



Summary of work activities

Laure Mortgat
European Programme for Intervention
Epidemiology Training (EPIET), 2019 cohort

Background

ECDC's Fellowship Programme is a two-year competency based training course offering two paths: the field epidemiology path (EPIET) and the public health microbiology path (EUPHEM). After the two-year training course, the graduates will have extensive expertise in applying epidemiological or microbiological methods to guide public health interventions for communicable disease prevention and control.

Both curriculum paths provide training and practical experience through a 'learning by doing' approach at acknowledged training sites across European Union (EU) and European Economic Area (EEA) Member States.

According to Articles 5 and 9 of ECDC's founding regulation (EC No 851/2004) 'the Centre shall, encourage cooperation between expert and reference laboratories, foster the development of sufficient capacity within the community for the diagnosis, detection, identification and characterisation of infectious agents which may threaten public health' and 'as appropriate, support and coordinate training programmes in order to assist Member States and the Commission to have sufficient numbers of trained specialists, in particular in epidemiological surveillance and field investigations, and to have a capability to define health measures to control disease outbreaks'.

Moreover, Article 47 of the Lisbon Treaty states that 'Member States shall, within the framework of a joint programme, encourage the exchange of young workers' which is why ECDC initiated the two-year EUPHEM training programme in 2008. EUPHEM is closely linked to the European Programme for Intervention Epidemiology Training (EPIET). Both EUPHEM and EPIET are considered 'specialist pathways' of the two-year ECDC fellowship programme for applied disease prevention and control.

This report summarises the work activities undertaken by Laure Mortgat, cohort 2019 of the Intervention Epidemiology path (EPIET) at Sciensano, the Belgian scientific institute of public health, Brussels.

Pre-fellowship short biography

Laure Mortgat graduated as a medical doctor from the Université catholique de Louvain, Brussels in 2008, and specialised in general medicine. Being particularly interested in infectious diseases and health in developing countries, she earned a post-graduate certificate of Tropical Medicine and International Health in 2010 at the institute of Tropical Medicine, Antwerp. She mainly worked as a general practitioner in Belgium and in the French overseas territories (Mayotte and French Guyana), and was also involved in HIV and STI prevention activities among at-risk populations, especially sex workers. Her growing interest in upstream approaches to health led her to undertake a MSc in Public Health at the London School of Hygiene and Tropical Medicine in 2015. In 2017, she was hired by Sciensano, the Belgian scientific institute of public health, where she began her fellowship. She has been responsible for the national surveillance of *Clostridioides difficile* infections in hospitals since then.

The views expressed in this publication do not necessarily reflect the views of the European Centre for Disease Prevention and Control (ECDC).

Stockholm, March 2022

© European Centre for Disease Prevention and Control, 2022. Reproduction is authorised, provided the source is acknowledged.

Methods

This report accompanies a portfolio that demonstrates the competencies acquired during the EPIET fellowship 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 and the summary and communication of scientific evidence and activities with a specific epidemiological 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, with the exception of those prohibited for reasons of confidentiality.

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 ECDC Fellowship Manual¹.

1. Epidemiological investigations

1.1 Outbreak of *Salmonella enterica* Typhimurium monophasic in a nursery in Brussels, December 2020

Supervisors: Commission communautaire commune (COCOM), Directorate of Health and Personal Assistance, Bruxelles.

On the 12 January 2021, Sciensano was contacted by the COCOM regarding three cases of *Salmonella* in a small daycare centre with 12 children in Brussels. The cases had occurred over a period of 16 days, including 10 days when the nursery was closed for the end-of-year break. A small team was set up to investigate the source of the outbreak and prevent further transmission. At the time of notification, three cases had a culture positive for *Salmonella* spp. Because of the time lag between each case and their different ages, implying different meals, a point source of contamination was soon excluded. Active search for cases was conducted via phone interviews with the nursery manager and the parents of the cases, while passive reporting of any compatible symptoms was encouraged. During the phone interviews, a questionnaire was completed for the cases. Due to the COVID-19 pandemic, no field investigation could be performed. The overall attack rate was 21%. The three cases presented fever, diarrhoea, abdominal pain, lack of appetite and fatigue. All consulted a paediatrician and the second case was hospitalised for five days. Samples of the three cases ended up positive for *Salmonella enterica* Typhimurium monophasic with the MLVA profile 3-14-13-NA-0211. Direct contact with the index case, or with his mother who was one of the two childcare workers, was presumed to be the source of contamination. Hygiene measures and rules for food handlers were reiterated for the nursery workers and the parents, and no further case was detected.

Role: Laure was the principal investigator. She participated in meetings with the various stakeholders, designed the questionnaire, performed the interviews and interpreted the results.

1.2 Outbreak of SARS-CoV-2 South Africa variant in three nursing homes in West Flanders

Supervisors: Dr. Naïma Hammami (Agentschap ZORG & GEZONDHEID (AZG), Infectious disease control, Flanders).

In early February 2021, Sciensano got a request from AZG to help with various COVID-19 clusters in Flanders. On the 20 December 2020, a 83 years old lady tested positive for the SARS-CoV-2 South African (SA) variant in a hospital in Oostende and was presumed to be the source of a series of successive clusters which affected, among others, four nursing homes (NH) in West Flanders. The aim of the project was to describe the spatio-temporal transmission pattern of this outbreak in order to understand better the characteristic of this variant, and to prevent further transmission. Databases extracted from e-locket (an electronic tool used to collect data related to the COVID-19 epidemic in NH) were analysed. The Primary attack rate in three institutions, as well as hospitalisation and mortality rate among residents was calculated. The attack rate varied between 5 and 44%, and was similar or higher among residents compared to staff. Hospitalisation and mortality rates among infected residents were significant (respectively 15-60% and 11-27%) which could be explained by the virulence of the SA variant.

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

In the end, this project did not meet the pre-defined specific objectives, as no case-based data were available in the requested timeframe. It was therefore impossible to investigate, as hoped, specific characteristics of this variant such as duration of contagiousness and mean incubation period, nor the proportions of re-infections or the vaccine efficacy. Lack of time and resources as well as high pressure on the researchers in these challenging pandemic times hindered the success of this project.

Role: Laure was a co-investigator in this project. She participated in meetings with AZG members, performed the data analysis and wrote a final report.

1.3 Foodborne outbreaks in Flanders

Supervisors: Dr. Naïma Hammami (Agentschap ZORG & GEZONDHEID (AZG), Infectious disease control, Flanders).

During her fellowship, Laure was confronted with one *Salmonella* outbreak and one Shiga toxin-producing *Escherichia coli* (STEC) outbreak in Flanders.

- Between the 6 and 8 September 2019, nearly 200 students and teachers from a Hotel and Tourism School in Bruges presented with gastrointestinal symptoms. Most of them took their meals in one of the three restaurants of the school or in the local cafeteria. On the 9 September, AZG contacted Sciensano for help and an investigation team was set up. A retrospective cohort study was undertaken to identify the source of the outbreak and interrupt the chain of transmission. An anonymous online survey was developed and sent to all students and staff of the school via email. The results of the epidemiological investigation and the laboratory analyses pointed towards contamination of the tartar sauce with *Salmonella*. Control measures were implemented as soon as the outbreak was declared. No new cases were reported since the 14 September.
- On the 29 September 2021, AZG contacted Sciensano regarding an unusual elevation of STEC cases in Flanders, with 27 confirmed cases since the beginning of September, including with haemolytic uraemic syndrome. On the 12 September, a Rapid Alert System for Food and Feed was issued from France, following an outbreak caused by O157 STEC found in a cucumber salad made with Belgian cucumbers. In order to investigate the source of this outbreak and the possible link with the outbreak in France, a case-control study was undertaken. Online questionnaires were developed in LimeSurvey for both cases and controls, and were completed by OST members by phone. The questionnaires were completed by 18 cases and 20 controls. Results are currently pending.

Role: Laure was a co-investigator and had only a minor contribution to both these outbreaks, that occurred at the very beginning and the very end of her fellowship. Together with the other fellows, she communicated with the outbreak investigation team members and developed and entered the questionnaires in the online survey application LimeSurvey.

Training modules related to assignment/projects

EPIET/EUPHEM Introductory Course – This course introduced the basic principles and the 10 steps of an outbreak investigation. It included various case studies based on real outbreaks, where Laure could discuss study design, perform descriptive and analytical data analysis or appraise the importance of team work and adequate communication.

Outbreak Investigation Module – This essential module allowed Laure to apply concepts and skills previously introduced. A week-long case study on a gastroenteritis outbreak enabled her to perform data collection, cleaning, management and analysis using software as STATA, EpiData and GGIS, as well as reporting. The module also introduced other facets of outbreak investigation as epidemic intelligence, WGS and mapping.

Educational outcome

During the outbreaks, Laure gained insight into outbreak management using the standardised 10 steps approach as a starting point, got more familiar with laboratory methods, and improved her technical skills. She encountered several challenges including communication challenges and issues regarding data completeness and validity.

1.4 The Belgian faecal microbiota transplantation (FMT) national registry

Supervisors: Els Duysburgh.

Faecal microbiota transplantation (FMT) is a medical procedure in which the faeces from a healthy donor are prepared and delivered to a recipient, in the hope of restoring his microbial intestinal flora. Its benefit is proven in the treatment of recurrent *Clostridioides difficile* infection (r-CDI) and is currently investigated for many other conditions. The aim of the project was to set up a 'FMT national registry' in order to gather data on safety and effectiveness of FMT in Belgian patients affected by r-CDI. A protocol was designed based on registries already existing or being implemented in the US, Germany, and the Netherlands. A dedicated working group was set up (including FMT experts from hospitals, from the CDI national reference centre and the two Belgian stool banks), where the variables specifications were discussed. The registry consisted of a prospective cohort study following donors and recipients over a period of 10 years. All hospitals carrying out FMT were eligible and participation was voluntary. Data needed to be collected and entered by the treating physician via a specific online platform. Cure was defined as 'resolution of diarrhoea without need for further anti-CDI therapy', failure as 'no resolution of diarrhoea' and recurrence as 'CDI after initial response to treatment'. Safety was monitored by the occurrence of short-term (within 30 days) and long-term (up to 10 years) adverse events. The registry was constructed with flexibility, to anticipate the use of other forms of gut-related-microbiota products, and be applicable for other potential indications.

The registry was presented and approved by the national health authority Steering Committee. Unfortunately, no funding was yet found, and as a result the project is currently on hold.

Role: Laure was the principal investigator of this project. She developed the entirety of the registry, set up the working group, and communicated with the international and national stakeholders.

1.5 Epidemiology of *Clostridioides difficile* infections in Belgian hospitals

Supervisors: Els Duysburgh.

Clostridioides difficile infection (CDI) is a major cause of healthcare-acquired infectious diarrhoea and pseudomembranous colitis. In 2006, following the increase in CDI incidence and the emergence of hypervirulent strains, a national CDI surveillance was set up in Belgian hospitals. Participation was mandatory until 2015. A yearly report was created, aiming to describe the epidemiology of CDI in Belgian hospitals focusing on year 2019. It summarised the data from four different sources, (1) the national surveillance, including data from the national reference laboratory; (2) hospitals stays; (3) billing of diagnostic tests; and (4) the death registry. Participation in the national surveillance has slowly decreased since 2015 but remains good (76%). The proportion of 'hospital-associated' cases (HA-CDI, with date of onset \geq 2days after admission) was 56% in 2019, compared to 62% 10 years ago. The mean CDI incidence in acute hospitals remained stable since 2015, approaching 1.4/10 000 hospitalisation-days for HA-CDI. As usual, incidence was higher in Wallonia than in Flanders and showed a large variability between provinces and hospitals. Ribotype BR014 remained the most prevalent and widespread strain type in the three Belgian regions. Using the more comprehensive hospital stay dataset, CDI incidence approached 3.2/10 000 hospitalisation-days in 2018, the highest number ever recorded. Trends were similar whether using hospital stay data or surveillance data. Billing data showed an increase in tests billed for *C. difficile* detection, essentially reflecting the increase in testing in ambulatory patients. The death registry displayed an age-adjusted specific mortality rate of 0.73 deaths/100 000 inhabitants, exceptionally similar in the three regions. To conclude, there was no major change during the last five years, but evidence suggest there is still room for improvement. Antimicrobial stewardship in hospitals should be further strengthened.

Role: Laure was the principal investigator of this project. She performed data collection, validation and analysis, wrote a report available online and presented a poster in ESCAIDE 2020.

1.6 COVID-19 outbreak in Belgium

Supervisors: Javiera Rebolledo Gonzalez.

Since the beginning of the pandemic and until her maternity leave, Laure supported the Crisis-corona team that was established to coordinate the national health emergency due to COVID-19 in Belgium. Her tasks included:

- From mid-March 2020 to July 2020, involvement in the weekly COVID-19 report. This report allowed for more in-depth analysis of certain topics such as mortality, hospital surveillance, nursing home surveillance, testing or absenteeism. Two different versions were produced, one aimed at the authorities, one aimed at the general public. Laure was involved in the reflection on the content of the report, the review of the different chapters, the compilation of the report, and the publication. From July onwards, 'thematic' reports were introduced instead, at a rate of 1-2X/month. Each report allowed for a more in-depth analysis of a particular topic. Laure proofread several reports concerning COVID-19 surveillance in children, in primary care, in hospitals, in schools, hospital transfers and illicit drug use during the pandemic.
- Early in the pandemic, Laure participated in weekend shifts which included reviewing and uploading the daily report on the dedicated sharepoint, helping the Walloon region with outbreaks in long-term care institutions, or investigating and answering specific scientific urgent questions.

- Early in the pandemic, involvement in updating specific procedures (eg/ on contacts or outpatients), and checking the transversal consistency of all procedures.
- Early in the pandemic, follow-up of posts of a Facebook group concerning 'COVID-19 for medical doctors'.
- Early in the pandemic, ad-hoc help in reviewing the literature to reply to specific questions.

Training modules related to assignment/projects

EPIET/EUPHEM introductory course – This course introduced basic concepts of surveillance, explained how to set up a surveillance system (choosing appropriate indicators and design) and how to perform and interpret surveillance data analysis. The introduction to STATA and the various case studies were very useful in completing these projects.

Outbreak Investigation Module – The introduction to QGIS given in this module helped Laure to map CDI incidence according to Belgian provinces.

Time Series Analysis module – This module taught Laure how to identify, test and fit a trend in a time serie, interpret the significance of a trend, or analyse seasonality which is very interesting in the context of CDI. She is currently trying to perform a time series analysis with the CDIF dataset, but this was not done for this assignment.

Multivariable Analysis Module – Although multivariable analysis were not performed in the CDI surveillance project, Laure's general statistical skills improved during this module which was indirectly very useful for this project.

Educational outcome

Laure now feels confident enough to run routine surveillance systems. She also learned how to design a new surveillance system, defining appropriate indicators, objectives and data collection specifications. Analysing the CDI data made her improve her coding skills using STATA. She also got acquainted with ethical principles regarding data security and confidentiality needed to build a surveillance system. With COVID, she gained first-hand experience in outbreak crisis assessment, management and communication.

2. Applied public health research

2.1 Prevalence and incidence of anti-SARS-CoV-2 antibodies (IgG) among healthcare workers (HCW) in Belgian hospitals

Supervisors: Els Duysburgh.

In Spring 2020, little was known on the burden of SARS-CoV-2 infection among hospital healthcare workers (HCW). We aimed to document and follow the prevalence and incidence of anti-SARS-CoV-2 antibodies in this population, and to study potential risk factors for the infection. We designed a prospective cohort study, starting end of April 2020 and extended until April 2021. Seventeen hospitals across Belgium and 50 HCW per hospital were randomly selected. RT-qPCR was performed to detect SARS-CoV-2 RNA on nasopharyngeal swabs, and a semi-quantitative IgG ELISA was used to detect anti-SARS-CoV-2 antibodies in sera. In seropositive samples, neutralising antibodies were measured using a virus neutralisation test. Additionally, an online questionnaire collecting socio-demographic and COVID-19 related information was conducted at each of the monthly visits. Among the 850 participants at enrolment, 80% were women, 60% nurses and 21% physicians. The median age was 40 years. A cross-sectional analysis at baseline showed unprotected contact with a confirmed case was the only factor associated with seropositivity (PR 2.16, 95% CI, 1.4-3.2). The seroprevalence remained relatively stable from April (7.7%) to September (8.2%) and increased thereafter, reaching 19.7% in December 2020, just before vaccination was introduced. In the same period, 76 of 778 initially seronegative participants seroconverted. At the end of the study, 97% were seropositive. The study showed that the seroprevalence among hospital HCW was slightly higher than that of the general Belgian population but followed a similar evolution, suggesting IPC measures were effective and should be maintained. After two SARS-CoV-2 waves, 80% of HCW were still seronegative, justifying their prioritisation in the vaccination strategy. Four months after the introduction of vaccination, antibodies were detected in nearly all the participants.

Role: Laure was a principal investigator in the study. She wrote the protocol, moderated the working-group meetings, developed the questionnaires on LimeSurvey, performed data validation and analysis, and communicated the results (individual interim reports to hospitals, press releases, abstract and oral presentation in ESCAIDE 2020, publications 1 and 2).

2.2 Infection prevention and control in Belgian nursing homes: knowledge, attitudes and practices of general practitioners at the onset of the COVID-19 pandemic

Supervisors: François Kidd, Els Duysburgh.

Healthcare-associated infections (HAIs) represent a significant burden in nursing homes (NH). In Belgium, gaps in IPC expertise in NH and difficulties in mobilising general practitioners (GPs) around this issue were highlighted several times. This study, performed early in the pandemic, aimed to assess knowledge, attitudes and practices (KAP) regarding IPC of Belgian GPs working in NH. An online questionnaire was developed using LimeSurvey and sent by email to a convenience sample of 18,554 GPs early 2020. The survey focused on four topics: prevention and control of HAIs, antimicrobial stewardship, hand hygiene, and collaboration between GPs and the coordinating NH physicians (MCCs). Descriptive analysis of the results was performed using STATA-16, while open-ended responses were coded manually and analysed in Excel. Response rate was 1%. Participants had on average 25 years of experience and half of them were working as MCCs besides being GPs. All respondents overestimated HAI prevalence in NH. They considered antimicrobial overuse, pressure ulcers and wounds, malnutrition, and poor hand hygiene as the most important HAIs risk factors. Knowledge on antimicrobial stewardship was good. Respondents believed antimicrobial prescription should be left to GPs (77%), based on existing national guidelines (94%), and may be discussed with MCCs (68%). Regarding HH, 84% reported using a hydro-alcoholic solution. Fifty-one percent practiced hand hygiene before touching a patient and 27% rarely or never after contact with the patient's environment. Sixty-three percent acknowledged wearing jewellery and 30% never cleaned their personal equipment. Difficult or insufficient communication between GPs and MCCs was highlighted. Overall, 90% of the respondents claimed they needed more training on IPC. In conclusion, although knowledge seemed satisfactory, gaps in the fields of hand hygiene and hygiene of reusable equipment were observed. We recommended appropriate training of GPs on IPC.

Role: Laure was one of the two principal investigators. She wrote the protocol, developed the questionnaire on LimeSurvey, performed data analysis, and wrote a report and an abstract for ECCMID 2022.

Training modules related to assignment/projects

EPIET/EUPHEM Introductory Course – This module covered the main concepts of applied public health research. It enabled Laure to improve her data analysis skills and her communication skills, which were essential for the success of her projects. Also, the research protocol exercise and the introduction to sampling techniques were very useful.

Multivariable Analysis Module – This module taught Laure the principles of different types of regression modules, such as linear, logistic, or Poisson regressions. She learned how to build the most suitable model according to her objective and how to interpret the results. This proved extremely useful in analysing risk factors for SARS-CoV-2 infection in Belgian hospital HCW.

Project Review Module: In this module, Laure presented the results of the seroprevalence study among HCW to her fellows. The feedback received helped her to improve her oral presentation skills as well as the visual aspect and content of her slides.

Educational outcome:

Laure got familiar with writing research protocols (including ethical approvals), designing questionnaires, managing data, and using more advanced statistical methods. She also learned to work under pressure and collaboratively despite different project visions and agendas inside the team. Her management skills improved, by learning how to best use the available resources and coordinate and monitor the development of a project. She gained further insight into the lab environment and the importance of microbiology in public health. Mostly, she learned how to communicate to different audiences in time of crisis, write manuscripts, improve her presentation skills, and draw appropriate recommendations from her findings.

3. Teaching and pedagogy

3.1 Introduction to epidemiology for public health professionals

This five days course on basic epidemiology was provided twice (Oct 2020 and Nov 2021) to employees recently hired in the Sciensano department of public health and epidemiology. Laure delivered four lectures and facilitated two case studies. She used and adapted the teaching material previously developed by her colleagues and former EPIET fellows. She also performed the evaluation by developing a daily online satisfaction survey to assess usefulness and difficulty level of each of the lecture/case-study.

3.2 Training of public health professionals on systematic literature review

This three-hour training was offered twice (29/10 and 05/12/2019) to the Sciensano researchers interested in the topic. The EU-track fellow and Laure developed the teaching material and presentation using material from an intensive course Laure followed in 2016 at the LSHTM and from the 'Cochrane Systematic Review course'. The course included lectures, exercises and a workshop using Zotero. To evaluate the training, a short online satisfaction survey was conducted using google docs.

3.3 Training on Healthdata applications

This one-hour training was provided on the 11/02/2020 to the 'Regional IPC platform of Hainaut'. The audience consisted on hospital IPC specialists active in the national surveillance of HAIs. A satisfaction survey had indeed revealed a need for additional training on the Healthdata applications. Laure and her colleagues set up a practical workshop, where they reviewed the data entry tool (HD4DP), and the data reporting tool ('Healthstat'). Examples focused on the quality indicators project and the CDI and bloodstream infections surveillances.

3.4 STATA training for colleagues

Laure introduced the basics of STATA to two colleagues during two full days. The training was informal and very hands-on. The aim was to become familiar with the STATA environment, learn how to import files, and use basic STATA commands to perform descriptive data analysis.

Training modules related to assignment/projects

EPIET/EUPHEM Introductory Course – During this module, the principles of adult education were introduced. Laure learned various tips and tools (e.g. 'the 3 As') that were particularly useful to design, facilitate and evaluate her trainings.

Educational outcome:

Laure was eager to provide teaching and found the exercise very satisfactory. She facilitated practical exercises, case-studies and provided lectures to a variety of adult participants. Content-wise, she refreshed her memory on key epidemiological and research topics while preparing the courses. She realised the importance of a good preparation, the impact that the motivation and level of participants can have on the quality of the workshop and how to adjust to that, and learned how to actively engage participants.

4. Communication

Publications related to the EPIET fellowship

1. Mortgat L, Verdonck K, Hutse V, Thomas I, Barbezange C, Heyndrickx L, et al. Prevalence and incidence of anti-SARS-CoV-2 antibodies among healthcare workers in Belgian hospitals before vaccination: a prospective cohort study. *BMJ Open*. 2021 Jun;11(6):e050824.
2. Mortgat L, Barbezange C, Fischer N, Heyndrickx L, Hutse V, Thomas I, et al. SARS-CoV-2 Prevalence and Seroprevalence among Healthcare Workers in Belgian Hospitals: Baseline Results of a Prospective Cohort Study [Internet]. *Infectious Diseases (except HIV/AIDS)*; 2020 Oct [cited 2021 Nov 30]. Available from
3. Duysburgh E, Mortgat L, Barbezange C, Dierick K, Fischer N, Heyndrickx L, et al. Persistence of IgG response to SARS-CoV-2. *The Lancet Infectious Diseases*. 2021 Feb;21(2):163–4.

Reports

1. Mortgat L, Duysburgh E. Epidemiology of *Clostridioides difficile* infections in Belgian hospitals, Report 2020, Data up to and including 2019 [Internet]. Brussels, Belgium: Sciensano; 2020 Jan. Report No.: D/2021/14.440/10. Available from: https://www.sciensano.be/sites/default/files/report_2020_cdif_v6.pdf
2. Miller E, Mortgat L, Kidd F. Prévention et contrôle des infections associées aux soins dans les maisons de repos et de soins belges : connaissances, attitudes et pratiques des médecins généralistes en 2020. Brussels, Belgium: Sciensano; 2021 Août. Internal report.
3. Mortgat L, Duysburgh E. Epidemiology of *Clostridioides difficile* infections in Belgian hospitals, Report 2019, Data up to and including 2018 [Internet]. Brussels, Belgium: Sciensano; 2019 Sep. Report No.: D/2019/14.440/98. Available from: https://www.sciensano.be/sites/default/files/report_2019_lm_v13.pdf

4. Mortgat L, Duysburgh E. SARS-CoV-2 prevalence, seroprevalence and seroconversion among healthcare workers in Belgium during the 2020 COVID-19 outbreak (SARS-CoV-2 HCW): amended protocol [Internet]. Brussels, Belgium: Sciensano; 2020 Mar. Available from: <https://www.sciensano.be/en/biblio/sars-cov-2-prevalence-seroprevalence-and-seroconversion-among-healthcare-workers-belgium-during-2020-0>
5. Mortgat L. The Belgian fecal microbiota transplantation national registry. Brussels, Belgium; 2019 Jul. Internal report.

Reports chapters

1. Mortgat L, Duysburgh E, Arien K, Desombere I. Séroprévalence du SARS-CoV-2 chez les professionnels de la santé dans les hôpitaux. In: COVID-19 – Bulletin épidémiologique hebdomadaire du 29 mai 2020 [Internet]. 2020. Available from: https://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_Weekly%20report_20200529%20-%20FR_0.pdf
2. Mortgat L, Duysburgh E, Arien K, Desombere I. Seroprévalence du SARS-CoV-2 chez les professionnels de la santé dans les hôpitaux. In: COVID-19 – Bulletin épidémiologique hebdomadaire du 26 juin 2020 [Internet]. 2020. Available from: https://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_Weekly%20report_20200626%20-%20FR_0.pdf

Conference presentations

1. Mortgat L. SARS-CoV-2 prevalence and seroprevalence among healthcare workers in Belgian hospitals: preliminary results of a prospective cohort study. ESCAIDE 2020; 2020 Nov 26; online. Oral presentation.
2. Mortgat L, Duysburgh E. Clostridioides difficile surveillance in Belgian hospitals since 2008 : main incidence trends. Online. Sciensano. Poster presentation.

Other presentations

1. Mortgat L, Duysburgh E. SARS-COV-2 prevalence and seroprevalence among healthcare workers in Belgian hospitals: Preliminary results of a prospective cohort study (Update until February 2021). ECDC/WHO Europe sero-epi network meeting; 2021 Mar 25; online.
2. Mortgat L, Duysburgh E. SARS-COV-2 Seroprevalence among healthcare workers in Belgian hospitals during the 2020 COVID-19 outbreak: preliminary results. ECDC/WHO Europe sero-epi network meeting; 2020 Jun 24; Online.
3. Mortgat L. Fecal microbiota transplantation registry. Healthdata SteerCo meeting; 2020 Feb 14; RIZIV/INAMI.

5. Other activities

Press releases

1. Mortgat L, Duysburgh E, Arien K, Desombere I. Etude sur le nombre de contaminations par le COVID-19 chez les travailleurs de la santé dans les hôpitaux belges [Internet]. 2020. Available from: <https://www.sciensano.be/fr/coin-presse/etude-sur-le-nombre-de-contaminations-par-le-covid-19-chez-les-travailleurs-de-la-sante-dans-les>
2. Mortgat L, Duysburgh E, Arien K, Desombere I. COVID-19 study: 8,4% of Belgian health workers have antibodies to SARS-COV-2 [Internet]. 2020. Available from: <https://www.sciensano.be/en/press-corner/covid-19-study-84-belgian-health-workers-have-antibodies-sars-cov-2>
3. Le nombre de donneurs de sang et de travailleurs de la santé possédant des anticorps contre le coronavirus reste stable [Internet]. 2020. Available from: <https://www.sciensano.be/fr/coin-presse/le-nombre-de-donneurs-de-sang-et-de-travailleurs-de-la-sante-possedant-des-anticorps-contre-le>
4. Augmentation du nombre de donneurs de sang et de travailleurs de la santé ayant développé des anticorps contre le coronavirus [Internet]. 2020. Available from: <https://www.sciensano.be/fr/coin-presse/augmentation-du-nombre-de-donneurs-de-sang-et-de-travailleurs-de-la-sante-ayant-developpe-des>
5. Le pourcentage de professionnels de la santé présentant des anticorps atteint 64 % [Internet]. 2021. Available from: <https://www.sciensano.be/fr/coin-presse/le-pourcentage-de-professionnels-de-la-sante-presentant-des-anticorps-atteint-64>

Being a MS-track fellow, Laure additionally pursued her daily routine surveillance activities, including collaboration with data providers, with the national reference centre, data management and reporting. She attended the monthly unit meetings, the outbreak crisis meetings, and also participated and moderated various 'Epi journal clubs', set up by the previous fellow. As a medical doctor, she continued to perform one-week epidemiological shifts, in rotation with her colleagues.

During the HCW seroprevalence study, she also collaborated with the Sciensano department of Lifestyle and chronic diseases to include a study on the impact of the COVID-19 crisis on mental health of HCW (BE-HEROES study). She reviewed their protocol and questionnaire and amended the HCW seroprevalence study original protocol and informed consent to incorporate 4 rounds of this additional mental health survey.

6. EPIET/EUPHEM modules attended

1. Introductory course, 23/9/2019 – 11/10/2019, Spetses, Greece.
2. Outbreak Investigation Module, 09/12/2019 – 13/12/2019, Nicosia, Cyprus.
3. Multivariable Analysis Module, 20/4/2020 – 24/4/2020, online; and MVA inject day 18/03/2021, online.
4. Project Review Module, 24/8/2020 – 28/8/2020, online.

5. Time-Series Analysis module, 25/1 – 29/1 2021, online.

In 2022, Laure will participate in the two modules she was unable to attend due to her maternity leave, as a facilitator:

- Vaccinology, 14/02 – 18/02/2022, online
- Rapid assessment & Survey Methods, 06/06 – 10/06/2022, online.

7. Other training

1. ESCAIDE 2019 conference, 27/11/2019-29/11/2019, Stockholm, Sweden.
2. ESCAIDE 2020 conference, 24/11/2020 – 27/11/2020, online.
3. ESCAIDE 2021 conference, 16/11/2021 – 19/11/2021, online.

Discussion

Coordinator's conclusions

One of the main goals of the EPIET programme is for fellows to develop core competencies in field epidemiology mainly through project or activity work, but also partly through participation in training modules and apply epidemiological methods to provide evidence to guide public health interventions for communicable disease prevention and control. This report summarizes all activities and projects conducted by Laure during her two-year EPIET Member State Track fellowship (cohort 2019) at Sciensano, the Belgian institute of public health. It has been a pleasure working with Laure during her fellowship.

Laure is an open, efficient and determined public health doctor who has consistently demonstrated discipline and enthusiasm for her own learning. In her work, she benefited from her previous experience as general practitioner (GP), for example in developing a KAP study regarding the use and implementation of infection prevention and control measures by GP's in nursing homes. During her fellowship, she has had to balance the conflicting demands of working in a public health emergency, while also focusing on the fellowship to improve her field epidemiology skills and 'learning by doing'. It is gratifying to see that her contribution to the daily activities and tasks at her institute have been so valued. She has also proved to be resilient and able to work to challenging demands. Laure managed to progress rapidly on her projects, developed technical and analytical skills and successfully delivered scientific output. Her main project was a national Sars-CoV-2 seroprevalence study among health care workers in Belgium hospitals, resulting in several published manuscripts. During her fellowship, Laure also experienced the reality that one interesting project unfortunately did not progress as some analyses could not be done because of aggregated data format, or that her protocol on the Belgian fecal microbiota transplantation national registry still needs to find funding in order to be really implemented. Laure enjoyed several teaching experiences she did during her fellowship. She has shown to be a clear and inspiring communicator, and looks forward to facilitate in upcoming modules herself.

She can be self-critical in a good way, and she is dedicated to follow up on her own learning goals in her public health career after the fellowship, for example more field exposure in a multidisciplinary outbreak investigation in the region. She is very much willing to sharing her newly acquired skills, expertise and enthusiasm with colleagues inside and outside her institute.

Supervisor's conclusions

Since 2017, Laure is a staff member at the unit of 'healthcare-associated infections and antimicrobial resistance' which is part of the 'epidemiology and public health' scientific direction at Sciensano, the Belgian institute of public health. In September 2019, she was enrolled as member state fellow in the two-year EPIET fellowship.

During her EPIET fellowship, Laure continued being involved in the daily activities at the unit of 'healthcare-associated infections and antimicrobial resistance'. Apart from that, she was involved in research projects and tasks outside this unit, many of these related with the COVID-19 pandemic. Among others, she coordinated a national study on the prevalence of anti-SARS-CoV-2 antibodies among healthcare workers in Belgian hospitals. This study resulted in communication of findings in national press, at national and international scientific platforms, and in peer reviewed journals. During the COVID-19 crisis Laure showed that she is able to work very efficiently, even in a stressful situation.

Additionally, Laure coordinated as part of the fellowship some none-COVID-19 related outbreak investigations and did a 'knowledge, attitude, practice' study regarding the use and implementation of infection prevention and control measures by general practitioners in Belgian nursing homes. All this resulted in the fact that Laure fulfilled the EPIET requirements already some months before the end of the fellowship.

Laure is a very pleasant and trustworthy colleague ready to share her knowledge and help peers. As researcher and epidemiologist she is eager to learn, try new things and take up challenges and opportunities. I really enjoy brainstorming with Laure about the research and project we did and do together. Laure is reflective and open-minded. Research integrity and evidence-based science are guaranteed when working with Laure. The only minor working point is that she is a perfectionist which, apart from being a positive characteristic, sometimes hinders going ahead with a project/task.

It is really a pleasure having Laure as colleague and to work with her as researcher. I wish her all the best in the future and a nice, interesting career within or outside Sciensano.

Personal conclusions of fellow

The EPIET fellowship has been a truly enriching and rewarding experience. I have broadened my epidemiology knowledge, have developed both technical and soft skills, and feel I took a huge step towards becoming a proficient public health professional. Although this pandemic was and still is a real challenge, a positive externality was that it allowed me to experience and navigate a health crisis situation. I learned a lot in terms of outbreak management and the multiple challenges at stake, and became aware of the importance of a good communication strategy when dealing with sensitive information and various audiences. I really appreciated working in multidisciplinary teams, on immediately impactful projects.

I was very satisfied with the support I received during the fellowship and with the content of the training, but slightly regret the online format and that I was not able to participate in two very interesting modules.

In the end, the greatest gift of these two years is the life-long network of public health experts and friends I developed. I recognise the immense value of the EPIET network in strengthening the capacity for prevention and control of communicable diseases nationally and internationally, and I look forward to further adding my contributions.

Acknowledgements of fellow

I am firstly extremely grateful to my supervisor, Els Duysburgh. She supported and trusted me since the day I entered Sciensano and encouraged me to seize every opportunity to increase my knowledge and skills in epidemiology. Our discussions about the content of the projects, but more broadly about our vision of public health were very enriching, and contributed to making sense of my work. Big thanks to Javiera Rebolledo Gonzalez, my co-supervisor, who was equally very supportive and thanks to whom the few long evenings/nights of hard COVID work became enjoyable. I am not forgetting Sooria Balasegaram, my FLC, who, even remotely, has always given me very valuable feedback, both on the scientific and human aspects of the projects. Els and her were a source of inspiration and motivation whenever I lost confidence. Thanks to Barbara Schimmer, who succeeded Sooria the last few months and wisely guided me towards the end of the fellowship. I am also grateful to Naïma Hammani and her colleagues who tried to provide me with interesting opportunities to get involved in outbreak management. Similarly, thanks to Amber Litzroth for giving me the possibility to teach. My gratitude also goes to the organisers and facilitators of the EPIET/EUPHEM programme, who have managed to maintain the excellent quality of the fellowship in challenging circumstances. Finally, the interesting and festive exchanges, -even online-, with my cohort fellows and my colleagues contributed greatly to the success of this fellowship.