

The section header "Summary of work activities" in a bold, white, sans-serif font, set against a blue background.The author's name "Andrea Sanchini" in a white, sans-serif font, set against a blue background.The programme title "European Public Health Microbiology Training Programme (EUPHEM), 2011 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's (ECDC) 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. The primary work function is to use microbiology to improve the health of populations in collaboration with other public health disciplines, in particular epidemiology. Public health microbiology laboratories play a central role in the detection, monitoring, outbreak response, and 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 or assist in the development of microbiological guidelines, evaluate/develop new diagnostic tools, arbitrate on risks from microbes or their products, and provide pertinent information to policy makers related to the above issues from a microbiology 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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This report summarises the work activities undertaken by Andrea Sanchini of the Cohort 2011 of the European Public Health Microbiology Training Programme (EUPHEM) at the Robert Koch Institute (RKI), Berlin, Germany.

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

Material and methods

This report accompanies a portfolio of 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 by project/activity work and partly by participation in the modules. Results are presented according to the EUPHEM core competencies as can be found in the EUPHEM scientific guide¹.

1. Epidemiological investigations

1.1. Outbreak investigations

A. Participation in an outbreak investigation: Staphylococcus aureus in a neonatal unit in June 2012.

The laboratory investigations were carried out at the German National Reference Centre for Staphylococci and Enterococci of the RKI (Wernigerode branch). The fellow supported the outbreak team by undertaking laboratory investigations and linking the laboratory results with the epidemiological data obtained in collaboration with the Infectious Disease Epidemiology Department of the RKI (Berlin Branch). The outbreak investigation was launched after the deaths of two preterm neonates with a clinical picture of toxic shock syndrome (TSS). The outbreak strain colonised and infected seventeen neonates, four staff members, and three parents of neonates. Methicillin-susceptible *Staphylococcus aureus* (MSSA), a toxic shock syndrome toxin 1 (TSST-1) and enterotoxin A producer, was identified. The transmission was interrupted by increased MSSA screening for neonates and contact precautions, decolonisation of colonised patients with mupirocin, and treatment of infected patients with clindamycin. The long duration of the outbreak suggested that healthcare workers acted as transmitters of infection. Hence regular screenings for toxin-producing MSSA should be considered in neonatal settings.

B. EPIET/EUPHEM introductory course

Objectives of the module: understanding the principles of intervention epidemiology, rationales and methods of outbreak investigations, the role of public health microbiology laboratories in an outbreak investigation.

C. Computer tools in outbreak investigation module

Objectives of the module: understanding data collection, data entry, data cleaning and data validation using STATA, Excel and Epidata software; creating a questionnaire; conducting descriptive and analytical studies (e.g. case-control or cohort studies).

Educational outcome: Participation in an outbreak investigation with in a multi-disciplinary team (e.g. epidemiologists, paediatricians, clinicians, microbiologists); connecting laboratory and epidemiological data; management of outbreak communication between all involved parties (hospital, local public health authority, Robert Koch Institute); applying molecular typing techniques in an outbreak scenario; writing of a scientific article.

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

1.2. Surveillance

A. A systematic overview of laboratory diagnosis of paediatric tuberculosis in the EU

In order to evaluate laboratory confirmation of active paediatric tuberculosis (TB), the range of diagnostic tests and their performance were analysed using different types of samples from different European laboratories. The project was carried out at the Infectious Disease Epidemiology Department of the RKI and involved international European partners. The study included two stages: at the first stage, a survey was conducted among the TB European Reference Laboratory Network; at the second stage, routine laboratory data were collected and analysed for 10549 paediatric samples tested in 2007–11 by six reference laboratories in the United Kingdom, Germany, Italy, Croatia, Latvia and Lithuania. The analysis included the following: description of survey results, description of range of samples received, sample positivity rates for *Mycobacterium tuberculosis* complex (MTBC) detection. Performances of molecular assays against culture for MTBC identification were also assessed. Results showed full laboratory capacities and minor differences between diagnostic algorithms (paediatric vs adult TB). Non-respiratory samples were submitted more readily to Western European laboratories than to Baltic laboratories. The sample positivity rate for MTBC detection was higher with gastric aspirate and lymph node samples than with sputum samples. Sensitivity and specificity of molecular assays were 79.2% and 93.6%. In order to increase laboratory confirmation of paediatric TB, a more comprehensive approach in collecting gastric aspirates or non-respiratory samples from children should be considered, along with the evaluation and optimisation of molecular diagnostic assays using these samples. An early and appropriate diagnosis of paediatric cases is essential for the treatment of the patients and the necessary intervention steps.

B. Development of an assessment tool to evaluate surveillance system

The aim was to evaluate the *Campylobacter* sentinel surveillance system and identify strengths and weaknesses of the system in the federal German state of Saxony-Anhalt. A questionnaire containing questions assessing the quality of the surveillance system was developed and the responsible persons for the *Campylobacter* laboratory at the Wernigerode hospital were interviewed. The absence of feedback between the laboratory and the local public health authority was cited as the main problem. The project partners will conduct further interviews using the same questionnaire template.

C. EPIET/EUPHEM introductory course, Menorca, Spain

Objectives of the module: development and evaluation of surveillance systems; analysis of surveillance data.

Educational outcome: Writing a study protocol/scientific article; involvement in a project within a European Laboratory network; meetings, teleconferences and collaborations with international partners; visiting mycobacterial reference laboratories; involvement in a project with a population-based approach addressing public health microbiology problems (e.g. laboratory confirmation of paediatric TB); evaluation of diagnostic assays; management of large datasets; understanding the principles and the basic algorithms for the evaluation of surveillance systems and their crucial parameters (e.g. simplicity, acceptability, flexibility, sensitivity, representativeness, timeliness, cost, usefulness).

2. Applied public health microbiology research

A. Persistence of transmitted HIV drug resistance: consequences for resistance testing of newly diagnosed patients with unknown duration of infection

The aim of this research study was to assess if HIV drug-resistance testing should be performed close to the infection date in order to enable an optimal choice of drug regimens once treatment intervention becomes obligatory for the patient. The prevalence of HIV-1 resistance mutations conferring resistance to nucleoside analog reverse-transcriptase inhibitors (NRTIs or NRTIs), non-nucleoside analogue reverse transcriptase inhibitor (nnRTI), and proteases inhibitors were compared in two different HIV patient populations, infected between 2002 and 2008: i) HIV-1 seroconverters with known duration of infection; and ii) newly diagnosed patients with unknown duration of infections. The revertant substitutions T215CDEISV in the reverse transcriptase (RT), which arises from previously resistance-associated thymidine analogue resistance mutation T215Y/F, was encountered twice as often in newly diagnosed patients as in seroconverter patients. In turn, the resistance-mediating mutation T215Y/F was identified only in HIV from seroconverters but not from newly diagnosed patients. Resistance testing in patients with unknown duration of infection (newly diagnosed) does not seem to critically impact the data about transmitted drug resistance collected by epidemiological surveillance studies. However, the consequences for an individual patient who will be treated (or not) according to the genotypic resistance result can be more important because each failed treatment will diminish treatment options.

B. EPIET/EUPHEM introductory course, Menorca, Spain

Objectives of the module: Writing a study protocol including study justification and aims, methods and expected outcomes.

Educational outcome: Using SPSS software for massive databases; descriptive analyses of populations and determine statistically significant differences among populations.

3. Applied public health microbiology and laboratory investigations

A. Identification and typing of *Cryptococcus* patient isolates, Germany, 2004–10

In this study, *Cryptococci* were identified to the species level by sequencing of the intergenic spacer 1 (IGS) of the ribosomal RNA operon. Serotype and mating type were determined for *Cryptococcus neoformans* var. *grubii* (CNG) and var. *neoformans* (CNN) by specific PCRs. Multi-locus sequence typing (MLST) was performed on CNG and CNN isolates by using the consensus scheme (*cap59*, *gpd1*, *lac1*, *plb1*, *sod1*, *ura5*, *igs1*) with slight modifications. Sequences from CNG were compared with a global CNG-MLST database. Patient data were provided by the treating physicians.

A total of 103 strains cultured from CSF, blood, respiratory tract and soft tissue from 103 patients. Isolates were identified as CNG (78%), CNN (14%), as hybrids of CNN and CNG (6%) or *C. gattii* (CG) (2%). All CNG and CNN isolates were of the alpha mating type.

Among CNG, a total of 29 different alleles were identified at the seven MLST loci. Only four of the resulting 20 different sequence types (STs) have been reported previously. Most isolates belong to three main clusters: First, strains with new STs related to globally distributed strains. Second, strains with STs isolated in south-east Asia from clinical samples. Third, strains with new STs related to isolates from Africa. Among CNN, a total of 37 different alleles, resulting in 11 STs, were identified. MLST data on CNN for comparison are not publicly available. Among patients with cryptococcosis in Germany, CNN and hybrids appear to be more prevalent than in other regions (e.g. North America, Africa), while CG is still rarely identified. MLST suggests that a substantial number of CNG strains may be acquired abroad, either by immigrants or travellers. It appears that German CNN strains are genetically more heterogeneous than German CNG strains.

B. Assessing the epidemiological relevance of measles vaccine failures: analysis of laboratory-confirmed cases, Germany, 2000–13

In order to assess the protection levels against measles, information on primary and secondary measles vaccine failure cases in Germany was collected for the period 2000–13. Laboratory databases were reviewed, and clinical and laboratory data were analysed to identify vaccine failure cases. Preliminary results showed that measles vaccine failure cases remain rare in Germany. About 20 cases were identified, most of them being secondary vaccine failure cases, probably due to waning immune response. The IgG avidity test demonstrated to be a powerful tool in analysing the serological nature of vaccine failure. Further analysis of the vaccine failure cases, along with the implications of the study's results on future investigations and recommendations, are in progress.

C. Virus discovery in clinical settings

Objectives of the module: isolation and identification of viral agents; sequencing and bioinformatics; ELISA design.

D. Laboratory rotations: identification and characterisation of bacteria

During his seven weeks in Wernigerode, the fellow was introduced to different laboratories in order to familiarise himself with different identification and characterisation procedures, worked at the German national reference centre for *Salmonella* and other enteric pathogens, and spent time at the German National Reference Centre for *Staphylococci* and *Enterococci*. Activities included isolation/identification techniques for Gram negatives by biochemical reactions and chromogenic media; serotyping of *Salmonella* and *Escherichia coli* strains; phage typing of *Salmonella*; various typing methods (MLST, MLVA, PFGE); antibiotic-resistance laboratory surveillance of staphylococci, enterococci and Gram-negative bacteria.

E. Visit of mycobacterial national reference laboratories

In conjunction with the project on paediatric TB laboratory confirmation, the fellow visited the British and German national reference laboratories for Mycobacteria in order to discuss the project study protocol and extract data from laboratory databases.

Educational outcome: Planning and conducting a laboratory project; structuring a laboratory database; analysis of sequence-based molecular typing results compared with those reported by other laboratories; development of criteria for vaccine failure case classification; case identification in a laboratory database; analysis of vaccine failure; understanding the role and responsibilities of a reference laboratory; writing a scientific article; designing a conference poster.

4. Biorisk management

A. Outbreak investigation and laboratory investigation

Objectives: Laboratory work with pathogens; optimisation of specimen collection and storage; conducting a risk assessment in a real-life scenario; following universal work precautions; use of personal protective equipment; decontamination of waste and equipment.

B. Biorisk management module

Objectives of the module: Understanding principles and practices of biosafety and biosecurity as well as confinement levels and protective equipment; biorisk assessments and mitigation; principles of international shipping of infectious substances.

5. Quality management

A. External quality assurance (EQA) of serological diagnosis of West Nile Virus (WNV) infection

In order to assess the performance accuracy of serological diagnostics for West Nile virus, the European Network for the Diagnostics of Imported Diseases – Collaborative Laboratory Response Network (ENIVD-CLRN) organised the second EQA study for the serological diagnosis of WNV infection in 2011. A panel with 13 sera was sent to 48 laboratories involved in WNV diagnostics. Forty-seven of 48 laboratories participated. Eight laboratories achieved 100% concurrence with the expected results. Lesser degrees of concordance were explained by the antigenic cross-reactivity of flavivirus antibodies. Immunofluorescence assays were more specific than ELISA in detecting IgG antibodies. The overall sensitivity and specificity of diagnostic tests for IgM detection were 50% and 95%, while the overall sensitivity and specificity of diagnostic tests for IgG detection were 86% and 69%. The low sensitivity for IgM detection suggests that there is a risk of overlooking acute WNV infections, whereas the low specificity for IgG detection demonstrates a high level of cross-reactivity with heterologous flaviviruses. In order to improve WNV serological diagnostics, a secondary test for any ELISA or positive immunofluorescence assay is recommended. IgG avidity tests should only be considered as an aid to distinguish among recent and past WNV infections and as a means to perform diagnostic tests for other flaviviruses to identify false-positives.

B. Quality management module

Objectives of the module: Quality management system according to ISO15189; internal and external quality control, assessment and audit; management of personnel and equipment.

Educational outcome: Designing an EQA study; interpretation and evaluation of results; identification of laboratory shortcomings; strengths and weaknesses of diagnostic tests; writing a scientific article; designing a conference poster.

6. Teaching and pedagogy

A. Laboratory practices assistant at two training modules organised by ECDC in 2012

The two modules took place at the Centre for Biological Threats and Special Pathogens 1 (ZBS1) – Highly Pathogenic Viruses Department of the RKI (Berlin Branch). The fellow participated in two workshops, one on the laboratory diagnosis of Dengue virus (DV) infections and one on the laboratory diagnosis of West Nile Virus (WNV) infections. Courses skills included DV and WNV diagnostic tests and the critically interpretation of test results.

B. Organisation and facilitation of the laboratory module for epidemiologists (lab4epi module) in 2012 and 2013

The modules took place at the Centre for Biological Threats and Special Pathogens 1 (ZBS1) – Highly Pathogenic Viruses Department of the RKI (Berlin Branch). I organised the courses together with the EUPHEM supervisor, EUPHEM alumnae at RKI, and EPIET-PAE coordinators at the Infectious Disease Epidemiology Department of the RKI. Participants to the module were EPIET and PAE fellows (fellows of the German training programme for field epidemiology). Topics of the modules included: public health microbiology, sampling, safety transport, biorisk and quality management, typing and diagnostic techniques, and practical laboratory exercises. Invited speakers from different departments of the RKI participated in the module and gave presentations on major activities and research in their respective laboratories and departments.

C. Lecture: 'Link between laboratory and infectious disease epidemiology'

The lecture was part of the module on infectious disease epidemiology. The module took place at the RKI for PhD students, epidemiologists and microbiologists in November 2012.

Educational outcome: Designing a training course with both theoretical and practical components; teaching experience in laboratory principles with different target groups (epidemiologists, PhD students, microbiologists); importance of the connection between microbiology and epidemiology.

7. Public health microbiology management

A. Outbreak investigation

Facilitated the contact between the laboratory and the epidemiological investigators of the outbreak control team; communicated the laboratory results to other parties involved in the investigation, e.g. epidemiologists, paediatricians, microbiologists.

B. Surveillance project on paediatric TB laboratory confirmation

Leadership of the project; coordination of activities (teleconferences, meeting organisation, visit to reference laboratories, communication) between the international partners in the ERLN-TB laboratory network.

C. Molecular epidemiology of cryptococcosis in Germany

Planned and organised the laboratory work and analyses.

D. Projects with principal investigator function

Lead and coordinated the different projects and partners; assigned priorities; explained the public health importance of the projects; presented public health recommendations.

E. Module: Initial management in public health microbiology

Objectives of the module: Understanding the role and responsibilities of a people manager within a public health environment; understanding different management styles; understanding team roles and team evolution to ensure team success; motivation of teams; conflict management: structured feedback to improve performance and minimise disruption in a conflict.

8. Communication

A. Publications

1. Sanchini A, Donoso-Mantke O, Papa A, Sambri V, Teichmann A, Niedrig M. Second international diagnostic accuracy study for the serological detection of West Nile virus infection. *PLoS Negl Trop Dis.* 2013;7:e2184.
2. Sambri V, Capobianchi MR, Cavrini F, Charrel R, Donoso-Mantke O, Escadafal C, Franco L, Gaibani P, Gouldi E, Niedrig M, Papa A, Pierro A, Rossini G, Sanchini A, Tenorio A, Varani S, Vázquez A, Vocale C, Zeller H. Diagnosis of West Nile virus human infections: overview and proposal of diagnostic protocols considering the results of External Quality Assessment studies. (Submitted to Eurosurveillance.)
3. Sanchini A, Fiebig L, Drobniewski F, Haas W, Richter E, Katalinic-Jankovic V, Pimkina E, Skenders G, Cirillo DM, ERLN-TB members, Balabanova Y. Diagnosis of paediatric tuberculosis in the EU: what do routine data show us? (Submitted to Eurosurveillance.)
4. Sanchini A, McCormick Smith I, Sedlacek L, Schwarz R, Tintelnot K, Rickerts V. Identification and typing of *Cryptococcus* patient isolates, Germany, 2004–10. (In preparation.)
5. Sanchini A, Layer F, Greutelaers B, Strommenger B, Breier AC, Proquitté H, Bühner C, Schenkel K, Bätzing-Feigenbaum J, Gastmeier P, Werner G, Eckmanns T. An outbreak of toxic shock syndrome toxin 1-producing, methicillin-susceptible *Staphylococcus aureus* among preterm neonates. (In preparation.)
6. Sanchini A, Santibanez S, Mankertz A. Analysis of laboratory-confirmed measles vaccine failure cases, Germany, 2001–2013. (In preparation.)

B. Reports

1. Persistence of transmitted HIV drug resistance: consequences for resistance testing of newly diagnosed patients with unknown duration of infection.
2. How to evaluate surveillance systems.

C. Book chapter

Donoso-Mantke O, Escadafal C, Sanchini A, Domingo C, Hagedorn P, Patel P, Achazi K, Hüther A, Niedrig M. Chapter 'Tick-borne encephalitis viruses'. In: Dongyou Liu, editor. *Manual of security-sensitive microbes and toxins.* CRC Press, London; 2014. (In press.)

D. Conference presentations

1. Sanchini A, McCormick Smith I, Sedlacek L, Schwarz R, Tintelnot K, Rickerts V. Identification and typing of *Cryptococcus* patient isolates, Germany, 2004–2010. Accepted as poster at the 23rd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID 2013). Berlin, Germany, 27–30 April 2013.
2. Sanchini A, Donoso-Mantke O, Papa A, Sambri V, Teichmann A, Niedrig M. Second International Diagnostic Accuracy Study for the Serological Detection of West Nile Virus Infection. Accepted as poster at the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE 2012) congress, Edinburgh, Scotland, 24–26 October 2012.

E. Submitted abstracts (ESCAIDE 2013)

1. Sanchini A, Fiebig L, Drobniewski F, Haas W, Richter E, Katalinic-Jankovic V, Pimkina E, Skenders G, Cirillo DM, ERLN-TB members, Balabanova Y. Laboratory confirmation of paediatric tuberculosis in the EU: what do routine data show us?
2. Sanchini A, Layer F, Greutelaers B, Strommenger B, Breier AC, Proquitté H, Bühner C, Schenkel K, Bätzing-Feigenbaum J, Gastmeier P, Werner G, Eckmanns T. An outbreak of toxic shock syndrome toxin 1-producing, methicillin-susceptible *Staphylococcus aureus* among preterm neonates.

F. Other presentations

1. Sanchini A. Seminar on EUPHEM and projects plan. In conjunction with the weekly EPIET-PAE fellows meeting at the Infectious Diseases Epidemiology Department of the RKI (Berlin Branch), November 2011.
2. Sanchini A. European Public Health Microbiology (EUPHEM) fellowship: overview and practical experience. In conjunction with the weekly meeting of the HIV and Other Retrovirus Department at the RKI (Berlin Branch), November 2011
3. Sanchini A. Overview of typing methods. In conjunction with the 2012 laboratory module for epidemiologists (lab4epi module), February 2012.
4. Sanchini A. Sampling, biosafety and transport. In conjunction with the 2012 laboratory module for epidemiologists (lab4epi module), February 2012.
5. Sanchini A. A systematic overview of laboratory diagnosis of paediatric tuberculosis (TB) in the EU. In conjunction with the monthly Teleconference for European Epidemiology and Public Health Microbiology (TEAM) organised by the EPIET-EUPHEM fellows and under the supervision of the ECDC training section coordinators, February 2012.
6. Sanchini A, Lenz Y. A systematic overview of laboratory diagnosis of paediatric tuberculosis in the EU. In conjunction with the European Reference Laboratory Network for Tuberculosis (ERLN-TB) 3rd Annual Meeting, 27–30 Mar 2012, London, UK, March 2012.
7. Sanchini A. Epidemiology of cryptococcosis in Germany. In conjunction with the weekly meeting of the Mycology, Parasitology and Mycobacteria Department at the RKI (Berlin Branch), July 2012.
8. Sanchini A. The international diagnostic accuracy study for the serological detection of West Nile virus infection performed in 2011 reveals the need to improve diagnostic tests. In conjunction with the ECDC Project Review module 2012, August 2012.
9. Sanchini A. Epidemiology of cryptococcosis in Germany. In conjunction with the ECDC Project Review module 2012, August 2012.
10. Sanchini A. Overview of EUPHEM fellowship and possible link with epi. Within the weekly EPIET-PAE fellows meeting at the Infectious Diseases Epidemiology Department of the RKI (Berlin Branch), September 2012
11. Sanchini A. European Public Health Microbiology (EUPHEM) fellowship training programme. In conjunction with the annual meeting for young scientists at RKI, November 2012.
12. Sanchini A. Sampling, biosafety and quality management. In conjunction with the 2013 laboratory module for epidemiologists (lab4epi module), February 2013.
13. Sanchini A. Second international diagnostic accuracy study for the serological detection of West Nile virus infection. In conjunction with the weekly meeting of the Centre for Biological Threats and Special Pathogens 1 (ZBS1) – Highly Pathogenic Viruses Department at the RKI (Berlin Branch), April 2013.
14. Sanchini A. Diagnostic of paediatric tuberculosis in the EU: what do routine data show us? In conjunction with the European Reference Laboratory Network for Tuberculosis (ERLN-TB) 4th Annual Meeting, 28–31 May 2013.

9. EPIET/EUPHEM modules attended

- EPIET/EUPHEM introductory course, Menorca, Spain (15 days)
- Computer tools in outbreak investigations (5 days)
- Biorisk and quality management (5 days)
- Initial management in public health microbiology (5 days)
- Project review module 2012 (5 days)
- Vaccinology (5 days)
- Project review module 2013 (5 days)

10. Other courses

- Introductory course at the Infectious Disease Epidemiology Department of the RKI (Berlin Branch) (5 days*)
- ECDC stay (3 days)
- European Reference Laboratory Network for Tuberculosis (ERLN-TB), 3rd Annual Meeting (3 days)*
- Virus discovery in clinical settings (5 days)
- European Reference Laboratory Network for Tuberculosis (ERLN-TB), 4th Annual Meeting (3 days)*

* Funded by RKI

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 in the field of public health. This report summarises the different activities and projects conducted by Andrea Sanchini, EUPHEM fellow (Cohort 2011) the second fellow placed at the Robert Koch Institute (RKI), Germany. The activities were in line with the 'learning by doing' approach of the EUPHEM programme and followed the core competency domains described for midterm carrier professionals and above. All projects had a clear educational outcome contributing into the development of a wide range of experiences and expertise. The activities provided the fellow with a variety of knowledge, skills, abilities and attitudes required in the field of public health microbiology and strengthened his ability to work in a multidisciplinary team. The fellow has succeeded in performing all his tasks to a very high quality and with a professional attitude.

B. Supervisor's conclusions

During the two-years fellowship at Robert Koch Institute, Andrea Sanchini has been involved in a wide range of learning-by-doing activities, e.g. outbreak investigations, surveillance, descriptive and analytical epidemiology, and research in public health microbiology. Andrea has reached a high level of qualification and expertise. He is known as a very positive, constructive and enthusiastic colleague, and it has always been a pleasure to work with him. Andrea, whose thinking is often unconventional, is equally dedicated to public health microbiology as he is to field epidemiology. His project work at the Robert Koch Institute, carried out with national and international partners, resulted in excellent outcomes which were published in high-impact international journals and/or practically applied in the public health sector. Based on his personal and professional skills, we can highly recommend Andrea Sanchini for any kind of public health work.

C. Personal conclusions of fellow

The EUPHEM fellowship gave me the opportunity to expand my view of public health microbiology and the field of communicable diseases. Over the course of two years I worked in many disciplines, improving my knowledge of virology, bacteriology and mycology. Networking was one of the most important added values of the fellowship: I had the unique opportunity to develop my own scientific network at the RKI but also at the international level, including contacts with international organisations such as ECDC or WHO. I found it especially useful to be in contact with people with a multidisciplinary background (epidemiologists, statisticians, microbiologists, clinicians, policy advisors), who showed me different aspects of my field of work. During the fellowship my ability for multitasking was highly improved. One of the EUPHEM objectives is to foster future leaders in public health microbiology: I was given the opportunity to develop my leadership skills by leading and coordinating most of my projects. Moreover, the EUPHEM fellowship gave me the opportunity to participate in several training courses, to be guided and supervised by international organisation, and to live in another country (Germany), adapting to a new culture and becoming familiar with other fellows and supervisors around Europe. I strongly recommend EUPHEM fellowship to microbiologists.

I strongly believe that the Programme should maintain its flexibility and diversity, and that the bridge between microbiologists and epidemiologists should be kept and developed.

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