EPIET REPORT

Summary of work activities

Ides Boone
European Programme for Intervention Epidemiology Training (EPIET), 2011 cohort

Background

Pre-fellowship short biography

Ides Boone is a Belgian biologist who holds a PhD in veterinary sciences (animal health and production) and a Master of Science in tropical animal health. Before joining EPIET, Ides worked as a post-doc scientific collaborator in the disease control unit of the Veterinary Department at the Institute of Tropical Medicine in Antwerp.

EPIET assignment

Ides enrolled in the EPIET programme in 2011 and was placed at the Epidemiology and Health Reporting Department at the State Health Office of Baden-Württemberg, Stuttgart, Germany.

Fellowship projects

Surveillance project

Analysis of case notifications discarded from the electronic surveillance system 'SurvNet 3' in Baden-Württemberg between 2010 and 2012

Clinically suspected cases in hospitals and deaths from communicable diseases are notified to the local health offices (LHO). Hereafter, the LHO verifies that the case definition is met and transfers the anonymised data electronically to the State Health Office (LGA). The LGA subsequently verifies that the case definition is met before forwarding records to the national level. LHOs can discard notified cases. The objectives of the analysis were to retrospectively describe discarded cases between 2010 and 2012 (n=900) by disease category and analyse the reasons for discarding case data. The collected data provided baseline data for future comparisons with the proportion of discarded cases before/after the introduction of shorter notification delays introduced on 29 March 2013. This will allow testing the hypothesis if shorter notification delays result in a higher number of discarded cases.

In the disease categories with a total of at least 100 deleted cases between 2010–2012, the highest proportions of discarded cases (of all cases notified between 2010–2012, by disease category) were observed for hepatitis B (10%),

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tuberculosis (7%), TBE (7%), adenovirus (7%) and shigellosis (7%). Reasons for discarding were non-compliance with the case definitions (e.g. no evidence for an acute infection in hepatitis B and hepatitis C cases), missing clinical symptoms, missing laboratory results (e.g. tick-borne encephalitis cases), no laboratory confirmation, or no laboratory confirmation in cases linked to an outbreak (shigellosis, influenza). Changes in patients' addresses were the main administrative reason for deleting notified cases.

We recommended that LHO notify cases that require laboratory confirmation after laboratory result have been obtained. Before transmitting hepatitis B and C cases, LHO should thoroughly check if these cases are not chronic. We recommend adding the reason for discarding a notification in the comments field of the notification data sheet.

Role: Collected, analysed the data; wrote the report

Status: Report drafted

Routine analysis of surveillance data

From October 2011 to April 2012, 852 human hantavirus infections were notified in Germany, 580 (68%) of which were in the federal state of Baden-Württemberg. In contrast to previous outbreaks in 2007 and 2010, the first stage of the 2011–2012 outbreak was characterised by a rapid proliferation of cases, which made this the largest reported outbreak ever for this time of year (October to April) in this state. The early rise could be due to a beech mast year in 2011, followed by an early and massive reproduction of the reservoir bank vole populations during winter 2011 and spring 2012.

Role: Collected, analysed the data, wrote the analysis

Status: Completed. Rapid communication published [1]

Tularaemia in southwest Germany: three cases of tick-borne transmission

Three cases of tick-borne tularaemia occurred in the summer of 2012 and 2013 in two counties in the federal state of Baden-Württemberg, Germany. Although the most reported transmission route of tularaemia is contact to, or consumption of, infected hares, tularaemia has to be also considered after tick bites. Health professionals should include tularaemia in their differential diagnosis in patients with fever and/or ulcerative lymphadenopathy following a tick bite.

Role: Collected, analysed the data, wrote the report

Status: completed. Final draft sent to all co-authors for approval

Outbreaks

Varicella outbreak in a primary school in Baden-Württemberg, October–December 2011

A varicella outbreak occurred in a primary school, where 14 cases (13 children and one teacher) and six contact infections in a household were initially reported. A cohort study was conducted among 357 school children to identify the extent and spread of the outbreak (additional case finding and vaccination status) and make public health recommendations.

We adapted a questionnaire (questions on demographics, disease onset and duration, symptoms, contact, immune status, commute to school, and activities) from Robert Koch-Institute and distributed it to the school children for self-administration by parents or caretakers.

In total, 183 in 357 questionnaires were returned. We identified two new cases. Disease duration ranged between three and 10 days (median: eight days). A median of four missed school days was reported, with a range between one and nine days. Seventy-two percent of the respondents reported to have received at least one dose of varicella vaccine (21%) or having a history of varicella (51%). Nine percent neither had undergone vaccination nor had evidence of previous varicella infection, and in 19% of the respondents the immune status was unknown.

Despite a high infection rate and low reported vaccination coverage among school children, a low number of cases were reported. This may be explained by an immune status that was better than indicated in the self-reported questionnaires. To prevent varicella cases, the Standing Committee on Vaccination (STIKO) recommendations should be followed strictly. The newly introduced mandatory notification of vaccine-preventable child diseases (29 March 2013) will allow better monitoring of varicella outbreaks.

Role: Collected, analysed the data, wrote the report

Status: Completed. Final report drafted

A large outbreak of epidemic keratoconjunctivitis caused by adenovirus type 37 in southern Germany, 2011–2012 [3, 4]

Between November 2011 and February 2012, Baden-Württemberg reported an outbreak of epidemic keratoconjunctivitis (EKC) with 112 notifications, as compared to 28 in 2009 and 38 in 2010. All cases visited an outpatient eye clinic (clinic A). We investigated the characteristics and severity of the outbreak.

We defined a case as a person with clinically diagnosed EKC between 15 November 2011 and 3 February 2012. Community-acquired cases were defined as cases who presented symptoms at their initial visit, while nosocomial cases developed symptoms after visiting clinic A. We collected demographic, treatment, clinical data and self-reported symptom severity (scale: light, moderate, severe, very severe) using a structured questionnaire and genotyped available isolates from conjunctival swabs.

Sixty-two of 104 case patients (60%) completed the questionnaire (mean age 59, 50% females). Twenty-six cases were considered community-acquired cases. The remaining 36 cases who developed EKC symptoms after a median of 12 days after consultation (range: 3–33) were considered nosocomial cases. We detected adenovirus type 37 in 4/4 conjunctival swabs from nosocomial cases. Symptoms lasted a median of 19 days (range: 2–41) and included red eyes (94%), watery eyes (82%), foreign body sensation (82%) and corneal ulcers (8%). Nosocomial cases were more likely to report severe or very severe symptoms (94%) than community-acquired cases (60%, relative risk: 1.6, 95% confidence interval: 1.1–2.2). On 14 December 2011, the clinic carried out disinfection measures and dedicated rooms and equipment for EKC patients, which led to a decrease in the number of cases, with a last nosocomial case recorded on 30 January 2012.

Community outbreak of EKC may lead to sub-clusters of nosocomial transmission. We recommend rapid dissemination of recommendations to eye clinics so that they implement separate treatment paths and virucidal disinfection methods for EKC patients.

Role: Collected, analysed the data

Status: Completed. Presented at ESCAIDE 2012 [2]

Research

Hantavirus infections in Baden-Württemberg, 2012. A case-control study to assess disease knowledge and use of preventive measures [6-8]

In 2012, the German Federal State of Baden-Württemberg reported a hantavirus outbreak with 1683 cases, requiring an evaluation of the use of preventive measures. Preventive measures focus on avoiding contact with the reservoir host, the bank vole. We conducted a case-control study to assess whether the level of disease knowledge and use of preventive measures was associated with disease.

Cases were residents of Baden-Württemberg, 18 years or older, with laboratory-confirmed hantavirus disease notified between 21 June 2012 and 21 September 2012. Because the study aimed to address the adherence to existing recommendations in the affected areas, we selected neighbourhood controls from local telephone directories. Cases and controls were interviewed by telephone, using a standardised questionnaire. Demographics, knowledge on hantavirus infection, exposures and use of preventive measures in the four weeks before disease onset (cases) or before interview (controls) were analysed. We calculated odds ratios (OR) and 95% confidence intervals (95% CI) by multiple logistic regression.

Of 361 cases reported, 205 were interviewed (median age 47 years, 71% male). Of 428 selected controls, 174 were interviewed (median age 56, 59% male). Cases were less likely to report knowledge on hantavirus prior to their disease (OR=0.5; 95% CI 0.3–0.8), the ventilation of rooms before cleaning (OR=0.4; 95% CI 0.2–0.9) or the use of dust masks (OR=0.1; 95% CI 0.01–0.8). Cases were more likely to have visited unused utility rooms (OR=4.7; 95% CI 2.0–11.3).

Differences in the level of disease knowledge confirm the need to improve communication on the disease and preventive measures. Knowledge of recommendations for cleaning activities, for example the use of protective equipment, seems to decrease the likelihood of developing hantavirus disease. In order to increase evidence for recommended measures, further effectiveness studies are required.

Role: Primary investigator

Status: Data analysed, report drafted; presented at ESCAIDE 2013 [3]

Identification of hotspots for hantavirus transmission in Baden-Württemberg

The annual incidence of notified hantavirus infections varies between the 44 counties in Baden-Württemberg (range 0–59.8/100 000 in 2012). To date, no data are available on the incidence at the next lower administrative level.

The objective was to describe the geographical distribution of the incidence of reported hantavirus infections at the municipal level in Baden-Württemberg for the outbreak years of 2007, 2010 and 2012 and 2007–2012. This would define high-risk areas for hantavirus in Baden-Württemberg and allow a more targeted communication of prevention measures in these high risk areas.

For each hantavirus case notified between 2007 and 2012 we asked the local public health offices to provide the official municipality key for the residence and the probable municipality where the infection was acquired. The incidence of hantavirus cases notified by county and municipality key were visually represented in InstantAtlas.

Visual inspection of the incidence distribution by municipality in 2007, 2010, 2012 and 2007–2012 clearly indicated the Swabian Alb region as the most affected area. The remaining affected municipalities were characterised by lower incidence rates and mainly scattered in the northern part of the Black Forest and northern Baden-Württemberg. The map was made available to the local public health offices where it can be used a basis for the delimitation of high-risk zones. The human case data can be combined with host reservoir and environmental data and may be used to develop an early warning system.

Role: Primary investigator, wrote report

Status: Completed. Interactive maps provided to all local public health offices in Baden-Württemberg

Hantavirus in Europe: Review of preventive measures and communication strategies [9,10]

Below is an excerpt from: European Centre for Disease Prevention and Control. Prevention measures and communication strategies for hantavirus infection in Europe. 2014. Stockholm: ECDC; p. 1 [5].

> Hantaviruses are a large group of RNA viruses that belong to the genus *Hantavirus*, family Bunyaviridae. Reservoirs for hantaviruses are mostly rodents. At least five hantaviruses – Puumala (PUUV), Dobrava-Belgrade (DOBV), Tula (TULV), Saarema (SAAV) and Seoul (SEOV) – circulate in Europe, but most reported human cases of infection are caused by PUUV and DOBV.
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> Between 2000 and 2010 the annual number of reported hantavirus cases increased in Europe, although there were significant temporal and geographical fluctuations. In 2012, a sudden increase of hantavirus activity (e.g. in Germany and Slovenia) prompted the European Centre for Disease Prevention and Control (ECDC) to reassess the hantavirus situation in Europe and review the availability and scope of preventive and control measures. ECDC summarised all available information (as of 2012) on hantavirus for a total of 29 European countries; topics covered by the survey included the effectiveness of preventive measures, communication strategies, impact assessment studies and recommended preventive measures.
>
> This report presents the results of a literature review and a telephone survey among members of the European Network for Diagnostics of 'Imported' Viral Diseases (ENIVD). ENIVD is a network of European laboratories working on diagnostics of imported, rare and emerging viral infections, including tick-borne encephalitis, hantavirus and dengue. The authors identified eight publications with a focus on hantavirus prevention measures in Europe, one of which presents specific strategies on what to communicate to the general public, how to disseminate information sheets and posters, and how to make medical doctors aware of recommended preventive measures.
>
> The situation in the 29 ENIVD member countries covered in this report was heterogeneous and varied widely (number of cases reported, presence of outbreaks in 2005–2012, distribution of the disease). The majority of the countries (26/29) had prepared institutional guidelines on preventive measures for hantavirus. Twenty-seven countries (90%) had a policy to communicate preventive measures through a variety of media in case of an outbreak; eight countries (28%) also provided information on a regular basis even before outbreaks. The most frequently used communication channels were mass media (TV, radio, newspapers), institutional websites (health and occupational health), presentations and workshops for health professionals, and articles in specialised journals. The majority of the countries have never performed impact assessment studies on the effectiveness of preventive measures, communication strategies, or awareness or knowledge studies.
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> To prevent further human hantavirus infections in Europe, an integrated approach needs to be established, including predictive models which are adapted to the regional situation. There is also a need to evaluate the impact of preventive measures in the affected countries and increase the level of awareness in the population at risk. This often translates into increasing the availability of pertinent information through a variety of information channels.

Role: Equal contribution with three other fellows in designing, collecting, analysing the data and writing the report

Status: Completed. Presented at ESCAIDE 2013, published as an ECDC report [4, 5]

Scientific communication

- Three oral presentations
- Four oral presentations at bi-annual national meetings (2012: 3, 2013: 1) for all regional health officers of Baden-Württemberg, Baden-Württemberg State Health Office, including:
  - Boone I, Oster N, Wagner-Wiening C, Zollner I, Pfaff G. Adenovirus-outbreak in Waldshut-Tiengen. Qualitätsmanagement in Ausbruchssituationen und im IfSG-Meldewesen. Landesgesundheitsamt Baden-Württemberg, Stuttgart, 15 May 2012 [not publicly available]
  - Boone I, Lohr D, Wagner-Wiening C, Pfaff G. Hantavirus – current situation in Baden-Württemberg. Qualitätsmanagement in Ausbruchssituationen und im IfSG-Meldewesen. Landesgesundheitsamt Baden-Württemberg, Stuttgart, 15 May 2012 [not publicly available]

  - Boone I, Wagner-Wiening C, Zoellner I, Pfaff G. Hantavirus case-control study, Baden-Württemberg, summer 2012, Update. Qualitätsmanagement in Ausbruchssituationen und im IfSG-Meldewesen. Landesgesundheitsamt Baden-Württemberg, Stuttgart, 26 November 2012 [not publicly available]
  - Boone I, Wagner-Wiening C, Zoellner I, Pfaff G. Hantavirus in Baden-Württemberg: risk factors, knowledge and preventive measures. Results of the case-control study. Qualitätsmanagement in Ausbruchssituationen und im IfSG-Meldewesen. Landesgesundheitsamt Baden-Württemberg, Stuttgart, 17 April 2013 [not publicly available]
- One manuscript published[1]
- One manuscript drafted: Boone I, Hassler D, Nguyen T, Splettstoesser WD, Wagner-Wiening C, Pfaff G. Tularaemia in southwest Germany: three cases of tick-borne transmission [not publicly available]

Teaching experience

Workshop on infection epidemiology for public health professionals, LGA Stuttgart (7–8 February 2012): 30-minute lecture on a case-control study – Q-fever outbreak in Hardheim, 2010.

Infection epidemiology – asthma outbreak (22 April 2012). Facilitation of a case study (asthma outbreak) for students of the Medical Faculty, University of Tübingen (Prof. Martin Eichner, Dr Stefan Brockmann)

15th applied epidemiology course for public health authorities/services in Germany, Part 2. Robert Koch-Institute, Berlin (11–15 May 2012). Undertook group facilitation for 3 days, 45 min. each. Lecture: data analysis – calculation of relative risks

Status: Completed

Miscellaneous

Participated in a five-day laboratory module at the LGA. The module was organised by Dr Hartelt (LGA) and covered virology, molecular biology, bacteriology, air quality and water.

Tick sampling in Rottweil, Baden-Württemberg. Evaluation of the infestation rate in two areas (after reports of TBE cases in the region), followed by preparation of tick specimens for PCR testing on TBE.

Participation in a multidisciplinary research project aiming to develop an early warning system for hantavirus in Baden-Württemberg. One-week internship at the local health authority of Göppingen county: four days in the infectious disease department and one day at the local veterinary authority (food inspection).

Supervisor's conclusions

It is always a rewarding experience when expectations are met or even exceeded. My expectation was that Ides Boone would be able to build a successful EPIET fellowship on his prior competence in biology and veterinary medicine, expanding into a scientifically productive epidemiological training programme with an emphasis on zoonoses. So that's what happened. Along his way, Ides has acquired experience with issues inherent to surveillance systems which will be of service in future research projects. One aptitude that should not remain unmentioned in this fellowship summary report is Ides' talent for languages – a real asset for him and also for his working environment. Supervisor's overall conclusion: 'Bravo Zulu' – a job well done!

Next steps

Upon completion, Ides will continue his career in epidemiology, with a focus on zoonoses and food-borne diseases. He will work as a researcher on a project entitled 'Zoonoses and food safety along global supply chains' at the Federal Institute for Risk Assessment (BfR) in Berlin.

References

1. Boone I, Wagner-Wiening C, Reil D, Jacob J, Rosenfeld UM, Ulrich RG, et al. Rise in the number of notified human hantavirus infections since October 2011 in Baden-Wurttemberg, Germany. Euro Surveillance 2012;17(21):pii=20180. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20180.

2. Boone I, Oster N, Wagner-Wiening C, Heim A, Zöllner I, Pfaff G. A large outbreak of epidemic keratoconjunctivitis caused by adenovirus type 37 in southern Germany, 2011–2012. 2012. European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE), 26–28 October 2012, Edinburgh, Scotland. http://ecdc.europa.eu/en/escaide/materials/documents/escaide-2012-abstract-book.pdf, p. 58. ESCAIDE reference number: 20121065
3. Boone I, Wagner-Wiening C, Zoellner I, Pfaff G. Hantavirus infections in Baden-Württemberg, 2012. A case-control study to assess disease knowledge and use of preventive measures. Oral presentation at ESCAIDE 2013, 5–7 November 2013, Stockholm. Abstract available from: http://ecdc.europa.eu/en/ESCAIDE/Materials/Documents/ESCAIDE-2013-abstract-book.pdf, p. 35, ESCAIDE reference number: 20131729
4. Boone I, Guzman-Herrador B, Polkowska A, Rebolledo J, Leitmeyer K, et al. Preventive measures for hantavirus infections in Europe, 2012: a review. Oral presentation at ESCAIDE 2013, 5–7 November 2013, Stockholm. Abstract available from: http://ecdc.europa.eu/en/ESCAIDE/Materials/Documents/ESCAIDE-2013-abstract-book.pdf, p. 50, ESCAIDE reference number: 20131823
5. European Centre for Disease Prevention and Control. Prevention measures and communication strategies for hantavirus infection in Europe. Stockholm: ECDC; 2014. http://www.ecdc.europa.eu/en/publications/Publications/hantavirus-prevention.pdf