



## FELLOWSHIP REPORT

### Summary of work activities

Mario Fafangel

Intervention Epidemiology path (EPIET)

Cohort 2014

## 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;

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*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.

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 guide<sup>1</sup>.

### Pre-fellowship short biography

Mario Fafangel is a MD with previous experience in emergency medicine and pre-hospital care. During the past four years and since the start of the fellowship, he has been working as an epidemiologist at the National Institute of Public Health (NIJZ) in Slovenia. His main fields of interests are infectious disease epidemiology, outbreak investigations, vaccinology and statistics.

### Fellowship assignment: Intervention Epidemiology path (EPIET)

On 15 September 2014, Mario Fafangel started his EPIET fellowship at the Communicable Diseases Centre at the NIJZ, under the supervision of Irena Klavs and co-supervision of Veronika Učakar. This report summarizes the work performed during the fellowship.

## Fellowship portfolio

This portfolio presents a summary of all work activities (unless restricted due to confidentiality regulations) conducted by the fellow during the ECDC Fellowship, EPIET path. These activities include various projects, 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.

This portfolio also includes a reflection from the fellow on the field epidemiology competencies developed during the 2-year training, a reflection from the supervisor on the added value of engaging in the training of the fellow, as well as a reflection by the programme coordinator on the development of the fellow's competencies.

## Fellowship projects

### 1. Surveillance

**Title:**            **Development of a protocol for laboratory surveillance of HIV, STI and hepatitis B and C in Slovenia**

Despite a well-established network of laboratories and contemporary microbiology methods used, a standardised laboratory reporting system within the national communicable diseases surveillance system coordinated by the NIJZ has not yet been developed. Routine reporting of diagnoses of communicable diseases from microbiology laboratories could become the backbone of communicable diseases national surveillance system.

We developed a protocol for laboratory reporting of HIV, STIs and hepatitis B and C for surveillance purposes. We will initially pilot the proposed surveillance system and then extend the development of the laboratory reporting system to include other communicable disease in the future. We expect this will improve the Slovenian national communicable

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<sup>1</sup> 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](http://ecdc.europa.eu/en/epiet/Documents/Scientific%20guides/EPIET%20Scientific%20Guide_C2016.pdf)

diseases surveillance system minimising and potentially eliminating underreporting of laboratory confirmed cases. This project output includes the protocol for this new laboratory surveillance system, which will be used for the pilot phase.

Based on a literature review that included case definitions proposed by international health organisations (such as WHO and ECDC) and used by other national health institutes, and Slovenian expert opinions, we developed case definitions and a proposal for a list of variables together with coding for reporting from microbiology laboratories within the Slovenian HIV, other STIs and hepatitis B and C surveillance system.

In the future laboratory based surveillance system, all laboratories (public and private) will notify to NIJZ all cases that fit the case definitions for hepatitis B and C, HIV, chlamydia, gonorrhoea and syphilis according to the protocol. These individual cases will be notified within 24h after diagnosis confirmation. In addition, the laboratories will submit data on total number of individuals tested for different pathogens with different methods and number of tests performed for each of the methods included in the case definitions of the STIs. Such aggregated data will be reported monthly for each laboratory and will be stratified by age groups, sex, specialisation of referring physician.

*Role and outputs:* *Principal investigator*

Wrote the protocol, engaged with stakeholders

*Supervisors:* *Irena Klavs, Veronika Učakar*

### Competencies developed:

This project allowed to build competencies in the development of a new surveillance system while already providing a learning opportunity for the future pilot phase of this surveillance system. The literature review work provided a better understanding of the situation in the EU and a more detailed knowledge of the surveillance system currently in place in Slovenia. In addition, it required to liaise with stakeholders from different fields (epidemiology, microbiology, information technology). This allowed for the development of skills in operational planning, negotiation and in the implementation and adaptation of the strict requirements of a surveillance system in a fashion that is feasible and acceptable considering the existing resources.

## 2. Outbreak investigations

### **Title: Measles outbreak in Slovenia, likely linked to a common exposure at an international mass gathering event**

In Slovenia, where measles virus had not been circulating for many years, an outbreak of measles among visitors of an international dog show occurred in November 2014. On 24 November 2014, the regional epidemiologist from Nova Gorica region notified the Communicable Diseases Centre of NIJZ about two suspected measles cases. Both had visited the international dog show in Vrtojba/Šempeter, close to the Italian border, which took place on 8 and 9 November 2014. Dog owners from 27 (mostly European) countries participated. Around 1,100 persons attended the exhibition (700 dog owners and ca. 400 visitors).

As of 31 December, a total of 44 measles cases linked to the dog show have been reported from two of the nine Slovenian regions. We identified 23 measles cases plus 21 presumable secondary and tertiary cases. Of the 44 measles cases, 19 were male. Five were children between six months and 11 years-old and 39 were adults aged 27 to 56 years, of whom 36 were between 34 and 51 years-old. Among the adults, 12 had been fully vaccinated (with two doses of measles-containing vaccine), nine had received only one dose and 18 were not vaccinated or information was not available (vaccination status unknown or no written proof of vaccination). None of the five children had been vaccinated. Only two adult cases required hospitalisation, no fatal outcomes were recorded.

Thanks to early introduction of measles vaccination into the Slovenian vaccination programme (1968) and to high vaccination coverage in past decades (from 93.9% to 96.1% for birth cohorts 2003 to 2012) extensive transmission has not occurred in Slovenia.

*Role and outputs:* *Co-investigator*

Wrote the protocol for the regional investigation, conducted case finding, contact tracing, data collection, outbreak data analysis, wrote the outbreak report. At a national level he participated as co-investigator and collaborated in the writing of the manuscript submitted and published in a peer-reviewed journal.

*Supervisors: Marta Grgič-Vitek; Irena Klavs; Veronika Učakar*

**Title: Importance of high vaccination coverage and comprehensive contact tracing in avoiding secondary transmission of measles cases, Slovenia, April 2015**

Slovenia has interrupted endemic measles transmission and maintained a vaccination coverage of 94.3% in the 2011-2014 period. On 11 April 2015 the emergency department of Ajdovščina, in the Goriška region, notified the on-call epidemiologist/EPIET fellow of the NIJZ of a suspect measles case. In order to describe the event in terms of time, place, person and implement control measures to prevent further spread of the disease we performed a comprehensive epidemiological and microbiological investigation. Two confirmed cases of measles were identified on the basis of initial reporting and epidemiological interviews performed. The cases were both male, 44 and 47 years old. Both cases had rash onset on the 21 November and a common travel history of a work trip to Bosnia and Hercegovina during the incubation period. Both cases were vaccinated with one dose of measles containing vaccine. No additional cases were reported from health care providers and there was no indication of secondary transmission occurring in Slovenia. We identified 1379 contacts of the cases. Of those 1300 were in the work environment, 34 were family and friends contacts, 41 were identified during group free time activities and 4 were healthcare personnel. We used the employer intranet network to inform work environment contacts. After the assessment of their vaccination status we identified and vaccinated 26 persons who were not or were only partially immunized against measles. After two incubation periods since the last case, no additional cases were identified.

After the occurrence of two imported measles cases in Slovenia a combination of high vaccination coverage combined with extensive contact tracing and implementation of control measures contributed to the prevention of further disease spread in the country. Both cases occurred in individuals vaccinated with one dose from birth cohorts known to have low vaccination coverage. We recommend that public health authorities in collaboration with primary health care should engage awareness rising activities in under-immunized groups on the importance of receiving a complete vaccination schedule. The rising numbers of measles cases occurring in Slovenia in the past years are posing an increased pressure on public health response capacities. Due to the importance and effectiveness of such activities, we continue to advice a thorough epidemiological investigation of all suspect cases to be performed in order to minimize the impact on public health.

*Role and outputs: Principal investigator*

Wrote the protocol, interviewed cases, performed contact tracing, performed post-exposure vaccination, collected data, analysed data, and wrote the outbreak report.

*Supervisor: Veronika Učakar*

**Title: A norovirus outbreak investigation occurring at an international handball competition in the Primorska region**

The NIJZ advises inclusion of public health authorities (PHA) in event planning to timely detect and contain outbreaks. On 4 July 2015, a paediatrician notified NIJZ of eight hospitalised children with acute gastroenteritis, related to a youth handball tournament (1-6 July 2015; 70 teams; 18 countries; 2000 participants; 4 courts). We defined cases as participants with onset of vomiting, diarrhoea, nausea or stomach cramps between 1-8 July. We conducted a cohort study among participants restricting analysis to cases with symptoms onset 48 hours after the first reported case to exclude secondary transmission. Exposures were considered associated with illness if they explained at least 50% of cases and the association was statistically significant ( $p < 0.05$ ). Stool specimens were tested for bacteria, parasites, and viruses. All teams responded, 39 (56%) reported individual level data ( $n=1223$ ) with 157 (13%) cases. The outbreak started on 2 July, peaked on 3 July (60 cases) and last case occurred on 8 July. Teams playing first-day matches at court X had 5.3 (95%CI: 1.3-21.3) times the risk to report ill participants. Most participants stayed in dormitories with shared bathrooms; no dormitory or caterer was associated with illness. Teams shared water bottles. Cases' samples tested positive for Norovirus GI (3/3) and *Campylobacter jejuni* (1/3); an asymptomatic kitchen staff tested positive for Rotavirus (1/12). PHA were not included in event planning, delaying access to the organizer and other stakeholders by 6 hours. No common source was identified; results suggest initial norovirus introduction at court X with subsequent person-to-person transmission. Mandatory PHA involvement in planning mass gatherings in Slovenia would improve rapid detection and timely implementation of control measures.

**Role and outputs:** *Principal investigator*

Wrote the protocol, developed data collection tools, interviewed cases, collected data, analysed data, implemented control measures, wrote outbreak report, and presented a poster at an international epidemiological conference.

*Supervisors: Veronika Učakar, Irena Klavs*

**Competencies developed:**

Comprehensive development of outbreak investigation skills including developing case definitions, using descriptive and analytic epidemiology methods, recommending control measures and reporting results to different target audiences. Gaining theoretical and practical statistical knowledge to perform multivariate analysis in an outbreak setting. Having different roles in different outbreaks helped the development of professional and social skills required in a multidisciplinary outbreak response team and offered the opportunity to learn first-hand about the importance of collaboration of different stakeholders at different levels.

### 3. Applied epidemiology research

**Title: Estimation of DALYs for tick-borne encephalitis diseases in Slovenia with the use of an incidence approach developed by ECDC in the Burden of communicable diseases (BCoDE) project**

With an annual incidence between 8 and 15/100,000 population during 2009-2013, Slovenia has one of the highest notified incidence of tick-borne encephalitis (TBE) in Europe. TBE vaccination coverage remains low. In order to inform vaccination policy, we used 2009-2013 surveillance data to calculate the overall and age- and gender-specific mean annual TBE incidence. We estimated disability-adjusted life years (DALYs) from TBE, with 95% uncertainty intervals (UI), using the ECDC Burden of Communicable Diseases in Europe approach. The mean annual incidence was 11.6/100,000 population peaking in older age groups (50-74 years: 18.5/100,000) while relatively lower among children (5-14 years: 10.2/100,000). We estimated an overall 11.0 DALYs/100,000 population per year (95% UI: 10.2-11.7). While in children aged 5-14 years the TBE incidence was lower, the disease burden was higher, compared to adults aged 50-74 years: 17.2 (95% UI: 14.6-20.1) and 11.6 (95% UI: 10.3-12.9) DALYs/100,000 stratum-specific population, respectively. Incidence data alone do not fully reflect disease impact and should not be the only indicator to inform vaccination policy. In a limited resource setting where prioritisation of TBE vaccination strategies is required, vaccination programmes targeting children should be considered as possibly having a higher impact on disease burden.

**Role and outputs:** *Principal investigator*

Wrote the protocol, extracted data from surveillance system, performed data entry, contributed to data analysis, submitted a manuscript to a peer-reviewed journal

*Supervisors: Alessandro Cassini, Irena Klavs, Marta Grgič-Vitek, Veronika Učakar*

**Competencies developed:**

Infectious disease modelling using Markov models. Extraction of relevant data from surveillance system. In depth knowledge on the clinical and epidemiological aspects of tick-borne encephalitis in Europe. Shaping recommendations based on epidemiological study in order to change national policy. Development of scientific writing skills.

### 4. Communication

**Publications in peer reviewed journals**

Two publications (1, 2) in Eurosurveillance.

**Manuscripts submitted to peer reviewed journals (in review process)**

One manuscript (3) submitted and under review in Eurosurveillance.

## Conference presentations

One oral presentation (4) at ESCAIDE 2015.

One poster (5) at ESCAIDE 2016.

## Other presentations

One presentation at the Vaccinology module in Paris (6), France (May 2016).

One presentation at the Slovenian vaccination advisory board (7) (June 2016).

One presentation at the Slovenian national meeting of epidemiologists (8) (July 2016).

## Reports

Two outbreak reports.

One international mission report.

## 5. Teaching activities

### Title: **Disaster medicine course for public health professionals**

- Preparing for an international mission - presentation of the experience and activities done during the Ebola response deployment in Sierra Leone (WHO/GOARN May-June 2015)
  - o The field experiences acquired during the EPIET/WHO/GOARN pre-deployment/deployment to Sierra Leone were used to inform the participants with deployment procedures, requirements and overall advice for the preparation and completion of a field assignment.
- The ten top priorities in Complex Emergency Situations and initial Rapid Assessment & survey methodology (lectures and case study)
  - o Cascading adapted material from EPIET "Rapid Assessment & survey methodology" module candidates used the 2010 Haiti earthquake scenario to discuss and learn on the main priorities during a complex emergency situation, the appropriate indicators and sources of information. For the case study participants were divided in groups. Group discussion was facilitated by Mario Fafangel and former EPIET fellow Veronika Učakar.

*Role and outputs:* *Principal lecturer*

Developed of training material, planned the sessions, presented lectures, facilitated case study, prepared and performed course evaluation (survey).

*Supervisor:* *Veronika Učakar*

### Educational outcome:

Learning about the importance of tailoring content for the target audience. Understanding the importance of a SOCO (single overarching communication objective) when preparing and giving a lecture.

## 6. Other activities

### Title: **Ebola response mission in Sierra Leone**

During the mission he provided provide technical assistance as a field epidemiologist deployed to Koinadugu as part of the WHO Team operating in the district closely collaborating with the District Ebola Response Centre (DERC), District Health Management Team (DHMT), Ministry of Health and Sanitation (MoHS) and other partners. He reported directly to the field coordinator.

He was mainly involved in the following areas:

- Improving DERC databases in regards to data quality and data flow between pillars to provide useful and timely information on Ebola Virus Disease (EVD) response activities

- Assessment and improvements of EVD cross border surveillance
- Development of a companion digital form for the required new triage form to be introduced at Koinadugu Government Hospital and all the district Peripheral Health Units
- Support to DHMT in the national measles and polio campaign (5th – 10th June 2015)
- Supporting and strengthening district surveillance system
- Case finding and contact tracing activities

At the end of a mission he prepared a detailed end of mission report as per WHO/GOARN requirements.

**Title: Epidemic Intelligence activities**

Being responsible for daily monitoring of emails, communicable diseases notifications, the international surveillance network communication alerts (EWRS/IHR), checking media for outbreaks/alerts

**Title: On call duty**

Being responsible for all after-hours enquiries and response about outbreaks or infectious disease emergencies for a Slovenian region.

## 7. EPIET/EUPHEM modules attended

1. Introduction course, 29 September - 18 October 2014, Spetses, Greece
2. Outbreak module, 5-7 November 2014, Berlin, Germany
3. Multivariable analyses module, 25-29 March 2015, Vienna, Austria
4. Project review module, 24-28 August 2015, Lisbon, Portugal
5. Time series analyses module, 23-27 November 2015, Bilthoven, the Netherlands
6. Vaccinology module, 16-20 May 2016, Paris, France
7. Rapid risk assessment module, 20-25 June 2016, Athens, Greece
8. Project review module, 22-26 August 2016, Lisbon, Portugal

## Supervisor's conclusions

The fellow achieved all of the EPIET training objectives showing a professional approach to all tasks assigned with a high degree of independence in completing them. His research project on tick-borne encephalitis (TBE) burden provided evidence for the planned change in the Slovenian TBE vaccination policy. This will result in an important health benefit for the Slovenian population. His teaching activities contributed to raised interest in infectious disease epidemiology among the new generation of Slovenian public health professionals. His completion of the EPIET training will contribute to the work force capacity building efforts in the area of communicable diseases public health in Slovenia and will contribute towards the achievement of the necessary critical mass of field epidemiologists trained according to EPIET standards in Slovenia. His international mission contributed to his learning and gaining experience in international settings and provided an opportunity for NIJZ to provide support in a public health emergency of international concern as was Ebola. His enthusiasm to work in the communicable diseases public health field in Slovenia has been and will be an inspiration to many colleagues.

## Coordinator's conclusions

Mario was a very independent fellow with relevant background knowledge in public health. This allowed him to make rapid progress in developing field epidemiology-related competencies. His innovative thinking and drive to engage in topics that are more progressive led to a very interesting project in the field of burden of disease, opening new insights into TBE in Slovenia and strong recommendations to review the current vaccination policy. As a fellow in

training, Mario was very respectful of his supervisors and showed a good balance between his professional independence and his role as a fellow in the EPIET training. Mario is an excellent communicator and will be a valuable asset to the NIJZ, both as a public health specialist and as a future trainer.

## Personal conclusions of fellow

This 2-year programme allowed me to obtain knowledge on different aspects of epidemiology I previously had little experience in and to improve further some of the skills that I had already used in my previous career. It allowed me to get very valuable field experience during international missions as well as in the EU, giving me a broad knowledge and skills of an epidemiologist for my future work in the field.

## Acknowledgements

I would like to acknowledge all my site supervisors for all their feedback and guidance during these two years. I would like to extend my acknowledgments to the whole Communicable Disease Department of the NIJZ. I would also like to acknowledge my frontline coordinator for all the help and constructive comments that helped me improve my knowledge and work practices.

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