Zsofia Bognar

The European Programme for Intervention Epidemiology Training (EPIET), Cohort 2022
Sciensano, Belgium

Background

The ECDC Fellowship Programme is a two-year competency-based training with two paths: the field epidemiology path (EPIET) and the public health microbiology path (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. The Administrative Decisions ECDC/AD/2023/23 and ECDC/AD/2023/06 govern the EU-track and MS-track, respectively, of the ECDC Fellowship Programme, field epidemiology path (EPIET) and public health microbiology path (EUPHEM).

Both curriculum paths provide training and practical experience using the 'learning by doing' approach at acknowledged training sites across the European Union/European Economic Area (EU/EEA). This final report describes the experiences and competencies the fellow acquired by working on various projects, activities, theoretical fellowship training modules, other modules or trainings, and international assignments or exchanges during the fellowship.

Pre-fellowship short biography

Zsofia Bognar graduated as a medical doctor in 2007. Afterwards she worked as staff physician, specialist registrar in infectious diseases in South-Pest Central Hospital – National Institute of Hematology and Infectious Diseases, Budapest, Hungary, where she was also involved in the outpatient vaccination clinic. During the H1N1 pandemic, Zsofia assisted the immunisation campaign. She had the opportunity to deepen her knowledge on tropical diseases in Eldoret, Kenya. In 2013 she became a specialist in infectious diseases.

Since 2014, Zsofia has been working in the Surveillance and Immunization Unit of the National Public Health Center (Nemzeti Népegészségügyi Központ – NNK) of Hungary, where she has been in charge of the surveillance of invasive bacterial diseases. She also worked with emerging diseases, such as Zika virus disease, for which she developed the national guideline for screening suspected cases. During the COVID-19 pandemic, she was involved in policy making, among other responsibilities.

Results

The objectives of the core competency domains were achieved partly through project and activity work and partly by participating in the training modules. Results are presented in accordance with the EPIET/EUPHEM core competencies, as set out in the ECDC Fellowship Manual[1].

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[1] European Centre for Disease Prevention and Control (ECDC). European public health training programme. Stockholm: ECDC; 2020. Available from: https://www.ecdc.europa.eu/en/publications-data/ecdc-fellowship-programme-manual-cohort-2021

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1. Epidemiological investigations

1.1. Outbreak investigations

Outbreak of Shigella sonnei *in a restaurant in West Flanders, Belgium, 2023*

Supervisors: Naïma Hammami, Amber Litzroth

Category: Food- and waterborne diseases

Aim: To investigate and find the source of a *Shigella sonnei* outbreak in a restaurant between 2–13 September 2023 in West Flanders.

Methods: Descriptive analysis of the outbreak and a cohort study of the first affected group was conducted. Visitors were contacted by phone interviews, data were gathered on food consumption, demographics and symptoms. A case was identified if visiting or working in the restaurant between 2–13 September and presenting with diarrhoea, abdominal cramps, vomiting and nausea within seven days.

Results: The outbreak happened among 113 persons over two consecutive weekends. Symptomatic cases occurred in five of the 11 groups who visited the restaurant. Fifty-one people (45%) met the case definition including six staff members. Of the cases, 12 patients needed hospitalisation (24%). Twelve people had *Shigella sonnei*-positive stool culture. No food items were significantly associated with illness. None of the staff could be identified as index case, and none of the food or environmental samples yielded positive results. WGS revealed an MSM-strain related cluster and proved that all cases were linked to the outbreak with an undetected common source. Environmental investigations showed deficiencies in hygienic practices.

Public health implications: Staff serving the first affected group were excluded from work until a negative stool sample. Further measures included shutting down the venue for cleaning and disinfection, discarding all opened food items, three consecutive stool samples from all staff and antibiotic treatment of personnel with *Shigella*-positive samples. We emphasised the importance of personal hygiene of food handlers and hygienic standards during food preparation and serving.

Role: Zsofia was a co-investigator. She worked in collaboration with the lead investigator, Naïma Hammami. Zsofia performed the descriptive and analytical analysis of the outbreak and wrote the outbreak report. She led the cohort study. She also created a summary for the monthly Flash news on infectious diseases (public news flash for medical doctors and public health professionals) and a summary for the regional infectious disease epidemiology bulletin.

1.2. Surveillance

Evaluation of the Campylobacter *laboratory-based surveillance systems in Belgium, 2017–2023*

Supervisors: Dieter Van Cauteren, Amber Litzroth

Type of project: Evaluating a surveillance system, analysing data from a surveillance system

Aim: To evaluate the Belgian *Campylobacter* surveillance, which is based on a network of voluntarily reporting clinical microbiology laboratories (CML) called Epilabo, coordinated by Sciensano. Additionally, the National Reference Center (NRC) for *Campylobacter* provides expertise and technical support to the CML in identification and further subtyping of invasive or multidrug resistant strains.

Methods: The objective of the surveillance system to monitor trends was assessed. Representativeness, usefulness and acceptability of both Epilabo and the NRC, as well as stability of Epilabo were assessed. Epilabo data between 2017–2023, the number of reimbursed stool cultures, NRC data and survey data requesting the number of all *Campylobacter* cases diagnosed in 2021 in Belgium were used.

Results: Epilabo coverage was estimated to be 39% of all diagnosed cases in 2021 (response rate: 86%). Flanders had much higher regional coverage (55%) than Brussels (15%) and Wallonia (8%). Annual *Campylobacter* trends by age group and month of diagnosis were similar over time and to the European trends, demonstrating usefulness. The NRC coverage (1.2%) seemed appropriate for monitoring invasiveness but rather low for resistance. Epilabo participation was not stable over time, as the number of CML participating decreased from 2017 to 2021, followed by a stabilisation in 2022–2023.

Public health implications: Instability can hamper the objectives of this surveillance system. The planned implementation of a new data collection system for test results using system-to-system data transfer will help to overcome the current limitations of Epilabo regarding representativeness and stability. Furthermore, we also recommended that the NRC provide feedback to CML and monitor invasive and multidrug-resistant *Campylobacter* strains.

Role: Zsofia performed the data analysis and wrote the final report. The project proposal was agreed to be detailed enough not to set up an evaluation protocol and this was agreed upon with the FLC.

2. Applied public health research

Group B Streptococcus maternal colonisation and neonatal sepsis in Belgium between 2012 and 2021: a description of the epidemiological situation and identification of risk factors

Supervisor: Laura Cornelissen

Aim: GBS infection represents a significant neonatal morbidity globally. Maternal rectovaginal GBS colonisation is a primary predisposition for early onset neonatal GBS infection. Pregnant Belgian women are screened and, if required, given intrapartum antibiotic prophylaxis (IAP). The aim was to provide the first comprehensive overview of Group B Streptococcus (GBS) maternal colonisation and neonatal invasive infection in Belgium between 2012 and 2021.

Methods: We calculated proportions of maternal screening, colonisation and incidence of neonatal GBS infections and their risk factors using log binomial regression on national registries' data between 2012–2021.

Results: Of 1,197,994 pregnant women, 90% was screened. Of all women with a known screening result, 18.5% were GBS-colonised with a stable trend over time. Risk factors for maternal GBS colonisation were Sub-Saharan (aRR=1.45, [1.41–1.48]) and North-African origin (aRR=1.31, [1.28–1.34]) vs. Belgian origin, 5+ parity vs. primiparity (aRR=1.21, [1.18–1.25]), obesity vs. normal weight (aRR=1.09, [1.08–1.11]) and no/little formal education vs. secondary school (aRR=1.09, [1.06–1.13]).

Two independent data sources showed a declining trend of neonatal GBS sepsis incidence. Overall neonatal GBS sepsis estimates were around 0.49 cases per 1,000 livebirths in Flanders. Risk factors for neonatal GBS infection were pre-term birth (aRR=7–41, depending on level of prematurity) and very low birthweight (aRR=14.83, [6.48–33.94]). The risk of neonatal GBS infection was higher with colonised mothers without IAP (aRR=7.05, [5.05–9.85]) than with IAP (aRR=4.34, [3.28–5.74]) vs. non-colonised mothers.

Public health implications: Our study provided the baseline data for GBS colonisation and neonatal sepsis in Belgium. We identified risk groups to be prioritised for future preventive strategies such as maternal vaccination.

Role: Zsofia wrote the study protocol, analysed the data from different data sources in R, and wrote two abstracts for the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) (2023: selected for poster presentation as well as presented in Sciensano poster session, 2024: rejected). Zsofia also wrote a manuscript (Reference #1) and submitted it to the Eurosurveillance journal in mid-September.

How might climate change influence epidemiology of food- and waterborne diseases in Europe? - Desk-review to find methodological approaches to be used assessing the Belgian context since 2000

Supervisors: Naïma Hammami, Els Duysburgh, Amber Litzroth

Aim: To conduct a desk review on possible associations between food- and waterborne diseases (FWBD) and climate change relevant for the Belgian context from 2000 following a request from Department Zorg (Flemish public health service). The objectives were to identify the FWBD pathogens most affected by climate change which require future monitoring and to identify methodologies applicable to assessing FWBD-climate change associations in Belgium.

Methods: Based on findings of major international health organisations (e.g. WHO, ECDC), leading international working groups (e.g. IPCC) and articles of key scientific literature publishers in the field of climate change (e.g. The Lancet Countdown), we searched in PubMed and ScienceDirect using Boolean operators with relevant keywords. We described the general impact and factors of climate change on FWBD. FWB pathogens were listed in association with weather phenomena in the European context followed by an evaluation based on their public health relevance and severity of consequences. Examples of methodological approaches were presented.

Results: Salmonellosis, campylobacteriosis and cryptosporidiosis were identified as being influenced by weather factors due to their microbiological characteristics, transmission routes, reservoirs and pathophysiological and clinical characteristics of these reservoirs. Although currently not a significant burden in Belgium, non-cholerae vibriosis was included because of rapidly changing environmental conditions of coastal water.

Public health implications: Future studies exploring the possible association between FWBD and climate change in Belgium could be based on salmonellosis and campylobacteriosis data. Cryptosporidiosis and vibriosis would be limited in case numbers. We recommended time series analysis as a methodology using regression models.

Role: Zsofia conducted the scientific literature review and wrote the report for the use of Department Zorg.

3. Teaching and pedagogy

Introduction to public health surveillance – lecture, Epicourse

The Epicourse is a five-day face-to-face training for new colleagues or colleagues with limited epidemiological knowledge held in Sciensano. Zsofia conducted the daily evaluation of the Epicourse in 2022 and 2023. She developed and presented a lecture on surveillance in 2023 and 2024. She modified the available materials from previous EPIET modules and completed them with recent examples of different surveillance systems and outbreaks. Zsofia also contributed to the facilitation of the case-study and wrote a reflective note.

4. Communications related to the EPIET/EUPHEM fellowship

4.1.   Manuscripts published in peer-reviewed journals

1. **Bognar Zs**, Leroy C, Van Leeuw V, Goemaes R, Melin P, Meex C, Sacheli R*, Camfferman F, De Keersmaeker F, Cornelissen L. Group B Streptococcus maternal colonization and neonatal sepsis in Belgium between 2012 and 2021: a description of the epidemiological situation and identification of risk factors – (first author; submitted to *Eurosurveillance* in mid-September)

2. Digregorio M, Van Ngoc P, Domen J, **Bognar Zs**, Duysburgh E, Hendrickx G, Van Damme P, Coenen S, Scholtes B. Primary Healthcare Providers' Views on Periodic COVID-19 Booster Vaccination for Themselves and Their Patients: A 2023 Nationwide Survey in Belgium, Vaccines 2024, 12(7), 740; Available at: https://doi.org/10.3390/vaccines12070740 (co-author)

4.2.   Other reports

3. **Bognar Zs**, Hammami N, Litzroth A. A *Shigella sonnei* outbreak in a restaurant in West Flanders, Belgium, 2-13 September, 2023 (internal, unpublished)

4. **Bognar Zs**. Short summary in the monthly Newsflashes on Infectious Diseases of a *Shigella outbreak* after a restaurant visit, available following translation to Dutch and French, 2023

5. **Bognar Zs**, Hammami N, Litzroth A. Summary report in the regional infectious disease bulletin of a *Shigella outbreak* after a restaurant visit, in Dutch (publication in progress)

6. **Bognar Zs**, Van Cauteren D. Evaluation report of the *Campylobacter* surveillance system in Belgium, 2017–2023 (internal, unpublished).

7. **Bognar Zs**. How might climate change influence epidemiology of food- and waterborne diseases in Europe? – Literature review to find methodological approaches to be used assessing the Belgian context since 2000 (internal, unpublished)

8. **Bognar Zs**. Reflecting notes on evaluation and experiences of the teaching assignments during Sciensano Epicourse

9. Hanczvikkel A, Tóth Á, Erdősi T, **Bognár Zs**. Description and evaluation of the Invasive Meningococcal Disease Surveillance System of Hungary (IMD-SS). Hungarian National Center for Public Health and Pharmacy Institutional surveillance report (in English); 2023. internal, unpublished)

4.3.   Conference presentations

Bognar Zs, Leroy C, Van Leeuw V, Goemaes R, Melin P, Meex C , Sacheli R , Cornelissen L Group B Streptococcus maternal colonization and neonatal sepsis in Belgium between 2012 and 2021: a description of the epidemiological situation. ESCAIDE 22-24 November, 2023 Barcelona – poster presentation

4.4.   Other presentations

Bognar Zs, Leroy C, Van Leeuw V, Goemaes R, Melin P, Meex C , Sacheli R , Cornelissen L. Group B Streptococcus maternal colonization and neonatal sepsis in Belgium between 2012 and 2021: a description of the epidemiological situation – Infectious Diseases Epidemiology Service team meeting – poster session, Sciensano, 5 December 2023, Brussels, Belgium

5. EPIET/EUPHEM modules attended

- Introductory Course, 26 September–14 October 2022, Spetses, Greece

- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2022, 23–25 November 2022, Stockholm, Sweden

- AppliedEpi R Introductory course, 28 November–2 December 2022, online

- Outbreak Investigation, 5–9 December 2022, Berlin, Germany

- Qualitative Research – Optional Inject Days, 31 January and 3 February 2023, virtual

- Multivariable Analysis, 22–26 May 2023, Frankfurt, Germany

- Rapid Assessment and Survey Methods, 19–23 June 2023, Stockholm, Sweden

- Project Review Module 2023, 28 August–1 September 2023, Lisbon, Portugal

- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2023, 22–24 November 2023, Barcelona, Spain

- Time Series Analysis, 11–15 December 2023, Rome, Italy

- Vaccinology, 4–8 March 2024, virtual

- Writing Abstracts for Scientific Conferences, 14 March 2024, virtual

- Management, Leadership and Communication in Public Health, 24–28 June 2024, Stockholm, Sweden

- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2024, 20–22 November 2024, Stockholm, Sweden

6. Other training

- EAN Mini-module on Whole Genome Sequencing training, 2–4 February 2024, Barcelona, Spain

- Pimp your scientific poster, knowledge transfer on-site workshop and try-out session, 27 June, 12 September 2023

- Introduction to R, Sciensano course, June 2023

7. Other activities

Primary Healthcare Providers' Views on Periodic COVID-19 Booster Vaccination for Themselves and Their Patients: A 2023 Nationwide Survey in Belgium

Supervisor: Els Duysburgh

New COVID-19 strains and waning vaccine effectiveness prompted initiatives for booster vaccination. In Belgium, healthcare providers (HCPs) received a second booster in July 2022, with eligible individuals receiving a third dosage in autumn. Primary HCPs (PHCPs) play a crucial role in healthcare organisation and patient communication. This study, conducted in February–March 2023, surveyed 1,900 Belgian PHCPs to assess their views on periodic COVID-19 boosters for themselves and their patients. The survey included questions on sociodemographic information, willingness to receive periodic COVID-19 boosters, reasons for acceptance or refusal, confidence in vaccine safety and efficacy, and views on booster recommendations. Overall, 86% of participants were willing to receive periodic COVID-19 boosters, motivated by self-protection, patient well-being, and the uninterrupted delivery of healthcare services. Factors influencing booster refusal included not being a general practitioner (GP) or GP trainee, working in Wallonia or Brussels, and lacking vaccine confidence. Although 243 participants did not take boosters periodically, only 74 did not recommend it. Regarding administration, 59% supported pharmacist involvement in COVID-19 vaccination. Further qualitative analysis of 290 PHCPs' responses revealed varying recommendations, including specific roles like nurses, organisational structures, and collaborative approaches. This study highlights the need to address vaccine confidence, regional disparities, and PHCP roles in booster implementation.

Role: Zsofia assisted in developing the questionnaire and reviewed the manuscript as a co-author (Published; Reference #2).

Supervising an EPIET project (Evaluation of the Hungarian Invasive Meningococcus Disease Surveillance – project co-supervisor, 2023)

Before Zsofia's EPIET fellowship, she was working in the National Public Health Center (Nemzeti Népegészségügyi Központ – NNK) of Hungary and was responsible for the surveillance of invasive bacterial diseases. Adrienn Hanczvikkel, a Hungarian MS-track EUPHEM fellow (Cohort 2021) evaluated the Hungarian invasive meningococcus surveillance, for which Zsofia was the project co-supervisor. They held several meetings addressing the working mechanism of the surveillance system. From September 2022 Zsofia become an EPIET fellow in Sciensano. During Zsofia's fellowship, she reviewed and discussed the report and reviewed the abstract submitted to the ESCAIDE 2023 (not accepted).

Acknowledgements

Supervising an EPIET project (Evaluation of the Hungarian Invasive Meningococcus Disease Surveillance – project co-supervisor, 2023)