Saint Martin in the Caribbean, the European Network for Diagnostics of Imported Viral Diseases (ENIVD) compiled a document with information on epidemiological, ecological, clinical and laboratory preparedness and response for chikungunya virus. As with the MERS CoV project the document was compiled following the structured laboratory preparedness checklist. The fellow helped to prepare the working document and participated in the meeting of the ENIVD outbreak group to discuss the content.

C. Public health microbiology management components as part of regular projects

Public health microbiology management was an integral component of all projects (e.g. MRSA, measles, hepatitis A, MERS-CoV) and activities during the fellowship. This included establishing networks and contacts, communication within and between multidisciplinary work teams, ethical and integrity considerations, security issues with confidential information, team building, research collaboration and time management.

Educational outcome: Working in a multidisciplinary public health team; understanding team management; planning, scheduling and organising research projects.

8. Communication

A. Publications

1. Reusken C, Mou H, Godeke G, van der Hoek L, Meyer B, Muller M, et al. Specific serology for emerging human coronaviruses by protein microarray. *Euro Surveill.* 2013 Apr 4;18(14).
2. Reusken CB, Haagmans BL, Müller MA, Gutierrez C, Godeke GJ, Meyer B, et al. Middle East respiratory syndrome coronavirus neutralising serum antibodies in dromedary camels: a comparative serological study. *Lancet Infect Dis.* 2013 Oct;13(10):859-66.
3. De Sousa R, Reusken C, Koopmans M. MERS coronavirus: Data gaps for laboratory preparedness. *J Clin Virol.* 2014 Jan;59(1):4-11.
4. Kraaij-Dirkzwager M, Timen A, Dirksen K, Gelinck L, Leyten E, Groeneveld P, et al. MERS-CoV outbreak investigation team of the Netherlands. Middle East respiratory syndrome coronavirus (MERS-CoV) infections in two returning travellers in the Netherlands, May 2014. *Euro Surveill.* 2014 May 29; 19 (21).
5. Sane K, De Sousa R, van Pelt W, Petrignani M, Verhoef L, Koopmans M. Risk of hepatitis A decreased among Dutch travellers to most endemic regions 2003–2011 (submitted to *Journal of Travel Medicine*).
6. De Sousa R, Vennema H, Verhoef L, Kroneman A, Petrignani M, Sane J, Koopmans M, on behalf of Hepatitis A International Network (HAVNET): A tool for public health surveillance (in preparation).
7. De Sousa R, Smits G, Mollema L, Berbers G. Antibody responses to pertussis vaccine antigens in two population-based studies conducted in the Netherlands, 1996 and 2006. (in preparation).
8. Nic Lochlainn L, Mandel S, De Sousa R, Paranthaman K, van Binnendijk R, Hahné S, et al. Measles outbreak in the United Kingdom and the Netherlands linked to air travel and transit at a large international airport: should travellers and airport staff be vaccinated? (in preparation).

B. Reports

De Sousa R. Molecular surveillance of MRSA in the Netherlands. Internal report National Institute of Health and Environment (RIVM).

C. Developed protocols

The fellow participated in the development of the new version of the hepatitis A protocol which was distributed to the participants of the Hepatitis A International Network. De Sousa R, Harry Venemman, Annelies Kronman, Linda Verhoef, Koopmans M. Hepatitis A protocol for the Hepatitis A Network (HAVNET). Available at: <http://www.rivm.nl/en/Topics/H/HAVNET>

D. HAVNET website

The fellow participated in the development of the material available on the HAVNET website including the production of the logo for HAVNET. <http://www.rivm.nl/en/Topics/H/HAVNET>

E. Conference presentations

De Sousa R, Vennema H, Verhoef L, Kroneman A, Sane J, Petrigani M, Marion Koopmans on behalf of HAVNET Geotagging hepatitis A virus: a dynamic tool for public health surveillance. International conference on molecular markers, IMMEM-10, Paris, France (oral presentation)

De Sousa R, Vennema H, Verhoef L, Kroneman A, Sane J, Petrigani M, Marion Koopmans on behalf of HAVNET Geotagging hepatitis A virus: a dynamic tool for public health surveillance. ESCAIDE 2013, Stockholm, Sweden. (poster presentation)

F. Abstracts 2014

De Sousa R, Smits G, Mollema L, Berbers G. Antibody responses to pertussis vaccine antigens in two population-based studies conducted in the Netherlands, 1996 and 2006. ESCAIDE 2014 (poster presentation).

Sane J, De Sousa R, van Pelt W, Petrigani M, Verhoef L, Koopmans M. Risk of hepatitis A decreased among Dutch travellers to most endemic regions 2003–2011. ESCAIDE 2014 (oral presentation).

De Sousa R, Vennema H, Verhoef L, Kroneman A, Sane J, Petrigani M, Marion Koopmans on behalf of HAVNET Hepatitis A Network: a dynamic tool for public health surveillance. IMED 2014, Vienna, Austria (poster presentation).

G. Selection of other presentations

De Sousa, Schouls L, Heck M, Bijlmer H. MRSA, molecular surveillance in the Netherlands. Evaluation and improvement of database analysis. Presentation at ECDC, February 2013, Stockholm, Sweden.

De Sousa R and Koopmans M. Laboratory response and preparedness MERS-CoV, ECDC, September 2013, Stockholm, Sweden.

De Sousa R and Vennema H. Hepatitis A Network (HAVNET). RIVM; 25 April 2014, Bilthoven, the Netherlands.

10. EPIET/EUPHEM modules attended

- EPIET/EUPHEM introductory course, Menorca, Spain (three weeks)
- Computer tools in outbreak investigations, Robert Koch Institute, Berlin, Germany (one week)
- Biorisk and quality management module, ECDC, Stockholm, Sweden (one week)
- Initial management in public health microbiology, ECDC, Stockholm, Sweden (one week)
- Vaccinology, Public Health England, London, United Kingdom (one week)
- Rapid assessment of complex emergency situations, Athens, Greece (one week)
- Two project review modules, ECDC, Stockholm, Sweden (one week each)
- ECDC stay, Stockholm, Sweden (three days)

11. Other courses

- 'Applied bioinformatics in the field of public health: A first encounter with next generation sequencing data' 19 December 2012, National Institute of Health and Environment (RIVM), Bilthoven, the Netherlands.
- Applied bioinformatics in the field of public health: 'An introduction to microarray analysis', 20 December 2012, National Institute of Health and Environment (RIVM), Bilthoven, the Netherlands.

Discussion

A. Coordinator's conclusions

One of the main goals of the EUPHEM programme is to expose the fellows to different public health experiences and activities, thus enabling them to work across various disciplines.

This report summarises all activities and projects conducted by Rita de Sousa during her two-year EUPHEM fellowship (cohort 2012) at the National Institute of Health and Environment (RIVM) in the Netherlands.

The projects described here show the breadth of public health microbiology. Outbreak and surveillance activities included national and international perspectives and provided the fellow with new insights to add to her previous experience, while contributing to the understanding of important international public health issues. Laboratory research projects covered bacterial and viral pathogens across a variety of disease programmes, such as vector-borne diseases, vaccine-preventable diseases, food and waterborne diseases, respiratory tract infections, and healthcare-associated infections. Projects involved different professional groups, for example physicians, laboratory technicians, epidemiologists, statisticians, government officials, public health officers, and logisticians, strengthening the fellow's ability to work in a multidisciplinary team.

Activities were in line with the 'learning by doing' and 'on the job training' approach of the EUPHEM programme and followed the core competency domains described for professionals in mid-career and above. Activities were complimented by nine training modules providing theoretical knowledge and practice in different microbiological and epidemiological domains. Projects had clear educational outcomes, with results communicated in scientific journals and at national and international conferences.

The fellow has succeeded in performing all the tasks to a very high standard and with a professional attitude.

B. Supervisor's conclusions

Dr Rita de Sousa came to RIVM as a highly-experienced microbiologist, with a track record of having managed a reference laboratory for vector-borne diseases, and the ambition to broaden her scope and skills. Given this background, she was introduced to a challenging list of projects that required in-depth knowledge of laboratory work, even if this was not in her own area of expertise. She also combined this with new insights from the training modules. She approached her tasks with great enthusiasm and a scientific rigour that led to interesting discussions with her colleagues and supervisors, thus creating a mutual learning experience, in the spirit of the EUPHEM programme. This included some excellent observations on the managerial aspects of the work that were the subject of many of our regular meetings. I have no doubt that Dr de Sousa will be a strong advocate and role model for future EUPHEM fellows, and will continue to do excellent work in the public health arena.

C. Personal conclusions of fellow

The two-year EUPHEM training programme has given me a unique opportunity to broaden my horizons and acquire skills in different disciplines of public health microbiology. The 'learning-by-doing' approach to the training has shown me how to confront diverse public health problems with flexibility and adaptability. The fellowship successfully brings together microbiologists and epidemiologists (EPIET training), which makes them aware of the need to collaborate for the benefit of public health. The programme provides the opportunity to work in prestigious institutes and with renowned international specialists in public health and to have contact with international organisations through training modules, projects and conferences. The EUPHEM programme strongly contributes to establishing an important network of specialists in the field of public health microbiology. This scientific network provides a solid foundation for future national and international interdisciplinary collaborations.

Acknowledgements of fellow

I would like to thank my EUPHEM supervisor Prof. Marion Koopmans from the Dutch National Institute for Public Health and the Environment (RIVM) for her excellent supervision and shared knowledge, motivational support and the scientific opportunities that she gave me during the programme. I would like to thank my other project supervisors and colleagues from the virology and bacteriology IDS department at RIVM for providing me with the opportunities to learn, share and work with them on interesting projects within the field of public health microbiology. I would like to thank my colleagues from the epidemiology department who have worked with me and supported my project developments.

I would like to especially thank my EUPHEM/ECDC coordinators and advisors Prof. Aftab Jasir, Prof. Androulla Efstratiou, and Dr. Steen Ethelberg for their continuous supervision and feedback and all their efforts to maintain and improve the EUPHEM programme. I wish to thank all supervisors from the EUPHEM and EPIET programme who gave the training modules; the persons who have contributed to the development of the EUPHEM programme; the members of the EUPHEM forum; the training section; and the fellowship programme office at ECDC for administrative assistance during my fellowship.

Finally, I would like to thank my EUPHEM co-fellows, EUPHEM alumnae, and EPIET colleagues from my cohort for their friendship and for creating a great team spirit.