EPIET & EUPHEM

Summary of work activities

Ida Sperle-Heupel

The ECDC Fellowship Programme
Field Epidemiology path (EPIET), 2020 cohort

Background

The ECDC Fellowship Programme is a two-year competency-based training with two paths: the field epidemiology path (EPIET) and the public health microbiology path (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 provide training and practical experience using the 'learning by doing' approach in acknowledged training sites across European Union (EU) and European Economic Area (EEA) Member States.

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'. ECDC therefore 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 Ida Sperle-Heupel, cohort 2020 of the Intervention Epidemiology path (EPIET) at the Robert Koch Institute.

Pre-fellowship short biography

Ida Sperle-Heupel has a Bachelor's and Master's (2013) degree in Public Health from the University of Copenhagen, Denmark. After finishing her studies, she worked with viral hepatitis and HIV at CHIP, Centre of Excellence for Health, Immunity and Infections (2013-2017) in Copenhagen. In 2017, she started working at the Robert Koch Institute in the unit for HIV/AIDS, STIs and blood-borne infections where she worked as an epidemiologist. Before starting in the EPIET Programme, she also began a doctoral thesis at the Charité, University

Stockholm, October 2022

Medicine, Berlin, on the topic of viral hepatitis burden in Europe and how to collect better data to monitor and guide elimination efforts.

Methods

This report accompanies a portfolio that demonstrates the competencies acquired during the EPIET fellowship by working on various projects, activities 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. The portfolio presents a summary of all work activities conducted by the fellow, unless prohibited due to confidentiality regulations.

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 EPIET core competencies, as set out in the ECDC Fellowship Manual[1].

1. Epidemiological investigations

Outbreak investigations

1.1 Cross-border outbreak of Listeria monocytogenes in Austria, Denmark, Germany, and Switzerland linked to smoked trout, 2020

Supervisors: Dr Hendrik Wilking, Dr Raskit Lachmann, Alexandra Holzer

In October 2020 a new molecular cluster type (13516 and 14488) of *L. monocytogenes* was detected through whole genome sequencing of human isolates at the RKI reference laboratory. Invasive listeriosis is a serious food-borne infection which causes severe disease in susceptible populations, including people of older age, with weakened immune systems and pregnant women. Although listeria is a relatively rare disease, the high case-fatality makes it a serious public health concern.

We investigated the outbreak, and through exchange of genome sequences via the Epidemic Intelligence Information System discovered a cross-border outbreak involving also Austria, Denmark and Switzerland. We defined confirmed cases as individuals notified with laboratory confirmed listeriosis and identification of the cg MLST (13516 or 14488) with disease onset from September 2020. Cases were interviewed about food consumption and microbiological investigations were conducted in Austria and Germany.

There were 60 notified cases in the four affected countries (Austria: 2, Denmark: 2, Germany: 55, Switzerland: 1), of which 21 (38%) were female. The median age was 80 years (range: 0-93). Three cases were reported as deceased. Two cases were pregnancy-associated, of which one was a newborn with sepsis and meningitis. Sixteen of 19 interviewed cases (84%) reported having eaten smoked trout. Microbiological investigations identified *L. monocytogenes* matching the cluster in smoked trout from Brand A. Investigations at the processing facility of Brand A in Denmark identified *L. monocytogenes*, but it did not belong to this cluster, and the source of contamination was not found. We concluded that the smoked trout from Brand A was the probable vehicle of the outbreak: it was publicly recalled, and the Danish Food Authorities increased control in the trout processing facility. This outbreak highlighted the importance of timely molecular surveillance and multi-national cooperation to efficiently respond to cross-border outbreaks.

Role: Ida investigated this outbreak following the 10 classical steps of an outbreak investigation. She also carried out the majority of the case interviews, adapted the questionnaire, and performed data entry and analysis. Ida wrote the outbreak report [5] under the supervision of Raskit Lachmann, Hendrik Wilking, and Alexandra Holzer, and also submitted and presented (as a poster) an abstract to ESCAIDE 2021 [12]. Ida also co-authored a manuscript submitted to a peer-reviewed journal as shared first author [4].

1.2 COVID-19 outbreak in a long-term facility care, Schleswig-Holstein, Germany, June 2021

[1] European Centre for Disease Prevention and Control. European public health training programme. Stockholm: ECDC; 2020. Available from: https://www.ecdc.europa.eu/en/publications-data/ecdc-fellowship-programme-manual-cohort-2021

Supervisors: Dr Wiebke Hellenbrand, Dr Viktoria Schönfeld and Dr Thomas Harder

In June 2021 we investigated an ongoing SARS-CoV-2 outbreak in a long-term care facility (LTCF) in Dithmarschen, Schleswig-Holstein, Germany, and conducted a retrospective cohort study. A case was defined as a person who tested SARS-CoV-2 positive (with PCR) between 1 April 2021 and 23 June 2021 (the day the outbreak was declared over) and who was either a staff member or resident in this facility. We collected data on potential risk factors for COVID-19, including age, vaccination status, and pre-existing medical condition. We performed statistical analyses to identify significant risk factors for SARS-CoV-2 infection and calculated vaccine effectiveness (VE) estimates.

There were 40 staff and 53 residents in the LTCF, of which 70.8% were fully vaccinated. The residents had a high mean age (83 years) and nearly all suffered from one or more pre-existing conditions (98.0%). In total, 40 cases were identified (AR: 43.0%), including 24 with symptomatic infection (25.8%), nine hospitalisations (9.7%), and five deaths (5.4%). The alpha variant (B.1.1.7) was detected in 19 (79.2%) of 24 sequenced blood samples.

The entry of SARS-CoV-2 into the facility most likely occurred via unvaccinated staff, and subsequently spread to both vaccinated and unvaccinated people. Due to the small cohort size, we only conducted univariable analyses. Among staff, vaccination status (fully vaccinated) was significantly and negatively associated with SARS-CoV-2 infection, while work involving direct contact with residents was positively associated with a SARS-CoV-2 infection (but not significant). We were unable to demonstrate significant associations with other factors or among residents. The crude VE for protection against infection was 76% (95% CI: 32%-91%) for staff.

Vaccination of staff in LTCF is essential to prevent entry and spread of SARS-CoV-2. Upon first detection of a case in LTCF, control measures including additional hygiene measures and more frequent testing are essential.

Role: Ida investigated this outbreak following the 10 classical steps of an outbreak investigation. She went to the local public health authority in Dithmarschen as part of the outbreak investigation team, and performed the data collection and analysis under the supervision of Wiebke Hellenbrand, Viktoria Schönfeld, and Thomas Harder. Ida wrote the outbreak report [6] and is also first author of a manuscript published in the RKI internal journal EpiBull [1].

Training modules related to assignment/projects

EPIET Introductory Course: Ida was introduced to the basic principles, including the classical 10 steps, which were applied when conducting the two outbreak investigations. She was also introduced to the importance of microbiology in surveillance, which was exemplified by the detection of the cross-border listeriosis outbreak.

Outbreak Investigation Module: Ida received more in-depth training about outbreak investigations, including developing a good case definition, dealing with time in statistical analyses, and further knowledge on statistical analyses relevant for outbreak investigations, which was particularly helpful for the SARS-CoV-2 outbreak investigation.

Multivariable Analysis Module: The module was helpful when conducting the analyses for the outbreak investigation in the long-term care facility. More information on different regression analyses and types of outputs, as well as how to control for potential confounders, was useful.

Educational outcome

Prior to the EPIET fellowship, Ida did not have any practical experience with outbreak investigations. For the listeriosis outbreak, Ida learned about the importance of collaboration with the laboratory, and usefulness of whole genome sequencing to identify and stop outbreaks. Further, Ida also learned the importance of cross-border collaboration and communication, and how crucial it is to maintain non-pharmaceutical interventions in vulnerable settings despite COVID-19 vaccination to prevent and stop SARS-CoV-2 outbreaks.

2. Surveillance

2.1 Indicator-based surveillance of Shigellosis in Germany (2020-2022)

Supervisors: Dr Bettina Rosner

Ida was responsible for the surveillance of Shigellosis notifications in Germany during the fellowship and performed weekly review of the national surveillance data with focus on time, place and person. Ida was the primary contact person for any questions regarding Shigellosis either within the RKI or externally and from international partners such as ECDC. Routine tasks included checks of data to be uploaded to TESSy (ECDC) and writing up the Shigellosis chapters for the annual infectious disease report on notifiable diseases in Germany for 2020 and 2021 [7,8]. Ida also provided information and data for the WHO Euro Disease Outbreak News concerning extensively drug-resistant *Shigella sonnei* infections in Europe.

2.2 COVID-19: Cross-border contact tracing in Germany, 2020

Supervisors: Inessa Markus, Timm Schneider and Dr Maria an der Heiden

Interruption of transmission chains has been crucial in the COVID-19 response. The Emergency Operations Centre (EOC) at the RKI coordinated cross-border case and contact tracing activities at national level by sharing data with German public health authorities (PHA) and other countries. These data were not collected in the national surveillance system, and thus challenging to quantify. The project's aim was to describe cross-border COVID-19 case and contact tracing activities and to identify lessons learned by PHA.

Case and contact tracing events were recorded using unique identifiers. We collected data on cases, contacts, dates of exposure and/or SARS-CoV-2 positive test results and exposure setting. We performed descriptive analyses of events from 6 April to 31 December 2020. We conducted interviews with PHA to understand experiences and lessons learned, applying a qualitative thematic analysis approach.

In total, 7 527 cross-border COVID-19 case and contact tracing events were collected. Among these, Germany initiated communication 5 200 times. Communication from other countries was most frequently initiated by Austria (n=1 184, 50.9%) and Switzerland (n=338, 14.5%). Overall, 3 719 events (49.4%) included information on 5 757 cases (median 1, range: 1-42), and 4 114 events (54.7%) included information on 13 737 contacts (median: 1, range: 1-1 872). The most frequent setting of exposure (available for 54.6% of the events) included private gatherings (35.2%), flights (24.1%), and work-related meetings (20.3%). The median time delay between date of exposure and contact information reporting to RKI was five days, and between positive test result and information of cases three days. The main challenges identified through interviews were missing or delayed accessibility to data, particularly from flights, and the lack of clear and easy to use communication channels. More and better trained staff were suggested for improving pandemic response preparedness.

Cross-border case and contact tracing data can supplement national surveillance. We need improved systems for cross-border event management to allow efficient communication in order to guide public health action.

Role: Ida wrote the study protocol, conducted data extraction (including coordination of the team assisting with data extraction), and analysed the data. She also developed the interview guide, and conducted interviews with local PHA in Germany. She transcribed and analysed the qualitative data. Ida submitted and presented (as a poster) an abstract to ESCAIDE 2021 [12], and the German conference BVÖGD [14]. She also wrote the manuscript that was submitted to BMC Public Health [2].

Training modules related to assignment/projects

EPIET Introductory Course: Principles of public health surveillance and elements of case definitions were helpful in identifying and specifying a surveillance project. COVID-19 contact tracing and surveillance lectures also provided a good baseline for initiating the COVID-19 contact tracing project.

Multivariable analysis: The multivariable analysis module further strengthened the analytical skills and data handling, which was useful in the above-mentioned projects, in particular MVA using surveillance data.

Educational outcome

Ida learned how the surveillance system in Germany is built up, particularly for shigellosis and COVID-19, and the associated strengths and challenges. The importance of timely notification, data completeness, and the ability to detect outbreaks was exemplified. Ida learned how to review, understand, and use different data sources in public health planning and response. She also gained experience with data reporting at the EU level, and with WHO Europe collaborations. The COVID-19 contact tracing project allowed her to practice on working with a large dataset not originally designed for data analysis to transform it for research purposes.

3. Applied public health research

Protective Hepatitis B vaccination series and serologic prevalence of vaccine derived Hepatitis B anti-bodies in children and adolescents in Germany aged 3-17 years, 2014-2017: Results from the second wave of the German Health Interview and Examination Survey (KiGGS)

Supervisors: Dr Thomas Harder, Dr Sandra Dudareva, Dr Christina Poethko-Mueller and Sofie Gillesberg Raiser

An effective vaccine against the hepatitis B virus (HBV) has existed since 1982, and is a key tool for most countries to reduce the burden of hepatitis B. In Germany, vaccination against HBV has been recommended to all infants, children and adolescents since 1995 as outlined by the German Standing Committee on Vaccination (STIKO). The vaccine has proved to be an important intervention, but the exact duration of hepatitis B protection after childhood immunisation remains unclear. Data from the second wave of the population-based German Health Interview and Examination Survey for Children and Adolescents (KiGGS Wave 2; 2014-2017) include information on both HBV vaccinations given as well as the hepatitis B vaccination-induced anti-bodies (anti-HBs) titre at the time of the study examination. Our overall aim was to estimate the prevalence and level of anti-HBs among vaccinated children and adolescents (aged 3-17 years) who took part in KiGGs Wave 2 from 2014-2017 in Germany. Further, we wanted to assess if those with four doses of polyvalent vaccine or those who have received a protective series of HBV vaccination have a measurable higher level of anti-HBs compared to participants with three doses or

without a protective series. In our study, which included 2,489 children and adolescents from Germany, we found that the estimated weighted proportion of vaccinated children and adolescents with anti-HBs levels were relatively similar in the three anti-HBs groups (<10 IU/ml, ≥10 IU/ml and ≥100 IU/ml), but with slightly more in the <10 IU/ml group (38.0% [95%CI 35.7-40.4%]) than the ≥100 IU/ml group (26.4% [95%CI 24.5-28.4%], respectively. We were unable to confirm the association of protective series and three versus four doses in our analyses, and found that the titre is strongly associated with time since the last dose.

Role: Ida wrote the study protocol, and carried out the statistical analyses. She also wrote up the results, and submitted an abstract and presented (poster) at the viral hepatitis elimination meeting 2022 [13]. Ida also wrote up a manuscript as first author, which will be submitted to a peer-reviewed journal [3].

Training modules related to assignment/projects

EPIET introductory course: The course refreshed knowledge about different study designs and their strengths and weaknesses. Moreover, information on different measures of association and how to identify confounding or effect mediation was introduced. Further, the basics of operational research were presented, which provided a strong foundation for initiating this research project.

Multivariable analysis module: The module refreshed knowledge about the different analytical approaches, and which are most suitable for which data types. Knowledge on how to identify potential confounders or effect modifiers helped in this research project.

Vaccination module: The module provided useful insights into the biological mechanisms behind vaccination and immunity, as well as public health implications. The biological background, including what measures to look at when looking into vaccination and public health impact, was useful for this research study.

Educational outcome:

The work on this research project allowed Ida to develop general knowledge about vaccination, and hepatitis B vaccination in particular. Importantly, Ida gained in-depth knowledge about the difference between response from vaccine and actual immunity and the implications for public health and planning of vaccination programmes. Ida developed further skills with data analyses using a large population-based dataset, and importantly how to analyse and test different statistical models when analysing survey data.

4. Teaching and pedagogy

4.1 Using Social Media as a Global Health Researcher

As part of a writing retreat workshop organised by Uniting Streams, a working group for early career Global Health researchers within the Netherlands Society for Tropical Medicine & International Health, Ida and Dr Sonia Boender planned and carried out a social media workshop. The three-hour online workshop targeted global public health researchers, and took place on 18 November 2021. The following were developed for the training: evaluation questionnaires, homework, presentations, and ideas/tasks for interactive group work.

Training modules related to assignment/projects

EPIET Introductory Course: The course provided a good foundation for carrying out adult teaching, particularly focusing on problem-based learning. The theoretical background provided, combined with the practical task of planning and executing training focusing on aim, needs assessment, activities, and materials needed were helpful when planning the social media training workshop.

Educational outcome:

Ida learned how to plan and execute efficient training. The activities ranged from pre-and post-evaluations, and the planning of presentations and group work during the workshop. Special with this teaching, and also many modules attended during this fellowship, was the online format. Ida learned how to overcome challenges with engagement and activities online, and how to ensure the participants were engaged and heard by using different interactive online tools including a mix of mix of plenary and breakout sessions with group exercises, zoom polls and word cloud.

5. Communication

5.1 Publications related to the EPIET fellowship

1. I. Sperle, A. Hofmann, V. Schönfeld, W. Hellenbrand, M. Sandfort, M. Grossegesse, N. Hofmann, J. Michel, A. Nitsche, A. Brinkmann, C. Kohl, B.G. Dorner, T.C. Meyer, D. Stern, C. Gadomski, Thomas Harder. Untersuchung und Eindämmung eines SARS-CoV-2- Alpha Ausbruchs in einer Pflegeeinrichtung im Landkreis Dithmarschen, Juni 2021. EpiBull (Published 27 October 2022).

2. I. Sperle, U. Koppe, R. Lachmann, R. Vonderwolke, N. Püschel, N. Litzba, P. Böhm, J. Stauke, A. Heck, J.H.J. Baum, L. Ghebreghiorghis, G. Steffen, U. Rexroth, M. an der Heiden, T. Schneider, I. Markus. COVID-19 cross-border case and contact tracing activities - experiences and lessons learnt, Germany, April-December 2020. BMC Public Health (Submitted August 2022).
3. I. Sperle, S. Gillesberg Lassen, M. Schlaud, S. Dudareva, C. Poethko-Müller, T. Harder. Protective Hepatitis B vaccination series and serologic prevalence of vaccine derived Hepatitis B antibodies in Germany: results from a population-based survey of children and adolescents, 2014-2017. BMC Infectious Diseases (to be submitted).
4. S. Halbedel,_I. Sperle, R. Lachmann, M. Adler, M.A. Fischer, A. Holzer, et al. Large multi-country outbreak of invasive listeriosis by a novel genomic clade of L. monocytogenes genoserotype IIa linked to smoked rainbow trout, 2020-2021. Emerging Microbes & Infections (submitted July 2022).

5.2 Reports

5. Listeria Monocytogenes (Ny9) outbreak in Germany, October 2020. Outbreak Report. June 2021. RKI [Internal Report].
6. Investigation of a SARS-CoV-2 outbreak in a long-term care facility among vaccinated residents and staff, May-June 2021, Schleswig Holstein, Germany. Outbreak Report. December 2021. RKI [Internal Report].
7. Shigellose. Infektionsepidemiologisches Jahrbuch für 2020. Datenstand: 1. März 2021. Robert Koch-Institut; 2020. p. 182-185. https://www.rki.de/DE/Content/Infekt/Jahrbuch/Jahrbuch_2020.html;jsessionid=E9392420DE73284F124A35D355EE670F.internet111?nn=2374622
8. Shigellose. Infektionsepidemiologisches Jahrbuch für 2021. Datenstand: 1. März 2022. Robert Koch-Institut; 2021. p. 152-6. https://www.rki.de/DE/Content/Infekt/Jahrbuch/jahrbuch_node.htm
9. HIV and Viral Hepatitis Programme Review in Kyrgyzstan. Evaluation Report. July 2022 (draft report at WHO for review).
10. COVIMPACT Hepatitis Report Kyrgyzstan, August 2022 (draft report with colleagues in Kyrgyzstan for review).

5.3 Conference presentations

11. I. Sperle, S. Halbedel, H. Wilking, A. Holzer, A. Flieger, S. Lüth, S. Al Dahouk, S. Kleta, K. Schaten, P. Zanger, J. Schäfer, A. Pietzka, S. Schjørring, L. Espenhain, R. Stephan, G. Bloemberg, L. Murr, I. Huber, R. Lachmann. Cross-border outbreak of Listeria monocytogenes in Austria, Denmark, Germany and Switzerland linked to smoked trout, 2020. Poster Presentation, ESCAIDE 2021 (online).
12. I. Sperle, R. Lachmann, U. Koppe, N. Litzba, R. Vonderwolke, N. Püschel, J.H.J. Baum, L. Ghebreghiorghis, G. Steffen1, U. Rexroth, M. an der Heiden, T. Schneider, I. Markus. Surveillance during a pandemic: COVID-19 cross-border contact-tracing in Germany, April-October 2020. Poster Presentation, ESCAIDE 2021 (online).
13. I. Sperle, S. Gillesberg Lassen, M. Schlaud, S. Dudareva, C. Poethko-Müller, T. Harder. Seroprevalence of vaccine derived Hepatitis B antibodies in Germany: results from the German Health Survey for Children and Adolescents, 2014-2017. Poster Presentation, EASL Viral Hepatitis Elimination, 2022 (online).
14. I. Sperle, R. Lachmann, U. Koppe, N. Litzba, R. Vonderwolke, N. Püschel, J.H.J. Baum, L. Ghebreghiorghis, G. Steffen, U. Rexroth, M. an der Heiden, T. Schneider, I. Markus: Surveillance während einer Pandemie: SARS-CoV-2 Fall- und Kontaktpersonennachverfolgung mit grenzüberschreitendem Bezug in Deutschland, 2020. Poster Presentation, BVÖGD, 2022, Magdeburg, Germany.

5.4 Other presentations

15. COVID-19 Cross-border contact tracing in Germany, 2020. PAE-Treffen. 25.02.2021, Online.
16. Investigation of a SARS-CoV-2 outbreak in a long-term care facility among vaccinated residents and staff, May-June 2021, Schleswig Holstein, Germany. RKI Krisenstab. 18.06.2021, Online.
17. COVIMPACT Hepatitis Mission in Kyrgyzstan, 25-29, 2022. PAE Treffen. 02.06.2022, Online.

6. Other activities

6.1 The WHO Regional Office for Europe; country mission to Kyrgyzstan

Between 24 and 30 April 2022, Ida took part in a one-week World Health Organization (WHO) mission to Kyrgyzstan together with two other colleagues from RKI, Dr Sandra Dudareva and Michael Brandl. The aim was to assess the national hepatitis and HIV/AIDS elimination programmes. Moreover, data were collected for the project 'Assessing the impact of COVID-19 pandemic on viral hepatitis B and C elimination efforts in Eastern Europe and Central Asia' (COVIMPACT Hepatitis). In addition to contributing to the desk-review prior to the mission, Ida attended several meetings with national and international partners to discuss their current response and future

plans, as well as site visits to collect data on WHO elimination target indicators to evaluate their viral hepatitis response before, during and after the COVID-19 pandemic. Ida also contributed to the recommendations presented by the team lead on the last day of the mission to the Ministry of Health, with one of the main points being to combine the hepatitis and HIV programmes to make use of existing synergies and structures to improve response to both infectious diseases.

6.2 Monitoring of the Rapid System for Food and Feed (RASFF)

Supervisor: Dr Bettina Rosner

The Rapid Alert System for Food and Feed (RASFF) is a communications platform through which food safety issues are reported to all EU/EEA countries. Ida covered the monitoring of RASFF for RKI in November 2020 and May 2021. The task entailed daily screening of incoming RASFF alerts and selection of those that might be helpful for local public health authorities in solving food-borne outbreaks. When relevant, Ida collated the information and forwarded to the federal states and local health authorities for them to review and consider as potential sources of ongoing food-borne outbreaks.

6.3 Event-based surveillance (EpiLag)

Supervisors: Renke Biallas, Inge Mücke, and Claudia Siffczyk

The weekly EpiLag teleconference is a platform where the Robert Koch Institute (national level) and federal states exchange information on current infectious disease events. Ida attended the EpiLag weekly, and also took on the role as editor three times during the two years. The tasks as editor involved collecting all relevant infectious disease related themes relevant for the participating stakeholders, including an update on the ongoing COVID-19 pandemic, internationally and nationally, presenting these during the teleconference. As editor Ida took notes from the call and the discussions, and distributed to RKI internally and to the federal states.

6.4 Activities related to the COVID-19 response in Germany in the Emergency Operations Center

During the two-year fellowship, Ida did on average six shifts per month in the COVID-19 Emergency operations Center from September 2020 to March 2022. Main positions covered were cross-border contact tracing, involved communication with other countries via the Early Warning and Response System or the international Health regulation National Focal Points about cases and contacts. Ida also took some shifts to cover the post for the COVID-19 situation report which involved updating the daily numbers and figures for the report.

6.5 Internship in the local public health authority Friedrichshain/Kreuzberg

From 11 July to 15 July 2022, Ida did an internship at a local public health office in Berlin. During this week she observed what daily activities are done on a local level and also supported contacting monkeypox cases to collect data on the infection, exposure, symptoms and contacts. Ida also joined an inspection at a local daycare and a rat inspection, as well as spending one day with their COVID-19 team and getting a closer look into how the data are collected on a local level, as well as how cases and contacts are managed.

6.6 Public Health Management

During the two-year fellowship, Ida was exposed to several management-related tasks. These included overseeing the data cleaning and extraction for the surveillance project performed by a larger team, coordinating the outbreak response at the long-term care facility, and the international mission in Kyrgyzstan. The management tasks included communication with different stakeholders and team members, organising regular calls, and overseeing progress and timeline.

7. EPIET/EUPHEM modules attended

1. Introductory Course, Part 1, 28 September to 16 October 2020, online
2. Introductory Course Part 2, operational research inject days, 9 to 11 November 2020, online
3. Outbreak investigation, 7 to 11 December 2020, online
4. Multivariable Analysis, 15 to 19 February 2021, online
5. Introductory Course Part 3, 26 April to 7 May 2021 (except 3 May), online
6. Rapid Assessment and Survey Methods, 5 to 6 May 2021, online
7. Project Review 2021, 23 to 27 August 2021, online
8. Biorisk and Quality Management, 17 to 18 January 2022, online
9. Vaccinology, 14 to 18 February 2022, online
10. Time series Analysis, 4 to 8 August 2022, Rome, Italy

11. Management, Leadership and Communication in Public Health, 13 to 17 June 2022, Stockholm, Sweden
12. Project Review 2022, 29 August to 2 September 2022, Lisbon, Portugal

8. Other training

1. PAE Introductory week, 11 to 18 September 2020, Robert Koch Institute, Berlin, Germany
2. Basic principles of data protection, 18 May 2021, organised by Robert Koch Institute, online
2. Laboratory module for epidemiologists, 7 to 8 June 2021, organised by Robert Koch Institute, online
3. Causal Inference with DAGs, 13 October to 23 November 2021, organised by Robert Koch Institute, online
3. Digital Workshop 'Visibility and Networking', 18 May 2022, organised by Robert Koch Institute, online
4. Master of Applied Epidemiology at the Charité – Universtätsmedizin & Berlin School of Public Health; the two-year full-time course (120 ECTS) is integrated into the EPIET training program

Discussion

Coordinator's conclusions

Ida started her fellowship with strong epidemiological skills and expertise in viral hepatitis from her previous work and doctoral studies. During her two-year fellowship, she exceeded the number of projects to satisfy EPIET requirements, while producing high-quality outputs on diverse topics that expanded her competencies into new areas and methodologies.

Ida was involved in five field assignments, including two outbreak investigations, one surveillance project, and one research study. These projects resulted in four manuscripts as first author (or shared first author) submitted to peer-reviewed journals, and four conference presentations. Particular highlights from her portfolio include: (1) a listeriosis outbreak investigation that underscored the importance of whole genome sequencing and cross-border collaborations in stopping multinational outbreaks; (2) cross-border COVID-19 contract tracing surveillance that highlighted the challenges in sharing contact tracing information across borders; (3) a research study on Hepatitis B vaccination that provided further experience analysing large population registry datasets, applying effect modification and confounding concepts, and employing regression models; (4) an international assignment with WHO in Kyrgyzstan to assess the national hepatitis and HIV/AIDS elimination programmes.

Through the fellowship, Ida developed new competencies, most notably practical experience in outbreak investigations, advanced statistical analysis methods, and further experience in preparing research manuscripts and conference presentations. Ida has been highly committed to the fellowship and showed perseverance through a two-year period marked by COVID-19 restrictions, remote working, and disruptions to in-person training and networking opportunities. Ida is also highly organised, competent, able to work independently and within teams, and well-respected by peers and supervisors. She received excellent supervision at the RKI that further drove her fellowship success. I believe that Ida's strong competencies, combined with her personal characteristics, will serve her well in future work endeavours. I wish her only the best in what will undoubtably be a bright professional future ahead.

Supervisor's conclusions

Throughout her fellowship, Ida's work contributed to the public health response in our institute. She supported two outbreak investigations and worked directly on understanding the outbreaks and analysing public health implications. In addition, she supported the institute with her contributions to the COVID-19 emergency centre and by designing and leading the analysis on cross-border contact tracing in Germany. Ida ensured that the results of her work would be accessible to the scientific community by preparing and submitting four publications. She also contributed to the institute's goals by supporting the international mission in Kyrgyzstan. We are very grateful for Ida's support during her fellowship and wish her all the best for her future endeavours.

Personal conclusions of the fellow

These past two years have been special; not just because of the COVID-19 pandemic that turned everything upside down but also due to the EPIET fellowship. I applied to the programme to become familiar with more infectious diseases, get first-hand knowledge of EU level response and also to better understand the link between epidemiology and microbiology. The fellowship has provided me with the opportunity to develop further within these areas, and improve my applied infectious disease skills. I have gained more experiences on food-borne infections, outbreak investigations, COVID-19, and vaccine-preventable diseases, and widened my technical skillset. I am grateful that I was able to complete this programme through which I have developed further both

personally and professionally, and I will also value the new and meaningful relationships made throughout the last two years.

Acknowledgements of the fellow

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