FINAL REPORT

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The European Programme for Intervention Epidemiology Training (EPIET), Cohort 2021

Finnish institute for health and welfare (THL), Finland

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 at acknowledged training sites across European Union (EU) and European Economic Area (EEA) Member States.

According to Article 9 (6), Article 5 (8) and Article 11a (1) of Regulation (EU) 2022/2370 of the European Parliament and of the Council of 23 November 2022 amending Regulation (EC) No 851/2004 establishing a European centre for disease prevention and control (the ECDC Founding Regulation):

Article 9 (6) 'The Centre shall, as appropriate, support and coordinate training programmes, in particular in relation to epidemiological surveillance, field investigations, preparedness and prevention, response to public health emergencies, public health research and risk communication. Those programmes shall take into consideration the need for training to be kept up-to-date, take into account the training needs of Member States and shall respect the principle of proportionality.'

Article 5 (8) 'By encouraging cooperation between experts and reference laboratories, the Centre shall foster the development of sufficient capacity within the Union for the diagnosis, detection, identification and characterisation of infectious agents that have the potential to pose a threat to public health. The Centre shall maintain and extend such cooperation and support the implementation of quality assurance schemes'.

Article 11a (1) 'The Centre shall establish an EU Health Task Force and ensure that there is a permanent capacity and an enhanced emergency capacity to mobilise and use it. The EU Health Task Force shall provide assistance with regard to requests for prevention, preparedness and response planning, local responses to outbreaks of communicable diseases and after-action reviews in Member States and in third countries, in cooperation with the WHO. The EU Health Task Force shall include the Centre's staff and experts from Member States, fellowship programmes and international and non-profit organisations'.

Moreover, Article 47 of the Lisbon Treaty states that 'Member States shall, within the framework of a joint programme, encourage the exchange of young workers.' Therefore, ECDC initiated the two-year EUPHEM training programme in 2008. EUPHEM is closely linked to the European Programme for Intervention Epidemiology Training (EPIET). Both EUPHEM and EPIET are considered 'specialist pathways' of the two-year ECDC fellowship programme for applied disease prevention and control.

This final report describes the output of the fellow and the competencies they acquired by working on various projects, activities, theoretical fellowship training modules, other modules or trainings and international assignments or exchanges during the fellowship.

Pre-fellowship short biography

Eveline Otte im Kampe is a trained physiotherapist and holds a BSc in Health Sciences from the Hamburg University of Applied Sciences. She did her undergraduate research on malaria epidemiology in Burkina Faso at the Global Health Institute of the University of Heidelberg, Germany. She then completed an MSc in Epidemiology at the London School of Hygiene and Tropical Medicine (LSHTM) in London. Her thesis focused on mathematical modelling of epidemiological interference between two influenza subtypes. After graduating, Eveline spent five years in academia at Imperial College London and LSHTM researching planetary health and communicable diseases in low-, middle- and high-income countries, followed by two years in the private not-for-profit and for-profit sectors as a senior epidemiologist working in digital health. Prior to joining the fellowship programme at THL in September 2021, Eveline supported the COVID-19 response as a senior epidemiologist at the Robert Koch Institute in Berlin, Germany.

Results

The objectives of these core competency domains were achieved partly through project and activity work and partly by participating 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

1.1.   Outbreak investigations

Norovirus outbreak associated with lettuce in a nursing home in Eastern, Finland, February 2022

Supervisors: *Ruska Rimhanen-Finne*

Category: *Food and waterborne diseases*

On 11-12 February 2002, about 100 people in a nursing home in eastern Finland became ill after eating food from a central kitchen. The aim of this outbreak investigation was to describe the extent of this outbreak and to identify the cause, the vehicle, and the reasons for the outbreak.

Ten surface samples taken from the kitchen after disinfection, three food samples and 16 patient stool samples were tested for norovirus and other pathogens by rtRT-PCR. One food and six stool samples were typed by sequencing-PCR. All residents and staff were given a questionnaire (n=322). A case was defined as a person with diarrhoea or vomiting within 10-48 hours after eating food from the central kitchen on 9, 10 or 11 February 2002 and/or with norovirus in the stool. We performed a historical cohort study and calculated attack rates among exposed persons (ARe), risk ratios (RR) and 95% confidence intervals (CI) for each meal and other factors (age group, travel abroad, contact with animals, sick family members, occupation and nursing home care unit).

51% responded to the questionnaire. The ARe among 123 exposed persons was 44%. All meals were associated with being a case, except fresh vegetables cut in individual care units. The highest RR was estimated for lettuce (RR=11; 95% CI=2.9-44), which tested positive for norovirus (GII.4 Sydney). Twelve stool samples tested positive for norovirus, including one from a central kitchen worker who handled lettuce on 10 February 2002. This worker had a history of gastrointestinal illness and returned to work after two symptom-free days. The polymerase sequence results of two stool samples were GII.P16 and one sample was GII.P16-GII.4, suggesting that the outbreak was caused by recombinant norovirus GII.P16-GII.4. All surface kitchen samples were negative for norovirus.

Our investigation suggests that lettuce contaminated with recombinant norovirus (GII.P16-GII.4 Sydney) by an infectious central kitchen worker caused this outbreak. We recommended that hand hygiene should be intensified after gastrointestinal illness and that current guidelines on when kitchen staff should return to work should be reviewed.

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[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

Role: Lead investigator. This investigation was carried out in collaboration with the local public health authority. Eveline was the lead investigator for this outbreak and coordinated the work of the national team. She gathered information on what was already known and discussed outstanding issues with colleagues. Eveline reported updates at meetings and liaised with laboratory staff to confirm the diagnosis and suggest additional investigations, such as taking photographs of the kitchen. She developed a case definition, was responsible for data management, led the descriptive and analytical epidemiological analysis, drew conclusions from the analysis taking into account data from additional investigations (laboratory analysis and environmental investigations) and wrote the outbreak report (report 1; section 8.1.2) with recommendations for control and prevention measures. Eveline wrote and submitted an abstract (abstract 2, section 4.2) as first author to ESCAIDE 2022 (rejected).

A novel fava bean product caused an outbreak of Listeria monocytogenes in dialysis patients in Finland in 2019

Supervisors: *Ruska Rimhanen-Finne*

Category: *Food and waterborne diseases*

Listeria monocytogenes is a bacterium commonly found in foods and associated with high hospitalisation and mortality rates. We investigated the first listeriosis outbreak of in dialysis patients exposed to ready-to-eat plant-based products including fava beans. A case was defined as a person with a laboratory-confirmed listeriosis with isolates clustered in the core genome MLST. Six cases were reported to the Finnish Infectious Diseases Registry during 2015-2019. We conducted a descriptive study to identify the possible source of infection. In 2021 and 2022, listeria MLST 37 was detected in food product samples taken by the manufacturer through self-monitoring. The strains were similar to the strains in the MLST-37 cluster cases. Inspections by the manufacturer and the local food control authority indicated that listeria had entered the fava bean product from the production environment after pasteurisation of the fava bean products. Contamination during packaging of the suspect food at the production plant was the likely cause of this outbreak. We recommend that sporadic cases and clusters should be monitored in a timely way and investigated to inform the ongoing risk assessment. Listeria risk foods served to vulnerable groups should be heated according to guidelines. Existing regulatory limits on levels of listeria in products and guidelines on testing schemes for listeria in production facilities should be evaluated if they are still sufficient to prevent listeria infection. Our investigation highlights that the risks involved in the production of plant-based products are the same as for animal products, and establishments producing plant-based food should be subject to similar controls as those producing food of animal origin.

Role: Co-investigator. Eveline analysed and interpreted the data, collaborated with colleagues at the local, regional, and national level as well as with clinicians to obtain additional data and submitted a manuscript as first author for submission to Eurosurveillance (paper 1; section 8.1.1).

Educational outcome

During the two outbreak investigations, the fellow gained insight into outbreak response and management at local, regional, and national levels in Finland. Eveline led one of the two outbreak investigations, which included a cohort study. In addition to gaining more experience and technical skills in conducting outbreak investigations and in the epidemiology of foodborne infections, including study design, data management, statistical analysis, communication of results and development of public health recommendations, she also gained leadership skills and insights into laboratory methods, interpretation of laboratory results, environmental and microbiological investigations.

1.2. Surveillance

Regional shift in Pogosta disease incidence during 2021 epidemic in Finland

Supervisors: *Timothée Dub*

Human Sindbis virus (SINV) infections are mosquito-borne and have been reported mainly from a few geographical areas, mainly Finland, where clinical SINV infection is called Pogosta disease. Finland has experienced large SINV epidemics with hundreds or even more than thousands of reported cases in 1995 (n=1 311), 2002 (n=597). In 2021, another epidemic of Pogosta occurred in Finland. Symptoms of Pogosta disease include joint manifestations for years implying considerable public health importance. This project described characteristics of the epidemic in 2021 and possible changes overtime since the last epidemic of similar size in 2002 to update regions and population groups at risk and raise awareness among the population and clinicians. Reporting of laboratory-confirmed Pogosta cases to the Finnish Infectious Diseases Register (FIDR) is mandatory in Finland. I analysed NIDR case numbers for the period 2002-2021 and calculated annual incidence per 100 000 nationwide, by age, sex, and residential hospital district of the cases. I calculated monthly cases for each year to describe seasonality. In 2021, 565 cases were reported corresponding to an incidence of 10/100 000 nationwide. Regional incidences ranged from 41/100 000 in North Savo (central Finland) to 0,82/100 000 in Southwest Finland. Incidence peaked in the age-group 50-59 (22/100 000) and was lowest in age-group <30 (2,5/100 000). The incidence among women (13/100 000) was approximately twice as high as among men (6,6/100 000).

Cases occurred from June to December peaking in September (55% of all cases). In 2002, incidence was similar (11/100 000) nationwide, but the epidemic was geographically less widespread peaking in North Karelia (eastern Finland) (80/100 000). Population risk groups, regional variation of reported incidence, and seasonality did not change considerably in 2002-2020. Annual nationwide incidences ranged from 0,27-4,03/100 000 in 2003-2020. The results suggest a shift in risk from eastern to central Finland in 2021. No other considerable change in disease patterns occurred during 2002-2021. More disease awareness, particularly in new risk regions, could improve disease recognition in clinicians and the general population, and the adoption of preventive measures specifically targeting women and summer/autumn.

Role: Eveline extracted the data from the FIDR, cleaned the data, designed, and performed the data analysis, and interpreted the data, wrote the final surveillance report (report 2; section 4.1.2, co-authored a rapid communication published in Eurosurveillance (paper 2; Section 4.1.1), wrote and submitted an abstract to ESCAIDE 2022 as first author that was accepted as an oral presentation (1.; Section 4.2),

Educational outcome

Eveline designed the Sindbis virus/Pogosta disease surveillance project, carried out the analysis of Sindbis virus surveillance data using descriptive and time series analysis and communicated the results. She gained valuable insight into the surveillance system in Finland, improved her communication skills and gained experience in the use of geographic information systems.

2. Applied public health research

Identifying regions of probable place of Sindbis virus infection and severe Pogosta disease in Finland

Supervisors: *Timothée Dub*

Human Sindbis virus (SINV) infections are mosquito-borne and have been reported mainly from a few geographical areas, mainly Finland, where clinical SINV infection is called Pogosta disease. Finland has experienced large SINV epidemics with hundreds or even more than thousands of reported cases in 1995 (n=1 311), 2002 (n=597) and 2021 (n=566). SINV infection can cause joint manifestations that may persist for months or even years. The long duration of the disease is of considerable public health importance in endemic areas. In Finland, laboratory-confirmed cases have been notified to the Finnish Register of Infectious Diseases since 1995. In contrast to previous decades, when Pogosta disease was more common in eastern Finland, cases were reported throughout the country in 2021. This geographical shift in the incidence of SINV infection to regions with previously low incidence of SINV may lead to misdiagnosis, especially in areas where the incidence was previously low or close to zero and where doctors/healthcare workers may be less aware of Pogosta disease. The joint symptoms can lead to multiple investigations and cause unnecessary patient distress and healthcare costs if Pogosta disease goes undiagnosed. Lack of awareness of SINV infection among physicians may also result in physicians not recommending preventive measures to patients, such as the use of repellents and protective clothing. In addition, a significant proportion of the general population in Finland (about 70%) is unaware of Pogosta disease. Raising awareness could improve compliance with prevention. However, information on risk areas in Finland is based only on the patients' place of residence at the time of diagnosis and not on the actual place of infection. The aim of this study is to identify risk regions where SINV infection and severe Pogosta disease are likely to occur to better target prevention messages and increase awareness among the population and diagnosing physicians. The study population will consist of all reported cases in Finland. A questionnaire will be used to assess disease severity, potential exposure location, duration of exposure, previous awareness and preventive measures taken.

Role: Eveline developed the protocol, questionnaire, and invitation letter for this study, which can be implemented as soon as the next outbreak occurs.

Appropriateness of medical doctors' outpatient antibacterial prescribing for acute upper respiratory infections in Finland, 2017-2021

Supervisors: *Emmi Sarvikivi*

Antibiotic use is the main driver of antimicrobial resistance and adverse events. Primary care accounts for approximately 80-90% of all antibiotic prescriptions, mainly for respiratory infections. This project focused on acute upper respiratory tract infections (AURI), as these are mainly of viral aetiology and should not be treated with antibiotics. The objectives of this project were to estimate the proportion of outpatient visits for AURI that received an antibacterial prescription in Finland to inform public health and antibiotic stewardship efforts, and to determine factors associated with receiving an outpatient antibacterial prescription for AURI in Finland. Data on antimicrobial prescriptions (ATC group J01) were available from the Finnish Social Insurance Institution (Kela) for the period 2017-2021. For the same period, outpatient visits registered in the Primary Care Outpatient Treatment Register (Avohilmo) with a diagnosis of AURI were extracted. Visit data were linked to prescription data using the patient's personal identifier, the date of the visit and prescription, and the organisational identifier of the healthcare provider's service

unit. Visits with a diagnosis of acute tonsillitis (excluding streptococcal tonsillitis) were more likely to receive an antibacterial prescription than visits with another AURI diagnosis. Patients aged 65 years or older or those with underlying chronic lung disease were more likely to receive an antibacterial prescription for an AURI. The odds of receiving an antibacterial prescription for an AURI decreased over time.

Role: Eveline is the principal investigator of this study and developed the study protocol, linked, cleaned and analysed the data and is currently preparing a manuscript as first author for publication in an international peer-reviewed scientific journal.

Educational outcome
Eveline was able to expand her research skills in developing study protocols and questionnaires and writing manuscripts. She was able to deepen her understanding of quantitative data analysis, the use of directed acyclic graphs and started to work with R.

3. Teaching and pedagogy

Essentials of Infectious Disease Epidemiology, Tampere University, online

Eveline taught a one-week intensive course for postgraduate students (Masters and PhD) at the University of Tampere together with three other fellows and another colleague from THL. She developed new teaching materials, developed and gave a full lecture on the principles of infectious disease surveillance, and facilitated several case studies on outbreak investigations and exercises in risk communication and mathematical modelling. She also organised and participated in preparatory meetings with the other fellows, colleagues, and the course coordinator. She developed training materials, adapted existing materials, and suggested changes to the curriculum, which were happily accepted. Together with the other fellows and colleagues, she carried out an evaluation of the course, which was very positive.

Educational outcome
Eveline has worked with a wide range of postgraduate students from a variety of professional and cultural backgrounds. She was able to strengthen her skills in the subjects she taught and developed her teaching and communication experience and skills. Her teaching assignments included lectures, case study facilitation and practical exercises.

4. Communication

4.1 Publications related to the EPIET fellowship

4.1.1 Manuscripts published in peer-reviewed journals
Paper 1: A novel fava bean product caused an outbreak of Listeria monocytogenes in dialysis patients in Finland in 2019 (submitted)

Paper 2: Sindbis virus outbreak and evidence for geographical expansion in Finland, 2021. Euro Surveill. 2022;27(31):pii=2200580. https://doi.org/10.2807/1560-7917. ES.2022.27.31.2200580 (second author)

Paper 3: Appropriateness of medical doctors' outpatient antibacterial prescribing for acute upper respiratory infections in Finland, 2017-2021 (in preparation)

4.1.2 Other reports

Report 1: Norovirus outbreak associated with lettuce in a nursing home in city A, Finland, February 2022 (outbreak investigation report)

Report 2: Regional shift in Pogosta disease incidence during 2021 epidemic in Finland (surveillance report)

4.2 Conference presentations

1. ESCAIDE. 25.11.2022. Stockholm, Sweden. Regional shift in Pogosta disease incidence during 2021 epidemic in Finland. Oral presentation.

2. Norovirus outbreak associated with lettuce in a nursing home in city A, Finland, February 2022 (submitted to ESCAIDE 2022 – rejected)

3. ECMID 2022. Vaccine effectiveness against Covid-19-related hospitalization caused by Omicron among Finnish elderly aged 70 years or more – A register-based cohort study (co-authored – poster)

4.3 Other presentations

1. Identifying regions of probable place of Sindbis virus infection and severe Pogosta disease in Finland. EPIET/EUPHEM bi-weekly meeting at THL, 27.01.2022

2. Identifying regions of probable place of Sindbis virus infection and severe Pogosta disease in Finland. Nordic Mini Project Review Module, Oslo, Norway, 08.03.2022

3. Principles of Infectious Disease Surveillance. Essentials of Infectious Disease Epidemiology. Tampere University, online lecture. 28.03.2022

4. Identifying regions of probable place of Sindbis virus infection and severe Pogosta disease in Finland. Midterm Project Review Module, Spetses, Greece, 20.04.2022

5. Regional shift in Pogosta disease incidence during 2021 epidemic in Finland. Project Review Module 2022. Lisbon, Portugal, 29.08.2022

6. Regional shift in Pogosta disease incidence during 2021 epidemic in Finland. EPIET/EUPHEM bi-weekly meeting at THL, 20.10.2022

7. Community antibiotic /antimicrobial consumption in Finland, [development of indicators for future (routine) automatized surveillance, and assessment of indications for antibiotic prescribing (in Finland)]. Comparison of community antimicrobial consumption in Finland and British Columbia, Canada. EPIET/EUPHEM bi-weekly meeting at THL, 09.02.2023

8. Appropriateness of outpatient antimicrobial prescribing for acute upper respiratory infections in Finland. Nordic Mini Project Review Module, Copenhagen, Denmark, 13.03.2023

9. Appropriateness of outpatient antimicrobial prescribing for acute upper respiratory infections in Finland. EPIET/EUPHEM bi-weekly meeting at THL, 04.05.2023

5. EPIET/EUPHEM modules attended

1. Introductory course part 1, 20/9-08/10/2021, online

2. Inject days data, 10-11/11/2021, online

3. Phylogeny inject day, 20/10/2021, online

4. Operational research inject days, 27-28/10/2021, online

5. Outbreak investigation, 06-10/12/2021, online

6. Outbreak investigation – wrap up session, 13/01/2022, online

7. Multivariate analysis, 14-18/03/2022, online

8. Inject day cox regression, 30/03/2022, online

9. Midterm project review, 20-22/03/2022, Spetses, Greece

10. Introductory course part 2, 25-29/03/2022, Spetses, Greece

11. Rapid Assessment and Survey Methods, 06-10/06/2022, Stockholm, Sweden

12. Project Review, 29/08-02/09/2022, Lisbon, Portugal

13. Time series analysis, 07-11/11/2022, Bilthoven, Netherlands

14. Qualitative Research Inject Day 1, 31/01/2023, online

14. Qualitative Research Inject Day 2, 03/02/2023, online

15. Vaccinology, 13-17/02/2023, online

16. Leadership, Management and Communication, 08-14/05/2023, Stockholm, Sweden

6. Other training

1. Nordic Webinar: Environmental monitoring of antibiotic resistance, 04/11/2021, online

2. Omicron Think Tank, 13/12/2021, online

3. COVID-19 Think Tank, 07/02/2022, online

4. Digitally secure working life, 24/02/2022, online

5. Nordic Mini Project Review Module, 07-08/03/2022, Oslo, Norway

6. Public Health Preparedness For Mass Gathering Events, May 2022, online

7. BSAFE security awareness training, May 2022, online

8. Epidemic Intelligence, May 2022, online

9. Public Health Microbiology, 05-19/05/2022, online

10. Drivers and modifiers of antibiotic prescribing and infection prevention & control practices in healthcare settings (interactive lecture), 03/10/2022, online

11. Cognitive ergonomics, 10/11/2022, online

12. Xenomonitoring and surveillance: Using mosquitoes to find (and control) pathogens , 26/10/2022, online

13. Risk management in the digital world, 14/11/2022, online

14. R ladies event: Data Visualisation with ggplot2, 07/12/2022, Helsinki, Finland

15. Healthcare associated infections seminar at THL, 11/01/2023, Helsinki, Finland

16. WHO Public Health Laboratories knowledge sharing webinar series: Guiding principles for pathogen genome data sharing and lessons learned during public health emergencies, 22/02/2023, online

17. Nordic Mini Project Review Module, 13-14/03/2023, Copenhagen, Denmark

18. WHO EPI-WIN Webinar: Avian influenza H5: its evolution and associated risk, 29/03/2023, online

19. WHO webinar: The role of communities in oral cholera vaccine campaigns, 04/04/2023, online

20. WHO webinar: The role of communities on readiness for cholera outbreaks, 25/04/2023

7. Other activities

1. Eveline developed a proposal for a project on "Realtime Omicron online surveillance" to compare disease severity between the omicron and other variants of SARS CoV 2.

2. Eveline developed a project proposal to develop indicators to monitor antibiotic consumption on an annual basis using prescription data from the Finnish Social Insurance Institution. Eveline cleaned and analysed the data and explored its feasibility for surveillance.

3. Eveline worked with scientists from British Columbia, Canada, on a project to compare antibiotic use in Finland and British Columbia, Canada, and developed the statistical analysis plan.

4. Eveline conducted a literature review of predictive factors for Pogosta disease in Finland and liaised with external colleagues to assess data availability for these variables.

5. Eveline developed a proposal for a surveillance project to describe influenza-associated hospitalisations in Finland between the last influenza pandemic and the COVID-19 pandemic (2011 to week 20 in 2020). She cleaned and analysed data from the National Hospital Discharge Register (HILMO) and population data from Finland and performed a time series analysis to analyse the data descriptively by different diagnostic groups (influenza, viral or unspecified pneumonia, bacterial pneumonia, febrile convulsions, ARDS), sex, age group and over time by estimating the weekly incidence.

6. THL EPIET and EUPHEM meetings - THL runs bi-weekly EPIET and EUPHEM meetings during which the current fellows present their project proposals and results to the wider department. Eveline has actively contributed to these meetings throughout her fellowship and has presented most of her projects during the meetings.

7. Nordic countries meeting for the COVID-19 pandemic follow-up and COVID-19 working group at THL – Eveline attended several meetings organised by Nordic countries to collaborate and exchange in the pandemic response. In addition, she was involved in some of the THL working group meetings on vaccine effectiveness to participate to the debate on the vaccine effectiveness results in Finland.

8. Eveline was the 2021 cohort representative for the EPIET (field epidemiology track fellows) during the first year of the fellowship. The role of the cohort representatives is to bring fellows' issues and concerns to the attention of the Fellowship Programme. Together with the other representatives of her cohort and those of the 2020 cohort, Eveline co-organised quarterly teleconferences with the ECDC Fellowship Office and the Scientific Lead of the Fellowship, as well as with the EAN (EPIET Alumni Network). Together with the other cohort representatives, she organised the fellows' satisfaction surveys, social activities, and career sessions where public health experts answered fellows' career-related questions.

Acknowledgements