



FELLOWSHIP REPORT

Summary of work activities

Jana Prattingerová

Intervention Epidemiology path (EPIET)

Cohort 2016

Background

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

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

Intervention Epidemiology path (EPIET)

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

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

The 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;

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

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

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- 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

Jana Prattingerová is a medical doctor specialised in the epidemiology of communicable diseases. Prior to EPIET, she worked for 16 years in the Czech Republic as an epidemiologist at the Regional Public Health Authority in Liberec, at the Ministry of Health and the National Public Health Institute in Prague. Her responsibilities included outbreak investigation, outbreak response, surveillance of communicable diseases, infection control, international health regulations and risk communication. She served as a national contact point for the ECDC point prevalence survey of healthcare-associated infections in acute care hospitals and as a member of WHO Virtual International Advisory Group on Mass Gathering.

Fellowship assignment: Intervention Epidemiology path (EPIET)

On 15 September 2016, Jana started her EPIET fellowship at the National Institute for Health and Welfare (THL), Helsinki, Finland, under the supervision of Dr Outi Lyytikäinen. Her scientific coordinator was Dr Louise Coole from Public Health England, Yorkshire and Humber, UK. This report summarizes the work performed in that fellowship assignment.

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.

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

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

Fellowship projects

1. Surveillance

Title: HIV and AIDS in Finland, 1980-1994: report of surveillance data

Supervisors: Dr Outi Lyytikäinen, Dr Kirsi Liitsola

Human immunodeficiency virus (HIV) attacks the body's immune system, specifically the CD4+T cells, which help the immune system fight infections. The HIV epidemic in Finland is characterised by a low annual incidence and prevalence rate. By the end of 2015, the total cumulative number of HIV infections diagnosed in Finland was 3,513; the annual incidence in 2015 was 3.2/100,000 population. The aim of this study was to summarise historical HIV and AIDS surveillance data during 1980-1994 through an analysis of data extracted from the National Infectious Disease Register.

During 1980-1994, a total of 637 HIV cases were identified in Finland (range by year, 1–89). The average annual incidence rate was 0.85 cases per 100,000 populations (range by year, 0.03-1.76). Helsinki Hospital district

¹ European Centre for Disease Prevention and Control. European public health training programme. Stockholm: ECDC; 2013. Available from: http://ecdc.europa.eu/en/epiet/Documents/Scientific%20guides/EPIET%20Scientific%20Guide_C2016.pdf

reported 68% of all HIV cases. Eighty-nine, either AIDS-related or non-AIDS deaths were reported during the study period (range by year, 1–23). Of the HIV cases, 539 (85%) were males; the median age was 33 years (range, 0–77). Among males, the most affected age group was 30–34 year olds (24%) and among females 25–29 (32%). For the whole period, male to female ratio was 5.5:1. The majority of HIV infections (81%, 518 cases) were acquired through sexual contact. Infections acquired through sexual contact between men accounted for 63 % and heterosexual contact for 37% of these cases. The number of infections due to sexual encounters between men was 325. Of these, individuals of Finnish origin accounted for 93% (303). The number of infections attributed to sex between men (MSM) peaked in 1986 and remained at this level throughout the whole period.

The report provided a detailed overview of the HIV epidemiology at the beginning of HIV epidemic in Finland. It has been important in strengthening the understanding of the evolution of the disease and the impact of changes over time.

Role: Jana Prattingerová was the principal investigator. She wrote the protocol, cleaned the data, did the data analysis and wrote the report.

Title: Increased rates of Clostridium difficile infections (CDI) in Finnish hospitals with high CDI prevalence at admission, 2008-2015

Supervisor: Dr Outi Lyytikäinen

Hospital-based surveillance of *Clostridium difficile* infections (CDI) has been conducted in Finland since 2008; hospital-specific rates are ranked to provide feedback to participating acute care hospitals. We aimed to determine whether hospital-specific CDI rates are associated with testing frequency or PCR use.

Cases were hospitalised patients meeting the CDI EU case definition (origin: nosocomial, another healthcare facility, community) notified during 2008-2015. We obtained data on CDI testing frequency in 2014-2015 from two hospital surveys and data on PCR availability from the reference laboratory. We used as denominators patient-days and number of admissions to calculate rates and prevalence at admission, respectively. To examine the relationship between annual CDI rate and testing frequency we calculated Spearman correlation coefficients (ρ) and incidence rate ratios (IRRs) using mixed effect negative binomial regression.

We identified 6,664 CDI cases in 19 hospitals; 4,928 (74%) were nosocomial. PCR was introduced in 2008 in two hospitals and was available in all by 2014. During 2014-2015, annual hospital-specific CDI rates varied from 0.14 to 1.33 and testing frequency from 0.92 to 41.53 /1,000 patient-days ($\rho=0.22$). Overall annual nosocomial rates decreased significantly ($p<0.001$) from 0.59/1,000 patient-days in 2008 to 0.36 in 2015; overall annual CDI prevalence at admission varied from 0.33 in 2014 to 0.99/1,000 admissions in 2008. CDI rates increased (IRR=1.21; 95%CI=1.04-1.42) with increasing prevalence at admission, but not with testing frequency (IRR=1.02; 95%CI=1.00-1.04) or PCR use (IRR=0.94; 95%CI=0.77-1.15).

More sensitive CDI diagnostics and increased testing frequency were not associated with increased CDI rates. The association between prevalence at admission and nosocomial rate suggests that prevalence should be part of surveillance feedback to inform strengthened control measures in a hospital with high prevalence at admission.

Role: Jana Prattingerová was the principal investigator. She performed a literature review, wrote the protocol, cleaned and analysed the data, delivered an oral presentation at the SIRO annual conference 2017 and a poster presentation at ESCAIDE 2017. She also prepared and submitted a manuscript on this work to the Journal of Hospital Infections (18).

Title: Evaluation of Clostridium difficile surveillance; SIRO Protocol vs. European CDI surveillance Protocol

Supervisor: Dr Outi Lyytikäinen

Standardized CDI surveillance is more likely to facilitate the identification of epidemiological changes and is an essential tool for CDI prevention and control. The Finnish hospital-based surveillance system (SIRO) was established before the European surveillance. There are some differences between the two in the timing used in case definitions and variables collected so the aim of this study was to evaluate CDI surveillance in Finland and ascertain if the surveillance system corresponds to European requirements.

We conducted an evaluation study in terms of internal completeness, validity and timeliness in 2016. Guidelines for data quality monitoring surveillance system and evaluation developed by European Centre for Disease Prevention and Control were used.

During 2016, a total of 588 cases were identified in 13 SIRO hospitals. The average annual overall incidence rate was 0.41 cases per 100,000 patient-days. The median patient age was 71 years. Of the CDI cases, 481 (82%) were nosocomial, 36 (6%) other healthcare facility origin, 54 (9%) community-associated origin and 17 (3%) unknown origin. Comparing admission date reported by SIRO surveillance to admission date reported by HILMO we found that of the CDI cases, 315 (65%) had the same SIRO (the Finnish Hospital Infection Program) and HILMO (National hospital discharge register) admission date. Strictly applying the European case definition, we detected 41 cases, 86% less than submitted to the register. We calculated the number of cases with disease onset between 48 and 72 hours after admission. Using HILMO admission date we determined 43 cases (9% of total); of which 28(65%) were reported as nosocomial, 3 (7%) as another healthcare facility, 8 (19%) as a community-associated, and 4 (9%) as the unknown origin. We tried to quantify how many cases would not have been reported to ECDC as nosocomial if we used the SIRO definition in terms of the disease onset instead of the European one. We found 15 cases, which account for approximately 4% of reported nosocomial cases.

In general, the surveillance system is well designed, addressing an important public health problem and partly meeting its objective. We found limitations of surveillance data quality and we identified some areas where the operation of the surveillance system could be improved.

Role: Jana Prattingerová was the principal investigator performed a literature review, defined objectives, wrote the protocol, cleaned the data, did the data analysis and wrote the report.

2. Outbreak investigations

Title: *Salmonella Enteritidis 14b in Finland, 2017*

Supervisor: Dr Rimhanen-Finne Ruska

On 1 June 2017, the National reference laboratory (NRL) informed the Infectious Disease Control and Vaccinations Unit at the National Institute for Health and Welfare about an unusual increase in domestically acquired *Salmonella* Enteritidis (SE) cases in different parts of Finland.

We defined a case as a laboratory-confirmed SE 14b infection diagnosed in Finland between May and June 2017 without reported travel history outside the country in the National Infectious Disease Registry (NIDR). Between 19 and 30 June 2017, a case–case study was conducted. Controls were the other *Salmonella* serotype cases and *Campylobacter sp.* cases without reported travel history outside the country from the same time-period extracted from the NIDR. The food exposure was defined as consumption of food item 7 days before the day of onset. We performed a descriptive analysis from questionnaires. Risk factors were compared between cases and controls. To measure the association between food items and disease we calculated odds ratios (OR) and 95% confidence intervals. To see if the age distribution between cases and controls differed we used the Wilcoxon-test. To see if sex is associated with being a case we used the chi-square test. We carried out univariate analysis.

In total, 32 cases from eight hospital districts were identified. The median patient age was 35 years; 18 (56%) were males, six (33 %) were hospitalized. In total, 64 persons participated in the study, of which 18 were cases and 46 controls. Of the exposures, only sprouts had a statistically significant association with SE 14b infection (OR=35; 95%CI=5.14-364.7). Neither sex, nor any other exposure was associated with illness.

In this outbreak, the collaborative epidemiological investigation suggested that sprouts were likely to be the vehicle of the outbreak. The investigation highlighted the importance of using epidemiological and food trace-back data in accordance with microbiological data during the course of a foodborne outbreak investigation.

Role: Jana Prattingerová was co-investigator. She performed a literature review, wrote the protocol, formulated a case definition, designed the data collection instrument, cleaned the data and performed the analysis including description of the data by time-place-person. She prepared and communicated information at the weekly outbreak meetings at THL department of Infectious Disease Control and Vaccination; recommended evidence-based measures and wrote the outbreak report.

Title: *Salmonella Bareilly in Finland, 2017*

Supervisor: Dr Rimhanen-Finne Ruska

On the 21 August 2017, the National reference laboratory (NRL) at the National Institute for Health and Welfare (THL) informed the Infectious Disease Control and Vaccinations Unit about domestically acquired *Salmonella* Bareilly cases in the Helsinki metropolitan area.

A case was a person with laboratory-confirmed *Salmonella* Bareilly infection diagnosed since 1 August 2017 without reported travel history outside the country in the last 7 days before illness onset. Between 3 October and

13 November 2017, a case–case study was conducted. Controls were the other *Salmonella* serotype cases and *Campylobacter sp.* cases without reported travel history outside the country from the same time period extracted from the NIDR. The food exposure/restaurant chain exposure was defined as consumption of food item/restaurant consumption 7 days before the day of onset. We performed a descriptive analysis from questionnaires. To measure the association between food items and disease we calculated odds ratios (OR) and 95% confidence intervals in a univariate analysis.

In total, 23 confirmed cases were identified. The median patient age was 39 years; 13 (56%) were females. The outbreak lasted 15 weeks. In total, 49 persons were included in the study (8 cases, 41 controls). Among the cases, there were six females (75%). Among the controls, there were 25 females (61%). Cases and controls did not differ in age ($p=0.08$). Of the exposures, only Restaurant 1 had a statistically significant association with *Salmonella* Bareilly infection (OR=27; 95%CI=2.97-+ Inf).

Epidemiological investigation suggested that restaurant 1 is likely to be the source of the outbreak. Odds of eating food at restaurant 1 were 25-fold among those who fell ill with *S. Bareilly* infection compared to those who did not fall ill. The case-case study indicated that food consumption at restaurant 1 was the only exposure associated with illness. Fifty percent cases mentioned consumption or possible consumption of food at restaurant 1 seven days before the date of onset, compared with zero of controls. The results of food trace-back investigation supported the result of the analytical study. *S. Bareilly* was identified in a potato salad and a broccoli salad. All six sequenced clinical isolates were closely related. WGS of food isolates clustered together and clustered with human isolates. This indicates that patients were likely sickened by the same vehicle, but only two of them recall eating food at restaurant 1 seven days before the day of onset. It means that eating at restaurant 1 could not explain 50% of cases, suggesting that a common product used in the restaurant and elsewhere may be implicated.

Role: Jana Prattingerová was co-investigator. She performed a literature review, wrote the protocol, formulated a case definition, designed the data collection instrument, cleaned and analysed the data including describing the outbreak in terms of time-place-person. She prepared and communicated information at the weekly outbreak meetings at THL department of Infectious Disease Control and Vaccination; recommended evidence-based measures and wrote the report.

3. Applied epidemiology research

Title: Knowledge of pertussis and attitudes towards different pertussis immunisation strategies among pregnant women and their providers in Finland

Supervisors: Dr Hanna Nohynek, Dr Outi Lyytikäinen

Pertussis is a vaccine-preventable disease with potentially severe consequences for newborns. In response to increased incidence, many countries have modified their immunization strategy including the introduction of maternal immunization to protect newborns. In Finland, pertussis incidence is relatively low. As part of the development of the national strategic plan to control pertussis, in preparation for the possibly increasing incidence and the need to introduce maternal vaccination, we aimed to assess the awareness of pertussis and vaccination during pregnancy among public pregnant women and their providers.

Between May and October 2017, we conducted a prospective semi-quantitative knowledge, attitude and practice (KAP) online survey among a convenience sample of pregnant women, public health nurses and midwives attending (working at) maternity clinics in Joensuu, Vaasa and Vantaa. We used descriptive statistics and logistic regression to assess the impact of demographic and KAP-related variables on intent to obtain or to recommend pertussis vaccine during pregnancy.

Thirty-two pregnant women completed the study questionnaire. Only fifteen providers returned surveys. Seven out of 32 women received vaccine during pregnancy; six of them got influenza vaccine and one tetanus vaccine. Twelve out of 31 pregnant women who answered that question planned to have a vaccine against pertussis, seven-did not and 12 pregnant women had not decided yet.

The obtained number of responses did not allow meaningful analysis. The low response was probably because of the summer season in Finland and also that we had to rely on the willingness of the health care centre personnel to make the survey known to their co-workers and the pregnant women. Notwithstanding the above, our results were very useful to inform the broader development and catchment of future KAP surveys. We recommended opening the pertussis KAP study for all Finnish public health nurses and midwives advertised through the professional journal as a first step to highlight this issue more broadly among healthcare professionals and then potentially an open study among laywomen in fertile age. It will support the development of appropriate communication strategy on maternal pertussis vaccination.

Role: Jana Prattingerová was the principal investigator. She performed a literature review, defined objectives, wrote the protocol, designed the data collection instrument, cleaned the data, did the data analysis and wrote the report.

Title: Knowledge of pertussis and attitudes towards pertussis immunization during pregnancy among public health nurses and midwives in Finland

Supervisors: Dr Hanna Nohynek, Dr Outi Lyytikäinen

Based on the recommendation of the previous project we aimed to assess the awareness of pertussis and vaccination during pregnancy among public health nurses and midwives.

Between December 2017 and February 2018, we conducted a prospective semi-quantitative knowledge, attitude and practice (KAP) online survey among a convenience sample of public health nurses and midwives recruited through adverts in a professional journal. We used descriptive statistics and logistic regression to assess the impact of demographic and KAP-related variables on intent to recommend pertussis vaccine during pregnancy.

Of 253 survey participants (median age, 41 years), 91% were public health nurses. Most of them knew the current Finnish epidemiology and vaccine recommendations for pregnant women (76 and 79 %, respectively), but only 18 % were aware of pertussis fatalities. Among participants, 87% reported their intentions to recommend pertussis vaccine to pregnant women, 40% had received a pertussis booster themselves. In the multivariate analysis, factors associated with intention to recommend vaccination were knowledge of vaccine recommendations (OR, 2.87; 95%CI, 1.16-7.13), favorable risk-benefit belief (OR, 5.33; 95%CI, 2.23-12.75) and choice of the adult booster (OR, 3.06; 95%CI, 1.07-8.72). Other variables were not significantly associated with willingness to recommend the vaccine.

Nurses and midwives play a vital role in ensuring that pregnant women are able to make an informed choice on vaccination. Gaps in their knowledge should be addressed prior to the introduction of maternal vaccination.

Role: Jana Prattingerová was the principal investigator. She performed a literature review, defined objectives, wrote the protocol, designed the data collection instrument, cleaned the data, did the data analysis and wrote the report, its synopsis to the Finnish (National Immunization Technical Advisory Group) NITAG and the ESCAIDE abstract.

Title: Hip and knee joint infections after joint replacement surgery in Finnish hospitals, 1999-2016

Supervisor: Dr Outi Lyytikäinen

Surveillance of surgical site infections (SSI) in orthopedic surgery has been conducted in the Finnish Hospital Infection Program (SIRO) since 1999 and reported SSI rates have increased over time. Both the National Infectious Disease Register and the European prevalence survey of healthcare-associated infections have shown an increase in *Staphylococcus aureus* (SA) infections in Finland. In order to explore targets for SSI prevention, we aimed to determine whether SA is responsible for the increasing incidence of SSIs.

We analysed data on 157,087 hip and knee primary and revision arthroplasties from 19 hospitals participating in prospective SIRO surveillance during 1999-2016. Cases were patients meeting the EU SSI case definition (superficial and deep incisional, organ/space SSIs). We defined prosthetic joint infection (PJI) to include both deep and organ/space SSIs. For each year, the overall SSI and PJI rates per 100 procedures (%) were calculated. We used binomial regression with a log link to model trends.

We identified 3,585 SSIs; 2001 were superficial SSIs and 1,584 PJIs (366 deep incisional SSIs, 1,218 organ/space SSIs). The annual overall SSI rate decreased significantly from 4.00% in 2003 to 1.62% in 2014 ($p < 0.001$). The trend of PJI rate increased significantly from 0.54% in 2002 to 1.36% in 2016 ($p < 0.001$). Of SSIs, 79% (2,848), and 88% (1,401) of PJIs were microbiologically confirmed; 40% of which were caused by SA (range by year, 12-50%). The proportion of PJIs attributable to SA has increased by 3.6% (95% CI: 2.2-5.0%) each year.

Despite the decreasing trend of overall SSI rate, we found a significant increase in severe infections caused by SA following hip and knee arthroplasty. Evaluation of evidence-based *S. aureus* prevention measures implemented for SSIs might be useful.

Role: Jana Prattingerová was the principal investigator. She performed a literature review, defined objectives, wrote the protocol, cleaned the data, did the data analysis and wrote the report and abstracts for ESCAIDE.

Title: Hip and knee joint infections after joint replacement surgery in Finnish hospitals, 1999-2016, risk factors for Staphylococcus aureus infections

Supervisor(s): Dr Outi Lyytikäinen

In order to explore targets for SSI prevention, we aimed to identify patient, operation and hospital predictors of SA SSIs.

We analysed data on 157,087 hip and knee primary and revision arthroplasties from 19 hospitals participating in prospective SIRO surveillance during 1999-2016. Cases were patients meeting the EU SSI case definition (superficial and deep incisional, organ/space SSIs). We defined prosthetic joint infection (PJI) to include both deep and organ/space SSIs. For adjustments, we chose a subset of patient, operation and hospital-related factors that have previously been shown to be important risks for SSIs: age, sex, ASA score, wound class, duration of operation, type of operation, time of operation and operation volume. Backward stepwise logistic regression models were built to identify independent risk factors for SA PJI. For each analysis, a p-value ≤ 0.05 was considered statistically significant.

Of 87,268 hip arthroplasties 17% (14,461) and of 69,819 knee arthroplasties 10% (6,771) were revisions. We identified 3,585 SSIs; 2,001 superficial SSIs and 1,584 PJIs. Of all SSIs, 79% (2,848), and of PJIs, 88% (1,401), were microbiologically confirmed; SA was found in 37% of those (range by year, 12-50%). By multivariable analysis, independent factors significantly associated with increased risk of SA PJIs included male gender (OR, 9.37; 95%CI, 3.37-26.02), revision operations (OR, 1.54; 95%CI, 1.06-2.24), operation during summer (OR, range by month, 1.3-1.7; $p < 0.001$ for each), high ASA score (OR, 3.38; 95%CI, 1.83-6.23), and long duration of operation (OR, 1.02; 95%CI, 1.01-1.04). Independent protective factors were older age among males (OR, 0.97; 95%CI, 0.96-0.97), or females (OR, 0.10; 95%CI, 0.03-0.29) and operation before 11 a.m. (OR, 0.78; 95%CI, 0.62-0.99).

We found that the risk of SA PJIs differed by sex and age, and the risk was also affected by the timing of the operation. This suggests that there may be some patient-related risk factors in emergency operations, or gaps in pre- or perioperative practices like antimicrobial prophylaxis of certain patient groups, such as young men, which needs further evaluation.

Role: Jana Prattingerová was the principal investigator. She performed a literature review, defined objectives, wrote the protocol, cleaned the data, did the data analysis and wrote the report and abstracts for the European Bone Joint Infection Society conference. She also prepared and submitted a manuscript on this work to the Infection Control & Hospital Epidemiology journal (24).

4. Communication

Publications in peer reviewed journals

1 manuscript accepted (18)

Manuscripts submitted to peer reviewed journals (in review process)

1 manuscripts submitted (24)

Reports

2 surveillance reports (1, 13)

2 outbreak reports (2, 14)

4 reports on training public health professionals: reflection and evaluation (10, 11, 15, 19)

2 research reports (12, 17)

Conference presentations

1 oral presentation at SIRO annual meeting (9)

1 poster at ESCAIDE 2017 (7)

1 poster at European Bone and Joint Infection society annual meeting (21)

2 posters at ESCAIDE 2018 (22, 23)

Other presentations

2 oral presentations at the Nordic mini project review meetings (8, 16)

3 briefings on an outbreak investigation (2)

5. Teaching and pedagogy

Title: Outbreak training module

Supervisor: Dr Outi Lyytikäinen

Jana Prattingerová twice (18 February 2017 and 6 April 2018) prepared and facilitated an 8-hours training module at the Laurea University of Applied Sciences for students of the Masters in global development and management of health care programme.

Training objectives

1. Describe the steps in an outbreak investigation
2. Develop a case definition in the context of an outbreak investigation
3. Construct and interpret an epidemic curve
4. Choose an appropriate control group for a case control study
5. Calculate and interpret an odds ratio
6. Define an appropriate cohort for a cohort study
7. Calculate and interpret an attack rate
8. Compare and contrast case-control and cohort approach in analytical epidemiology
9. Adapt the steps of an outbreak investigation to a healthcare setting
10. Insights in difficulties in the field during an outbreak situation.

Evaluation

The students were positive about the day in general as verbally expressed at the end of the day and via the evaluation forms. The lectures and case study were well adapted to their previous knowledge according to the students and the mix of lectures and group-work 'was about right' (100% score in 2017 and 90% in 2018). For most of the students, the learning outcomes were either 'mostly' or 'completely' fulfilled. The question about whether the students would apply the learned knowledge in the future was answered with slightly more variation: unlikely (n=1), probably (n=3), definitely (n=7), and not sure (n=1) in 2017 and probably (30%) and definitely (70%) in 2018.

Title: Outbreak training module

Supervisor: Dr Outi Lyytikäinen

Jana Prattingerová prepared and delivered a 6-hours training module at Third Faculty of Medicine Charles University, Prague, Czech Republic (29 November 2017) for students of postgraduate course on Infection Control and Hospital Hygiene.

Training objectives

1. Describe organisation of Public Health in the Czech Republic
2. Describe general principles and objectives of surveillance
3. Describe the steps in an outbreak investigation
4. Insights into difficulties in the field during an outbreak situation
5. Insight challenges in cooperation between regional Public Health Authority and infection control staff

Evaluation

The students were very positive about the day in general as verbally expressed at the end of the day and via the evaluation forms (n=25). The lectures were well adapted to their previous knowledge according to the students. For 21 out of 25 (84%) students, the learning outcomes were either 'mostly' or 'completely' fulfilled.

Title: Essential of Infectious Disease Epidemiology training module

Supervisor: Professor Dr Ralf Reintjes

Jointly with the principal coordinator, EPIET and EUPHEM fellows, Jana Prattingerová facilitated a one-week training module at Tampere University, School of Health Sciences (22-26 January 2018) for the international doctoral programme students in epidemiology.

Training objectives

1. Surveillance
 - a. Understand the role of the laboratory in public health surveillance;
 - b. Identify the type of specimen to take along with the role of non-human-samples in Salmonellosis investigation
2. Outbreak investigation
 - a. Describe the steps in an outbreak investigation
 - b. Develop a case definition in the context of an outbreak investigation
 - c. Construct and interpret an epidemic curve and calculate and interpret an attack rate
 - d. Combine epidemiological and laboratory data to formulate conclusions during an investigation.
3. Methodology
 - a. Choose a relevant study design depending on the research question, exposure and outcome studied.
 - b. Compare and contrast case-control and cohort approach in analytical epidemiology
 - c. Define an appropriate cohort for a cohort study
 - d. Choose an appropriate control group for a case control study
 - e. Calculate and interpret relative risks and odds ratio
4. Insights into difficulties in the field during an outbreak situation

Two different evaluations were conducted; a hot debrief and a formal university evaluation. At the end of every day a wrap-up and discussion with students followed by an extensive debriefing with the principal coordinator was conducted to gather feedback and discuss how we could improve the training for the next days. Feedback was also obtained from the evaluation performed by the University of Tampere. In general, the learning objectives of the course were achieved. The course content was appropriate and the lectures supported achievement of the learning objectives. Participants would recommend the course to other students.

Reflection

From her participation in these teaching activities Jana learned how to prepare and deliver material for a course and the importance of adjusting prepared presentations to the level of knowledge in a group during the course of giving lectures/conducting a case study. She gained confidence in conducting case studies independently and learned about initiating discussions following lectures and during the case study among the groups.

6. EPIET/EUPHEM modules attended

1. EPIET/EUPHEM Introductory Course, 26 September - 14 October 2016, Spetses, Greece;
2. Outbreak Investigation, 5-9 December 2016, Berlin, Germany;
3. Multivariate Analysis, 13 – 17 March 2017, Zagreb, Croatia;
4. Rapid Assessment, 8-13 May 2017, Athens, Greece;
5. Project Review, 28 August-1 September 2017, Lisbon, Portugal;
6. Time Series Analysis, 20-24 November 2017 Bristol, UK;
7. Vaccinology, 11-15 June 2018, Cardiff, UK;
8. Project Review, 27-31 August 2018, Lisbon, Portugal

7. Other training

1. Whole Genome Sequencing: Decoding the Language of Life and Health 3 weeks (23 Jan-10 Feb 2017) online course NHS Health Education England
2. VECMAP Lite workshop; Mapping and modelling the distribution of disease vectors and any other invasive or autochthonous species depending on the environment for its survival, 30.3.2017 University of Helsinki, Finland
3. Nordic Mini Project Review, 3-4 April 2017, Helsinki, Finland

4. Pandemic and epidemic-prone disease, online course OpenWHO (August 2017)
5. Incident management system, online course OpenWHO (August 2017)
6. Public health interventions in pandemics and epidemics, online course OpenWHO (August 2017)
7. Influenza vaccination among healthcare workers-asses and communicate to improve uptake ECDC online course (November 2017)
8. Nordic Mini Project Review, 5-6 March 2018, Oslo, Norway
9. Introduction to Crimean-Congo Haemorrhagic Fever, online course OpenWHO (May 2018)

DISCUSSION

Supervisor's conclusions

Dr Outi Lyytikäinen, Dr Hanna Nohynek

During the two-year fellowship at THL Dr Jana Prattingerová has been involved in a variety of public health activities, including surveillance, outbreak investigations, descriptive and analytical epidemiology and research as well as communication and teaching, as described in the core competencies of the EPIET programme.

The outcome of her work has been excellent, benefitting the department of health security at THL as well as the international community. She has contributed to the development of Finnish surveillance systems for *Clostridium difficile* infections, surgical site infections and HIV and AIDS. Her research project on knowledge of pertussis and attitudes towards pertussis immunization during pregnancy among public health nurses and midwives provided valuable information to the Finnish National Immunization Technical Advisory Group (NITAG), which is needed for designing pertussis control priorities and prior to the possible introduction of maternal vaccination in Finland.

The two-year experience at THL has increased her confidence in the field of infectious diseases epidemiology, especially in analysing and reporting surveillance data as well as scientific writing. Her participation in the daily work of the department has made it possible for the supervisors to carry out projects that would otherwise have been impossible to accomplish.

The fellow developed both personally and professionally during the fellowship and solved the given tasks in a highly competent way with a high and increasing degree of independence, but at the same time seeking assistance when necessary.

A positive attitude towards challenges in the field of infectious diseases, and an open mind towards colleagues makes the fellow a very good team player.

Based on her personal and professional skills, we can highly recommend Jana Prattingerová for any kind of public health work.

Coordinator's conclusions

Dr Louise Coole

Jana Prattingerová has had a very successful fellowship which embodies the goal of the EPIET fellowship programme in strengthening epidemiological capacity in Europe and developing the networks to support effective detection and response to infectious diseases. Jana has exhibited great commitment, personal resilience and application in making the most of the opportunities the programme has offered her and has developed both her epidemiological competence and her confidence to a level that she will be very well placed to make a genuine difference to public health in her future career. In addition to her successful completion of projects on surveillance, outbreak investigation and applied research she has developed her skills in scientific communication and teaching others which I am confident she will put to good use on her return to the Czech Republic. It has been a pleasure to work with such a dedicated individual.

Personal conclusions of fellow

Throughout my training, I have been based at the Infectious Disease Control and Vaccinations Unit at the Finnish National Institute for Health and Welfare. During my EPIET fellowship, I have had the opportunity to work on a wide range of projects across the competencies, including surveillance, research projects and the outbreak investigations. I have the chance to experience the different working style and way of thinking in another EU country and being exposed to a different culture on each day of these unforgettable two years. In addition, I have had the opportunity to work with and learn from national level experts from various fields. I highly appreciate that the Programme allowed me to develop statistical and analytical skills that I only could have developed by working

with experts in the THL and applying the knowledge gained through the ECDC training modules. The programme also provided me with the great opportunity to gain confidence in professional writing, presentation and teaching which will benefit me in throughout my further professional career.

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