Summary of work activities
Brecht Ingelbeen
Intervention Epidemiology path (EPIET)
Cohort 2016

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.

Stockholm, September 2018

- 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

Before EPIET, Brecht Ingelbeen worked as an epidemiologist with Médecins sans Frontières (MSF) and Epicentre in Guinea, Democratic Republic of the Congo, Central African Republic, Syria and Pakistan. He is a pharmacist (MSc, Ghent University) and obtained a postgraduate degree in Tropical Medicine and an MSc Public Health from the Institute of Tropical Medicine, Antwerp.

Fellowship assignment: Intervention Epidemiology path (EPIET)

On 15/09/2016, Brecht Ingelbeen started his EPIET fellowship at Santé publique France, Direction des Maladies Infectieuses, St Maurice, France, under the supervision of Henriette de Valk and Kostas Danis. His EPIET frontline coordinator was Christian Winter. 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 guide[1].

Fellowship projects

1. Surveillance

Title: Adapting RSV surveillance in France in the light of a future vaccine introduction

Supervisor(s): Emmanuel Belchior, Daniel Levy-Bruhl

While respiratory syncytial virus (RSV) infections are a known major cause of hospitalization for bronchiolitis among young children (<2 years), its incidence and severity in elderly (>65 years) is poorly documented. Anticipating the introduction of RSV vaccines in France, we evaluated whether RSV infections among young children and elderly could be estimated from routine surveillance data in France, to propose improvements in the established surveillance systems.

RSV laboratory data (2015-2017) were obtained from the sentinel influenza surveillance (2.1% of general practitioners (GPs) and 4.1% of pediatricians) and the hospital-based laboratories network. Bronchiolitis cases (2009-2015) were recorded in national emergency ambulatory and hospital consultations, and hospital discharge databases.

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[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

The seasonal RSV increase in young children can be monitored using bronchiolitis data from emergency consultations. RSV hospitalization rates for them can be approximated from hospital discharges following bronchiolitis. Within sentinel influenza surveillance, before the influenza season only 5.0% (1,442/28,957) of acute respiratory infections in young children and 1.1% (53/4,945) among elderly were eligible for RSV testing (influenza-like illnesses). Bronchiolitis hospitalization rates due to RSV are difficult to estimate in elderly as 92.8% (2,646/2,851) are without causal agent specified. Hospital-based laboratory reports do not record age, and testing criteria may vary between hospitals.

Available emergency bronchiolitis consultation and hospital discharge data provide reasonable proxy estimates for RSV among young children. The few detected RSV cases through sentinel influenza surveillance are likely not representative of RSV incidence throughout the year since testing is limited to influenza-like illnesses. Testing elderly who present with acute respiratory illness in GP offices and nursing homes for RSV would help assessing their RSV incidence and hospitalization rate, and thus support policy decisions regarding the RSV vaccine introduction in France.

Role:
Brecht was the principal investigator of this surveillance project. He conceived the study questions, performed the analyses, presented the results, conclusions and recommendations to the national reference centre for respiratory viral infections, in a report, and in a poster presentation at an international conference (6,11). The recommended changes in influenza surveillance were implemented during the 2017/18 influenza season.

Title: Recurrent cholera outbreaks in the Democratic Republic of the Congo, 2008-17

Supervisor(s): Marianne van der Sande (Institute of Tropical Medicine, Antwerp, Belgium)

In 2017, the exacerbation of an ongoing countrywide cholera outbreak in the Democratic Republic of the Congo (DRC) resulted in >53,000 reported cases and 1,145 deaths. To guide control measures, we analyzed the characteristics of cholera epidemiology in DRC based on surveillance and cholera treatment center data during 2008-2017.

The 2017 nationwide outbreak resulted from three distinct mechanisms: (i) significant increases in the number of cases in cholera-endemic areas, so-called hotspots, around the Great Lakes in eastern DRC; (ii) recurrent outbreaks progressing downstream along the Congo River, and (iii) spread along Congo River branches to areas that had been cholera-free for over a decade. Case fatality was higher in non-endemic areas and in the early phases of the outbreaks, possibly reflecting low levels of immunity and less appropriate prevention and treatment.

Targeted use of oral cholera vaccine, soon after initial cases are diagnosed, could contribute to decreasing the case fatality.

Role:
The Institut National de Recherche Biomedicale (INRB, Kinshasa, Democratic Republic of the Congo) requested epidemiological support to analyse national cholera surveillance and laboratory data. This was a joint project with David Hendrickx, EPIET fellow at Landesgesundheitsamt Baden-Württemberg (Stuttgart, Germany) under the supervision of the Institute of Tropical Medicine (ITM, Antwerp, Belgium). First, Brecht and David consulted local cholera control actors in DRC to conceive the study questions. They performed the data analyses, presented the results and proposed recommendations for cholera surveillance and control efforts. They submitted a manuscript in a peer-reviewed journal, presented the results in a report disseminated among cholera control actors and the Ministry of Health in DRC and during a seminar at ITM, and presented the results in two oral presentations at an international conference (8,12,14).

2. Outbreak investigations

Title: Countrywide Salmonella enterica 4,5,12:i:- outbreak

Supervisor(s): Nathalie Jourdan

At the end of April 2018, the French national laboratory for *Salmonella* reported a cluster of 15 phylogenetically-linked *Salmonella enterica* serotype 4,5,12:i:- cases in nine regions of France since the last week of 2017. Thirteen (87%) cases were children between 3 and 12 years of age. To identify the potential source of the outbreak and set up control measures, we compared at risk exposure of cases with that in the population.

Parents of cases or cases were interviewed on food exposure and at risk contacts in the week prior to symptom onset, using a trawling questionnaire. We also retrieved information on groceries bought in the month prior to symptom onset. In a case-control study, exposures reported by ≥50% of cases were compared to those among controls. Cases had *Salmonella enterica* serotype 4,5,12:i:- infections belonging to the same distinct phylogenetical cluster with dates of symptom onset between December 2017 and June 2018. Clusters were identified by the French national laboratory, by whole genome sequencing of stool or urine samples. Controls were voluntary participants of Grippenet.fr, an on-line cohort reporting every year any symptom during the flu epidemic. Within this cohort (5,958 participants), 1,350

adults ≤40 years old received an electronic questionnaire to complete for their children 3 to 17 years old and themselves. For controls to be more representative for the cases, we restricted the analysis to cases and controls living in regions with ≥5 cases, and subsequently to those buying groceries in three large supermarket brands. We calculated adjusted odds ratios, using logistic regression and adjusting for age and region.

As of 24/07/2018, 99 cases (46 males/53 females; 25 adults/74 children) were identified, with onset of symptoms between the last week of December 2017 and July 2018. Cases were found in 11 regions of France, with no cases from the North or East of France. Sixty-four cases were interviewed. Excluding 10 potential secondary cases, consumption of ham (89%), ground beef (89%), food items containing raw eggs (79%), chocolate (68%), bacon (67%) and several types of dry cured sausages (67%), and contact with pets (73%) were most frequently reported. When restricted to regions with ≥5 cases, cases were significantly more likely to have consumed dry cured sausages (aOR 5.5; 95%CI 1.9-16) or Frankfurt sausages (aOR 4.7; 95%CI 1.4-16) and having had contact with animal food (aOR 5.0; 95%CI 1.5-16). When also restricted to grocery shopping in large supermarkets, consumption of dry cured sausages (aOR 34; 95%CI 6.1-221) and Frankfurt sausages (aOR 7.7; 95%CI 1.6-49) remained significantly associated.

Results of the case-control study and the very frequent consumption among cases point to dry cured sausages as most likely source of the outbreak. Further trace-back investigations of dry cured sausages that were bought by the cases during the weeks before symptom onset, have been ongoing with the Ministry of Agriculture.

Role:

Brecht led the outbreak investigation including case interviews, analyses of data on groceries that cases had bought before infection, coordinating and communicating with the national reference laboratory and the Ministry of Agriculture, and setting up a case-control study involving voluntary respondents. He developed a protocol for the case-control study, analysed the data and wrote a preliminary outbreak investigation report.

Title: Hepatitis A outbreak investigation in Centre region, France, June-July 2017.

Supervisor(s): Elisabeth Couturier

Hepatitis A virus (HAV) is transmitted through ingestion of contaminated food and water or through direct contact with an infected person. On 03/07/2017, eight HAV cases were reported in a primary school in the Centre region. An outbreak investigation was initiated to identify the source of the outbreak and to propose control measures.

The case definition for this outbreak was an IgM confirmed HAV infection belonging to the RIVM_HAV_16090 strain, with symptom onset after 01/05/2017, in a patient who resided or worked in Le Magny in the 4 weeks prior to symptom onset, or had been in contact with another certain case. Cases linked to the outbreak were sought in surveillance reports and local hospitals. We developed a questionnaire to interview cases and identify common events, common food items and contacts. We investigated whether specific food items used in the school canteen were more frequently consumed by case patients; we visited the affected school, its canteen and kitchen, and interviewed school and kitchen staff.

Between 18/06/2017 and 4/09/2017, the HAV outbreak affected 23 cases of which 11 primary cases with symptom onset between 18 and 30/06/2017 could be linked to attendance of the same primary school canteen. One more case with symptom onset in that period had direct contact with two cases from the school. A point-source outbreak was suspected. No other HAV cases could be linked to the suppliers of the school canteen. No single meal or food item on the school canteen menu between 15 May and 5 June 2017 (the longest and shortest incubation time before the primary cases) could be identified as source of the outbreak. All other cases with symptom onset after 30 June 2017 had been in contact with one of the initial 11 cases, or with secondary cases.

A meal at the school canteen was likely to be the source of the outbreak. The school canteen was temporarily closed with no further cases linked to the canteen. Reinforced hygiene practices and awareness rising in the school and school canteen, together with vaccination of family members of cases, was likely to have prevented the occurrence of further HAV cases.

Role: Brecht led the field investigation during the outbreak, visiting the affected community and coordinating the local case investigations. He developed the case definition, described the cases, developed hypotheses regarding the source of the outbreak, and wrote a field investigation report (7).

Title: Investigation of a Salmonella enterica serotype 4,12:i:- outbreak associated with consumption of caterers' food, Paris, November 2016-January 2017

Supervisor(s): Nathalie Jourdan

On 11 January 2017, the French national reference laboratory reported an increase in reported *Salmonella enterica*, serotype 4,12:i:- infections in the Paris 18th district in November and December 2016. An outbreak investigation was set up to identify the source of the outbreak, and to propose control measures.

An outbreak case was defined as any resident of Paris, with a stool isolate positive for *S. enterica* serotype 4,12:i:- or unknown serotype, between November 2016 and January 2017. Patients' characteristics and food consumption were collected using a trawling questionnaire. Human and food stool isolates were characterized by whole genome sequencing. Simultaneously, we sought grouped cases of food poisoning potentially linked to this outbreak.

Between November 2016 and January 2017, 35 cases were reported and 32 patients (91%) were interviewed. Among the interviewed cases, 29 cases (91%) were residents of Paris' 18th district. Mean age was 35 years (range 1 – 89). The M/F sex-ratio was 0.8. Twenty-one cases (68%) consumed food items from a caterer in the 18th district, not restricted to a single food item. An episode of food poisoning among 11 people participating in a family dinner was reported. Participants ate crusted ham bought from the same caterer, and *S. enterica*, serotype 4,12:i:- was identified on the crusted ham. This food isolate and 12 of 13 human isolates (92%) belonged to the same genomic clone. In January 2017, a food inspection visit of the caterer also identified Salmonella Derby on meat. The meat production workshop was closed for 15 days and the caterer was asked to carry out a thorough cleaning of all the premises and equipment.

Several infected meat products from a single caterer were the likely source of the outbreak. Meat products were possibly contaminated in the caterer's meat production workshop. The outbreak investigation and consecutive whole genome sequencing of outbreak isolates allowed identifying the caterers' meat products as the source of the outbreak. The subsequent temporary closure of the caterers' meat production workshop and cleaning measures probably led to the end of the outbreak.

Role: Brecht contributed to the outbreak investigation by interviewing cases, line listing and describing outbreak cases. He is co-author of the abstract for a poster presentation at an international conference (15).

3. Applied epidemiology research

Title: Emerging Shiga-toxin-producing Escherichia coli serogroup O80 associated hemolytic and uremic syndrome in France, 2013-2016: differences with other serogroups

Supervisor(s): Mathias Bruyand, Henriette de Valk

Shiga toxin-producing Escherichia coli (STEC) associated haemolytic-uremic syndrome (HUS) is the main cause of acute renal failure in children. In 2015, STEC O80 became the predominant serogroup in France. Its reservoir remains unknown. Our aim was to generate hypotheses on potential sources of infection.

We used French pediatric HUS surveillance data for the years 2013-16, and compared characteristics and exposures of STEC O80 cases with those of cases of STEC O157 or other STEC serogroups (case-case study). We calculated crude and adjusted odds ratios (aOR) using logistic regression.

STEC was isolated from 153/521 (29%) reported HUS cases: 45 serogroup O80, 46 serogroup O157 and 62 other serogroups, with median ages of 1.1, 4.0 and 1.8 years, respectively. By 2015/2016, O80 cases were distributed all over mainland France, while O157 cases were mainly reported in Western France. O80 cases were more likely to live next to a wood (OR 9.8; 95%CI 1.0-122) and less likely to consume ground beef (aOR 0.14; 95%CI 0.02-0.80) than O157 cases. STEC O80 cases were less likely to report previous contact with a person with diarrhea or HUS than O157 cases (aOR 0.13; 95%CI 0.02-0.78) or cases of other serogroups (aOR 0.14; 95%CI 0.04-0.51).

Differences in age, geographical distribution and exposures between STEC O80 cases and other serogroups suggest the existence of different sources, reservoirs and transmission routes. Those differences underscore the need to include additional exposures in the enhanced HUS surveillance, and conduct animal and analytical/ecological studies to identify the sources/reservoirs and transmission routes of STEC O80 infections.

Role:
Brecht was the principal investigator. He conceived the study question, wrote the study protocol, performed the data cleaning and analyses, submitted a manuscript to a peer-reviewed journal, and will present the results during a poster presentation at an international conference (2,13).

Title: Urban yellow fever outbreak – Democratic Republic of the Congo (DRC), 2016: towards more rapid case detection

Supervisor(s): Harold Noël

Between December 2015 and July 2016 a yellow fever (YF) outbreak affected urban areas of Angola and DRC. Because of increasing presence of the mosquito vector (Aedes spp.), outbreaks will probably reoccur in cities. To facilitate early diagnosis of cases in future urban outbreaks, we described the outbreak and analyzed the performance of the YF case definition.

During the outbreak in DRC, suspected YF infection was defined as jaundice within 2 weeks after acute fever onset, and was confirmed by either IgM serology or PCR for YF viral RNA. Using case investigation and hospital admission forms, we measured time to diagnosis and compared characteristics and death between confirmed YF cases who had travelled from Angola and those infected in DRC. Comparing clinical signs between confirmed and discarded suspected YF cases, we calculated the predictive values of each sign for confirmed YF and the diagnostic accuracy of several suspected YF case definitions.

Seventy-three percent of confirmed cases (57/78) had travelled from Angola: 88% men (50/57); median age 31 years (IQR 25–37). Nineteen percent (15/78) were infected locally in urban settings in DRC. Apart from one geographic cluster of three cases, all other cases were widespread. Median time from symptom onset to healthcare consultation was 7 days (IQR 6-9), to appearance of jaundice 8 days (IQR 7-11), to sample collection 9 days (IQR 7-14), and to hospitalization 17 days (IQR 11-26). A different case definition including fever or jaundice, combined with a negative malaria test, or malaria infected but not responding to malaria treatment, yielded an improved sensitivity (67%) and specificity (81%).

As jaundice appeared late, the majority of cases were diagnosed too late for supportive care and prompt vector control. In areas with known local YF transmission, a suspected case definition without jaundice as essential criterion and improving access to primary care could facilitate earlier YF diagnosis, care and control.

Role:
Brecht was the principal investigator. He collected the data, conceived the study, wrote the study protocol, performed data cleaning and analyses, submitted a manuscript to a peer-reviewed journal, and presented the results during an oral presentation at an international conference (4,10).

Title: Increasing Azithromycin resistant shigellosis Among Men Who Have Sex with Men in France, 2013-17

Supervisor(s): Mathieu Tourdjman

Acquisition of azithromycin-resistant Shigella used to be travel-related. Since 2009 however, its circulation has been described among men having sex with men (MSM) with no travel history. In France since February 2016, azithromycin is the treatment of choice for confirmed or suspected sexually transmitted Chlamydia infections and is an alternative option for shigellosis. In October 2016, the French national reference center for Shigella (NRC) reported an increase in azithromycin resistance among confirmed Shigella cases. By describing azithromycin-resistant Shigella cases and identifying potential risk factors for transmission, we aimed to inform guidelines for antibiotic treatment for shigellosis and other sexually transmitted infections (STIs).

We describe azithromycin-resistant Shigella cases reported by the NRC between May 2014 and December 2017. We excluded cases reported from the French overseas territories, cases for which azithromycin MIC was indeterminate and 37 cases from a school-related outbreak in March 2017, which was linked to travel to Vietnam. We interviewed 11 male patients with confirmed azithromycin-resistant Shigella infections in 2017 about potential risk exposures. We compared characteristics between azithromycin-resistant and –sensitive cases.

From May 2014 to December 2017, 417 (14%) of the 2,919 Shigella cases confirmed at the NRC were azithromycin-resistant, increasing from 25 (4%) in 2014 to 212 (25%) in 2017. Shigella sonnei g, S. flexneri 2a and S. flexneri 3a respectively accounted for 237 (63%), 84 (22%) and 20 (5%) of azithromycin-resistant cases, respectively. When excluding the 37 school-related outbreak cases, 339 (89%) of azithromycin-resistant cases were confirmed among men. Median age of azithromycin-resistant cases was 34 years old, with 259 adults (68%) aged 25-50 years. A travel history prior to symptom onset was only reported for 49 (13%). Among the 11 interviewed cases (10 of whom responded to the full questionnaire), median duration of symptoms was 10 days, two (18%) reported a duration of more than 2 months; eight received antibiotic treatment and among them, 4 (50%) reported persistent symptoms following initial treatment. All 11 were MSM; eight (80%) reported at least two occasional sex partners over the past 12 months; 4 (40%) were HIV positive and 3 (30%) reported a history of STI over the past 12 months.

Resistance to azithromycin is increasing among Shigella cases in France. Our results indicate that azithromycin-resistant Shigella strains are primarily circulating among MSM with multiple occasional sex partners. Exposure to

azithromycin as treatment against STIs may have resulted in selection pressure for azithromycin-resistant Shigella strains circulating in this at-risk population. Clinicians should be aware of sexual transmission of Shigella, particularly among MSM. When consulting male patients with shigellosis, particularly when no travel history is reported, clinicians should ask about sexual transmission and consider screening test for other STIs. Among Shigella cases amongst MSM with multiple sex partners, azithromycin might not be the best treatment option.

Role:

Brecht was the principal investigator. Mathieu and Brecht conceived the study and retrieved the data from the national reference laboratory. Brecht wrote the study protocol, performed the data cleaning and analyses, and plans to submit a manuscript to a peer-reviewed journal in September 2018 (5).

Title: Symptom-Based Ebola Risk Score for Ebola Virus Disease, Conakry, Guinea

Supervisor(s): Johan van Griensven (Institute of Tropical Medicine, Antwerp, Belgium)

A symptom-based risk score could allow risk-stratifying Ebola virus disease (EVD) suspected cases while awaiting laboratory confirmation in an Ebola treatment center (ETC). Oza and colleagues proposed an Ebola symptom-based risk (ESR) score, consisting of six symptoms (conjunctivitis, diarrhea, nausea/vomiting, headache, difficulty breathing, loss of appetite), which performed well in an ETC in Sierra Leone, but no external validation was done.

We evaluated the proposed ESR score on 805 EVD-positive and 1,506 EVD-negative case-patients in the Conakry ETC, Conakry, Guinea. The ESR score yielded an area under the curve of 0.58 (95% CI 0.56–0.61), which is lower than the 0.83 (95% CI 0.79–0.86) Oza et al. reported. Using the proposed risk thresholds (i.e., low risk if score <0, medium risk if score = 0, and high risk if score >0), 371 (46%) EVD-positive patients of the Conakry ETC were classified as high risk and 647 (43%) EVD-negative patients as low risk. However, negative and positive predictive values were generally low (online Technical Appendix Table). Reasons for poor validation could include differences in applying the general EVD suspect case definition (integration of patients' contact history); in patient characteristics because organization and access to care for EVD and non-EVD illness was different (patients in holding centers or ETC); in the quality of data collection (symptoms are entirely self-reported); and in underlying diseases of EVD-negative patients.

Our findings underline the importance of external validation in various settings before risk scores are applied outside of the setting within which they were developed, as well as the need to incorporate patient contact history into predictive models. Point-of-care EVD diagnostic platforms can perform reliable confirmatory testing within 90 minutes (3). We argue that, by integrating rapid confirmatory testing in triage, providers can avoid classifying patients by their likelihood of infection with Ebola virus while waiting for laboratory confirmation.

Role:

Brecht performed the data analysis and submitted a research letter that was published in a peer-reviewed journal (1).

4. Communication

Publications

One article was published (1), three articles have been submitted and are currently under review by scientific journals (2-4). One more article is under preparation and will be submitted in September 2018 (5).

Reports

Two reports for Santé publique France (6-7) and one report for cholera stakeholders in DRC (8) were disseminated.

Conference presentations

Brecht gave two oral and one poster presentation at ESCAIDE 2017 (9-11) and one oral and one poster presentation at ESCAIDE 2018 (12-13). He co-authored one oral presentation at ESCAIDE 2018 (14) and one poster presentation at the International Symposium Salmonella and Salmonellosis 2018 (15).

Other presentations

Jointly with David Hendrickx, Brecht and David presented their findings during a seminar "Cholera epidemiology in DR Congo 2008-17" at the Institute of Tropical Medicine on 21 December 2017.

5. Teaching and pedagogy

Lectures and facilitation of case studies during IDEA, an applied epidemiology short course for health professionals

From 19 to 23 March 2018, Brecht gave two lectures ("Epidemiological study design", "Choice of a control group and sample size calculation") and facilitated four case studies in the International Course of Applied Epidemiology (IDEA). This 3-week course is the equivalent of the EPIET introductory course targeting a French audience. He facilitated during the first week.

The training objectives were:

- Apply basic principles of descriptive and analytical epidemiology
- Use adapted methods to respond to health alerts, investigate outbreaks, and carry out epidemiological surveillance

The target audience were 44 health professionals from regional health agencies, the national public health agency, hospitals, occupational health, and the Ministry of Health, and MPH students (Institut Pasteur).

Reflection

I enjoyed the teaching and facilitation. One lecture was conceived as an interactive session with two lecturers. For the second lecture I added an activity, in which participants could explain features of different control groups in a case control study. This required more time than an ex cathedra lecture, and a next time I would rather provide a one page restitution of the lecture and spend more time on the activity, and provide more examples.

The case study learning material was well established and only required some minor updating. The case studies were most successful when interventions by facilitators were kept to a minimum. I felt that complementing the end of a section with some real life examples worked better than moderating through each question.

6. EPIET/EUPHEM modules attended

- Introductory course, Spetses, Greece, 26 September - 15 October 2016
- Outbreak module, Berlin, Germany, 5-9 December 2016
- Rapid risk assessments and surveys module, Athens, Greece, 8-13 May 2017
- Project review module, Lisbon, Portugal, 28 August - 2 September 2017
- Multivariable analyses module, Nicosia, Cyprus, 16-20 April 2018
- Vaccinology module, Cardiff, Wales, 11-15 June 2018
- Project review module, Lisbon, Portugal, 27-31 August 2018

7. Other training

- Treating missing data, Santé Publique France, 2-4 October 2017
- Molecular epidemiology Santé Publique France, 5-7 March 2018

Discussion

Supervisor's conclusions

Brecht has had a very successful 2 year Fellowship and has achieved a high level of competence in all the required domains. He has worked hard and efficiently and has completed many projects that have important implications for public health in France and internationally.

During his fellowship, he was involved in a wide range of public health relevant projects and achieved a large amount of outputs (including several publications in peer-reviewed journals). He investigated many outbreaks and conducted analytical studies to identify the source. His international work on Ebola, Yellow fever and cholera informed public health interventions targeting highly vulnerable populations. His work has been followed through to the stage of practical recommendations and required actions, with dissemination to others through numerous reports, oral and

poster presentations and scientific publications. He was able to work independently and effectively, but also in a team, and delivered high quality work. He was highly motivated and always focused on achieving the goals of the projects he was involved in. I believe that Brecht is commited to field epidemiology and has considerable professional skills for any epidemiological and public health related work, both at national and international level.

Coordinator's conclusions

Brecht is a pharmacist by training with advanced degrees in Tropical Medicine and Public Health and had MSF working experience as epidemiologists in many different countries with limited resources in Africa and Asia.

During his fellowship Brecht successfully led two outbreak investigations and supported additional outbreak investigations. He conducted a case-control study to investigate a country-wide Salmonella enterica serotype 4,12:i:- outbreak. He visited a school, interviewed cases and supported the environmental investigations of a Hepatitis A outbreak in Central France that was linked to a school canteen. These investigations allowed him to apply his epidemiological skills under field conditions in France.

Brecht explored different routine surveillance data in France to estimate RSV infections among young children and elderly and identify improvements needed in the surveillance before the introduction of RSV vaccinations. Additionally, he analyzed the characteristics of cholera epidemiology in DRC based on surveillance and cholera treatment center data (2008-2017). Being based at a national site Brecht used the good access to national surveillance data to further develop his epidemiological and data analysis skills and to broaden his knowledge and understanding of Public Health.

Brecht conducted a case-case study using HUS surveillance, where he compared characteristics and exposures of STEC O80 cases with those of cases of STEC O157 or other STEC serogroups (case-case study) in order to find potential sources of infection for STEC 080 infections amongst children. Additionally, he investigated urban yellow fever outbreaks in DRC and azithromycin resistant shigellosis amongst MSM in France.

Brecht is an excellent networker and team player and took plenty of the opportunities to be involved in Public Health activities in France. He is very dedicated and productive, and presented the findings of his projects at different international scientific conferences and through scientific peer-reviewed journals. Brecht plans to work for the Institute of Tropical Medicine in Antwerp, Belgium and I wish him great success in the future.

Personal conclusions of fellow

I enrolled in the EPIET programme hoping it would allow me to improve methodological skills and my understanding of infectious disease epidemiology. It did and moreover, by applying epidemiology on day to day public health threats I feel much more confident setting up studies, carrying out analyses or investigating outbreaks than I did two years ago. On top of that, meeting other fellows, national public health staff, biomedical researchers and many epidemiologists involved in the programme, allowed me to build a network that I can fall back on when setting up transnational studies. The site, national level, is the lead for outbreak investigations which extend to more than one region, and set up most surveillance systems. This, together with exceptionally experienced supervisors, facilitated developing projects on more complex outbreaks and surveillance data and hence to develop epidemiological skills complimentary to what I did before EPIET. An international assignment with the Institute of Tropical Medicine allowed me to work again with epidemiologists in DRC with whom I had worked before, but this time working on the country's surveillance and laboratory data, which was an extremely rewarding experience. I feel very privileged being part of the EPIET programme.

Acknowledgements of fellow

I am immensely grateful to my supervisors Henriette (Jet) de Valk and Kostas Danis, who have been very supportive and patient developing and providing feedback on the different projects. Jet watched over the projects so that I gained the most possible from the programme. Kostas provided excellent methodological and writing feedback in a way that benefitted the learning experience. Colleagues at Santé publique France have been very welcoming from day one. I would like to thank my EPIET frontline coordinator, Christian Winter, who was always available for advice, knew very well when to provide feedback to finalise abstracts and manuscripts and who encouraged me to improve my epidemiological and communication skills.

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