



FELLOWSHIP REPORT

Summary of work activities

Cyrus König

Intervention Epidemiology path (EPIET)

Cohort 2017

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.

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- To develop a European network of public health epidemiologists who use standard methods and share common objectives;
- To contribute to the development of the community network for the surveillance and control of communicable diseases.

Pre-fellowship short biography

Cyrus Alain König holds a Doctorate in Pharmacy (PharmD) from Loraine University, MSc in Epidemiology from Paris-Sud university and MPH from The French School of Public Health (EHESP) with majoring in humanitarian health and emergency and disaster crises. He also participated in various trainings concerning epidemiology in Institut Pasteur de Paris, in Université Libre de Brussels and in Paris-Sud university; prior to the fellowship, he worked mainly in humanitarian field in various countries such as Rwanda, DRC, Guinée and Irak. He started his international career as a medical field epidemiologist with Epicentre and was involved in the measles surveillance system in Kinshasa, DRC. He has worked in diverse humanitarian crises including the 2014-2015 Ebola outbreak in West Africa, and in internally displaced persons (IDP) camps in Iraq where he managed all health-related projects in the 11000 Bardarash IDP camp. He was the EPIET EU-track fellow in Warsaw.

Fellowship assignment: Intervention Epidemiology path (EPIET)

On 11 September 2017, Cyrus König started his EPIET fellowship at the National Institute of Public Health - National Institute of Hygiene (NIPH-NIH), Warsaw, Poland, under the supervision of Pr. M.Sadkowska-Todys. His EPIET frontline coordinator was Lisa Hansen. 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 guide¹.

Fellowship projects

1. Surveillance

Evaluation of surveillance system of outbreaks caused by pathogens responsible for food- and waterborne outbreaks

Supervisor: Pr. M.Sadkowska-Todys (NIPH-NIH)

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>

Poland has observed an increasing proportion of food and waterborne outbreaks (FWO) with an unknown causative agent (OWUKA). Evaluation of the surveillance system was needed in order to ensure that the surveillance system was meeting its objectives.

Surveillance data on 19 pathogens responsible for FWO from 2014, 2015 and 2016, was assessed, using two different data sources: outbreak aggregated data, and case-based data, including all cases of FWO.

The surveillance system was evaluated on two attributes, data quality (completeness) and timeliness. The completeness of data was assessed for suspected etiology, place of occurrence of outbreak and route of transmission, age and symptoms. Timeliness was measured as the duration between date of onset of symptoms and date of first laboratory result.

During the study period, there were 1661 outbreaks notified, with 38982 cases. The number of outbreaks increased from 2014 with 501 outbreaks (30% of total outbreaks from 2014 to 2016 included) to 2016 with 626 outbreaks (38% of total outbreaks from 2014 to 2016 included). The largest number of outbreaks were attributed to *Salmonella species* (36%), rotavirus (RV) (14%) and norovirus (NoV) (10%). We found that 95% of all outbreaks had laboratory test.

While OWUKA constituted 35% of total outbreaks, completeness was acceptable with less than 10% missing data. Timeliness was also acceptable, with a median delay of 2 days. However, further analysis is needed to calculate the timeliness of the system for other indicator dates such as notification. This is the first evaluation of the FWD surveillance system and will support further assessment and improvement of the FWD surveillance system.

Role: principal investigator

Cyrus was the principal investigator of this study. He developed and wrote the protocol ³, analysed the surveillance data and wrote an abstract submitted to ESCAIDE 2018⁹ as well as the final report ⁴.

Analyze of measles surveillance 2018 data

Supervisor: Dr. I. Paradowska-Stankiewicz (NIPH-NIH)

Since 1998 Poland is part of the WHO measles elimination programme. Since 2016, WHO considered measles in Poland as interrupted. We observed a rising number of measles cases in 2018 and therefore we did a descriptive analysis of the surveillance data.

We used 2018 measles surveillance data. We used two different data sources: outbreak aggregated data, and case-based data, including all measles cases in 2018. The surveillance system is paper based.

A total number of 340 cases have been observed with an incidence of 0.9 for 100000 inhabitants including 108 suspected, 18 probable and 214 laboratory confirmed. We observed a high increase in number of cases from iso week 41. The highest incidence belonged to Mazowieckie region (2,4 for 100000 inhabitants). 51% of all cases were female and 27% of all cases belonged to the age group of 31 to 40. 91 cases (27%) were imported with 85 from Ukraine.

There is a rising number of measles cases in Poland since 2017 with the high number of cases in the end of 2018. This would be a pre-sign of measles situation in 2019 and therefore new policies regarding the vaccination campaigns and communication should be implemented in Poland.

Role: data analyst

Cyrus did the data analysis for this study and prepared a small report for the internal use. He cleaned and analysed the surveillance data and merged different data sets needed for the study. The outcome of this analysis has been used to prepare an oral presentation with national stakeholders in measles as audience held in Krakow¹³.

2. Outbreak investigations

Measles outbreak in a public hospital, Szczecin, Poland, January 2019

Supervisor: Pr. M.Sadkowska-Todys (NIPH-NIH), Dr. I. Paradowska-Stankiewicz (NIPH-NIH)

In January 2019, a measles infection in an employee in a 168-bed hospital was reported to the local sanitary station (PSSE) in Szczecin, Poland. Further transmission occurred in the hospital and more cases were reported in the community. We investigated to identify transmission routes and implement control measures.

An outbreak case was any hospital staff, visitor, or patient, or any person in contact with them, meeting clinical criteria, from 3rd January. Cases were interviewed by PSSE to identify contacts and verify vaccination status. Susceptible contacts were offered post exposure vaccination (PEV). Clinical specimens were sent to the National Reference Laboratory for RT-PCR and serology confirmation. We collected vaccination status, geographical location and queried hospital authorities about control measures.

The index case, the hospital employee, returned from Ukraine one day before onset of symptoms. We identified 17 (8 confirmed, 7 probable, 2 suspect) outbreak cases including 11 hospital personnel. Four of the personnel provided vaccine documentation (36%), of which three had received 2 doses. Contacts identified as susceptible (130) received PEV. Eight cases were contacts of the index case but were not promptly identified and did not receive PEV. The hospital refused new admissions for 19 days.

Another 16 cases were identified in the community, with exposure information not sufficient to establish an epidemiologic link with the outbreak.

The introduction of measles into a susceptible population and missing contacts for PEV led to a hospital-associated outbreak. For the community cases, exposure may have occurred in multiple public spaces around the hospital. Most of the hospital staff who developed measles lacked vaccination records. The PSSE has recommended MMR vaccination for all hospital personnel without such documentation.

Role: principal investigator

Cyrus was the principal investigator from the national level and worked closely with the local investigation team and provided data analysis, map creation and liaison with national level. The data was presented in the national meeting in Krakow¹³. Cyrus prepared and submitted an abstract to international conferences⁸. This work was accepted as poster presentation and pitch in international conferences^{10,11}. A manuscript will be drafted for submission to Polish Journal for Healthcare workers.

Cholera outbreak in Democratic Republic of Congo, Mbuji Mayi, March 2018

Supervisor: Dr.Franck Fortuné MBOUSSOU (WHO head of mission in DRC)

In 2017, The RDC witnessed a new cholera outbreak, considered as the biggest in past 15 years. 22 out of 26 provinces in DRC have been touched by cholera with 44 282 cases and 905 death by October 2017 with a lethality rate of 2%. An emergency level 3 has been declared by WHO in DRC.

In 12 January 2018, new cases of cholera have been notified in Mbuji Mayi in Kasai Oriental. WHO brought a strong support to the Health Provincial Directorate in Kasai Oriental to answer to the ongoing cholera outbreak. Data have been collected from 167 health zones in Mbuji Mayi. WASH activities have been implemented in the region and new cholera treatment centres (CTC) built in Mbuji Mayi. Sensitization and active case finding activities have been introduced in the community. Collected specimens were sent to the national laboratory in Kinshasa (INRB).

The total number of cases up to 8 April 2018 was 421 with 23 death (lethality rate of 5.5%). Two CTC have been implemented by WHO: Chris Roi with 11 cholera adapted bed and Muya with 20 cholera adapted bed. The

investigation showed that specimen collection was not systematic, and 13 specimens were positive for cholera. The total number of specimens tested was unknown. For three weeks (Iso weeks 12, 13, 14) 14 specimens were analysed and all 14 were negative for cholera despite persistence of symptomatic cases.

WHO brought a strong support to local authorities to answer the cholera outbreak in Mbuji Mayi. A non-systematic collection of specimens was a weakness in this outbreak response. Negative laboratory results for cholera despite ongoing symptomatic cases could be resulted of parallel unknown aetiology outbreaks and need farther investigation. We recommend the continuity of WHO support to the local authorities in this ongoing outbreak and improvement of sanitation activities of local population.

Role: field coordinator

As the field coordinator, Cyrus was in charge of the outbreak response team and he was coordinating the activities of WASH team, Outreach team, the CTCs activities and communication- data collection and sensitisation team. He was in charge of the internal and external communication and coordination with governmental and non-governmental stakeholders and UN clusters present in Mbuji Maji. He assured that different activities are well distributed between different actors in order to preserve the cost-benefit of activities and avoid any duplication of work and waste of resources. He participated in meetings with local authorities, OCHA etc. He had a role of decision making.

3. Applied epidemiology research

Case-control study on effect of chronic hepatitis C on health-related quality of life, Poland, 2016

Supervisor: Pr. Magdalena Rosinska (NIPH-NIH)

Living with chronic diseases can negatively impact health-related quality of life (HRQOL). We studied HRQOL in people newly diagnosed with chronic Hepatitis C (CHC) to characterize the burden of living with CHC in Poland.

From a 2016 general population serosurvey, we included 43 consenting individuals with CHC, and 43 controls matched on sex, age and presence of other chronic conditions. We assessed HRQOL using a generic validated tool measuring mental and physical components, with scores from 0 (poor) to 100 (excellent). We identified CHC with (CHCF) and without fibrosis (CHCNF), using AST to platelet ratio index (APRI) and liver fibrosis (FIB4) scores. We categorized other chronic conditions, as absent (0) or present (1 or more conditions). We used Wilcoxon test and general linear models to compare component scores.

The average age of study participants was 49 years; 57% were male and 49% had other chronic conditions. There were 19 CHCF and 24 CHCNF cases; CHCF were older than CHCNF (56 versus 49 years, p-value 0,01) and included more males (79% versus 57%). While the physical component score was lower among CHCF cases with no other chronic conditions, compared with controls (49 vs. 55, p-value 0,03), there was no significant difference in HRQOL between CHCNF and matched controls.

Poorer physical component HRQOL scores are limited to individuals with CHC with fibrosis. Prior studies showing reduction of HRQOL due to Hepatitis C relied on patients diagnosed in routine practice, possibly due to symptoms. Our study group may be more representative of people living with CHC, emphasizing the importance of CHC treatment in preventing reduction of physical quality of life related to fibrosis.

Role: principal investigator

Cyrus was the principal investigator of this study. He prepared the protocol⁵, designed the data analysis and analysed and interpreted the data. He submitted an abstract to ESCAIDE 2019⁷ He has submitted a manuscript¹ for publication and will present the findings for the national stakeholders working in Hep C.

4. Communication

Manuscripts submitted to peer reviewed journals (in review process)

1. Koenig CA, Zakrzewska K, Stępień M, Parda N, Rosińska M, Hansen L. Case-control study on effect of chronic hepatitis C on health-related quality of life, Poland, 2016. (5).

Reports

2. Koenig CA. Report: Measles outbreak in a public hospital, Szczecin, Poland, January 2019. Szczecin, Poland: NIPH-NIH; 2019.
3. Koenig CA, Polański P, Sadkowska-Todys M, Budziosz P. Protocol: Evaluation of food and water borne disease surveillance system –in Poland, 2014-2016. NIPH-NIH; 2019 Jul.
4. Koenig CA, Polański P, Sadkowska-Todys M, Budziosz P. Report: Evaluation of food and water borne disease surveillance system –in Poland, 2014-2016. NIPH-NIH; 2019 Jul.
5. Koenig CA, Rosińska M. Protocol: Case-control study on effect of chronic hepatitis C on health-related quality of life, Poland, 2016. NIPH-NIH; 2019.
6. Koenig CA. Cholera outbreak response, Mbujimai, Democratic Republic of Congo, 2018. Mbujimai, Democratic Republic of Congo: GOARN-WHO; 2018..
7. Koenig CA, Zakrzewska K, Stępień M, Parda N, Rosińska M, Hansen L. Abstract: Case-control study on effect of chronic hepatitis C on health-related quality of life, Poland, 2016.
8. Koenig CA, Wojtyńska O, Janiec J, Bogusz J, Paradowska-Stankiewicz I, Sadkowska-Todys M. Abstract: Measles outbreak in a public hospital, Szczecin, Poland, January 2019. Szczecin, Poland; 2019
9. Koenig CA, Polański P, Sadkowska-Todys M. Abstract: Aetiological classification of food-borne outbreaks in Poland with an unknown causative agent by Random Forest algorithm, 2014-2016. Poland; 2018

Conference presentations

10. Koenig CA. Measles outbreak in a public hospital, Szczecin, Poland, January 2019. Poster presented at: ESCAIDE; 2019; Stockholm, Sweden.

Other presentations

11. Koenig CA. Pitch presentation: Measles outbreak in a public hospital, Szczecin, Poland, January 2019. Pitch presented at: EUPHA; 2019; Marseille,France(EUPHA)
12. Koenig CA, Hansen L. Global Outbreak Alert and Response Network (GOARN). Oral presentation presented at; 2019; Warsaw, Poland.
13. Paradowska-Stankiewicz I. Oral presentation: Risk of measles related to travel in Poland, 2019. Oral presentation presented at; 2019; Krakow, Poland.

5. Teaching and pedagogy

Stata training and basic epidemiology and statistics

Supervisor: Pr. M. Sadkowska-Todys (NIPH-NIH), Dr. J.Janiec (NIPH-NIH)

Description of activity

Cyrus developed a four-day training activity for colleagues in NIPH-NIH which included a mixture of lectures, pre-course videos, case study and hands-on workshop on basic statistics and epidemiology. This included an advanced introduction to STATA software to data management with STATA, statistical inference and univariate analysis.

Reflection

To determine learning objectives and develop materials, Cyrus reviewed his epidemiology references to refresh his own knowledge. Organising the whole workshop enabled him to address all of the content and logistical issues. Additional time to cover more advanced topics, including multivariate analysis or basics with R software, would have been useful. Prior to the course, Cyrus conducted a pre-course survey among staff, in order to plan the course topics and evaluate the staff needs.

At the end of each day, he held an open discussion to review content and identify questions or changes needed. He created an evaluation tool (questionnaire) for participants.

The overall evaluation results were very satisfactory, and audience asked for similar trainings in the future. The Stata and R teaching were seen as a real need to the participants. The review of study designs was very useful as introduction to univariate statistical tests and inference. The need of farther trainings in software use like Stata and R and statistical methodology like univariate and multivariate analysis was highlighted. It would be great to be able to implement a systematic yearly course to make the capacity building.

6. Other activities

- International assignment under GOARN-WHO as field coordinator in DRC, Mbuji mayi in response to the Cholera Outbreak.
- Representation of Polish national public health agency (NIPH-NIH) in the European GOARN 2.0 planning meeting for Eastern Europe and Russian Speaking Countries in Belgrade, Serbia.
- Active lobbying within the NIPH-NIH to make NIPH-NIH part of GOARN Network.
- GOARN focal point in NIPH-NIH

7. EPIET/EUPHEM modules attended

1. *Introductory Course, Spetses, Greece*
2. *Outbreak Investigation, Berlin, Germany*
3. *Multivariable Analysis, Nicosia, Cyprus*
4. *Rapid Assessment and Survey Methods, Athens, Greece*
5. *Project Review 2018, Lisbon, Portugal*
6. *Time Series Analysis, Brussels, Belgium*
7. *Vaccinology, Rome, Italy*
8. *Project Review 2019, Prague, Czech Republic*

8. Other training

9. Factor analysis, classification and random forest using R software Kremlin Bicetre Summer School, Paris, France

Discussion

Supervisor's conclusions

During the two-year fellowship at National Institute of Public Health - National Institute of Hygiene Cyrus Koenig has successfully completed a variety of public health activities, including outbreak investigations (measles outbreak, cholera outbreak – WHO-GORAN mission), surveillance (food borne outbreaks, foodborne infections) and research in epidemiology (health related quality of life in chronic hepatitis C) as well as teaching, as described in the core competencies of the EPIET program.

Through active and enthusiastic participation in the activities of the Department of Infectious Disease Epidemiology and Surveillance he has been exposed to several different fields in the infectious diseases epidemiology. This has improved his understanding of infectious diseases and allowed to appreciate practical challenges of surveillance and outbreak investigations. The exploration of data on food and waterborne outbreaks, in which the etiological agent was not identified, conducted by Cyrus, was a necessary first step to improvement of food and waterborne outbreak investigation routines, which is now carried on further under the National Health Program.

As we are a small team, we are forced to share time between different tasks. Time management was one of the challenges for Cyrus at the beginning of the fellowship and one of the skills that he gained. On the other hand Cyrus already joined us with substantial analytical skills, that were further developed during the fellowship. He used the skills to engage in surveillance and research projects that required more advanced statistical techniques and ability to use both STATA and R software. All data analysis was independently managed by Cyrus only with limited guidance from supervisors.

He has excellent networking ability and a great skill to find synergies and new collaborations. Noting that young colleagues at the Department often lack STATA skills, he developed and organized a four-day workshop on basic statistics and epidemiology with hands on exercises in STATA. The workshop was highly appreciated and improved the analytic capacity at the Department. Similarly, having attended European Global Outbreak Alert and Response Network (GOARN) 2.0 planning meeting for Eastern Europe and Russian Speaking Countries meeting he successfully lobbied to include the National Institute of Public Health – National Institute of Hygiene in the GORAN network.

Coordinator's conclusions

Cyrus came into the fellowship with considerable experience and skills, and throughout his two years, he has demonstrated his commitment to the goals of the programme as well as the larger vision of improving public health capacity to respond to communicable disease threats in Europe, and beyond. He joined the NIPH-NIH in Poland at a time when the organization was undertaking a significant restructuring of its disease surveillance activities and was able to manage several concurrent projects in disparate disease areas.

Cyrus showed significant professional initiative in undertaking a field coordinator role during his GOARN deployment to DRC in 2018, and in identifying and responding to the learning needs of his colleagues at NIPH-NIH by developing a comprehensive in-house training course.

Cyrus is always willing to share his knowledge with his peers, and clearly values supportive and collegial professional relationships in all of the projects and activities in which he has engaged. It has been a pleasure to work with Cyrus as he has improved his skills in concise and organised scientific communication, and he has always been willing to listen and respond to constructive criticism. His enthusiasm for learning and his commitment to international health will ensure success in his future endeavours.

Personal conclusions of fellow

I believe the EPIET fellowship is one of the most wonderful experiences I have ever done in my professional and personal life. I feel glad and lucky to have been able to perform such an exciting and forming training. This program enabled me to acquire new skills and knowledge and apply them to the real-life situations.

I am glad to have done my fellowship in Poland where I learned how to work independently and that forged my self-confidence. During my EPIET, I have been lucky to do an international mission with GOARN-WHO where I contributed to the cholera response as a field coordinator. This experience allowed me to trust my judgement and be confident in decision making.

During my EPIET I got to work in a varied range of projects and diseases, I got to know a different surveillance system than my own country with different structure and different challenges. Learning in such a programme, being surrounded by all other EPIET fellows and coordinators, in an international environment is an unique and valuable experience in one's career. I am grateful for having such an experience and I would love to be involved more in the EPIET family in the future and maybe one day become a coordinator.

Acknowledgements of fellow

I would like to thank Pr. M. Sadkowska-Tody for having given me the opportunity to perform my EPIET in NIPH-NIH and support my decisions during performing my projects and my international assignment. I am also very grateful to Pr. M. Rosinska for having supported me on my projects and guided me during my research project and for her availability, she is an excellent teacher, working with her was a pleasure. I also would like to thank Dr. I. Paradowska Stankiewicz for her support concerning my outbreak investigation project. A special thanks to Dr. J. Janiec for his support and advices, his review of my abstracts and his great help to make NIPH-NIH part of the GOARN network and his friendship. I also would like to thank Dr. P.Polanski for his reach help in my surveillance project.

I would like to thank Dr. F. Mboussou (WHO) for his help and support during my mission in DRC and also all the WHO and GOARN team for their true involvement and real support during this mission. I hope to have the opportunity to work again with them in new missions.

I also would like to thank Dr. K.Danis for his help and support as my front line coordinator during the first months of my fellowship.

I would like to have a very special thank to Lisa Hansen, my frontline coordinator who helped me, guided me, inspired me during this fellow ship. I believe, without her help I could not perform well my fellowship. Thank you, Lisa, for all the efforts you did to support me despite all challenges. You are a model in my professional life, and I hope one day, I could communicate as good as you. Your professionalism, communicational skills, patience and kindness was a real help for me.