



FELLOWSHIP REPORT

Summary of work activities

Delphine Perriat, PhD

Intervention Epidemiology path (EPIET)

Cohort 2018

Background

The ECDC Fellowship Training Programme includes two distinct curricular pathways: Intervention Epidemiology Training (EPIET) and Public Health Microbiology Training (EUPHEM). After the two-year training EPIET and EUPHEM graduates are considered experts in applying epidemiological or microbiological methods to provide evidence to guide public health interventions for communicable disease prevention and control.

Both curriculum paths are part of the ECDC fellowship programme that provides competency based training and practical experience using the 'learning by doing' approach in acknowledged training sites across the European Union (EU) and European Economic Area (EEA) Member States.

Intervention Epidemiology path (EPIET)

Field epidemiology aims to apply epidemiologic methods in day to day public health field conditions in order to generate new knowledge and scientific evidence for public health decision making. The context is often complex and difficult to control, which challenges study design and interpretation of study results. However, often in Public Health we lack the opportunity to perform controlled trials and we are faced with the need to design observational studies as best as we can. Field epidemiologists use epidemiology as a tool to design, evaluate or improve interventions to protect the health of a population.

The European Programme for Intervention Epidemiology Training (EPIET) was created in 1995. Its purpose is to create a network of highly trained field epidemiologists in the European Union, thereby strengthening the public health epidemiology workforce at Member State and EU/EEA level. Current EPIET alumni are providing expertise in response activities and strengthening capacity for communicable disease surveillance and control inside and beyond the EU. In 2006 EPIET was integrated into the core activities of ECDC.

The views expressed in this publication do not necessarily reflect the views of the European Centre for Disease Prevention and Control (ECDC).

This portfolio does not represent a diploma. Fellows receive a certificate acknowledging the 2-year training and listing the theoretical modules attended. Additionally, if all training objectives have been met, they receive a diploma.

Stockholm, July 2017

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The objectives of the ECDC Fellowship - EPIET path are:

- To strengthen the surveillance of infectious diseases and other public health issues in Member States and at EU level;
- To develop response capacity for effective field investigation and control at national and community level to meet public health threats;
- To develop a European network of public health epidemiologists who use standard methods and share common objectives;
- To contribute to the development of the community network for the surveillance and control of communicable diseases.

Fellows develop core competencies in field epidemiology mainly through project or activity work, but also partly through participation in training modules. Outputs are presented in accordance with the EPIET competency domains, as set out in the EPIET scientific guide¹.

Pre-fellowship short biography

Delphine Perriat completed a Master of Science in Biotechnology Engineering at the Polytech Marseille School of Engineering and a Master of Public Health at the Pasteur Institute in France. From 2014 to 2017, she worked as a PhD student in epidemiology. She integrated her research into the clinical study ANRS 12249 TasP, which resulted from a collaboration between the French University of Bordeaux and the Africa Health Research Institute (AHRI) in South Africa. The topic of her doctoral thesis was the integration and generalization of "Universal Test and Treat" strategies for HIV in sub-Saharan Africa. Delphine Perriat gained further experience in the field of public health during short missions as a field epidemiologist in Africa and South East Asia.

Fellowship assignment: Intervention Epidemiology path (EPIET)

On 11.09.2018, Delphine Perriat started her EPIET fellowship in the Department for Infectious Disease Epidemiology in the Governmental Institute of Public Health of Lower Saxony (Niedersächsisches Landesgesundheitsamt, NLGA) in Hannover, Germany. She was under the supervision of Dr Elke Mertens and Dr Johannes Dreesman. This report summarizes the work performed during the fellowship.

Fellowship portfolio

This portfolio presents a summary of all work activities (unless restricted due to confidentiality regulations) conducted by the fellow during the ECDC Fellowship, EPIET path. These activities include various projects, and theoretical training modules.

Projects included epidemiological contributions to public health event detection and investigation (surveillance and outbreaks); applied epidemiology field research; teaching epidemiology; summarising and communicating scientific evidence and activities with a specific epidemiology focus. The outcomes include publications, presentations, posters, reports and teaching materials prepared by the fellow.

This portfolio also includes a reflection from the fellow on the field epidemiology competencies developed during the 2-year training, a reflection from the supervisor on the added value of engaging in the training of the fellow, as well as a reflection by the programme coordinator on the development of the fellow's competencies.

¹ European Centre for Disease Prevention and Control. European public health training programme. Stockholm: ECDC; 2013. Available from: http://ecdc.europa.eu/en/epiet/Documents/Scientific%20guides/EPIET%20Scientific%20Guide_C2015.pdf

Fellowship projects

1. Surveillance

1.1. Implementing a whole genome sequencing-based surveillance of Carbapenem-resistant Acinetobacter spp. in Lower Saxony, Germany 2019-2020

Infections and colonizations with carbapenem-resistant pathogens, especially carbapenem-resistant *Acinetobacter* spp. are serious health problems in Germany. Although the number of registered cases has so far not increased in Lower Saxony, inquiries regarding the accumulation of *Acinetobacter* spp. infections and colonizations in medical facilities has increased. Avoiding infections is possible and especially important in medical facilities.

The aim of the surveillance system was to describe the molecular epidemiology of carbapenem-resistant *Acinetobacter* spp. (e.g. distribution and spread of the clones, outbreak detection), therefore providing evidence for future public health decision making.

We implemented a prospective whole genome sequencing-based sentinel surveillance system. Participants of the surveillance were all resident of Lower Saxony for which an infection or colonization with *Acinetobacter* spp., including carbapenem-resistant *Acinetobacter* spp. was identified, in one of the sentinel laboratories. Sentinel laboratories were laboratories known to perform microbiological diagnostics for around 70% of all hospitals in Lower Saxony. In the framework of the surveillance, they were requested to ship patient samples (e.g. blood, smear) to the public health institute of Lower Saxony (NLGA), and to complete a short questionnaire containing demographic and epidemiological data (e.g. risk factors, implemented measures). Samples were analysed using whole genome sequencing, and epidemiological data were described using R.

A one year pilot-phase was launched in September 2019. As of September 1, 2020, eleven patients infected with *Acinetobacter* spp. were included in the surveillance. The results of the pilot-phase will be available in October 2020.

Role and outputs: Delphine was co-principal investigator of the surveillance project. She was involved in designing the surveillance system. She wrote the study protocol and developed data collection tools (10), recruited the sentinel laboratories, coordinated the laboratory and epidemiological components and reported on the project progress, including to the nation public health institute (Robert Koch Institute, RKI) (oral presentation) (5).

Supervisors: Elke Mertens, Johannes Dreesman

1.2. Implementing surveillance for the COVID-19 pandemic, Lower Saxony, Germany 2020

The COVID-19 pandemic in Lower Saxony is part of the ongoing worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). On March 1, 2020, the first case in Lower Saxony was laboratory confirmed. The epidemic control is advised according to the German national pandemic plan by the federal public health institute of Lower Saxony (NLGA).

The aim of the surveillance system for COVID-19 is to monitor the pandemic situation, evaluate all available information, estimate the risk for the population in Lower Saxony, and provide health professionals and the general population with recommendations.

We supported the implementation of a surveillance system to respond to the COVID-19 pandemic in Lower Saxony. Laboratory-confirmed COVID-19 cases are requested to be notified to the local public health departments, in accordance with the German Protection against Infection Act (IfSG). The patient data (e.g. demographics, clinical data) are electronically recorded and transmitted, to the federal (NLGA) and to the national health authorities. The NLGA ensures

the coordination of the data collection and analyses the outbreak development locally. It works closely with health ministries and public health institutions of other German federal states to support the national outbreak response.

Since the beginning of the COVID-19 pandemic, the NLGA has been actively supporting the crisis response in Lower Saxony. As of September 1, 2020, 16, 837 laboratory confirmed cases and 660 deaths were reported. Regular data analysis and reporting have built up public health capacities, and enabled the NLGA to make a visible contribution to a timely crisis management

Role and outputs: Delphine co-led a 5-person team who ensured the management and analysis of the surveillance data for COVID-19 in Lower Saxony. The team supported the local health authorities in the pandemic management (e.g. wrote guides for contact tracing activities (20)), reported the surveillance data (e.g. daily report (11), weekly report (12), website (13)), and answered to data-related questions emerging from various institutions (e.g. Robert Koch Institute, ministries, media). Delphine also assisted the crisis management cell of the NLGA (e.g. provided epidemiological guidance for various projects and reported on the NLGA pandemic management in Lower Saxony to the Robert Koch Institute (oral presentation) (6)).

Supervisors: Elke Mertens, Johannes Dreesman

Competencies developed in Surveillance: Delphine set up a laboratory-based surveillance system for nosocomial infections, which makes use of whole genome sequencing. She supported the surveillance activities of the COVID-19 pandemic in Lower Saxony, in supervising data collection and analysis, and communicating results to support public health measures.

2. Outbreak investigations

2.1. Investigating a measles outbreak in a school, Lower Saxony, Germany 2018

Two measles cases were reported to the public health department of Harburg district of Lower Saxony, Germany on November 5, 2018. An outbreak control team (OCT) was put into place to carry out the case investigation, decide on control measures, and communicate with the public.

A suspected case was defined as a person presenting with measles-compatible symptoms, including a rash, and having had a possible contact with a confirmed case after October 11, 2018, in the Harburg district. A confirmed case was defined as a person for which the PCR (Polymerase Chain Reaction) test result for measles on a saliva swab was positive after the October 11, 2018, in the Harburg district. The OCT specifically looked for cases among people who were possibly in contact with the cases (e.g. household members, schoolmates) and sent a letter to general practitioners and hospitals, reminding them to notify any suspected measles case. Information was regularly shared among school staff and parents, and communicated to the local press. No analytical study was undergone.

During this outbreak investigation, two measles cases among siblings were laboratory confirmed. The outbreak officially started on October 26, 2018 (day of rash onset in the first case) and ended on November 27, 2018. The outbreak investigation suggested that the cases were imported from Ukraine. Cases were infected with a genotype D8 measles virus, which is involved in current measles outbreaks in Ukraine.

The OCT continuously communicated with the public at risk of infection (school staff and parents of children attending the schools of the two measles cases), the local medical professionals and the federal ministry of health. They decided on a series of control measures, including asking all school staff and children to provide a copy of their vaccination status, and asking them not to come to school if they were not immune until notice of the end of the outbreak. On November 13, 2018, a vaccination campaign was organized in the schools.

As Europe is facing major measles outbreaks, imported cases are likely to occur in Germany in the coming years, possibly leading to outbreaks among the non-immune population. This outbreak investigation highlights that efforts in improving the national routine vaccination coverage in Germany should be continued to prevent the accumulation of susceptible individuals and prevent the population from future outbreaks. However, the fact that no secondary cases occurred outside the affected family, indicates a sufficient vaccination coverage in the schools visited by the cases.

Role and outputs: Delphine Perriat was co-principal investigator of the outbreak. She took part in the field activities of the outbreak control team, including supporting the activities of verification of vaccination status among school children and staff, and choosing adequate control measures. She wrote an outbreak report (14).

Supervisors: Elke Mertens, Johannes Dreesman

2.2. Implementing a retrospective cohort study to investigate a foodborne norovirus- outbreak at a Christmas dinner, Lower Saxony, Germany 2018

A gastroenteritis outbreak was reported among 190 diners who attended the Christmas buffet of their company in a restaurant on December 17, 2018, in Lower Saxony, Germany. An epidemiological and laboratory investigation was initiated to describe the outbreak's extent, identify the pathogen and its modes of transmission, and determine risk factors.

We conducted a retrospective cohort study among diner attendees. We collected information on demographics, food items eaten at the dinner and use of toilets among all attendees, and information on disease onset and clinical manifestations among sick people, using a web-based questionnaire. A case was defined as a diner with acute onset of diarrhoea or vomiting 6 – 50 hours after starting eating in the Christmas diner. A non-case was defined as a diner who did not have any of the above symptoms. We calculated relative risks (RR) and attributable fractions (AF) for each exposure at the dinner buffet and developed a multivariate logistic regression model. Faecal samples of symptomatic exposed diners and restaurant staff were tested for potential pathogenic enteric bacteria and viruses. Norovirus was detected using reverse transcription polymerase chain reaction and sequence analysis.

From 190 dinner attendees, 122 participated in the cohort study (64%). Cohort participants had a median of 50 years old and 58% were males. Overall, 83/122 persons fell ill (attack rate 68%). Most persons had disease onset in the night from 16 to 17 December, indicating a likely point source, single exposure gastroenteritis outbreak. Several food items from the cold buffet were incriminated as responsible for the outbreak, including mozzarella, cheese specialities, roastbeef, ham, pork, salmon and shrimps (overall AF = 84%, RR = 6,4 [1,0-40]). Norovirus was detected and identified as GII.P16-GII.4.2016 in the faecal samples of 2/4 ill diners and 6/9 restaurant employees. Control measures comprised exclusion of norovirus-positive restaurant employees from work and disinfection of restaurant's kitchen.

Our investigation suggests that the etiologic agent of this outbreak was a recombinant strain of norovirus, which has been well-established in Germany since 2016. The likely vehicles of transmission/source of infection were norovirus-contaminated food items of the cold buffet. This outbreak highlights that strict personal hygiene and proper disinfection of environmental surfaces remain crucial to prevent norovirus transmission.

Role and outputs: Delphine was co-principal investigator of the epidemiological and laboratory investigations of the outbreak. She designed a web-based questionnaire with which she collected information among diner attendees. She described the outbreak extent and determined risk factors (multivariate logistic regression). She was involved in communicating the outbreak investigation results to the local public health districts and providing infection control measures. She wrote an outbreak report (15) and presented the results of the outbreak investigation at the international ESCAIDE conference in 2019 (poster presentation) (2).

Supervisors: Elke Mertens, Johannes Dreesman

Competencies developed in outbreak investigation: Delphine conducted the ten steps of an outbreak investigation, including determining the existence of an outbreak, conducting an analytical study and communicating the findings.

3. Applied epidemiology research

3.1. *Deploying an online access panel as a control group for case-control studies in the investigation of gastrointestinal outbreaks, Lower Saxony, Germany 2018*

In outbreaks, established methods of recruiting population controls for case-control studies can be time consuming, and often such studies are not conducted, though indicated. We explored the feasibility and reliability of using an online panel as a control group in case-control studies to investigate foodborne outbreaks, in Lower Saxony, Germany.

We deployed a web-survey by email to all 277 members of a non-probabilistic access panel from Lower Saxony in 2019. We investigated the representativeness of the panel for Lower Saxony concerning basic socio-demographic characteristics. We compared responses of the panel members with responses of controls from four case-control studies that investigated foodborne outbreaks in Germany between 2003 and 2017. We tested hypotheses of identifying the same food items associated with the outbreak disease using odds ratios (ORs).

Overall 203/277 (73%) panel members answered the survey, 132/203 (65%) within a week. There were statistically significant differences in the distribution of socio-demographic characteristics between the panel members and the population of Lower Saxony. In three studies, the ORs of the food items associated with the diseases in the historical case-control studies were similar to the ORs when using the panel as a control group. In the fourth study, the source of the outbreak was related to a specific time and geographical location.

Using a non-probabilistic panel as a control group in case-control studies gave similar results as using randomly selected controls. It successfully identified the likely source of three historical outbreaks, despite the lack of representativeness. Public health professionals should be encouraged to consider recruiting controls in access panels for future investigations. We recommend the further evaluation of this approach in parallel case-control and case-panel studies.

Role and outputs: Delphine Perriat was the co-principal investigator of the research project. She participated in the project design, wrote the study protocol and designed the data collection tools (16). She collected and analyzed the data. She presented the results at the national public health institute (Robert Koch Institute, RKI) (oral presentation) (7), and at the international ESCAIDE conference 2019 (poster presentation) (3), published the results in the yearly NLGA report (17) and submitted an article to a peer-review journal (1).

Supervisors: Elke Mertens, Johannes Dreesman

3.2. *Molecular epidemiology and risk factors for Enterohemorrhagic Escherichia coli (EHEC) in Cuxhaven, Lower Saxony, Germany 2019*

Enterohemorrhagic Escherichia coli (EHEC) strains are an important cause of morbidity and mortality in Germany. Yet data on risk factors for EHEC infections and on clustering of sporadic cases are scarce. In recent years, the German district of Cuxhaven has reported a higher EHEC incidence than other districts. A better understanding of the EHEC strains that are responsible for human infection, as well as the risk factors for sporadic and clustered EHEC infections are needed to understand the transmission chains, detect outbreak and inform public health measures. The aim of the study was to describe the morbidity and mortality associated with the EHEC strains, identify molecularly linked EHEC clusters and outbreaks and investigate risk factors for EHEC infection in the Cuxhaven district.

We implemented a prospective explorative qualitative study among all EHEC cases occurring in Cuxhaven. A case was defined as a clinical-epidemiologically confirmed EHEC infection or laboratory confirmed EHEC. Each case provided a stool sample to be analyzed with whole genome sequencing, and underwent a 30 minutes interview to identify possible risk factors. Environment samples e.g. soil were taken from likely sources of exposure to look for EHEC contamination, and analysed using whole genome sequencing. Possible phylogenetic relationships between human and environmental EHEC isolates were analysed using a core genome multilocus typing (cgMLST) scheme.

The research project was launched in January 2019. As of September 1, 2020, one EHEC case was included in the project.

Role and outputs: Delphine was co-principal investigator of this multi-disciplinary research project. She wrote the study protocol and designed the data collection tools (guide for qualitative interview, quantitative questionnaire, laboratory sample forms, and laboratory Standard Operating Procedures (18)).

Supervisors: Elke Mertens, Johannes Dreesman

3.3. COVID-19: Knowledge, attitudes, and practices (KAP): a cross-sectional survey in Lower Saxony, Germany, 2020

A clear understanding of the population's knowledge, attitudes and practices (KAP) regarding COVID-19 is key to ensure adherence to the unprecedented public health measures. We aimed to assess the KAP in Lower Saxony, Germany, and establish a baseline for future local assessments.

We conducted a cross-sectional KAP online-survey among 273 members of a non-probabilistic panel, after the first outbreak peak (May 2020). Questions on knowledge, risk perceptions, coping strategies and trust were scored using Likert scales and analysed with descriptive statistics.

Overall 183/273 (67%) panel members answered the survey. They were on average higher educated than the general population of Lower Saxony. A vast majority felt well informed about the virus (84%). Most reported that they could protect themselves from an infection (65%) but considered a potential infection dangerous for themselves (53%). Most took appropriate individual measures (e.g. reducing non-necessary travel (90%), wearing a mask (66%)). There was a high level of acceptance for almost all government measures (e.g. cancellation of public events (96%), quarantine measures for contact persons (95%)). Only the precautionary reduction of social contacts was largely considered as inappropriate (83%), and emotionally affected respondents (63%). The panel participants highly trusted medical and political authorities in the pandemic management (e.g. family doctor (93%), local public health institute (92%)).

The study shows good knowledge, assertive attitudes and appropriate practices related to COVID-19 among the panel participants, and reveals how much of a burden the reduction of social contacts is. As social distancing is essential to slow down the pandemic, health authorities should strive to encourage people to take notice of it. Future KAP studies will be helpful to adjust local public health communication.

Role and outputs: Delphine was the principal investigator of this research project. She communicated the results to the Ministry of Health (oral presentation) (8) and submitted an abstract for the ESCAIDE conference 2020 (4).

Supervisors: Elke Mertens, Johannes Dreesman

Competencies developed in applied epidemiology research: Delphine framed research questions, outlined analysis plans, prepared data collection instruments and supervised data collection. She analysed the data and proposed recommendations for public health use and supported the development of further research.

4. Communication

Delphine communicated the results of her projects internationally (an article published in a peer review journal, two poster presentations in the international ESCAIDE conference). She held a number of oral presentations and wrote a variety of scientific reports (e.g. study protocols, study reports) for diverse audiences (e.g. national public health institute, health ministry, project partners) in German and English.

Manuscripts submitted to peer reviewed journals

1. D. Perriat, E. Mertens, M. Mylius, J. Dreesman, 2020. Use of an online panel as a control group for case-control studies to investigate food-borne outbreaks: the Hygiene and Health Online Survey (HuGO) group (work in progress)

International conferences

Poster presentations

2. D. Perriat, J. Dreesman, K. Beyer, K. Meyer-Schlinkman, S. Rettenbacher-Riefler, A. Baillot, K. Claußen, S. Niendorf, E. Mertens, 2019. Cracking the case: how local public health professionals unravel a foodborne norovirus outbreak in less than a week using a websurvey, ESCAIDE Conference, 27-29 November 2019, Stockholm, Sweden
3. D. Perriat, E. Mertens, M. Mylius, J. Dreesman, 2019. Deploying an online access panel as a control group for case-control studies in the investigation of gastrointestinal outbreaks: early experiences from Germany ESCAIDE Conference, 27-29 November 2019, Stockholm, Sweden

Other submitted Abstracts

4. D. Perriat, K. Hille, E. Mertens, J. Dreesman, 2020. Knowledge, attitudes, and practices (KAP) towards COVID-19: a cross-sectional survey in Lower Saxony, Germany, 2020, ESCAIDE Conference, 2020

Oral presentations (e.g. health ministry, national public health institute, project partners, NLGA)

5. D. Perriat, S. Roth, M. Scharlach, K. Beyrer, J. Dreesman, E. Mertens, 2019. Molecular surveillance of Carbapenem-resistant Acinetobacter spp, Lower Saxony, Germany: setting up the surveillance (German)
6. D. Perriat, K. Hille, M. Hoopmann, I. Holle, S. Heidrich, J. Dreesman, E. Mertens, 2020. Coronavirus Disease 2019 (COVID-19) Outbreak Management at the NLGA (German)
7. D. Perriat, E. Mertens, M. Mylius, J. Dreesman, 2019. Deploying an online access panel as a control group for case-control studies in the investigation of gastrointestinal outbreaks (German)
8. COVID-19: Monitoring knowledge, risk perception, coping strategies and public trust using an online access panel in Lower Saxony, Germany, 2020 (German)
9. D. Perriat, 2020. A GOARN mission to support the WHO response to the Ebola outbreak in the Democratic Republic of the Congo (German)

Scientific reports (e.g. study protocols, study reports)

10. D. Perriat, S. Roth, M. Scharlach, K. Beyrer, J. Dreesman, E. Mertens, 2019. Molecular surveillance of Carbapenem-resistant Acinetobacter spp, Lower Saxony, Germany: setting up the surveillance (German)

11. D. Perriat, K. Hille, M. Hoopmann, I. Holle, S. Heidrich, J. Dreesman, E. Mertens, 2020. Daily Coronavirus Disease 2019 Management Report (COVID-19) Outbreak (German)
12. D. Perriat, K. Hille, M. Hoopmann, I. Holle, S. Heidrich, J. Dreesman, E. Mertens, 2020. Weekly Coronavirus Disease 2019 Management Report (COVID-19) Outbreak (German)
13. D. Perriat, T. Hurtig, K. Hille, M. Hoopmann, I. Holle, S. Heidrich, J. Dreesman, E. Mertens, 2020. Daily updated website on the Coronavirus Disease 2019 (COVID-19) Outbreak on Lower Saxony (German) (5)
14. D. Perriat, A. Schweminn, J. Dreesman, E. Mertens, 2019. Report of a measles outbreak among two children, Harburg district, Lower Saxony federal state, Germany (English)
15. D. Perriat, J. Dreesman, K. Beyer, K. Meyer-Schlinkman, S. Rettenbacher-Riefler, A. Baillot, K. Claußen, S. Niendorf, E. Mertens, 2019. Foodborne norovirus outbreak in a Christmas dinner, Germany 2018: a retrospective cohort study (English)
16. D. Perriat, E. Mertens, M. Mylius, J. Dreesman, 2019. Use of an online panel as a control group for case-control studies to investigate food-borne outbreaks: the Hygiene and Health Online Survey (HuGO) group (German)
17. D. Perriat, E. Mertens, M. Mylius, J. Dreesman, 2019. Use of an online panel as a control group for case-control studies to investigate food-borne outbreaks: the Hygiene and Health Online Survey (HuGO) group (German)
18. D. Perriat, A. Mazick, J. Dreesman, E. Mertens, 2019. Risk factors for Enterohemorrhagic Escherichia coli (EHEC) infections in Cuxhaven, Lower Saxony, Germany (German)
19. D. Perriat, Marie-Amélie Degail-Chabrat, Brett Archer, 2019. Report of the GOARN mission to support the WHO response to the Ebola outbreak in the Democratic Republic of the Congo (English)

Teaching

20. D. Perriat, K. Beyrer, Masyar Monazahian, C. Zühlke, E. Mertens, J. Dreesman, 2020. Training of contact person tracking teams in Lower Saxony (German)
21. D. Perriat, 2019. Foodborne associated norovirus outbreak in a Christmas dinner, Germany 2018: a retrospective cohort study (English)
22. D. Perriat, 2019. Be brave and conduct qualitative research (English)
23. D. Perriat, 2019. Use of online surveys by the public health service, e.g. during outbreak investigations (German)
24. D. Perriat, J. Dreesman, E. Mertens, 2019. Case study: Management of a nosocomial outbreak (German)

5. Teaching activities

Delphine gave three interactive lectures: two for EPIET fellows and one to the local public health agency staff. She prepared a case study for hygiene hospital medical doctors.

5.1. Investigating a foodborne outbreak in a Christmas dinner using a retrospective cohort study

In the framework of the Multivariable Analysis Module 2019 of the EPIET fellowship, Delphine gave a 15-minute-lecture to the EPIET fellows on the investigation of a foodborne outbreak at a Christmas dinner using a retrospective cohort study (21). The lecture included interactive questions using Mentimeter (<https://www.mentimeter.com/>)

Supervisors: Elke Mertens, Johannes Dreesman

5.2. Be brave and conduct qualitative research

In the framework of the webinars of the EPIET fellowship, Delphine gave a 20-minute-webinar on the use of qualitative methods in field epidemiology (22). She taught the theory of qualitative methods in research, gave examples of real-life work and engaged the EPIET fellows in practical exercises.

Supervisors: Elke Mertens, Johannes Dreesman

5.3. Use of online surveys by the public health service, e.g. in outbreak investigations

In the framework of the regular training offered to the local public health authority staff, Delphine prepared the teaching plan and content (23). She gave a 15-minute-lecture on the use of online survey tools in the public health service. The lecture included interactive questions using Lamapoll® (<https://www.lamapoll.de/>) and was evaluated using a standard form.

Supervisors: Elke Mertens, Johannes Dreesman

5.4. Case study: Management of a nosocomial outbreak

In the framework of a one-week-training for medical doctors on hygiene practices in the hospital setting, Delphine prepared the plan of a teaching session and the content of a 45 minute-case-study on the management of a nosocomial outbreak (24). The objective of the case study was to understand the role of medical doctors in outbreak management in a hospital setting, and to get familiar with the basic descriptive epidemiology tools.

Supervisors: Elke Mertens, Johannes Dreesman

Competencies developed in teaching: Delphine identified learning objectives and prepared material for lectures, webinars and case studies. She taught students and public health professionals, in German and English, and used online tools to make the learning experiences interactive.

6. Other activities

6.1. *International Mission*

Delphine deployed through the Global Outbreak Alert and Response Network (GOARN) to support the Health Information Management team for Ebola Virus Disease, at the World Health Organization headquarters in Geneva from September 16 to October 25, 2020. She wrote a mission report (19) and presented the results of her work to the NLGA staff (9).

6.2. *Routine surveillance*

Delphine was involved in the routine surveillance activities of the Infectious Disease Epidemiology team. She regularly analysed the trends of notifiable disease reported cases, and provided the local health districts with data according to their needs. She attended the regular and theme-specific meetings during which the German states update each other on epidemiological matters.

She participated in the health prevention work of the NLGA during the three-day public event "Days of Lower Saxony" that welcomed over 300.000 visitors. She provided advice on the prevention of tick-borne infections and recruited participants for the online access panel (see section 3.1)

She was involved in the investigation of a potential tick-borne encephalitis infection (informal patient interview, collection of ticks in the potential exposure to tick locations, laboratory analysis of the infections carried by the collected ticks).

7. EPIET/EUPHEM modules attended

1. Introductory Course, 24/09/2018-12/10/2018, Spetses, Greece
2. Outbreak investigation, 03/12/2018-07/12/2018, Berlin, Germany
3. Multivariable Analysis, 25/03/2019-29/03/2019, Madrid, Spain
4. Rapid Assessment and Survey Methods, 13/05/2019-18/05/2019, Zagreb, Croatia
5. Project Review 2019, 26/08/2019-30/08/2019, Prague, Czech Republic
6. Time Series Analysis, 04/11/2019-08/11/2019, Utrecht, the Netherlands
7. Vaccinology, online, 04/05-24/06/2020: Pasteur Institute + National Institute for Public Health and the Environment Ministry of Health, Welfare and Sport, the Netherlands (RIVM)
8. Project Review 2020, online, 24/08/2020-27/08/2020

Supervisor's conclusions

The contents of Delphine's fellowship and her professional development are well described in her Fellowship report.

Delphine is a team player with excellent professional and organizational skills. It was a pleasure to have her in our team. Delphine worked independently and was a most reliable fellow. During her fellowship at the Governmental Institute of Public Health of Lower Saxony (NLGA) I recognized Delphine as a highly motivated and talented young woman. I firmly believe that she will be successful in whatever she pursues.

Delphine started her fellowship already highly qualified, with a sound scientific and methodological basis as well as very helpful work experience. She familiarised herself quickly with new topics and used the opportunities at the NLGA, RKI and EPIET network to work with and talk to experts, in order to broaden her knowledge and her skills. Delphine has shown the ability to explain complex concepts clearly to different audiences. She was eager to learn and had a genuine interest in interdisciplinary collaboration. Using her excellent communication skills, she motivated all colleagues and fostered constructive teamwork as well as sound outcomes.

Delphine was highly respected by all leaders and colleagues at NLGA. We are very pleased that Delphine will support us, after her EPIET fellowship, as senior epidemiologist in the fields of routine surveillance and pandemic response.

Coordinator's conclusions

Delphine started her fellowship with strong public health research background, and she had conducted work in international health. During the two fellowship years, she was involved in five field assignments in the surveillance and research area, along with two outbreak investigations, including two projects related to the COVID-19 pandemic. Through her knowledge and experience from applied research, technical skills and a high commitment, she has completed all of these, achieving the EPIET objectives. Her teaching of fellow-colleagues and in the public health institute had been also highly appreciated.

She is highly skilled, able to work independently, with strong interpersonal skills. Supported by excellent supervision at the site, her fellowship has been very successful. She improved her competencies working with several public health topics, also using novel methods like setting-up laboratory based surveillance system and use of a panel in outbreak investigations. I believe that Delphine has all professional, technical, and soft skills needed for epidemiological and public health related work.

Personal conclusions of fellow

The EPIET fellowship provided me with a structured training in which I learned and applied a range of state-of-the-art epidemiological methods. Among others, I set up a surveillance system for nosocomial infections and used advanced statistics in outbreak investigations, therefore bringing a valuable contribution to the German health system in which I was immersed.

Throughout the fellowship, I benefited from the constructive feedback and thoughtful support of the EPIET/EUPHEM network. I felt privileged to enter into this group of highly trained field epidemiologists and microbiologists. I share their ambition of conducting interdisciplinary and public health-relevant scientific work. It inspires me to contribute to knowledge transfer and capacity building in Europe and beyond.

Finally, being an EPIET fellow empowered me to sharpen my critical thinking and broaden my perspectives, to look forward innovative public health policies. Being involved in the response to the COVID-19 pandemic boosted me to advocate for a closer and stronger European collaboration, able to tackle the unprecedented challenges to come.

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