



Summary of work activities

Astrid Kirch

European Public Health Microbiology Training Programme (EUPHEM), 2019 cohort

Background

According to the European Centre for Disease Prevention and Control (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. Its primary function is 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 in 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 provides experts in all relevant communicable diseases at the regional, national and international level with the tools they need to mount rapid responses to emerging health threats. This enables them to plan appropriate prevention strategies, assess existing prevention disciplines, develop microbiological guidelines, evaluate/produce new diagnostic tools, assess 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' which is why 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.

This report summarises the work activities undertaken by Astrid Kirch, cohort 2019 of the European Public Health Microbiology Training Programme (EUPHEM) at the State Health Office of Baden-Württemberg.

Astrid Kirch is biologist and obtained her PhD on 'the influence of parasite infections during pregnancy on the risk and the course of infection and the immune competence of the offspring' at the Eberhard Karls University in

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Tuebingen, Germany. Astrid visited Togo, Africa, several times during her doctorate to conduct laboratory research for her thesis. Since 2003, she has been employed by the State Health Office of Baden-Württemberg (Landesgesundheitsamt, LGA). She worked in the department of parasitology and switched to the department of molecular biology after the department of parasitology was closed. Since 2013, she has been working in the department of microbiology. She also teaches medical-technical assistants at the Katharinenhospital in Stuttgart, 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.

Methods

This report accompanies a portfolio demonstrating the competencies acquired during the EUPHEM fellowship by working on various projects, activities and theoretical training modules.

Projects included epidemiological investigations (outbreaks and surveillance); applied public health research; applied public health microbiology and laboratory investigation; bio-risk management; quality management; teaching and public health microbiology management and the summary and communication of 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, with the exception of those prohibited for reasons of confidentiality.

Results

The objectives of these core competency domains were achieved partly through project or activity work and partly through participation in the training modules. Results are presented in accordance with the EUPHEM core competencies, as set out in the EUPHEM scientific guide¹.

1. Epidemiological investigations

1.1. Outbreak investigations

Listeria monocytogenes serotype 4b strain Psi1

Supervisors: Christiane Wagner-Wiening, Dorothee Lohr

Listeriosis is a foodborne disease caused by the bacterium *Listeria monocytogenes*. *L. monocytogenes* can be found in various foods such as meat, sausage, fish, milk and cheese, but has also been found in plant foods such as pre-cut lettuce and smoothies. *L. monocytogenes* usually affects immunocompromised people, the elderly, new-borns and pregnant women, who can become ill when ingesting the bacteria through food. Symptoms such as meningitis, gastroenteritis, and septicaemia can occur. During pregnancy, in the worst case, it can cause an abortion of the foetus or lead to death of the baby. Germany has a surveillance system for *L. monocytogenes* whereby outbreaks can be rapidly recognised. Laboratories from the whole of Germany send the isolated strains to the National Reference Centre (NRC) in Berlin for sequencing. If the NRC observes accumulations of one cluster, the epidemiologists of the Robert Koch Institute (RKI) inform the relevant federal states so that measures can be taken. In June 2021, the RKI informed the epidemiologists of the Landesgesundheitsamt (LGA, State Health Office) of accumulations during the years 2016-2021, mainly in Baden-Württemberg and especially in pregnant women with a specific strain (Psi1). The outbreak investigation team contacted the RKI to discuss further actions. A special questionnaire to interview the affected pregnant women was developed in order to interview recent cases. The source could not yet be determined because there were not enough cases in the near past and recent cases could no longer be contacted. As a result, the surveillance will continue and further cases with *L. monocytogenes* Psi1 strains will be interviewed immediately.

Astrid was a member of the outbreak team and developed an appropriate questionnaire for interviewing pregnant women with *Listeria monocytogenes* infection. She discussed the measures with epidemiologists at RKI and LGA.

Training modules related to the assignment/projects

EPIET/EUPHEM Introductory Course (IC) – During the IC, the fellow received an overview of the 10 steps of an outbreak investigation. Several lessons and case studies introduced the fellow to the assessment of an outbreak investigation, including the development of a case definition, construction and interpretation of an epidemic curve,

¹ European Centre for Disease Prevention and Control. European public health training programme. Stockholm: ECDC; 2013. Available from: <http://ecdc.europa.eu/en/publications/Publications/microbiology-public-health-training-programme.pdf>

design of an appropriate questionnaire using EpiData Manager, and data entry based on the questionnaire using EpiData Entry Client.

Outbreak Investigation Module (OIM) – The OIM consisted of lessons and small workgroups with a special dataset for an outbreak investigation. The fellow deepened some of the learning objects of the IC and conducted an outbreak investigation with a mixed team of epidemiologists and laboratory staff. The fellow learned how to prepare and assess an outbreak report and received an overview of mapping by the QGIS system. Systems for phylogeny and epidemic intelligence were also introduced.

Management, Leadership and Communication in Public Health (MLCPH) – The fellow learned how to work in a team to achieve required results. She also learned how to communicate with different groups of people (e.g. peers, stakeholders and the media/public, the ministry of health).

Educational outcome

Astrid learned about the application of microbiological and epidemiological knowledge and was a member of an outbreak team. She learned to develop an appropriate questionnaire and to evaluate and assess the data of a surveillance system. She applied the 10 steps of an outbreak investigation and learned how to write an outbreak report. She also deepened her knowledge of *Listeria monocytogenes*.

1.2. Surveillance

Evaluation of Chlamydia trachomatis and Neisseria gonorrhoeae data from people who visit the Sexually transmitted disease advice centres of Baden-Württemberg

Supervisors: Silke F. Fischer, Elke Göhring-Zwacka

Infections with the bacteria *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG) are two of the most common sexually transmitted infectious diseases (STI), which often show no symptoms but can be treated. Asymptomatic patients can transmit the infection unnoticed to other sexual partners. As a result, infection is notifiable in many countries but not in Germany, except for the federal state of Saxony. Due to the lack of notification in Germany for CT and NG, in 2010 the RKI established a laboratory sentinel programme in order to estimate the epidemiological situation in the country. An evaluation of the data in 2014 showed that Baden-Württemberg was underrepresented. As a result, the LGA started a surveillance project in cooperation with the STI advice centres in 2015. The STI advice centres offered their clients free examination for CT and NG infections if they were at risk. The analyses were made by the laboratory of LGA. Depending on sexual behaviour, a diagnosis from urine, cervical, urethral, vaginal, anal and/or pharyngeal swabs were recommended. Although an infection with both pathogens can lead to serious illness and may be passed on to others by asymptomatic carriers, since 1995 health insurance companies in Germany have only covered the costs for the examination of urine of pregnant women, and since 2008 from women before termination of pregnancy and for women younger than 25 years once per year. The data showed a high percentage of positive results (PPR) of CT infections independent of sex and sexual practices and a high PPR for NG infections in sex workers and men who have sex with men (MSM). Depending on sexual practices, PPR varied in different clinical material. As a result, we recommend that all groups should be screened regularly for CT infections as recommended by STI guidelines, especially when sexual partners frequently change. The high PPR of NG in MSM and in sex workers should also lead to regular examination for NG infections as recommended by the STI guidelines. Samples should be taken depending on sexual practice after detailed advice and examination of all materials should be supported by the healthcare system. For regular screening, the surveillance programme of CT and NG is an important tool to detect infections and interrupt the transmission and should therefore continue.

Astrid generated the data from the Laboratory Information and Management System (LIMS) LGA and conducted the data analysis with STATA. She also generated a card with the QGIS system with help of a specialist. She wrote the report and submitted the manuscript (1) to a peer-reviewed journal.

Training modules related to the assignment/projects

EPIET/EUPHEM introductory course (IC) – Through theoretical lessons, the fellow learned to decide if a surveillance system is needed and when it should be implemented. The fellow received an overview of the analysis, interpretation, and presenting of surveillance data. These skills were deepened with case studies during group work. The fellow was taught about statistical analysis and received an introduction into the statistical programme STATA.

Multi Variable Analysis (MVA) – During MVA, the fellow learned about multivariable analysis and logistic and binominal regression models in order to choose the appropriate model for her studies.

Rapid Assessment and Survey Methods (RAS) – The RAS module deepened the fellow's mapping skills with QGIS and taught her how to interpret surveillance data.

Educational outcome

Astrid learned about the evaluation and assessment of a surveillance system. She gained experience on how to analyse existing surveillance data with STATA. She also improved her skills in writing, formulating recommendations, and working with the mapping system QGIS.

2. Applied public health research

Seroconversion and antibody persistence after infection with SARS-CoV-2

Supervisors: Silke F. Fischer, Elke Göhring-Zwacka

In the context of the COVID-19 pandemic, a study team from the LGA started a project to discover if there is seroconversion and antibody persistence after infection with SARS-Cov-2. They also wanted to know how long the antibody response persists and if there is any relationship between disease severity and antibody progression. Antibody tests were performed by Enzyme Linked Immuno Sorbent Assay (ELISA) with serum samples from hospital staff with positive SARS-CoV-2 PCR result, serum samples from patients with COVID-19 and SARS-CoV-2 positive PCR result and SARS-CoV-2 infected people >18 years from the population. The first blood investigation took place shortly after diagnosis with the virus, follow-up tests were done every three months up to one year. Data about symptoms and underlying medical disease were collected by a questionnaire. The data evaluation had not yet been completed when portfolio was written.

Astrid was involved in writing the project proposal and ethical vote and developed data entry mask of questionnaire using Epidata Manager and performed data entry using Epidata Entry Client. Data analysis will be done by the fellow.

Training modules related to the assignment/projects

EPIET/EUPHEM Introductory Course (IC) - The fellows learned through theoretical lessons and small working groups to develop a detailed protocol for an applied public health research project including formulating hypotheses and deciding on the study design and sampling strategy. As mentioned above they got instructions on how to design an appropriate questionnaire using EpiData Manager and how to enter data based on the questionnaire using EpiData Entry Client.

Multivariable Analysis Module (MVA) - During MVA, fellows learned about multivariable analysis and logistic and binominal regression models to select the appropriate model for their studies.

Educational outcome

Astrid gained skills in formulating hypotheses and development of study design and sampling strategies. She also gained experience in writing a proposal for ethical clearance. She acquired experience in developing questionnaire using EpiData Manager and data entry based on the questionnaire using EpiData Entry Client.

3. Applied public health microbiology and laboratory investigations

SARS-CoV-2 diagnostic in the laboratory of the State Health Office of Baden-Württemberg

Supervisors: Rainer Oehme

In January 2020, the laboratory of the LGA established the diagnostics for SARS-CoV-2. As a result, primer from TibMolbiol for the E-gen were ordered, which is specific for all viruses from the corona family, and the RdRp gen, which is specific for SARS-CoV-2 and PCR protocol, from the conciliar-laboratory in Berlin (Prof. Dr. Drosten) was established. In order to validate the test system from TibMolbiol, positive control from the conciliar-laboratory and the positive control from the kit was tested. Samples were sent to the laboratory in liquid medium. Sample were inactivated with Guanidine Isothiocyanate buffer and RNA was isolated with EasyMaG instrument from Biomérieux. Two PCRs were performed on the LightCycler 480 from Roche. The first one detects the E-gene which is the same in all viruses of the corona family. Positive samples were then tested again on SARS-CoV-2-specific RdRp gen. The first positive sample was sent to the conciliar-laboratory to be confirmed. In March the analysing system was changed from TibMolbiol to ALTONA.

The fellow was responsible the laboratory work and ran the RNA isolation and the PCRs. She contacted the conciliar-laboratory and organised the shipment of the first positive sample in order to confirm the result. She also organised the laboratory work and was in charge of the laboratory reports. She was in contact with the local health authorities and gave recommendations for sampling and shipment.

Organisation of TB diagnostic laboratory: a case report of mixed *Mycobacterium tuberculosis* population of a patient from Eastern Europe

Supervisors: Silke F. Fischer

The laboratory of LGA has established the whole diagnostic of a tuberculosis infection (except phenotypical susceptibility testing). This includes Ziehl-Neelsen colouring and microscopy for acid-proof rods, PCR (FluorType MTBC, HainLifescience) for examination on *Mycobacteria tuberculosis* complex (MTBC) from direct material (e. g. sputum, urine) and also the culture with three media (Löwenstein Jensen, Stonebrink and MGIT (liquid medium)). Positive cultures with mycobacteria will be identified with molecular methods (GenoType MTBC; HainLifescience). When *Mycobacterium tuberculosis* was identified by GenoType MTBC the genotypic susceptibility testing by GenoType MTBDRplus, HainLifescience will be done. This helps to detect multi-drug-resistant (MDR) and extremely-drug-resistant (XDR) tuberculosis strains. The members of the department also support the tuberculosis care centres of the local health authorities. They give advice on which investigations should be done or how to assess the results from tuberculosis investigations. In December the laboratory had a positive result with acid-proof rods in microscopy and in PCR. The doctor of tuberculosis care centre from the local health authority informed the laboratory that the patient was from Eastern Europe and therefore it could be that he has a MDR or XDR. The laboratory examined the positive sputa with the GenoType MTBDRplus and got different and confusing results from two samples. Therefore they thought of a mixed population and sent the material to the cooperating laboratory in Heidelberg. By sequencing, resistance against Rifampicin and Isoniazid were detected. But the results showed double signals at the locus *rpoB* which represents the susceptibility against Rifampicin. One signal for a susceptible strain and one signal for a resistant strain. That explained the confused pattern from GenoType MTBDRplus.

The fellow evaluated and interpreted the results of the GenoType MTBDRplus test. She contacted the cooperating laboratory and discussed the results. She also communicated with the local health authority.

QuantiFERON® - GOLD Plus Test (QFT); investigation of school children after an active Tuberculosis (TB) case in a school class

Supervisors: Silke F. Fischer

QuantiFERON® - GOLD Plus Test (QFT) is a fast method to detect latent Tuberculosis infections by a serological method but it can't differentiate between an active and a latent case. This test often is used for investigation of contact persons of tuberculosis patients' e.g. family members, school classes or other people in community institutions. 2019 the laboratory of LGA detected many latent Tb infections (LTBI) in a school class by investigating blood samples with QFT. 75 from 354 samples had positive results.

Astrid evaluated the result from the QFT investigations of the samples from the school class. Therefore she had to check the results of the ELISA for plausibility. She evaluated the raw data and generated the reports. She communicated the results at the Tuberculosis conference in December 2019 at LGA in Stuttgart by a presentation.

Diagnostics of Enterohemorrhagic *Escherichia coli* (EHEC) in the laboratory of the State Health Office Baden-Württemberg

Supervisors: Maja Adam

Infections with Entero haemorrhagic *Escherichia coli* (EHEC) can cause either mild gastroenteritis symptoms or severe symptoms like Haemorrhagic Uremic Syndrome (HUS) which may lead to kidney failure, depending on the EHEC stain. EHEC with the shigatoxin subtype 2a, 2c, 2d are found in severe disease progressions (so called HUSEC stains – in contrast to Non-HUSEC strains leading to milder symptoms). Children are often affected. According to the Infection Protection Law of Germany people infected with EHEC were in the past not allowed to visit community facilities like kindergarten as long as they excrete the pathogen. They had to have three negative stool investigations for readmission to visit the community facilities again. The RKI Empfehlungen für die Wiedenzulassung zu Gemeinschaftseinrichtungen gemäß §34 Infektionsschutzgesetz (13.01.2020) established a new strategy for readmission of EHEC infected people. They make a difference between HUSEC and Non-HUSEC strains. People infected with a Non-HUSEC strain are allowed to go to the community facility after the symptoms have subsided (like an infection with *Salmonella Enteritidis*). Only people with a HUSEC strain need 2 negative stool samples before readmission to community facility. The laboratory of the LGA is partner in the national project for molecular EHEC surveillance where the RKI is the leader. The LGA examines up to 2000 stool samples each year on EHEC. They give support to the local health authorities in context with EHEC infections and readmission to visit the community facilities. Depending on the result of subtype the local health authorities decide where the patient is allowed to visit the community facility or not. In this context the fellow was involved in the daily routine of the EHEC diagnostics.

Astrid was responsible for the communication with the local health authorities in order to support them with decision about readmission of EHEC infected people to community facilities and she contacted the NRC in order to clarify the fast investigation of the sample from a child who couldn't participate in kindergarten for long time.

Training modules related to the assignment/projects

EPIET/EUPHEM Introductory Course (IC) - The IC gave a short overview of different laboratory methods and analysis for identification of an infection. The fellow learned how the quality of the results may be influenced by the validation of the methodology used and how to interpret the diagnostics and epidemiological significance of reports from the laboratory

Management, Leadership and Communication in Public Health Module (MLCP) –The fellow learned about time and person management, and communication to different stakeholders. She also learned to act as leader and how to react to different personalities.

Educational outcome

Astrid deepened her knowledge of public health microbiology in relationship to laboratory examinations. She also improved her skills in communication with different stakeholders like public health authorities and gained experience of working in a team with different personalities.

4. Biorisk management

Cultivation, packaging and shipment of BSL3 pathogens

Supervisors: Rainer Oehme

The LGA BSL 3 laboratory examines samples with suspected BSL 3 pathogens. In order to practice the handling of BSL 3 pathogens, once a year the laboratory staff cultivate seven BSL 3 bacteria:

Burkholderia mallei, *Burkholderia pseudomallei*, *Brucella melitensis*, *Francisella tularensis holarctica*, *Francisella tularensis tularensis*, *Yersinia pestis*, and *Bacillus anthracis*. They also examine cultures from other laboratories to confirm the results. The first cultivated culture was sent via World Courier to the National Reference Laboratory in Bavaria according to the valid regulations.

Astrid is a member of the BSL3 team and previously organised the culture procedure, trained colleagues to culture BSL3 organisms and analysed inactivated culture organism by PCR. In the past she has also been responsible for the packaging and transport organisation of BSL3 organism by World Courier. She examined samples turned over to the laboratory as part of a bioterrorism threat situation, and communicated with health authorities and police.

Training modules related to the assignment/projects

Biorisk and Quality Management Module – This module was cancelled

Educational outcome

Astrid learned a lot about BSL3 organism and how to handle and package cultures under BSL3 conditions, as well as about the shipment of BSL3 organisms. She worked in a team and gained experience in leadership of technical personnel. Astrid had all these experiences before starting the fellowship.

5. Quality management

External quality control bacteriology (5 Cultures)

Supervisors: Silke F. Fischer

Twice a year, the bacteriological laboratory of the LGA participate at an external quality control from Institute for Standardization and Documentation in the Medical Laboratory (INSTAND). The laboratory has to identify five lyophilised bacteria and to perform the anti-susceptibility testing. The lyophilised bacteria include anaerobic, microaerophilic, and aerobic microorganisms. The task had to be solved within one week. The samples for the External Quality Control in February 2020 were originated from following materials: throat swab, bronchial secretion, wound after burn, blood culture and cervical smear.

Astrid analysed the samples in cooperation with a technical assistant. She performed literature review for difficult and rare strain (*Granulicatella adiacens* and *Weeksella virosa*) and evaluated the results from the biochemical analysis of the VITEK System.

Accreditation of the Quality Management System of the State Health Office Baden-Württemberg

Supervisors: Silke F. Fischer

The laboratory of the LGA has several departments and is accredited by the Deutsche Akkreditierungstelle (DAkKS), which is based in Berlin. The laboratory was visited by members of the DAkKS in 2020 in order to extend the accreditation. In advance of the accreditation, the members prepared several points out of the DIN/EN ISO 15189 and 17025. They had meetings to discuss the point and wrote a report for the quality manager in advance of the accreditation.

Astrid participated at the meetings in advance for the accreditation and wrote the final report for the department of bacteriology. She also created a summary of the points from all laboratories and sent them to the quality manager of LGA.

Internal Audit of the department Medicinal-chemical analytics (MedChem)

Supervisors: Guido Fischer

Once a year, every department of the LGA has to carry out an internal audit. This includes a protocol based on DIN EC ISO/IEC 17025 for non-medical, environmental analysis. For the audit of the MedChem department, the auditor has to follow a procedure described in the audit protocol and has to evaluate points from the DIN EN ISO/IEC 17025. The focus of the audit was on the areas of mycology: fungi identification and strain collection, as well as allergy diagnostics.

Astrid took on the role of the auditor and did the verification of the standards outlined in the DIN EC ISO/IEC 17025. She wrote the final report and performed a literature review. She dealt with the DIN EC ISO/IEC 17025

Training modules related to the assignment/projects

Biorisk and Quality Management Module – was cancelled but in advance of the module the fellows got a form in excel format to validate a laboratory of their choice (in the own department). This form included an evaluation protocol with regard to requirement from DIN e. g. documentation, management and quality control.

Educational outcome

During the EQA bacteriology Astrid gained experiences in laboratory test method validation and verification and learned about standards and guidelines read much about exotic bacteria. She learned to understand external quality assessment and the process of accreditation according to ISO standards.

6. Teaching and pedagogy

Workshop: Training for staff of tuberculosis care departments of the local health authorities in the topic of the diagnostic of tuberculosis and information about other mycobacteria

The tuberculosis laboratory offers twice per year a workshop for the employees of the tuberculosis care departments on the topic of Mycobacteria. This includes a theoretical an active part of the workshop. Astrid organised the workshop and developed training material (e. g. identification tests). She also developed the presentation about diagnostics of Mycobacteria, trained the participants theoretically and were present during the workshop in the lab in order to answer questions from the participants and explained the methods. The workshop took place at the LGA and lasted one day.

Training of students; module microbiological diagnostics in human medicine

Once a year, the LGA trains students as part of the module 'diagnostics in human medicine' which is based at University of Hohenheim, Germany, on the topic of microbiological diagnostics. The students took part in the module in all areas of the laboratory during the course of one week. Astrid developed a presentation about diagnostics of bacteria and held the theoretical education (1.5 hours). She participated in the practical part and explained the methods of diagnostics from bacteria. The lesson took place at the LGA and lasted one day.

Training modules related to the assignment/projects

EPIET/EUPHEM Introductory Course (IC) – Some of the lessons during the IC taught the students the principles of adult education. The fellow learned to select appropriate facilitation methods based on goals and audience.

Management, Leadership and Communication in Public Health (MLCP) – During the MLCP module, the fellow learned how to present to different types of stakeholders.

Educational outcome:

Astrid deepened her skills in outlining course objectives and developing curriculum and lectures. She also deepened her facilitating skills by giving lectures to adults and students. She learned how to gain and use feedback from participants.

7. Public health microbiology management

Organisation of Tuberculosis conference 'Quality management in the Tuberculosis care', 2019

Once a year the LGA organises a conference for the tuberculosis care departments of the local health authorities. This conference is a platform for the members of the tuberculosis care centres of Baden-Württemberg where they may discuss about cases or outbreaks. The event offers also the possibility of exchange among local health authorities. They get input about one topic from an external speaker. Also a report about news of the German central committee of tuberculosis (DZK) is done by a member of the DZK e. g. about news in therapy. The epidemiologists of the LGA give an overview about tuberculosis infections in Germany and the laboratory of LGA reports about interesting results in diagnostics. Before the conference local health authorities will be asked about topics they are interested in. A programme has to be developed, rooms should be booked and invitations has to be send to the participants. Astrid was responsible for the organisation of the conference. She developed the programme and invited the participants. She invited the external speaker and did the moderation of the second part of the conference.

24/7 on duty (telephone support for the local health authorities)

The LGA has established a 24-hour telephone support line for the local health authorities outside office hours. They get support on different topics e. g. for contact tracing or decision about isolation etc. during COVID-19 pandemic. The support centres is located in department 92 (Health Protection and Epidemiology). Employees of other departments are involved in the telephone support in order to have a 24/7 call centre. If local health authorities have questions about e. g. contact tracing or other professional issues they can call the telephone support. Astrid was available for telephone support to the local health authorities and was in charge of assessing assess the risk for infection in hospitals, nursing homes, people who came back from risk areas etc.

Training modules related to the assignment/projects

Management, Leadership and Communication in Public Health Module (MLCP) – as mentioned above during the MLCP module the fellows learned how to present to and how to communicate with different types of stakeholders.

Educational outcome

Astrid gained experience in communication to different stakeholders. The organisation of the Tuberculosis conference supported her by developing a public health learning event. During the on-duty telephone support for the local health authorities, she learned to keep up to date with current regulations and provide expert information on various public health topics.

8. Communication

Publications related to the EUPHEM fellowship

1. Kirch A, Göhring-Zwacka E, Kömpf D, Körber J, Fischer SF. Surveillance data showed a high infection rate of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* in people visiting the Sexual Transmitted Infection advice centers of Baden-Württemberg, Germany 2018-2019. EUROSURVEILLANCE (submitted)

Reports

1. SARS-CoV-2 diagnostic in the laboratory of the State Health Office of Baden-Württemberg, February 2020, Ministry of Health, Stuttgart, Germany
2. QuantiFERON® - GOLD Plus Test (QFT); investigation of school children after an active Tuberculosis (TB) case in a school class, September 2019, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
3. Organisation of TB diagnostic laboratory: a case report of mixed Mycobacterium tuberculosis population of a patient from Eastern Europe, December 2020, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
4. SARS-CoV-2 diagnostic in the laboratory of the State Health Office of Baden-Württemberg, February 2021, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
5. Diagnostics of Enterohemorrhagic Escherichia coli (EHEC) in the laboratory of the State Health Office Baden-Württemberg, March 2021, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
6. Cultivation, packaging and shipment of BSL3 pathogens, December 2019, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
7. External Quality Control Bacteriology (5 Cultures), February 2020, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
8. Accreditation of the Quality Management System of the State Health Office Baden-Württemberg, November 2019, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
9. Internal Audit of the department Medicinal-chemical analytics (MedChem), October 2020, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
10. Organisation of Tuberculosis conference 'Quality management in the Tuberculosis care' 2019, December 2019, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
11. 24/7 On duty (telephone support for the local Health Authorities), August 2020, State Health Office Baden-Wuerttemberg, Stuttgart, Germany

Conference presentations

1. Kirch A, Göhring-Zwacka E, Kömpf D, Körber J, Fischer SF. High infection rate of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* in people visiting the Sexual Transmitted Disease advice centres of Baden Württemberg, Germany 2018 2019, ESCAIDE 2020

Other presentations

1. **Tuberculosis conference for the health care institutions of Baden-Württemberg 'Quality management in the Tuberculosis care'**: Laboratory data for environmental testing in a school, December 2019
2. **Meeting of local health authorities at MoH**: SARS-CoV-2 diagnostic in the laboratory of the State Health Office Baden-Württemberg. February 2020
3. **Module of University Hohenheim: microbiological diagnostics in human medicine**: Diagnostics of microbiological infections, February 2020, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
4. **Workshop Tuberculosis care centers**: Mycobacteria and their diagnostics, October 2020, State Health Office Baden-Wuerttemberg, Stuttgart, Germany

5. **Basic course for hygienists:** Pests and nuisances in the hospital, January 2021, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
6. **Basic module for disinfectors:** Parasites, March 2021, State Health Office Baden-Wuerttemberg, Stuttgart, Germany
7. **Basic module for disinfectors:** Microbiological testing of disinfections, July 2021, State Health Office Baden-Wuerttemberg, Stuttgart, Germany

Other training modules

1. **Essentials of Writing and Reviewing Scientific Abstracts: a field epidemiology focus,** 11/08/2020; ECDC online
2. **Toxin laboratory network, Germany:** Training on RKI in-house sandwich ELISA for the detection of botulinum toxin, August 2021, online

9. EPIET/EUPHEM modules attended

3. **Introductory course,** 23 September 2019 – 11 October 2019, Spetses, Greece
4. **Outbreak investigation,** 9 December 2019 – 13 December 2019, Nicosia, Cyprus
5. **Management, Leadership and Communication in Public Health,** 10 February 2020 – 14 February 2020, Stockholm, Sweden
6. **Multivariable analysis,** 20 April 2020 – 24 April 2020, online
7. **Project review,** 24 August 2020, online
8. **Rapid Assessment and Survey Methods,** 27 April 2021 and 5 May 2021 – 6 May 2021, online
9. **Vaccinology,** 14 June 2021 – 18 June 2021, online

Discussion

Coordinator's conclusions

One of the main goals of the EUPHEM programme is to expose fellows to diverse and multidisciplinary public health experiences and activities, thus enabling them to work across different disciplines. This report summarises all activities and projects conducted by Astrid during her two-year EUPHEM fellowship (cohort 2019) as an MS-track fellow at the State Health Office Baden-Wuerttemberg in Stuttgart, Germany.

This portfolio demonstrates a diversity of public health microbiology projects. The epidemiological studies consisted of outbreak investigations (including a central role in the response to COVID-19 pandemic) to surveillance activities. The laboratory and epidemiologically-based projects covered all diverse range of disease programmes involving multidisciplinary working and teamwork on all levels, such as physicians, laboratory technicians, epidemiologists, statisticians, government officials, and public health officers, showing strength of Astrid and ability to work within such an extended environment(s). Astrid has shown a high capacity for public health management by working with an active role in interdisciplinary groups and bringing different professionals together. Activities were in line with the 'learning by doing' of the EUPHEM programme and fulfilled the core competency domains described for professionals in their mid-career and beyond. Activities were complimented by seven training modules providing theoretical knowledge. Projects had a clear outcome, with results communicated in scientific journals and at conferences. The contributions made by Astrid to LGA work indicates importance of developing a future critical mass of highly skilled field public health microbiologists within Member States to contribute towards national preparedness as well as being available for responses in the interest of the EU. Thus, the importance of this professional profile has undoubtedly been revealed during the COVID-19 pandemic. The EUPHEM Coordinator Team concludes that the fellow has succeeded in performing all her tasks to a very high standard and with a professional and critical attitude. We wish the fellow every success in her future career.

Supervisor's conclusions

Astrid Kirch started the EUPHEM programme as an already experienced microbiologist and bacteriologist. She combined routine laboratory activities with the expectations due to her fellowship. She was very focused on her different projects within the EUPHEM programme and interacted with multiple internal and external partners. She thereby augmented her knowledge in the field and expanded her width in departmental activities in the public health area. Astrid also built networks with other EUPHEM fellows and took part at international conferences. During the programme, she organised and guided specific meetings about tuberculosis. One of her focuses was on STD, and she recently submitted a paper in this field about *Chlamydia trachomatis* and *Neisseria gonorrhoeae* with recommendations about the procedure in this field.

Astrid had taken up the challenge to participate in the EUPHEM MS Track programme and managed this commendably. In all her activities, she established a good relationship with her supervisors and co-workers. I am very grateful that Astrid could join the EUPHEM programme and widen her professional horizon.

Personal conclusions of fellow

The European Public Health Microbiologist fellowship is a very good opportunity to develop and deepen skills in many disciplines. It is great for EUPHEM fellows to dive into the world of epidemiologists. One's view of things is detached from the daily laboratory routine and looked at with different eyes. Working in a BSL3 lab is a great way to expand laboratory knowledge alongside working in a regular BSL2 laboratory. The theoretical modules and the practical work at the institute are a good mix to apply the learned topics in practice. In addition, the contact with experts from different European countries was a wonderful opportunity to build networks that will last and be helpful for future tasks. Although it was not always easy to manage everyday life and the fellowship at the same time, I am glad that I had the opportunity to participate in this programme.

Acknowledgements of the fellow

I would like to thank my main supervisor Silke Fischer for giving me the opportunity to participate in this programme. For the great supervision I would like to thank my frontline coordinator, Silvia Herrera Leon, who patiently reviewed all the reports even though the work always came in clusters, and Aftab Jasir, who assisted me during the transition period. I would like to thank all the supervisors and colleagues for supporting my work during the two years and all fellows of my cohort for the great time and support during the modules, whether they were face-to-face or online. Last but not least, I would like to thank the organisers, facilitators, supervisors, and everyone who contributed to the success of the two-year programme.