FELLOWSHIP REPORT

Summary of work activities

Alessandro Pini
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

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.

Stockholm, September 2016

communicable disease surveillance and control inside and beyond the EU. In 2006 EPIET was integrated into the core activities of ECDC.

The objectives of the ECDC Fellowship - EPIET path are:

- To strengthen the surveillance of infectious diseases and other public health issues in Member States and at EU level;
- To develop response capacity for effective field investigation and control at national and community level to meet public health threats;
- To develop a European network of public health epidemiologists who use standard methods and share common objectives;
- To contribute to the development of the community network for the surveillance and control of communicable diseases.

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[1].

Pre-fellowship short biography

Alessandro is a medical doctor specialised in tropical medicine in Italy.

Prior to EPIET, he did a master in Global Health in Karolinska Institutet, Sweden, he completed a six months training at the European Center for Disease Prevention and Control (ECDC) and worked as a consultant for the Burden of Communicable Disease in Europe project. He also worked for two years as a humanitarian aid-worker with Medicus Mundi Italia and Doctors Without Borders in different low-income settings mostly in Western Africa.

Fellowship assignment: Intervention Epidemiology path (EPIET)

On 15 September 2014, Alessandro started his EPIET fellowship at the Public Health Agency of Sweden, Solna, Sweden, under the supervision of Anders Wallensten. His frontline coordinator was Kostas Danis. 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.

[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

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

Online syndromic surveillance was suitable to estimate community incidence of Acute Gastrointestinal illness (AGI), Influenza-Like Illness (ILI) and Acute Respiratory Illness (ARI), Sweden, 2013-2014

Introduction: The Public Health Agency of Sweden implemented an online syndromic surveillance system (Halsorapport) to estimate weekly community incidence of AGI, ARI and ILI. Participants, selected using a stratified random sample from a population-based register, completed weekly online health questionnaires. We evaluated acceptability, representativeness and validity of the system.

Methods: We calculated the overall proportion of invited people who participated and weekly reporting proportions. We used chi-square test to compare sex and age of participants with the Swedish population. We calculated Spearman correlation coefficients (r) with a lag of ± 5 weeks to assess the agreement of the estimated weekly incidence of ILI, ARI and AGI, standardized for the Swedish population age distribution, with a routine internet search-based surveillance system that analyses trends of queries for specific terms.

Results: Of the 34,748 invited, 3,258 (9.4%) participated. On average, 78% of participants answered the weekly questionnaires. Compared with the general population, males were under-represented (47% vs 50% in the general population; $p<0.01$) and under-five participants were over-represented (47% vs 6%; $p<0.01$). The AGI and ARI incidence correlated significantly with routine surveillance data ($r=0.79$ and 0.83; $p<0.01$), when no lag was applied. ILI incidence correlated with influenza surveillance data with the largest coefficient ($r=0.69$; $p<0.01$) when traditional surveillance data were shifted back by three weeks.

Discussion: Acceptance to the weekly reporting questionnaire was high. Participants were not representative of the general population in terms of age and sex, but age-standardized data produced incidences that agreed with routine surveillance. The system was suitable for estimating the community incidence of ARI, ILI and AGI and could be introduced in Sweden and in countries with high internet penetration and up-to-date population registers.

Role and outputs: *Principal Investigator.*

Alessandro wrote the protocol (1), analysed the data, presented the findings orally at an international conference (2), submitted a manuscript as first author to "Epidemiology and infection" (3).

2. Halsorapport 2015-2016: an online surveillance systems for cross-sectional surveys using a national panel

The Public Health Agency of Sweden implemented an online syndromic surveillance system (Halsorapport) for the second year. The main objectives of Halsorapport 2015-2016 were i) to obtain a pre-recruited cohort for cross- sectional studies on public healthissues and ii) to facilitate the recruitment of controls for the investigation of national outbreaks.

Between the end of November and the beginning of December 2015, more than 30,000 Swedish people randomly selected from population registers, were invited to join the second version of Hälsorapport project for a period of one year. Participants were invited to answer an online questionnaire per month focused on public health relevant and topical issues.

Role and outputs: *Co-investigator.*

Within the project team, Alessandro contributed to drawing the strategy for the participants' selection, to designing and to analyzing a questionnaire on reasons for refusal to participate into the project, analyzing an intake questionnaire on socio-demographic characteristics of participants, adapting the system for selecting controls in case of large scale public health events.

Supervisors: Edward van Straten, AnnaSara Carnahan and Anders Wallensten

Competencies developed:

From those projects, I expanded my knowledge on syndromic surveillance, on how to evaluate surveillance projects against measurable objectives, and on providing practical and specific recommendations. I also developed further my skills in managing and analysing data.

In addition, I expanded my ability to identify sources of information for potential public health threats and surveillance data needs to assess public health threats. I also learned how to work as an effective and constructive team member.

2. Outbreak investigations

Title: Raisins, a novel possible vehicle for Enterohemorrhagic Escherichia coli (EHEC) O103 suggested by the epidemiological investigation of a national outbreak in Sweden 2015-2016.

Introduction: In January 2016, the Public Health Agency of Sweden identified a cluster of cases of EHEC O103, through whole genome sequencing, suggesting a common source. We investigated to describe the outbreak and identify the source.

Methods: We defined a case as a person infected in Sweden with the outbreak strain of EHEC O103, notified since November 1st, 2015. We conducted a case-control study with cases notified after January 1st. We randomly selected controls from a national population-based control panel available for online questionnaires. We individually matched each case to four controls on age, sex and region. Cases and controls completed paper, online or telephone questionnaires on food consumption. We calculated adjusted matched Odds Ratios (amOR) with 95% confidence intervals (CI), using conditional logistic regression. Collected food samples were tested for EHEC.

Results: Between November 2015 and July 2016, when the outbreak was declared over, we identified 73 cases in eleven counties mainly in southern Sweden. The epidemic curve was indicative of a continuous source. The median age of cases was 4 years (IQR 2-15); 43 (59%) were female. 24 cases (63%) and 101 (72%) controls completed the questionnaire. Cases were more likely than controls to have consumed raisins (amOR: 5.3; 95%CI: 1.6-18; p=0.007). All food-items tested negative.

Conclusions: Epidemiological investigations suggested raisins as possible vehicle, however due to lack of a microbiological link the source of the outbreak could not be confirmed. To our knowledge, raisins have never been identified as possible vehicles for EHEC outbreaks, but our results suggest that they may need to be considered in future similar outbreaks.

Role and outputs: *Principal investigator*

Alessandro developed the study protocol, produced weekly updated reports that were used for internal and external communication, produced summary-reports of the regular outbreak investigation team meetings, cleaned and managed the database, performed the analysis, and compiled the final report of the outbreak (4).

Supervisors: Hanna Merk, Emma Löf and Jakob Bergstrom

Title: Ebola Viral Disease (EVD), Dubreka, Republic of Guinea, May-July 2015

In May 2015, following a request for assistance for the Ebola outbreak in Guinea, Alessandro was deployed to the district of Dubreka, Guinea, under the supervision of ECDC outbreak response experts.
Introduction: On 11 May 2015, the Dubreka prefecture, Guinea, notified nine cases of Ebola Virus Disease (EVD). None of them could be linked to previously notified cases in the same prefecture. We described the epidemiological and molecular investigations aimed to prevent further transmission.
Methods: The outbreak response team collected information on cases and their contacts. We used EVD Dubreka registers and Ebola treatment centre (ETC) records to characterize chains of transmission. Real-time Ebola virus (EBOV) field sequencing was used to support investigation findings.
Results: We linked the nine initially identified EVD cases to five probable cases not previously identified. Between 9th April and 1st July, the cluster generated 32 reported cases, of which 23 (72%) were isolated and 20 (62%) died. Real-time sequencing on 12 cases indicated that i) the circulating viruses belonged to SL3 lineage and formed one cluster of closely related viruses with one to three nucleotide differences, and ii) one case with unknown epidemiological link was part of the ongoing chain of transmission. For cases who were isolated, the mean interval between symptoms onset and referral to an ETC was 2.8 days (Inter-Quartile-Range (IQR) 1-4). The mean interval between sample collection and molecular results availability was 3 days (IQR 2-5).
Discussion: Genetic characterisation supported in real time the outbreak investigations in a peripheral context with scarce resources. We recommend coupling thorough epidemiological and genomic investigations to control EVD clusters in the future.

Role and outputs: *Co-investigator*

Alessandro's tasks encompassed case and cluster investigation, contact tracing and data collection, cleaning and management. Alessandro tested a new software developed by GOARN for data management and visualization. He compiled an end-of-mission report for GOARN and submitted as first author a manuscript to WHO bulletin (5, 6).

Supervisors: Tarik Derrough, Josep Jansa and Ettore Severi

Title: An outbreak of norovirus associated with consumption of princess cake at a retirement party at the Public Health Agency of Sweden, Stockholm, 2014.

Introduction: On 1st December 2014, rumours of several cases of gastroenteritis among employees of the Public Health Agency of Sweden in Solna, Sweden, triggered further investigation to confirm the outbreak and identify its source.

Methods: Since initial investigations indicated a high number of cases among persons who attended a retirement party organized at the Agency on 26th November 2014, we sent a questionnaire on symptoms and food consumptions to all the party's attendees via email. We defined a case as a person who attended the retirement party and developed diarrhoea and/or loose stools and/or at least two of the following symptoms: headache, fever, abdominal pain and shivering. We calculated risk ratios (RR) and

95%Confidence Intervals (95%CI), for each food item served at the party. Cases self-collected stool samples for laboratory tests. The municipality environmental and health office inspected the bakery which had prepared the food served at the party.

Results: Among the fifty-seven people (89%) who completed the questionnaire, 13 (22%) were cases. The outbreak started and peaked on 27th November and the last case occurred on 29th November. Consumption of princess cake was associated with illness (RR: 16; 95% CI: 2.2-110). Four cases tested positive for norovirus.
Conclusions: Epidemiological and laboratory investigations confirmed the existence of a norovirus outbreak and pointed at the princess cake served at the retirement party as its possible source.

Role and outputs: *principal investigator*

Alessandro developed the questionnaire, collected and analysed the data, communicated the final results and wrote the final report (7).

Supervisors: Moa Rehn and Anders Wallensten

OTHER OUTBREAKS

Title: Short summary of other outbreaks that Alessandro co-investigated

Hepatitis A outbreak in Uppsala: Between November and December 2014, 12 cases of Hepatitis A were identified in Uppsala county, Sweden. The outbreak was investigated through cases interviews, questionnaires and contact tracing. When possible the virus was typed and all tested cases belonged to genotype IA. A vaccination campaign was carried out in the schools attended by some of the cases. The source of the outbreak was not identified.

Salmonella Enteritidis phagotype 13a national outbreak: In February 2015, an increase of cases with *Salmonella* Enteritidis phage type 13a were reported to the Public Health Agency from four different counties. In April, an outbreak investigation team was set up to identify a possible common source. 177 cases were reported, 110 of them were linked to a single restaurant. A spice mix, containing dried vegetables from the restaurant tested positive for the outbreak strain.

Norovirus outbreak at a wedding party in Uppsala: In July 2015, the Uppsala county Medical Officer reported an outbreak of 36 cases of gastroenteritis due to norovirus among guests of a wedding. All guests completed a paper-questionnaire on food consumption during the weeding party. The data were analysed and food-leftover tested, but the source was not identified.

National outbreak of EHEC O26, Sweden 2015-2016: Between September and April 2015, 57 cases were notified with the same strain of EHEC O26 identified through whole genome sequencing (WGS). 33 (58%) cases were 10 years old or younger; 28 (50%) of cases were males were affected. All cases developed mild gastroenteritis symptoms. Overall, 11 regions reported at least one case. The source of the outbreak was not identified, but the outbreak petered out spontaneously.

Role and outputs: *Co-investigator*

Alessandro's main activities included data cleaning, data management and data analysis.

Supervisors: Anders Wallensten

Competencies developed:

From the EHEC 0103 outbreak, I learned how to conduct matched case-control studies for outbreak investigations, to adopt strategies for selection of controls in a timely manner, to report results of the investigation in a systematic and concise manner focusing on the most relevant findings.

Through the Ebola outbreak, I learnt how to be an effective player in international and multidisciplinary teams responding to complex emergencies situations. I got acquainted with the role, mission and operational approach of the UN system and of other main international organizations engaged in humanitarian emergencies. I developed further my ability to manage stress, to cope with an extremely high work-load, and to work efficiently under a high level of pressure. From the other outbreak investigations, I got acquainted with the outbreak investigation procedures and the protocols used at the Public Health Agency of Sweden. I also developed skills in i) interpreting surveillance data to identify outbreaks, ii) formulating practical case definitions, iii) carrying out cohort and case-controls studies, iv) data entry, data validation and cleaning, performing descriptive, managing datasets, stratified and multivariable analysis, v) interpreting the results of various analysis, and identifying limitations in order to appraise critically their results.

3. Applied epidemiology research

Title: Low socio-economic status increased the risk of notifiable infectious diseases among adults in Sweden, 2005-2014.

Introduction: Although the association between low socio-economic status and non-communicable diseases is well established, the role of socio-economic factors on infectious diseases in high-income countries is less clear. We aimed to examine the associations between socio-economic characteristics and the occurrence of the 29 most frequent infectious diseases in Sweden reported between 2005 and 2014 among 18-65 year olds.

Methods: We defined a case as a person with one of the 29 most frequent infectious diseases notified between 2014-2015 and a reported security number. We compared each case, with 5 controls randomly selected from population registers and individually matched on sex, age, region of residence and year of notification. We extracted, from population registers, information on country of birth, civil, educational and employment status and income of cases and controls. We estimated adjusted matched Odds Ratios (amOR), using conditional logistic regression.

Results: We included 173,729 cases and 868,645 controls. Water- and food borne (WFB) diseases accounted for 95,955 (55%) cases. Compared with controls, cases were more likely to be born abroad (amOR: 1.04; 95%CI 1.02-1.06; p<0.001), be single (amOR: 1.14 95% CI: 1.12-1.15; p<0.001), unemployed (amOR: 1.41; 95%CI: 1.39-1.43; p<0.001) and have the lowest educational attainment (amOR: 1.34; 95%CI: 1.26-1.42; p<0.001). Cases were more likely to belong to the top income decile (amOR: 1.09; 95%CI: 1.06-1.11; p<0.001); this positive association was observed for most WFB diseases, but was inverse for most other diseases.

Conclusions: This study suggests an association between most commonly reported infectious diseases in adults and most socio-economic indicators. Policies addressing socio-economic disparities might result into also reducing the burden of infectious diseases.

Role and outputs: Principal investigator

Alessandro conceived the study idea, wrote the protocol (8), submitted it to the ethical committee (9), liaised with Statistics Sweden to receive all the population data, managed the administrative procedures for handing over and receiving sensitive data, prepared the administrative contract, cleaned and managed the datasets (n=65), carried out the analysis, summarised the results in a short report, prepared an abstract and he is currently drafting the manuscripts for peer-review publication.

Supervisors: Magnus Stenbeck and Anders Wallensten

Title: Seasonal influenza vaccine effectiveness in Sweden, 2015-2016: a test-negative case-control study, I-MOVE project.

Introduction: Influenza viruses constantly evolve, which necessitates a frequent reformulating of the vaccine. As part of a multicenter case-control test-negative study, i-MOVE project, we aimed to estimate 2015/16 seasonal influenza vaccine effectiveness against medically attended and laboratory confirmed influenza in Sweden.
Methods: We used a sentinel network of GPs reporting for influenza. We defined cases as as an ILI case (EU definition) with a respiratory sample positive for influenza collected by sentinel physicians and controls as ILI patient with a respiratory sample negative for influenza. Demographic and clinical information and influenza vaccination status were collected for both cases and controls. Using logistic regression, we calculated influenza vaccine effectiveness (AVE) adjusted for potential confounders (sex, age, time of onset and presence of chronic conditions)
Results: Between week 40, 2015 and week 20, 2016, we included 599 (54%) reports, 239 (40%) cases and 360 (60%) controls. Of all cases, 170 (71%) tested positive for influenza A (H1N1)pdm09, 5 (2.1%) for influenza A(H3N2), 58 (24%)for influenza B-Victoria and 5 (2.1%) for influenza B-Yamagata. Of the 239 cases, 8 (3.3%) were vaccinated; 2 werhad influenza A(H1N1)pdm09, 2 influenza B-Y, 2 influenza B-V (not included in the vaccine) and 1 influenza A(H3N2). AVE for seasonal influenza 2015-2016 against influenza A (H1N1)pdm09 was 0.48 (-1.65-0.76).
Discussion: Due to the small sample size, our estimation ofAVE against influenza A(H1N1)pdm09 was not precise enough to allow safe conclusions. The pooled multi-country analysis should benefit from a much larger sample size in order to provide accurate vaccine effectiveness estimation for this last influenza season.

Role and outputs: *co-investigator*

Alessandro adapted the study protocol for the Swedish centre. He followed-up, cleaned and managed the database providing updated reports to the coordinating centre. He produced a randomization protocol to select the isolates for further genetic characterization. He wrote the final report for ECDC (10).

Supervisors: Katherina Zakikhany and Mia Brytting

Title: Risk factors for sporadic psittacosis in Sweden

Background: Professional and domestic exposures to birds are the most commonly reported sources of psittacosis. However, in 2013, an outbreak investigation in Sweden indicated an association with exposure to wild birds. We conducted a case-control study to identify current risk factors for sporadic psittacosis to inform preventive measures. Methods: We individually matched (on sex, age and postal-code) psittacosis cases reported between December 2014 and April 2016 to controls randomly selected from the population register. Cases and controls completed a self-administered questionnaire on exposures to wild and domestic birds and use of protective measures. We estimated adjusted matched Odds Ratios (amOR), using conditional logistic regression. Results: Thirty (94%) cases and 77 (50%) controls completed the questionnaire. The median age of cases was 67 years (inter-quartile-range 50-71). Of all cases, 26 (81%) were male; 29 (97%) were hospitalized; 26 (87%) reported exposure to wild birds, 10 (33%) to domestic birds/poultry and 3 (10%) reported professional exposure. Compared with controls, cases were more likely to be exposed to wild (amOR: 16 CI: 1.3 -198; 87% cases exposed) or domestic birds (amOR: 8.5; CI 1.5-47; 33% cases exposed). Cleaning bird-tables contaminated by wild bird faeces (amOR: 12 CI: 1.0-134; 21% cases exposed) were associated with the disease. Two (20%) cases used gloves to clean-up bird-tables. Neither cases nor controls used respiratory protections when removing wild bird faeces

from surfaces. Conclusions: Exposure to wild birds was the most common risk factor for sporadic psittacosis in Sweden with exposure to wild bird faeces by cleaning bird-tables being a likely route of transmission. We recommend using bird-tables that reduce accumulation of bird faeces and cleaning surfaces in well ventilated areas. We also recommend wetting contaminated areas before cleaning.

Role and outputs: *co-investigator*

Alessandro was in charge of the data entry, data-cleaning, dataset management, data analysis. He submitted an abstract for the ESCAIDE 2016 conference that was accepted as a poster presentation (11).

Supervisors: Moa Rehn and Anders Wallensten

Title: Estimating the community burden of influenza-like illness (ILI) in Sweden, 2013-2014.

Background: Traditional healthcare-based surveillance systems underestimate the burden of influenza in the community, since most cases do not require medical attention. We used a population-based cohort to estimate the burden of influenza in the community in Sweden during the 2013-2014 season.
Methods: We randomly selected individuals aged 3 months-85 years from the National Population Registry. Between November 2013 and November 2014, cohort participants completed weekly online questionnaires reporting new occurrence of ILI symptoms, and related medical consultations and hospitalizations. We estimated the ILI weekly incidence as the proportion of cases fulfilling the EU case definition over the number of responders per week, standardized for the age of the Swedish population. We also estimated the proportion of all episodes receiving medical care and those requiring hospitalization.
Results: Of the 34,970 selected individuals, 3,245 (9.3%) completed at least one questionnaire and reported 1,863 ILI episodes. The weekly ILI incidence ranged from 1.4 cases/1,000 population in week 13, 2014 to 18/1,000 in week 30, 2014 (median 9.7/1,000). Overall, the highest proportions of episodes requiring medical consultation were observed among <2 (26%) and ≥65 (26%) year olds. The highest hospitalization proportions were also observed among those groups (1.6% and 5.9%, respectively).
Conclusion: The study estimated the ILI burden in the community in Sweden during an entire year with a mild influenza season. These findings can serve as baseline for severity assessments of future epidemics or pandemics. We recommend the use of these estimates for i) estimating the community ILI-associated costs, ii) evidence-based resource allocation, and iii) assessing additional needs during pandemics, in order to improve preparedness strategies and health communication to the general population.

Role and outputs: *principal investigator*

Alessandro performed the data analysis and submitted an abstract to ESCAIDE 2016 conference that was accepted as a poster (12).

Supervisors: Hanna Merk and Anders Wallensten

Competencies developed:

In the first project, I went through all the steps of a research project: from the conception of the research question to writing the report. I gained a full understanding of the ethical principles and guidelines to follow when planning research and to collect and disseminate data. I got acquainted with the Swedish law for data protection, specifically in regards with sensitive data and with IT issues and procedures in place at the Public Health Agency of Sweden. I learnt how to apply random procedures for the selections of controls.

From all my research projects, I developed further my skills in data management, cleaning and analysis and interpreting data and learned how to provide evidence-based recommendations.

4. Communication

Publications in peer reviewed journals

None yet

Manuscripts submitted to peer reviewed journals (in review process)

Two manuscripts submitted to peer-reviewed journals (3,6)

Conference presentations

1. One oral presentation at international conferences (2)
2. Two posters at international conferences (11,12)

5. Teaching activities

Nordic mini project review. Stockholm, 18-19 April 2016

Alessandro organized the Nordic mini project review: a two-day event where EPIET and EUPHEM fellows from Nordic countries present their projects to peer-fellows and experts in the topic. The event was organized at the Public Health Agency of Sweden in Solna.

Supervisor: Anders Wallensten

Facilitation of case studies

Alessandro facilitated the following case-studies:

1) outbreak investigation case study "trichinellosis in France" to 4 groups (10-15 students per group) to last-year Veterinary students at the Uppsala University on 22/01/2015 and 21/01/16. (overall 10 hours). The case study was based on a real outbreak that occurred several years ago in France.
2) outbreak investigation case study "outbreak of gastrointestinal illness in Sweden" for 10-12 medical students from the university of Örebro on 24/10/2014 (2 hours). The case study was produced by two previous EPIET fellows and was based on real outbreak of Cryptosporidiosis occurred in Sweden.
3) outbreak investigation case study "outbreak of gastrointestinal illness in Sweden" for 10-12 students enrolled in the Infectious Disease Epidemiology Master Program Södertörn, on 16/12/2015 (2 hours). The case study was produced by two previous EPIET fellows and was based on a real outbreak of Cryptosporidiosis that occurred in Sweden.
4) simulation exercise (role-play) for a group of EUPHEM fellows on an international mission to investigate an Ebola outbreak in western Africa (4 hours). The role-paly was part of the Initial management course, ECDC, Stockholm, 09/02/15-13/02/15.

Lectures

Alessandro delivered the following lectures:

1) "Surveillance and computers tools" to 10-15 master students enrolled in the programme in "Health and informatics", Karolinska Institutet " (1 hour and a half) 13.01.16

2) "Outbreak investigation, preparedness and actions" to 10-15 medical students (1 hour and a half) 12.01.2016

3) "evaluation of surveillance system, outbreak investigation" to 10-12 students enrolled in the in the Infectious Disease Epidemiology Master Program Södertörn. 16.12.2015 (2-3 hours)

4) "evaluation of surveillance system." to 12 students enrolled in the in the Infectious Disease Epidemiology Master Program Södertörn. 16.12.2014 (1 hour)

5) "Ebola outbreak in West Africa" to international aid workers (presented three times, 20-30 participants every time) enrolled in international humanitarian projects in West-Africa. The course was organized at the Centre for research on health care in disaster at the Karolinska Institutet. Each lecture lasted 30 minutes. 28/10/14, 04/11/14, 02/12/14.

Supervisor: Anders Wallensten

Educational outcome:

During the organization of the mini project review, I had to plan, prioritize and schedule tasks. Delivering teaching assignments has helped to understand in depth epidemiological concepts and methods.

6. Other activities

One international assignment to the district of Dubreka, Guinea for the Ebola outbreak (see outbreak investigations for details)

7. EPIET/EUPHEM modules attended

1) Introductory Course, 29/09/14-17/10/14 , Spetses, Greece
2) Outbreak investigation and computer tools, 08/12/14-12/12/14, Berlin, Germany
3) Initial management course, 09/02/15-13/02/15, Stockholm, Sweden
4) Multivariable analysis module, 23/03/15-27/03/15, Vienna, Austria
5) Nordic mini project review, 13-14/04/14 Copenhagen, Denmark
6) Project Review Module, 24-28/08/15, Lisbon, Portugal
7) Time series analysis module in, 23-27/11/15, Bilthoven, the Netherlands.
8) Nordic mini project review, 18-19/04/14, Stockholm, Sweden
9) Vaccinology, 16-20/05/2016, Paris, France
10) Rapid Assessment and Survey methods, 20-25/06/2016, Athens, Greece
11) Project Review Module, 22-26/08/16, Lisbon, Portugal

Supervisor's conclusions

Alessandro has spent two successful years at Folkhälsomyndigheten. During this time he has been involved with a great variety of projects and outbreak investigations. He has always been eager to take on new challenges and has worked hard to achieve them. Along the way he has increased his

knowledge and skills in the field of intervention epidemiology and fulfilled all the requirements of the EPIET-program.
In particular, he has helped the agency evaluating an online surveillance system for cross-sectional surveys using a national panel were the prevalence and impact of influenza like and gastrointestinal symptoms could be assessed. His evaluation was very important for the agencies decision to adjust and prolong the project.
He has also been a great asset to the agency in the investigations and epidemiological analysis of national outbreaks and has gained international experience by joining the international Ebola outbreak investigation in Guinea under the supervision of ECDC.
His major research study on the socio-economic characteristics of people notified with an infectious diseases between 2005 and 2014 is both innovative and highly relevant. The results will be of high relevance for raising awareness of the links between socio-economic status and infectious diseases in Sweden. Information that is likely to be important for public health interventions in Sweden and internationally.
Another area where I have had the privilege to see his great development as an intervention epidemiologist is in teaching and lecturing of which he has had plenty of opportunities to practice during his time with us so that he is now competent and well prepared for future assignments.
It has been a pleasure to work with Alessandro as he is both knowledgeable, hard working in addition to being a very gentle and kind person. He quickly managed to settle in at the agency and we are sure he will be a great asset wherever he chooses to work in the future.

Coordinator's conclusions

During his EPIET fellowship, Alessandro was involved in a wide range of public health relevant projects, including a big number of outbreak investigations, many research studies, surveillance projects and teaching activities. Several of those projects have important implications for public health in Sweden and internationally. He worked hard and independently on a diverse range of topics (influenza, gastro, respiratory infections, Ebola, socioeconomic factors) and using a variety of methods (cohort, case-control studies, evaluations etc). He was highly motivated and passionate with his work and managed to achieve all the EPIET objectives during his fellowship. Through his projects, he managed to develop a high level of competencies in epidemiology and public health and all other domains, and improved considerably his epidemiological skills. I believe that Alessandro is committed to field epidemiology and has considerable professional skills for any epidemiological and public health related work, both at national and international level.

Personal conclusions of fellow

I highly recommend the EPIET programme to all people who want to advance in their carrier in intervention epidemiology applied to infectious diseases or to have a European perspective of infectious diseases epidemiology. The fellowship gave me the opportunity to follow high-profile technical courses, interact with extremely experienced professionals and get into a solid network of European epidemiologists. At the Public Health Agency of Sweden I had the opportunity to investigate several outbreaks and to carry out different research projects. I extremely appreciated the friendly environment, the well-structured work organization, and the supportive help and encouragement of from several units and departments.

Acknowledgements

I would like specifically acknowledge my training site supervisor Anders for his friendly, experienced and positive guide and my front-line coordinator Kostas for the constant, timely and technical support

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