Summary of work activities
Anna Loenenbach
Intervention Epidemiology path (EPIET)
Cohort 2017

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 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 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.

Pre-fellowship short biography

Anna Loenenbach is a cultural anthropologist and epidemiologist. She holds a Master in Cultural Anthropology from the Freie Universität Berlin and Gender Studies from Humboldt Universität Berlin, and a Master in Epidemiology from the Berlin School of Public Health. She is currently finishing her Master in Applied Epidemiology and her doctoral thesis about HPV serology at the Charité Universitätsmedizin Berlin. Prior to the EPIET fellowship, Anna Loenenbach worked at the Immunization Unit and the HIV/AIDS, STI and Blood-borne Infections Unit of the Department for Infectious Diseases Epidemiology of the Robert Koch Institute (RKI) in the area of sexual transmitted infections, antibiotic resistance and vaccine-preventable diseases.

Fellowship assignment: Intervention Epidemiology path (EPIET)

On 11th of September 2017, Anna Loenenbach started her EPIET fellowship at the Centre for Infectious Disease Control of the National Institute for Public Health and the Environment (RIVM), Bilthoven, Netherlands, under the supervision of Mirjam Knol and EPIET Scientific Coordinator Lisa Hansen. This report summarizes the work performed during this fellowship.

Methods

This portfolio demonstrates the competencies acquired during the ECDC Fellowship, EPIET path, 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 EPIET scientific guide[1].

Fellowship projects

1. Surveillance

Monitoring strategies for a potential implementation of a HPV vaccination for boys

Human papillomaviruses (HPVs) are common sexually transmitted infections. The so-called high-risk (HR) HPV types are causative agents of several forms of cancer and precancerous lesions in women and men. In men, cancers attributable to specific HPV types include penile and anal cancer, as well as squamous cell carcinoma of the oral cavity and pharynx.

The HPV vaccine for girls was introduced into the national immunization programme in the Netherlands in 2010. In 2019, The Dutch Health Council recommended including boys in the HPV vaccination program. The objective of this project was to develop recommendations for a surveillance strategy to monitor and evaluate the vaccine effectiveness of HPV vaccination for boys, in order to inform rapid implementation of expanded HPV vaccination surveillance.

A literature review identified potential best practices among countries with an existing male HPV vaccination programme. An online questionnaire was distributed to all EPIET and EUPHEM fellows of cohorts 2017 and 2018 for

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[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/.pdf

feedback on current monitoring experiences from EU countries. Finally, a review of all available HPV and HPV-related disease studies, projects, and data sources in the Netherlands was undertaken.

We developed a report including a critical appraisal of various scenarios for the proposed surveillance strategy, considering measures of vaccine effectiveness, disease surveillance, pathogen surveillance, immunosurveillance, and/or mortality surveillance. The document will be used within the working group of the National Immunization Program to establish a system for the introduction of HPV vaccination among boys. Additionally, it can serve as the basis for future systematic evaluation of this new system.

Role: *Principal investigator: Anna developed a study protocol (1), reviewed literature, drafted and analysed the questionnaire, and wrote a report (2).*

Supervisor: *Hester de Melker*

Routine national surveillance activities for measles, mumps and rubella 2017/18

Measles, mumps and rubella (MMR) are notifiable diseases in the Netherlands and targeted for elimination; vaccination for MMR is part of the national immunisation program (NIP). Routine MMR surveillance is conducted by the RIVM using two different data sources: case notification from the Osiris registration system, and virological data from several medical laboratories in the Netherlands. Surveillance for notified MMR cases is updated weekly by RIVM and important results are shared with the weekly infectious diseases early warning meeting.

With the exception of a large outbreak in 2013/2014, reported measles cases are rare in the Netherlands, with 16 cases in 2017 and 17 cases in the first six months of 2018. The detected genotypes, B3 and D8, are also most commonly found in other European countries. For elimination purposes, all measles cases are followed up and categorized as non-imported, imported or import-related. For the first half of 2017, three of five clusters were linked to cases who acquired the infection abroad. For the other two clusters, the source of infection of the first case remained unknown. In 2017, 46 cases of mumps were reported; 25 were reported in the first half of 2018. No cases of rubella were reported during 2017 and the first half of 2018.

Between September 2017 and September 2018, the EPIET fellow was responsible for the weekly analysis of data from the national surveillance system for measles, mumps and rubella. In case of a cluster or outbreak, data was analysed and reported in the early warning meetings. The fellow also updated RIVM's MMR surveillance guidelines.

Role: *Principal investigator: Anna analysed and reported surveillance data weekly, reported clusters/outbreaks to the early warning committee (3), and updated the MMR surveillance guidelines (4)*

Supervisor: *Irene Veldhuijzen*

2. Outbreak investigations

Two community clusters of Legionnaires' disease directly linked to a biologic wastewater treatment plant

2017, we invested an outbreak of Legionnaires' disease (LD), totalling 14 cases in 2016 and 2017, in Boxtel/the Netherlands. The environmental investigation included testing of typical Legionella outbreak sources as well as water samples from a biological wastewater treatment plant (BWTP) and air samples above the BWTP ponds. Clinical and environmental isolates were genotyped using sequence-based typing. A transmission risk model, which was built for the rapid detection of potential environmental sources of airborne pathogens in outbreak investigations, was applied to the outbreak data.. The model calculated a measure of risk (MR) for defining hotspots, which indicated the likelihood of containing the actual source

A rare sequence type was identified in five patient samples, and in water and air samples from the BWTP. The risk model calculated one hotspot, which was located 650m from the BWTP. The genotypic match between clinical and environmental isolates, the high concentrations of Legionella in the BWTP ponds and the modelling results, all suggested the BWTP as the infection source for both clusters. Several risk factors for amplification and transmission of Legionella were present in the Boxtel BWTP: a water temperature around 35°C, nutrient-rich water, and aerosol formation through aeration. So far, documented outbreaks associated with BWTPs have involved an additional mechanical or natural disseminator for dispersing contaminated aerosols. In this outbreak, we assumed direct and long distance dispersion (min. 1.6km) of bacteria from the BWTP ponds to the cases, which has not been previously

described.. The investigation results highlighted the importance of BWTPs as sources of LD outbreaks, and provided evidence of direct transmission of contaminated aerosols from BWTP ponds over a greater distance than previously known. Because biologic aeration ponds are increasingly used in modern (energy-producing) waste water treatment installations in the Netherlands, more evaluation is required to establish the potential health risks of BWTPs.

Role: Co-investigator: Anna prepared and analysed data, visited the site, presented results (5-7), and wrote a manuscript, published in a peer-reviewed international journal (8).

Supervisor: Petra Brandsema

Measles outbreak in a workplace

On the 29th of May 2019, 4 laboratory-confirmed measles cases were notified to RIVM. The cases occurred in a company in Zwolle, the Netherlands. An outbreak team from the regional health authority and the RIVM investigated. Regional public health staff interviewed all cases, and samples from cases were sent to the Centre for Infectious Disease Research, Diagnostics and Laboratory Surveillance (IDS/RIVM) for further testing. Epidemiological and laboratory data were analysed by the team at RIVM.

In order to calculate attack rates and assess vaccine effectiveness, an online questionnaire was distributed via email from the company owner to all employees.

155/253 workers completed the questionnaire, for a response rate of 61%. With the additional information on three cases from the regional authority, 158 employees were included in the analysis. Laboratory and epidemiological investigation identified nine secondary and two tertiary cases in this outbreak. Based on reported immune status and the movement information from employees, we calculate the number of respondents exposed by their immune status. Of 106 employees, working on the 13th and 14th of May in building R (the most probable place of infection), 46 (43.4%) were immune, 50 (47.2%) were probably immune, and ten (9.4%) were (possibly) susceptible. The attack rate was 6.5% (3/46) among the immune, 6.0% (3/50) among those probably immune and 30% (3/10) among those deemed (possibly) susceptible.

The survey showed that the vast majority of employees who completed the questionnaire were well protected against measles, which prevented more cases in this outbreak. Four of the cases had no antibodies and were also more seriously ill. Colleagues who did have antibodies due to vaccination developed a mild form of measles after contact with the virus, and may not have been contagious to others. Even though the Netherlands records high measles vaccination coverage, all adults should be encouraged by employers to check their vaccination status, and obtain measles vaccination if needed.

Role: Co-investigator: Anna developed an online questionnaire, analysed data, and co-authored a report (9) and manuscript (10).

Supervisor: Irene Veldhuijzen

3. Applied epidemiology research

The clinical picture and severity of invasive meningococcal disease serogroup W compared with other serogroups in the Netherlands

Invasive meningococcal serogroup W (IMD-W) cases have been rare in the Netherlands; however, since October 2015, a sudden IMD-W increase was observed. Serogroup W infections have previously been described with atypical clinical manifestations like pneumonia, septic arthritis, or endocarditis. More recently, high mortality and cases presenting with gastrointestinal symptoms were reported among IMD-W cases in England and France. The purpose of this study was to compare the clinical picture and severity of IMD-W cases to IMD cases caused by meningococci of other serogroups. In addition, we assessed if differences in the clinical picture and the severity of IMD-W cases could be explained by underlying differences in host characteristics including comorbidity, age and gender.

We included IMD cases reported from January 2015 to June 2018 in the Netherlands. We assessed clinical manifestation and symptoms at disease onset, calculated case fatality rates (CFR), and used logistic regression to compare clinical manifestations and mortality of IMD-W to IMD caused by meningococci serogroup B, Y, or C, adjusting for age, gender and comorbidities.

The increase in IMD-W incidence in the Netherlands, was associated with a different clinical picture and a higher severity compared to IMD due to other serogroups, which could not be explained by age, gender, comorbidities, and

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clinical presentation. Our results underlined the importance of the recent MenACWY vaccination implementation in the Netherlands, in order to prevent a severe and rapidly-progressing disease with an atypical presentation, and may inform vaccination policy in other countries facing a similar challenge.

Role: *Principal investigator: Anna developed a study protocol (11), prepared and analysed data, communicated results (12-18), and wrote a manuscript (19).*

Supervisor: *Mirjam Knol*

Piloting and evaluating an algorithm to guide clinical treatment decisions for syphilis notified partners among men who have sex with men (MSM)

The Sexual Health Centre (SHC) Rotterdam introduced a decision guide (algorithm) for presumptive partner treatment (PPT) for syphilis. The aim of the new algorithm was to identify notified same-sex partners (men who have sex with men, MSM) of men diagnosed with infectious syphilis, who are at lower risk for syphilis infection, to avert unnecessary presumptive treatment with antibiotics. Notified MSM partners were offered standard testing, and treatment or follow-up consultation; MSM at higher risk would be offered presumptive treatment (PT), without awaiting laboratory results (ALR). The algorithm is a 11-parameter binary decision tree with two possible outcomes: PT or ALR.

We reviewed consultations at the SHC from 1 February to 31 December 2017 among MSM who had been notified for contact with clients with syphilis. We calculated frequency and percentage by algorithm indication, syphilis test result, follow-up and for single algorithm parameters.

Among notified partners, 11% (15/135) had infectious syphilis. In 36 consultations, the algorithm indicated ALR, including in 1 contact who subsequently tested syphilis positive. PT was indicated in 73% (99/135). Among those, 86% (85/99) tested negative, all of whom reported their last sexual contact within the previous eight weeks. Overall, 19% (25/135) of MSM had an ALR indication, were syphilis negative and had their last sexual contact within the previous twelve weeks. Documented follow up was missing in 24/48 (50%) of MSM, where a second follow up visit was needed.

While PPT can prevent further transmission, it may lead to overtreatment. The algorithm identified most MSM contacts with infectious syphilis, and avoided overtreatment in 19% of consultations, who would have been treated presumptively according to national guidelines. Potential overtreatment of some partners is warranted, given the large proportion who were within eight weeks of last sexual contact, when tests may not yet be able to detect syphilis. The algorithm is fast and easy to use as decisions are based on the client's answers to standardized risk assessment. Implementation of the algorithm is recommended, if the setting has capacity for active follow-up. Evaluation of this algorithm could inform adaptation of sexual health guidelines.

Role: *Principal investigator: Anna developed a study protocol (20), prepared and analysed data, presented findings in several fora (21-25), and wrote a manuscript (26).*

Supervisor: *Hannelore Goetz*

Identification of the earliest time point for generating reliable real-time estimates of influenza – mortality association during influenza season

As increased mortality is often observed during influenza seasons, it is assumed that the pathogen might be the reason for the observed mortality increase. However, other pathogens circulating during winter seasons may contribute to such an increase. Influenza-attributable deaths are currently estimated at about 1,389 per year in the Netherlands.

During the influenza A (H1N1) pandemic in 2009, a mortality monitoring system was initiated in the Netherlands. The system is a collaboration of Centre for Infectious Disease Control (CIb) of the National Institute for Public Health and the Environment (RIVM) and Statistics Netherlands. Because reports with cause of death are not available in real-time, estimates of deaths from all causes are analysed retrospectively.

This study evaluated if a reliable estimate for the severity (based on association of all-cause mortality with influenza incidence) of the influenza season can be calculated earlier, i.e. during the current influenza season. The overall aim was to have a severity estimate of the influenza season as soon as possible during the data collection process within the ongoing influenza season, which could be used for the additional information for the weekly influenza surveillance (Wekelijkse output Sterfte Monitoring).

Role: *Principal investigator: Anna developed a study protocol (27), prepared and analysed data, and wrote a manuscript (28).*

Supervisor: *Liselotte van Asten*

Proof of principle study: Using mobile phone data for outbreak investigations

This study was developed to address some challenges faced in collecting data on location and movements of Legionella cases in outbreak investigations. The usage of mobile telephone data offers the possibility of better assessment of cases' locations during the presumed exposure period. For Legionella, transmitted by aerosols possibly over a long distance, information on time spent outdoors or in other places away from home are important and useful information for source finding. Relying on the home address as a proxy for exposure location may introduce misclassification. We designed a study to pilot the use of mobile telephone data in LD surveillance and outbreak investigation with a focus on source finding.

The experiment included around 30 participants who carried a smartphone for 14 days, and visited the fictional source location on at least one occasion. For all participants, GPS data was extracted via Google Maps and antenna data were requested from providers. The data was subsequently analysed by a separate team to assess if the source location could be identified retrospectively. The main results of the pilot study were that it was not feasible to get antenna data from all participants due to privacy issues. Even though GPS data could be extracted, the source could not be pinpointed. However, the source could be identified via visualization as one of several possible locations.

In order to improve data collection of case locations and to solve Legionella outbreak investigation more rapidly, this study demonstrated the possibility of using mobile phone data, and contributed to the practical evaluation of using new outbreak investigation methods and data sources in infectious disease epidemiology.

Role: *Principal investigator: Anna developed a study protocol (29), reviewed literature, and presented the study idea (30).*

Supervisor: *Susan Hahné*

4. Communication

Publications

Publications in peer reviewed journals

8.   Loenenbach AD, Beulens C, Euser SM, van Leuken JPG, Bom B, van der Hoek W, et al. Two Community Clusters of Legionnaires' Disease Directly Linked to a Biologic Wastewater Treatment Plant, the Netherlands. Emerg Infect Dis. 2018;24(10):1914-8.

19. Loenenbach AD, van der Ende A, de Melker HE, Sanders EAM, Knol MJ. The Clinical Picture and Severity of Invasive Meningococcal Disease Serogroup W Compared With Other Serogroups in the Netherlands, 2015-2018. Clin Infect Dis. 2019.

Manuscripts in preparation for submission

10. Peckeu L, De Jong S, van Rijckevorsel G, Voordouw B, Bodewes R, Loenenbach A, et al. Measles outbreak among employees of a company [manuscript in preparation]. 2019.

26. Loenenbach A, Stip M, Beulens C., Götz H. Piloting an algorithm to guide clinical treatment decisions for syphilis notified partners among men who have sex with men (MSM) in Rotterdam, the Netherlands. [in preparation]. 2019.

28. Loenenbach A, Van der Hoek W, van Asten L. Identification of an earliest point in time for generating reliable real-time estimates of the influenza – mortality association during an influenza season. [manuscript in preparation]. 2019.

Reports

2. Loenenbach A. Monitoring strategies for a potential implementation of a HPV vaccination for boys [internal report]; 2019.

3.   Veldhuijzen I. Vijf mazelenclusters waarvan drie gelinkt aan Zuid- en Oost-Europa. Section of Early Warning Meeting Report: National Insitute for Public Health and the Environment (RIVM). Bilthoven/Netherlands. ; 2018 21.6.2018.

18. Knol MJ, van der Ende A, Kaaijk P, Berbers G, de Melker HE. Chapter 7.6 Meningococcal disease. In: RIM report 2018-0124. The National Immunisation Programme in the Netherlands. Surveillance and developments in 2017-2018. Bilthoven/Netherlands; 2018.

Conference presentations

7.   Poster presentation at the 28th Transmissiedag symposium (Transmissionday Infectious Diseases). A biological wastewater treatment plant as a probable direct source for two community clusters of Legionnaires' disease in the Netherlands, 2016-2017. Amersfoort, the Netherlands, 2018.

14. Oral presentation at ESCAIDE 2018. The severity and clinical manifestation of invasive meningococcal serogroup W disease in comparison to other serogroups in the Netherlands. St. Julian's, Malta, 2018.

15. Oral presentation at the 15th Congress of The European Meningococcal and Haemophilus Disease Society (EMGM). The clinical picture and severity of invasive meningococcal disease serogroup W compared with other serogroups in the Netherlands, 2015-2018. [presented by M Knol]. Lisbon, Portugal, 2019.

17. Oral presentation at the national WEON conference (Netherlands Epidemiological Conference) 2018. Ongoing Increase of invasive serogroup W meningococcal disease with high case fatality in the Netherlands. Bilthoven, the Netherlands, 2018.

21. Poster presentation at ESCAIDE 2019. Piloting an algorithm to guide clinical treatment decisions among notified partners of men having sex with men (MSM) with syphilis in Rotterdam, the Netherlands. Stockholm, Sweden, 2019.

24. Poster presentation at the STI & HIV world congress 2019. Piloting an algorithm to guide clinical treatment decisions among notified partners of syphilis-positive men who have sex with men Vancouver/Canada. : [presented by H. Goetz]; 2019.

Other presentations

5.   Oral presentation at the PAE Seminars of RKI. Two Community Clusters of Legionnaires' Disease Directly Linked to a Biologic Wastewater Treatment Plant, the Netherlands. Berlin/Germany. ; 2019 7.2.2019.

6.   Oral presentation at the Internal EPIET/EUPHEM Seminars of EPI – RIVM. Two Community Clusters of Legionnaires' Disease Directly Linked to a Biologic Wastewater Treatment Plant, the Netherlands. Bilthoven/Netherlands. 2019.

12. Oral presentation at the Internal Seminars of EPI – RIVM (Refereer). The severity and clinical manifestation of invasive meningococcal serogroup W disease in comparison to other serogroups in the Netherlands, 2015-2018. Bilthoven/Netherlands. 2018.

13. Oral presentation at the PAE Seminars of RKI. The clinical picture and severity of invasive meningococcal disease serogroup W compared with other serogroups in the Netherlands, 2015-2018. Berlin/Germany. 2018.

16. Oral presentation at the Internal EPIET/EUPHEM Seminars of EPI – RIVM. Project presentation: The clinical picture and severity of invasive meningococcal disease serogroup W compared with other serogroups. Bilthoven/Netherlands. 2018.

22. Oral presentation and discussion at the physicians' meeting at the sexual health clinic at the GGD Rotterdam-Rijnmond. Results of the evaluation of the partner presumptive treatment algorithm indroduced at the sexual health clinic at the GGD Rotterdam-Rijnmond. Rotterdam/Netherlands. 2018.

23. Oral presentation and discussion at the WASS meeting (regional STI clinics representatives). Results of the evaluation of the partner presumptive treatment algorithm indroduced at the sexual health clinic at the GGD Rotterdam-Rijnmond. Utrecht/Netherlands2019.

25. Oral presentation at the PAE Seminars of RKI. Piloting an algorithm to guide clinical treatment decisions among notified partners of syphilis-positive men who have sex with men. Berlin/Germany. 2019.

30. Oral presentation and discussion at the DOD - Dinsdag Ochtend Discussie (Tuesday Morning´s Discussion of EPI - RIVM). Proof of principle: Assessing the possibility of using mobile phone data in a Legionella outbreak investigation. Bilthoven/Netherlands. 2018.

Other documents

1. Loenenbach A. Study protocol: Monitoring strategies for a potential implementation of a HPV vaccination for boys 2019.

4. Loenenbach A. Update of 'Guideline: Weekly Measles, mumps, rubella (MMR) surveillance'. [internal guidelines]; 2018 11.12.2018.

9. Veldhuijzen IK, de Jong S, van Rijckevorsel G. Uitkomsten mazelenonderzoek [Results of the measles outbreak investigation]. 2019.

11. Loenenbach A. Study protocol: The clinical picture and severity of invasive meningococcal disease serogroup W compared with other serogroups in the Netherlands. 2017.

20. Loenenbach A. Study protocol: Piloting an algorithm to guide clinical treatment decisions for syphilis notified partners among men who have sex with men (MSM) 2018.

27. Loenenbach A. Study protocol: Identification of the earliest time point for generating reliable real-time estimates of influenza – mortality association during influenza season 2019.

29. Loenenbach A. Study protocol: Assessing the possibility of using mobile phone data in a Legionella outbreak investigation. 2018.

5. Teaching and pedagogy

Facilitation of a lecture and a case study on an outbreak of Giardiasis in Bergen, 30.01.2018

In January 2018, I facilitated a lecture and a case study with Susan Hahné and Roan Pijnacker at the National School of Public and Occupational Health (NSPOH) in Utrecht, the Netherlands. The target audience were doctors working in the control and prevention of infectious diseases, e.g. at local or national health institutes (GGD, RIVM, or a ministry).

Lecture

The training objectives of the lecture on epidemic curves were that participants will be able to list key elements of an epidemic curve; compare and interpret different types of epidemic curves; define the objectives of using epidemic curves in outbreak investigations; choose an appropriate time scale; and draw an epidemic curve.

Case study

The training objectives of the case study included, that the participants should be able to: define an outbreak; describe the steps in an outbreak investigation; understand the importance of a case definition in the context of an outbreak investigation; construct and interpret an epidemic curve; calculate attack rates; characterize an outbreak by time, place and person; and compare frequency of exposures between cases and a sample of the population.

Reflection

This was my first teaching experience in the field of epidemiology. I experienced the practical challenges of didactics and was able to develop a first feeling for the power of carefully listening to the comments of participants in order to be able to identify gaps of knowledge or to give the right hints to help them understanding the topic without saying/helping too much. In order to improve didactics, I have to gain more practical experience and learn to endure silence.

The training was evaluated with an online questionnaire for the participants after the module; 8 / 10 participants answered the questionnaire. The participants were satisfied with the learning methods used during the workshop.

They appreciated working through the case study in small groups. The overall score given to the content was 8,3 and 8,1 (out of 10). The score given to the way I taught the workshop was 8,0 (out of 10).

Facilitation of a lecture and a case study on an outbreak of trichinosis in France, Radboud University, 03.12.2018

In January 2018, I facilitated a lecture and a case study together with Alma Tostmann at Radboud University in Nijmegen, the Netherlands. The target audience was third year medical and biomedical students.

Lecture

The training objective of the lecture on the epidemiological research projects included, that participants will be able to list key elements of an epidemiological research project; define the objectives and challenges of epidemiological research; and define an epidemiological research question. Additionally, the lecture aimed to give participants an overview of the EPIET/EUPHEM programme, career opportunities and additional sources of information for the application process.

Case study

The training objective of the case study included, that participant are able to: describe the steps in an outbreak investigation; develop a case definition in the context of an outbreak investigation; interpret an epidemic curve; choose an appropriate control group for a case control study; and calculate and interpret an odds ratio.

Reflection

I enjoyed working with young students who had some basic epidemiology knowledge, but limited knowledge in the field of infectious disease and outbreak investigations and were therefore eager to learn something new. During the facilitation of the case study, I realized that I was able to apply some of the skills I learned during the previous teaching assignment. This included the didactic skills of being able to listen and understand participants' knowledge gaps and learning needs.

The students evaluated the lecture and case study in a routine online survey through the university. General feedback indicated satisfaction with the topics and enthusiastic teachers. Additional feedback from the organizer was that the lecture was interesting, clear and matched the interest and level of the students.

Needs assessment 'Lab for epi' at RIVM/Bilthoven

In cooperation with Titia Kortbeek, the EUPHEM supervisor at RIVM, a 'Lab for epi' training program for epidemiologists, particularly new EPIET fellows at RIVM, was designed. The main objective was to undertake a needs assessment to define the training needs of EPIET fellows in the area of microbiology and laboratory methods. A facilitated brainstorming session was organized with all current EPIET fellows at RIVM. The results of the needs assessment was further evaluated, topics prioritised, and a training program structure was designed. The training program outline can be used to further develop a detailed learning plan, ideally in cooperation with the EUPHEM fellows based at RIVM.

Reflection

The needs assessment brainstorming session was an easy and effective way to gain knowledge about training needs for EPIET fellows. Even though only the four EPIET fellows at RIVM were included, and training needs differ based on the background knowledge of fellows, we could identify common questions, which could inform a learning plan for EPIET fellows.

6. Other activities

Concurrently with her EPIET fellowship activities, Anna did a Master in Applied Epidemiology at the Charité Universitätsmedizin Berlin and in cooperation with the German Field Epidemiology Program (Postgraduiertenausbildung für angewandte Epidemiologie, PAE) at RKI, Berlin/Germany. She also continued to work on her PhD at the Charité Universitätsmedizin Berlin.

EPIET/EUPHEM seminars, RIVM/Bilthoven

During the two years of fellowship, Anna was responsible for organizing EPIET/EUPHEM seminars at RIVM on a rotating basis. The seminar occurs every 6 weeks and includes fellows, supervisors, coordinator and alumni. The seminar starts with a short presentation of one fellow about a current project, with the aim of obtaining critical feedback and answers to specific problems or questions on the project. All fellows provide updates about their activities, and discuss upcoming opportunities for new projects or outbreaks. After the 1h seminar, there is another 1h meeting of fellows only to discuss internal issues.

New cohort EPIET/EUPHEM welcome day, RIVM/Bilthoven, 12.09.2019

Anna proposed and organized a welcome day for the four new EPIET and EUPHEM fellows of cohort 2019 at RIVM, for the first time. All EPIET and EUPHEM related colleagues and EPIET and EUPHEM alumni working in the Netherlands were invited to join the welcome day. The day included a short welcome, attendance at the weekly early warning meeting, and introductory presentations from all supervisors about the role of RIVM, Epi and the lab as well as an introduction to the structure of public health in the Netherlands by one of the MS track fellows. This was followed by presentations of current and former fellows about projects at RIVM. New fellows were taken on a tour through RIVM, where they visited key departments (LCI and IDS) and learned about their work. After a common lunch, participants attended the bi-weekly scientific seminar. Dinner was organized for all participants of the welcome day.

7. EPIET/EUPHEM modules attended

- Introductory Course, 25 September – 13 October 2017, Spetses, Greece
- Outbreak Investigation Module, 4-8 December 2017, Berlin, Germany
- Multivariable Analysis Module, 16-20 March 2018, Cyprus, Greece
- Rapid Assessment and Survey Methods Module, 14-19 May 2018, Athens, Greece
- Project Review Module, 27-31 August 2018, Lisbon, Portugal
- Time Series Analysis Module, 5-9 November 2018, Brussels, Belgium
- Vaccinology, 24-28 June 2019, Rome, Italy
- Project Review Module, 26-30 August 2019, Prague, Czech Republic

8. Other training

Anna regularly attended the weekly scientific seminars organised by the RIVM Epi department. She also participated in specific scientific events, such as the national epidemiology conference (WEON). Anna regularly participated in the weekly early warning meeting, which has provided training on signal generation, outbreak management and national outbreak communication strategies.

For one of her projects, Anna worked at the GGD Rotterdam-Rijnmond once every two weeks over a period of six months. At the GGD, she joined meetings and patient consultations, analysed data from electronic patient file system and presented and discussed the results with the physicians.

Additional trainings in which she has participated:

- ESCAIDE 2017, 6-8 November 2017, Stockholm, Sweden
- Begin R. Course on basic training in using R software, 2 February 2018, RIVM, Netherlands
- Use R. Course on applied methods training in using R software, 9 February 2018, RIVM, Netherlands
- Exp R. Course on advanced training in using R software, 16 February 2018, RIVM, Netherlands
- Vis R. Course on elaborating graphs and maps using R, 12 April 2018, RIVM, Netherlands
- Lab module 20-23 February 2018, Wernigerode and Berlin, Germany
- EAN mini module: Outbreak investigation analysis with R, 19-20 November 2018, St. Julien, Malta
- ESCAIDE 2018, 21-23 November 2018, St. Julien, Malta

- EAN mini module: Advanced course - Outbreak investigation analysis with R, 25-26 November 2019, Stockholm, Sweden
- ESCAIDE 2019, 27-29 November 2019, Stockholm, Sweden
- Master of Science in Applied Epidemiology, 2017-2019, RKI, Berlin, Germany

Discussion

Supervisor's conclusions

Anna achieved all EPIET learning objectives. She performed several surveillance projects including routine MMR surveillance, evaluation of a partner notification algorithm for syphilis and developing a proposal for a surveillance system for the evaluation of HPV vaccination of boys. The syphilis project showed that the algorithm works well and that antibiotic use can be safely reduced by using this algorithm. The proposed surveillance system for evaluation of HPV vaccination of boys will be implemented when the HPV vaccination programme for boys begins. Anna was involved in two outbreak investigations: the legionella outbreak investigation led to more research on the role of (biological) waste water treatment plants for transmission of legionella, and it showed that legionella can be transmitted over several kilometres which is very relevant for future outbreak investigations on legionella. Anna's research projects included a project on severity and clinical presentation of invasive meningococcal serogroup W disease (IMDW) following a steep incidence of IMDW, where she applied multivariable analysis to study the association between serogroup and outcome. The results of this project have been used to create awareness among physicians and for communication to professionals and the public. Anna has contributed to a research project to explore the potential role of mobile phone data in outbreak investigation. This has led to a pilot project to identify a source using mobile phone data in a group of healthy volunteers. Next steps are to refine this approach and to test it in cases. Lastly, Anna has been working on a project of calculating influenza attributable mortality and whether this can be done reliably in a real time fashion during the influenza season. Overall, Anna completed a nice set of different projects in different disease areas (VPD, STI, respiratory disease).

In terms of training, Anna gave several lectures and facilitated several case studies for MSc students and Public Health physicians in training, and initiated development of a lab for epi training for EPIET fellows at the RIVM. Furthermore, during the fellowship she has become proficient in R, where before she mainly used Stata. Although giving presentations is not Anna's favourite thing to do, she really stood up giving presentations at local meetings as well as (inter)national conferences and developed her skills in this. In terms of communication, Anna's projects resulted in two published articles in highly cited journals (Emerging Infectious Diseases and Clinical Infectious Diseases) and three more manuscripts in preparation, and several oral and poster presentations at (inter)national conferences.

Anna is a very pleasant person to work with, she is proactive and very well organized. She can work independently but is also eager to ask for feedback. In her writing Anna is very precise and elaborate. Overall, it was a pleasure to supervise Anna during her fellowship and to see her developing her skills in field epidemiology.

Coordinator's conclusions

It has been a pleasure to work with Anna over the past two years: she entered the fellowship with considerable accomplishments and continued to pursue concurrent professional development activities over the two years, including her PhD research in progress and the Master of Applied Epidemiology. Although Anna may have felt that her non-traditional background was not an asset as a communicable disease epidemiologist, she has seen the value of multiple disciplines and perspectives in addressing complex public health issues. Anna had explicit personal learning objectives to develop her analytical skills, and she pursued training outside of the fellowship programme and endeavoured to apply new methods and use new applications in her projects. She has supported several training activities, including developing a local framework to enhance collaboration and knowledge exchange between epidemiologists and microbiologists at RIVM. Her projects at RIVM and with the GGD Rotterdam team provided experience in diverse disease programme areas and requiring many different outputs, including an impressive range of oral and written scientific communications. Anna leaves the fellowship with increased confidence in what she already knows and has demonstrated that she can do, and I hope that she will pursue her next career steps with the same commitment to learning and sharing knowledge that she has shown as an EPIET fellow.

Personal conclusions of fellow

I started the fellowship with a so far still rare university background of cultural anthropology, gender studies and epidemiology, with some educational training and working experience in infectious disease epidemiology and public health. On a professional level, I struggled with a feeling of being not a 'real' epidemiologist by missing the traditional career of a natural scientist. But I experienced the EPIET fellowship as increasingly open and welcoming to incorporate interdisciplinary approaches with different aspects, theories and methods from other scientific fields. The fellowship with its focus on practical training was a unique experience for me, both on a professional and personal level. It has been positively different to any other form of educational training I received before, and its focus on the practical training allowed me to grow from a scientist with a non-typical university background into a public health professional.

During the two years of the fellowship, my epidemiological and statistical knowledge and confidence improved considerably. I learned from attending the EPIET training modules and was able to apply what I learned to projects at RIVM. I also especially learned from the huge variety of projects I did, which is another unique experience of the fellowship, and gained knowledge from collaborations with fantastic colleagues at RIVM and at the local health authorities. The EPIET fellowship programme has additionally provided me with the opportunities to build a network of public health colleagues across Europe.

One of the most valuable experiences of the EPIET fellowship was the ability to work in a different country and to be able to learn about 'new' and 'different' approaches, structures, and methods in public health, which allowed me to come back and combine both my interests, for epidemiology and cultural anthropology.

Acknowledgements of fellow