Summary of work activities
Zvjezdana Lovrić Makarić
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 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 listing the theoretical modules attended and the 23-month training. Additionally, if all training objectives have been met, they receive a diploma.

Stockholm, September 2018

- 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

Zvjezdana Lovrić Makarić is medical doctor, prior to her work in epidemiology she has been working as general practitioner. During the past four years including the fellowship, she has been working as an epidemiology resident at the Division for Epidemiology of Communicable Diseases at the Croatian Institute for Public Health in Zagreb.

Fellowship assignment: Intervention Epidemiology path (EPIET)

In 15 September 2016, Zvjezdana Lovrić Makarić started her EPIET fellowship at the Croatian Institute for Public Health, Zagreb, Croatia, under the supervision of Branko Kolarić. 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

Supervisors: Goranka Petrović, Bernard Kaić, Branko Kolarić

Title: An Evaluation of national tuberculosis surveillance in Croatia

As Croatia is among few EU countries still performing the universal BCG vaccination, prior the change from the general to the selective BCG vaccination, an exhaustive and comprehensive TB surveillance system must be in place to inform TB control programme. Since the national TB surveillance system has never been formally evaluated, we conducted the evaluation of the performance and quality of surveillance in terms of simplicity, flexibility, usefulness, completeness, and timeliness of data from 2013 – 2016.

Simplicity, flexibility and usefulness were evaluated using semi-structured questionnaire, reviewing relevant documents and surveillance data. Completeness was evaluated for selected variables that are used for reporting to TESSy by examining the field completion of variables while median time from diagnosis to notification was calculated to evaluate timeliness.

Questionnaire was completed by 65/110 (59%) epidemiologists mainly working with TB management routinely (N=34; 52.3%) or as TB county institutes coordinators (N=7, 10.8%). Respondents consider overall TB surveillance as moderately simple (N=38, 58.5%) while usefulness in the outbreak detection was reported as good (N=37, 56.9%). The flexibility in terms of introducing new variables is low. Completeness of culture results data were 92,4% (data 2013-

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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

2016) and 88,4% (2016). Drug susceptibility testing for first line TB drugs was completed for a less than 70% of cases. Completeness of data of treatment outcome after 12 months was also slightly better in period 2013-2015 (84% vs 80% in 2016). The median time from diagnosis to notification was 24.5 to 158 days per year.

TB surveillance in Croatia is moderately simple, useful but has a low level of flexibility. Sustained efforts should be made to improve timeliness, completeness of laboratory and outcome related variables by raising awareness amongst the participants of the surveillance of its importance in TB prevention and control. Furthermore, combining additional data sources as hospitals, laboratories and mortality registers, should be considered in order to provide more comprehensive and timely information to the TB surveillance system.

Role:
Zvjezdana was the principal investigator. She wrote the evaluation protocol, designed the data collection instrument, exported the data from the national database, performed the data cleaning and analysis. She also wrote the report (4) and presented the preliminary findings as an oral presentation at 82nd Scientific meeting of Croatian Epidemiological Society (8). It is planned to prepare the manuscript to be submitted to a peer reviewed journal.

Supervisors: Goranka Petrović, Bernard Kaić

Title: Routine analysis of tuberculosis surveillance data 2017

In Croatia, tuberculosis is a mandatory notifiable disease according to Act on the Protection of the Population against Communicable Diseases. The TB surveillance system is comprehensive and includes the entire Croatian population. Surveillance is passive and case-based. We described tuberculosis cases notified to the national surveillance system in 2017.

In 2017, 369 cases were reported (incidence 8.8 per 100 000). Differences in morbidity by county in 2017 varied between 2.9 (Šibenik-Knin County) and 19.3 (Vukovar-Srijem County) per 100 000. The age-specific incidence of tuberculosis is the lowest in the youngest age groups, with no TB cases reported in children under 10 years in 2017. In the age groups 10 to 14 and 15 to 19 years, 2 and 6 patients with TB were reported, with an incidence of 1.0 and 2.6 per 100 000 population respectively. The highest incidence rate of tuberculosis was reported in persons aged 70 years and older, with 112 TB cases and an incidence of 20.1 in 2017. In regard to the disease site, the most common was pulmonary tuberculosis (324 cases), representing 87.8% of the total reported tuberculosis. Majority of the pulmonary tuberculosis (86.7%) was bacteriologically confirmed. In 2017, two cases of osteoarticular tuberculosis and one case each of disseminated tuberculosis and tuberculous meningitis were recorded. The last case of tuberculous meningitis in the age group 0-19 years was recorded in 2004.

In 2017, the lowest incidence of tuberculosis has been recorded since TB surveillance is in place showing favourable epidemiological status of disease.

Role:
Zvjezdana was involved in routine surveillance activities (data analysis, data management, monitored internal completeness of the system) and preparation of data for TESSY. She also participated in the analysis of national TB surveillance data to be published in Croatian health statistics yearbook (5).

2. Outbreak investigations

Supervisors: Ljiljana Žmak

Title: Neglected disease in mentally ill patients: Major tuberculosis outbreak in a psychiatric hospital

As tuberculosis (TB) incidence decreases over last years, there is possibility of overlooking the disease cases, especially in vulnerable populations. We describe here a major tuberculosis outbreak among mentally ill patients in Croatia, focusing on 1 regional hospital where most patients were hospitalized. The data were obtained from the national TB genotyping database, hospital statistics database, and national TB registry, located at the Croatian National Institute of Public Health.

In the period from 2007-2014, a major TB outbreak comprising 35 TB patients caused by a single Mycobacterium tuberculosis strain of multiple locus variable number of tandem repeats analysis Mtbc 15-9 type 2470-85 (MIRU-VNTRplus nomenclature) was identified in patients connected with several psychiatric institutions. Among them, 33 were hospitalized because of mental illness, 1 patient was a health care worker (HCW), and 1 was the brother of a psychiatric patient. Of the 35 analysed patients, 5 were women (14.3%) and 30 were men (85.7%), with an average age of 50.1 years. Because 28 TB patients were residents and 1 patient was a HCW in a regional psychiatric hospital, this institution was indicated as the central point of the outbreak report. The outbreak started in 2007, and the probable

index case was a 51-year-old man whose TB was recognized 5 months after admission to psychiatric hospital. During this period, he resided in the hospital together with 14 patients that later developed TB and are among the outbreak patients. Until 2010, 8 more patients developed TB, and the local epidemiology service proclaimed a TB outbreak in the hospital. The epidemiologic service made a comprehensive contact tracing analysis on 171 hospitalized patients and 96 hospital employees. Despite the epidemiologic service efforts, the hospital outbreak continued, with a peak in 2012 when 9 more patients developed TB, including the HCW. In years 2013 and 2014, 7 more TB patients were identified.

The outbreak emphasizes the vulnerability of mentally ill patients to tuberculosis infection and the complexity of infection control measures in psychiatric institutions. The awareness of tuberculosis in these settings should be maintained to interrupt prolonged exposure and avoid unnecessary infection.

Role:

Zvjezdana was a coinvestigator. She conducted descriptive analysis (time, place, and person); did data cleaning, interpreted the epidemiological data and developed recommendations for future outbreaks. She was a co-author of a brief report published at peer-reviewed journal (1).

Supervisors: Mirjana Lana Kosanović Ličina, Branko Kolarić

Title: An outbreak of haemorrhagic fever with renal syndrome linked with mountain recreational activities in Zagreb, Croatia, 2017

In 2017 Zagreb faced the largest outbreak of haemorrhagic fever with renal syndrome (HFRS) to date. We investigated to describe the extent of the outbreak and identify risk factors for infection.

We compared laboratory-confirmed cases of Hantavirus infection in Zagreb residents with the onset of illness after 1 January 2017, with individually matched controls from the same household or neighbourhood. We calculated adjusted matched odds ratios (amOR) using conditional logistic regression.

During 2017, 104 cases were reported: 11–81 years old (median 37) and 71% (73) male. Compared with 104 controls, cases were more likely to report visiting Mount Medvednica (amOR 60, 95% CI 6–597), visiting a forest (amOR 46, 95% CI 4.7–450) and observing rodents (amOR 20, 95% CI 2.6–159). Seventy per cent of cases (73/104) had visited Mount Medvednica prior to infection. Among participants who had visited Mount Medvednica, cases were more likely to have drunk water from a spring (amOR 22, 95% CI 1.9–265), observed rodents (amOR 17, 95% CI 2–144), picked flowers (amOR 15, 95% CI 1.2–182) or cycled (amOR 14, 95% CI 1.6–135).

Our study indicated that recreational activity around Mount Medvednica was associated with HFRS. We recommend enhanced surveillance of the recreational areas during an outbreak. To our knowledge this was first analytical outbreak study from Croatia published in peer-reviewed journal.

Role:

Zvjezdana was the principal investigator. She wrote the protocol, design the questionnaire, participate in interviewing cases and controls, conducted case finding, produced summary-reports of the regular outbreak investigation team meetings, conducted descriptive analysis (time, place, and person); developed and tested the hypothesis (case control study); did the data entry and cleaning, interpreted the epidemiological data; developed recommendations for future outbreak investigations. She also presented a poster at an international epidemiological conference (7), wrote the manuscript submitted and published in a peer-reviewed journal (2) and was a co-author of an oral presentation at Scientific meeting of Croatian Epidemiological Society (9).

Supervisors: Bernard Kaić

Title: An outbreak of haemorrhagic fever with renal syndrome in Croatia, 2017

In 2017 we detected the increase of reported cases of haemorrhagic fever with renal syndrome (HFRS) in Croatia. We investigated to describe the extent of the outbreak. Enhanced surveillance using a questionnaire was implemented in April 2017. An outbreak investigation was initiated to determine the extent of the outbreak.

Cases were defined according to a national case definition of HFRS. In total 389 cases were reported; predominately male 79% (N=307) with median of 32 years (11-81). Case numbers peaked in June 2017 (week 22). Eighty-three percent of cases were hospitalised (N=323) while 3 cases died (0,7%). Overall, 338 (N=87%) cases had laboratory confirmed Hantavirus infection of which 97% (N=327) had Puumala virus with remaining Dobrava virus (N=11, 3%). Cases were reported from 15 counties (15/21) with city of Zagreb county as mostly affected (N=118), following Pozega – Slavonija county (N=59) and Brod – Posavina (N=35).

This was the largest HFRS outbreak in Croatia to date. During the outbreak people were advised about preventive measures through local and national media. The majority of cases were reported from already known risk areas for HGBS infection where enhanced control of rodent populations was performed when an outbreak was identified.

Role:

Zvjezdana was the member of the outbreak management team. She performed weekly analysis of data from the national surveillance system and reporting results to county institutes. She presented the data as the invited speaker on Public health expert meeting, Croatian Institute of Public Health (10) and in national epidemiological bulletin as one of the co-authors (6).

3. Applied epidemiology research

Supervisors: Tatjana Nemeth Blažić, Branko Kolarić

Title: Sexual health and risk behaviour among men who have sex with men attending community-based HIV testing and counselling service, Zagreb, 2014-2017

Croatia is a country with a low prevalence of infection with human immunodeficiency virus (HIV). Men who have sex with men (MSM) account for >60% of all HIV diagnoses, and >80% of new HIV diagnoses. We described sexual risk behaviours and estimated HIV prevalence among first-time and repeat testers from September 2014 to April 2017.

We analysed questionnaires completed by counsellors during pre-test interviews at free voluntary rapid HIV testing and counselling services provided for MSM in Zagreb. We calculated prevalence ratios (PR) using binomial regression.

Of 569 eligible participants, 32% (n=178) were tested for the first time. 65% (352/540) were single; 78% (401/517) defined their sexual orientation as homosexual and 22% (111/517) as bisexual. Of all respondents, 76% (382/500) reported never discussing about sexual health with their physician. Among first-time testers, 60% (111/184) were <25 years old compared to 35% (134/386) among repeat testers (p<0.001). Repeat testers were more likely to report a history of sexually transmitted disease (20%, PR=5.7, 95% CI: 2.5-13) and having >5 sexual partners in the last 12 months (34%, PR=1.5, 95% CI: 1.3-2.1), compared with first-time testers. The preliminarily HIV prevalence was 2.5% (14/569) among all participants; 1.8% (7/385) among repeat testers versus 3.8% (7/184) among first-time testers (p=0.153).

Higher HIV prevalence among first time testers suggests the need for additional preventive measures and sensitization to promote HIV testing in MSM community. The association between repeated HIV testing and increased risk behaviour suggests that providers need to provide enhanced behavioural interventions for those with persistent risks.

Role:

Zvjezdana was the principal investigator. She did the data cleaning and analysis, formulate conclusions, proposed recommendations, and wrote the abstract submitted to an international conference.

Supervisor(s): Marija Posavec, Branko Kolarić

Title: Attitudes and beliefs related to childhood vaccinations among parents of 6 years old children in Zagreb, Croatia

The Croatian Immunization Programme is a mandatory prevention programme in which vaccines are offered free of charge and little is known about parental vaccine-related beliefs and attitudes. We aimed to describe beliefs and attitudes towards childhood vaccination of parents in Zagreb, estimate the proportion of positive attitudes towards vaccination and identify the possible predictors of positive attitudes.

Using a self-administered questionnaire, we performed a cluster sampling survey from 1 May to 1 June 2017 among parents of 6-years-old children in Zagreb.

In total 542 questionnaires were collected, 80% (n=430/542) of respondents were mothers. Overall, 93.5% (n=501/536; 95%CI:91.1-95.3%) respondents reported their child received all age-appropriate mandatory vaccines. Even though 72.6% (n=385/531; 95%CI:69-76 %) respondents feel that childhood vaccination should remain mandatory, 36.3% (n=192/528; 95%CI: 32.7-40) considered that simultaneous administration of vaccines can have negative effect to their child's health. In addition, 38% (n=202/532; 95%CI:33.2-43.1%) feared that vaccines may harm their child. Of total, parents mostly reported having a positive attitude towards vaccination (61.8%; 95% CI: 34.7-42). Parents with the positive attitude were more likely to state their child experienced mild or no adverse reaction after vaccination (OR=5.58; 95%CI: 1,57-21.86 and OR=8.99; 95%CI: 2.45-32.95), report not delaying vaccination (OR=16.7; 95%CI: 4.12-68.01) and provide additional non-mandatory vaccines to their child (OR=1.88; 95%CI: 1.12-3.15). However, gender, age, education and marital status of parent were not significantly associated with the positive attitude towards vaccination.

Our results suggest the need for educational interventions and communication strategies that could foster better knowledge on immunization with a focus on parental misconceptions, perceived constraints and safety issues about vaccine.

Role:

Zvjezdana was the principal investigator. She wrote the protocol, framed research question, analysis plan, designed the data collection instrument, and sought the Ethics Committee approval. Further she was involved in the data collection, did the data entry, cleaned and analysed the data; formulated conclusions and proposed recommendations. Also, she wrote the manuscript submitted and published in a peer-reviewed journal (3) and abstract submitted to an international conference.

4. Communication

Publications

1. Zmak L, Obrovac M, Lovric Z, Jankovic Makek M, Katalinic Jankovic V. Neglected disease in mentally ill patients: Major tuberculosis outbreak in a psychiatric hospital. Am J Infect Control 2017; 45.

2. Lovric Z, Kolaric B, Kosanovic Licina ML, Tomljenovic M, Dakovic Rode O, Danis K et al. An outbreak of haemorrhagic fever with renal syndrome linked with mountain recreational activities in Zagreb, Croatia, 2017. Epidemiology and Infection; 1–4.

3. Lovric Makaric Z, Kolaric B, Tomljenovic M, Posavec M. Attitudes and beliefs related to childhood vaccinations among parents of 6 years old children in Zagreb, Croatia. Vaccine (2018), https://doi.org/10.1016/j.vaccine.2018.10.055

Reports

4. Lovric Makaric Z, Petrovic G, Kaić B, Kolarić B. Report of evaluation of tuberculosis surveillance in Croatia.

5. Petrovic G, Lovric Makaric Z, Zrakic I. The Epidemiology of Tuberculosis In: Croatian health statistics yearbook 2017. Croatian Institute of Public Health.

6. Ilić M, Lovric Z, Pem Novosel I, Kurečić Filipovic S. Epidemija hemoragijske groznice u Hrvatskoj, 2017. Epidemiološki vjesnik.

Conference presentations

7. Lovric Z, Kosanovic Licina ML, Tomljenovic M, Kolaric B. Late breaker: A large outbreak of haemorrhagic fever with renal syndrome in Zagreb, 2017. Poster presentation at the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE), 6-8 November 2017, Stockholm, Sweden.

Other presentations

8. Lovric Z, Petrovic G, Kaić B, Kolarić B. Evaluation of tuberculosis surveillance in Croatia. Oral presentation at 82nd Scientific meeting of Croatian Epidemiological Society, 17-19 May 2018, Korčula, Croatia.

9. Kolaric B, Lovric Z, Kosanovic Licina ML, Tomljenovic M, Dakovic Rode O, Kaic B et al. An outbreak of haemorrhagic fever with renal syndrome linked in Zagreb, 2017. Oral presentation at 81st Scientific meeting of Croatian Epidemiological Society, 17 November 2017, Zagreb, Croatia.

10. Lovric Z, Kurecic Filipovic S. Haemorrhagic fever with renal syndrome in Croatia, 2017. Oral presentation at Public health expert meeting, Croatian Institute of Public Health, 10 November 2017, Zagreb, Croatia.

11. Lovric Z. Vaccination of healthcare workers. Oral presentation at Vaccination symposium 2017, 27 April 2017, Rijeka, Croatia

12. Lovric Z, Kaic B. Influenza surveillance, vaccination policy and vaccination uptake of influenza in Croatia. Oral presentation at workshop Seasonal Influenza Vaccination in South Eastern Europe, 13-14 December 2017, Belgrade, Serbia.

13. Lovric Z, Visekruna Vucina V, Pem Novosel I, Kurecic Filipovic S, Kaic B. Recruitment approach in Croatia - Screening in hospital for infectious disease. Oral presentation at IMOVE+ Technical meeting, 10-13 January 2017, Berlin, Germany.

Other

Participated in writing the National tuberculosis prevention and control guidance in Croatia to be published by Ministry of Health.

5. Teaching and pedagogy

Case study "An outbreak of gastro-enteritis in Kalundborg, Denmark", January 2018

Zvjezdana facilitated the case study "An outbreak of gastro-enteritis in Kalundborg, Denmark" on 10 January 2018 for the students of the postgraduate (doctoral) study programme "Health and ecological engineering. Training objectives of teaching activity were following: to identify the steps of the investigation of an outbreak, elaborate a case definition, generate hypotheses, test hypotheses with different pieces of evidence, interpret microbiological results, combine epidemiological, microbiological and environmental data to formulate conclusions, communicate findings and formulate recommendations. Students evaluated this training activity using an anonymous paper based questionnaire that showed they were satisfied with the overall support provided by the moderator during the case-study (8/8; 100%) and considered that the moderator was well prepared for the case study (8/8; 100%).

Reflection

During this activity, I have developed additional skills in guiding the discussion to achieve the training objectives of the case study. The group was very heterogeneous since participants were from different fields of medicine (e.g. gynaecologist, vascular surgeon, pulmologist, school and adolescent medicine specialist) and they all had their own experiences that they wanted to share with the group. That was good for discussion but it was time-consuming.

Exercise "Descriptive epidemiology, Measures of Frequency, Health Status indicators in Croatia and Performance of a diagnostic test", January 2018

The exercise was a part of the program of the Epidemiology course for medical students. The exercise was a combination of power point presentation and lecture. After each part of the presentation, students had tasks to calculate - measures of frequency, specificity, sensitivity, positive and negative predictive values of diagnostic tests The learning objectives were: identify the basic principles of descriptive epidemiology, apply epidemiological variables (person, place, time) to actual situations, describe and interpret epidemic curves, identify differences in indicators of morbidity and mortality (incidence, prevalence, mortality, lethality), calculate and interpret measures of frequency, identify indicators of health status of population, calculate and interpret specificity, sensitivity, positive and negative predictive value of diagnostic test. After the end of the exercise, students evaluated this training activity using an anonymous paper based questionnaire. They were satisfied with the provided overall support during the exercise (30/31; 96%) and they considered that the lecturer was well prepared for the presented topics (29/31; 94%). Students mostly agreed that the lecture and the exercise were clearly and accurately presented (27/31; 87%) and considered that they had enough time for discussion and questions (27/31; 88%).

Reflection

During this activity, I renewed my knowledge about epidemiological measures. I will improve this exercise with additional examples from epidemiology, such as real outbreak examples.

6. EPIET/EUPHEM modules attended

1. Introductory course, 26 September – 15 October 2016, Spetses, Greece
2. Outbreak investigation module, 5-9 December 2016, Berlin, Germany
3. Multivariable analysis module, 13-17 March 2017, Zagreb, Croatia
4. Rapid Assessment & Survey Methods Module, 8-13 May 2017, Athens, Greece
5. Project Review Module, 28 August – 01 September 2017, Lisbon, Portugal
6. Time series analysis, 19-25 December 2017, Bristol, UK
7. Vaccinology Module, 11-16 June 2018, Cardiff, UK
8. Project Review Module, 27-31 August 2018, Lisbon, Portugal

7. Other training

1. Statistical analysis and health statistics, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, January 2017, Zagreb
2. Basic epidemiological methods, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, January 2017, Zagreb

3. Selected topics in Infectious Diseases, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, February 2017, Zagreb

4. Selected topics in microbiology, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, February 2017, Zagreb

5. Immunity and allergy, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, February 2017, Zagreb

6. Epidemiology of communicable diseases, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, March 2017, Zagreb

7. Advanced epidemiological methods, Specialist postgraduate studies in epidemiology, March 2017, Zagreb

8. Health promotion, health education and health communication, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, March 2017, Zagreb

9. Epidemiology of non-communicable diseases, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, March 2017, Zagreb

10. Applied epidemiology, Specialist postgraduate studies in epidemiology, University of Zagreb School of Medicine, March 2017, Zagreb

Discussion

Supervisor's conclusions

During the two-year fellowship as the first EPIET fellow in Croatia Zvjezdana was involved in a wide range of activities, covering all core competencies of the EPIET programme. She developed both personally and professionally during the fellowship and solved the given tasks in a highly competent way. She worked independently, only occasionally consulting colleagues and peers for advice. Zvjezdana's analytic study of the outbreak of haemorrhagic fever was probably the very first analytical outbreak investigation in Croatia ever published in peer-reviewed journal. Zvjezdana also gained experience in the teaching and training of public health professionals at graduate and postgraduate levels. The surveillance project of Zvjezdana was a great challenge since comprehensive evaluation of the tuberculosis surveillance system has not been performed yet. In addition, Zvjezdana was engaged in amount of daily operational routine work at the department of communicable diseases. It was a great pleasure to supervise Zvjezdana as the first Croatian EPIET fellow. Despite all the obstacles during the introduction of a new programme it was great experience that enriched me both professionally and personally. EPIET experience certainly enabled Zvjezdana's development and made her capable for substantial contribution in further development of evidence-based epidemiology at national and EU levels.

Coordinator's conclusions

Zvjezdana started her MS-track fellowship trained as medical doctor and working as epidemiologist resident at the Croatian Institute for Public Health in Zagreb. She was involved in field assignments in the TB surveillance and applied research in MSM with HIV and parents attitudes to vaccination, along with two outbreak investigations. She has completed all of these projects, achieving EPIET objectives. Particular highlights are the first analytical study conducted within outbreak investigation of haemorrhagic fever leading to publication, participation in routine work of TB surveillance, which lead to the first TB surveillance system evaluation, but also contributing to the new version of National guidelines for tuberculosis control in Croatia. She conducted the research studies from start to finish, including scientific outputs.
Supported by professional supervision and project availability at the site, her fellowship has been successful. She improved her competencies working with several public health topics and learned new skills mainly in analytical epidemiology, teaching, and scientific writing. I believe that Zvjezdana has improved skills needed for high quality epidemiological and public health related work and she would apply them further in the public health practice.

Personal conclusions of fellow

During the two year EPIET fellowship I have acquired many new skills and knowledge on different aspect of epidemiology through the attended modules, but mainly by applying them to my projects. I am particularly happy that throughout the fellowship I have develop statistical and analytical skills by working with my supervisors, and applying the knowledge gained through the training modules. The programme also provided me the opportunity to increase confidence in professional writing, which will benefit me throughout my further professional career. I appreciated that I had the chance to further develop my network of public health professionals by attending the EPIET training modules

and international epidemiological conferences. I also feel very privileged to have been able to finish the EPIET as a first fellow at my Institute.

Acknowledgements of fellow

I am immensely grateful to my supervisor Branko Kolaric who has been supportive in the selection, implementation and follow-up of the projects included in my portfolio. I would also like to acknowledge Kostas Danis and Frantiska Hruba, my coordinators for their support during these two years. Many thanks to all the supervisors and collaborators on the different projects for sharing their knowledge and for their guidance.