FELLOWSHIP REPORT

Summary of work activities

Daiga Jermacāne
Intervention Epidemiology path (EPIET)
Cohort 2015

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 the 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 acknowledging the 2-year training and listing the theoretical modules attended. Additionally, if all training objectives have been met, they receive a diploma.

Stockholm, September 2016

- 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.

Fellows develop core competencies in field epidemiology mainly through project or activity work, but also partly through participation in training modules. Outputs are presented in accordance with the EPIET competency domains, as set out in the EPIET scientific guide[1].

Pre-fellowship short biography

Prior to EPIET, Daiga Jermacāne studied Public Health (BSc) and Nutrition Science (MSc) at the Rīga Stradiņš University and worked as a senior officer at the Health Inspectorate of Latvia. She then moved to UK and worked as a Clinical Risk Coordinator, based at Kent and Canterbury Hospital. Before commencing EPIET, she pursued a career in travel medicine and worked for 6 years at the National Travel Health Network and Centre ("NaTHNaC") based in London.

Fellowship assignment: Intervention Epidemiology path (EPIET)

On 14.09.2015, Daiga Jermacāne started her EPIET fellowship at Public Health England, Bristol, UK under the supervision of Isabel Oliver. This report summarizes the work performed during the fellowship.

Fellowship portfolio

This portfolio presents a summary of all work activities (unless restricted due to confidentiality regulations) conducted by the fellow during the ECDC Fellowship, EPIET path. These activities include various projects, 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.

This portfolio also includes a reflection from the fellow on the field epidemiology competencies developed during the 2-year training, a reflection from the supervisor on the added value of engaging in the training of the fellow, as well as a reflection by the programme coordinator on the development of the fellow's competencies.

Fellowship projects

1. Surveillance

The evaluation of an enhanced surveillance system for carbapenemase-producing Gram-negative bacteria in England

Introduction

Due to the growing number of cases and outbreaks of carbapenemase-producing Gram-negative organisms (CPO), an electronic reporting system (ERS) for the enhanced surveillance of CPO was implemented by Public Health England (PHE) in May 2015. We evaluated ERS, to determine if it is meeting its objectives to improve surveillance of CPOs.

Methods

We evaluated uptake, coverage, timeliness and completeness by comparing extracts from ERS with reference molecular data from the Antimicrobial Resistance and Healthcare-Associated Infections laboratory (AMRHAI) system.

[1] European Centre for Disease Prevention and Control. European public health training programme. Stockholm: ECDC; 2013. Available from: http://ecdc.europa.eu/en/epiet/Documents/Scientific%20guides/EPIET%20Scientific%20Guide_C2016.pdf

We estimated the proportions of isolates of Gram-negative bacteria, where expression of an acquired carbapenemase was suspected, reported through ERS with full characterisation, out of total number of referrals for suspected CPO at AMRHAI.

Results

A total of 7,632 suspected CPO cases were referred to AMRHAI between 5 May 2015 and 31 December 2016; 4,031 (53%) were reported through ERS. The proportion of organisms reported through ERS rose over time, reaching 73% by the end of 2016. The number of laboratories in England participating in ERS reached 116/133 (87%) by the end of 2016. There were large variations in adoption of the ERS by region; laboratories in West-Midlands, Yorkshire and the Humber and the North-West had highest uptake (>53%). The completion rate for enhanced data fields on risk factors was low (range: 0-32%). To assess timeliness, we calculated mean days for confirmatory testing – i.e. the turn-around-times (TAT). The mean regional TAT was estimated to be 1.8 days (range: 0.4 -18 days) during the entire period since the ERS system launch and end of April 2017. The mean TAT for confirmatory testing performed at national laboratory (AMRHAI) between July 2016 and April 2017, was 9 days (range: 2-31 days).

Conclusions and recommendations

Although ERS has increased in coverage and improved the identification of CPOs, completeness of enhanced risk factor data has been poor. We are using qualitative methods to explore barriers and identify opportunities to improve the system.

Role and outputs: Principal investigator

Daiga was responsible for the protocol development, system description, quantitative analysis, and written report for PHE [1]. Daiga developed an interview guide for the qualitative evaluation and conducted indepth interviews with selected stakeholders. This project was accepted for a poster presentation at ESCAIDE 2017[2].

Supervisor(s): Isabel Oliver, Dean Ironmonger, Rachel Freeman

Competencies developed:

I was very pleased to have the opportunity to work on an issue that is seen as an important, growing public health problem. I learned that allocating resources to collect and submit enhanced data is challenging for participants.

This project allowed for the development of my skills in surveillance and how to apply internationally recommended guidelines when evaluating public health surveillance systems for specific attributes, describing the limits of defined procedures, and the importance of quality data for public health programmes. Through liaising and negotiating with system developers, users and other stakeholders, I learnt the value of collecting and analysing qualitative data to direct public health action.

2. Outbreak investigations

A large school outbreak of H1N1 pdm09 amongst vaccine-eligible primary school children with low vaccine uptake, UK, 2016

In January 2016, a large outbreak of influenza A(H1N1)pdm09 was notified in a primary school (4-11 year-olds). We described the outbreak and estimated the vaccine effectiveness (VE) of the 2015/16 nasal spray influenza vaccine (LAIV).

A possible case was defined as a child with at least one influenza-like-illness (ILI) symptom recorded on school absence records. We used the EU case definitions for probable and confirmed cases. We obtained confirmatory diagnosis from HPZone and vaccination status from linked GP records. To estimate VE, we conducted a cohort study amongst vaccine-eligible school children (4-7 year olds) and calculated VE as 1-risk ratio for confirmed/probable cases.

The overall ILI attack rate (AR) at the school was 48% (191/395), with 165 possible, 23 probable and 3 confirmed influenza A cases, of whom 2 were H1N1 pdm09. The AR of confirmed and probable influenza was highest (4.7%) in 4-5 year olds who were LAIV vaccine-eligible. Higher AR (3.1%) was also observed among 9-10 year old children. Of the 180 vaccine-eligible children, only 57 (32%) had been vaccinated in the 2015/16 season. The 2015/16 VE was 33% (95% CI, -100% to 78%); VE of a single dose (received at any point between 2013 and 2015) was 43% (95% CI, -62% to 80%).

The vaccine uptake was lower than the England average of 55% in 2014/15 and was likely to have facilitated the spread of infection. Our VE results are compatible with the UK mid-season VE estimate for confirmed infection. Further work is needed to encourage uptake of the vaccine amongst eligible children.

Role and outputs: Principal investigator

Daiga developed the protocol, constructed a questionnaire, developed a dissemination list, collected the completed questionnaires, created a database, undertook data cleaning and analysis, and compiled the final report of the outbreak . Manuscript published in the journal *Vaccine* as short communication[3]. Presented at ESCAIDE 2016 (oral presentation)[4].

Food Poisoning at a hotel, South West

On 10 October 2015, a private wedding function was held at a hotel in North Somerset. On 12 October, Health Protection Team (HPT) was notified that 20 of the 60 hotel guests reporting symptoms of vomiting, diarrhoea and stomach cramps, with onsent from 11-12 October. An investigation was initiated and an outbreak questionnaire was administered to guests. Initially, one human stool sample tested positive for Clostridium perfringens and a second for – C. innocuum (isolate considered normal gut flora).
A suspected case was defined as anyone with vomiting and/or diarrhoea in the 7 days after attending the event at Hotel XX in Weston-Super-Mare on 10 October 2015, and a confirmed case was defined as a person with microbiological confirmation of a gastroenteritis-causing organism in their stool sample (Norovirus positive sample or Clostrodium perfringins). Stool specimens were collected from four symptomatic guests. Further testing did not identify the toxin-producing C. perfringens strains and Norovirus was confirmed in three of the four samples
Completed questionnaires were received from13 (22 %) guests. Five out of 13 respondents reported symptoms of gastroenteritis at some point since 3 October 2015. Of these, three (23%) respondents were defined as cases. Incubation period, symptoms reported and duration of illness were all consistent with norovirus infection. The point source for this outbreak could have been exposure to a contaminated food item served at a particular meal, direct exposure to an infected person or exposure to a contaminated object. The foodborne transmission in this case was considered less likely; however, the low response rate limited our ability to assess any association between food exposures and illness. The ongoing risk to public health was considered minimal and during visits to the hotel, the EHOs reiterated the importance of ensuring appropriate cooking methods and recording the temperature of foods probed as well as adopting good hygiene practice when working with food.

Role and outputs: Principal investigator

Daiga was responsible for developing a protocol, constructing a questionnaire, developing a dissemination list, collecting the completed questionnaires, creating a database, data cleaning and analysis, and compiling the final report of the outbreak.
Output: Completed PHE outbreak report.

Gastrointestinal illness after a wedding gathering, Gloucestershire

HPT was notified on 5 May 2016 of a number of gastrointestinal illnesses with vomiting / nausea/ diarrhoea/stomach cramps following attendance at a wedding event held in Gloucestershire. We attempted to contact all 11 symptomatic individuals by email or telephone.
A case was defined as any person who attended the wedding at the venue on 1st May 2016 and who developed diarrhoea (> 3 loose stools/day), vomiting, or abdominal pain and fever within 10 days of the wedding. Seven respondents met the case definition, and all reported eating at the wedding reception.
The main clinical features suggest this outbreak was caused by norovirus infection. Two cases provided faecal samples which were laboratory confirmed as positive for norovirus. The epidemic curve was consistent with a point source outbreak, and the wedding event was within the period of exposure. None of the cases had an onset of illness prior to the wedding or reported having attended a prior event, which narrows the possibility that there were other common exposures.
Investigations of potential environmental or food exposures before symptom onset did not identify any risk factors which explained a majority of cases, particularly when considering food items eaten outside home. Free text written comments from the respondents did not reveal any major concerns with the food served at the wedding or facilities, which is consistent with the environmental health assessment conducted on 6 May. No evidence of onward transmission from symptomatic cases was found. We recommended a number of measures to support the investigation of future gastrointestinal outbreaks, including improvements to be made among agencies to ensure that roles and responsibilities are described regarding the collection of epidemiological data from cases with suspected or confirmed links to an outbreak; approach regarding how cases will be identified, contacted and questionnaires completed (routine gastrointestinal, pathogen specific (including enhanced surveillance) or outbreak specific questionnaires).

Role and outputs: Principal investigator

Daiga was responsible for developing a protocol, constructing a questionnaire, developing a dissemination list, collecting the completed questionnaires, creating a database, data cleaning and analysis, and compiling the final report of the outbreak.
Output: Completed PHE outbreak report.

Gastrointestinal illness among restaurant attendees in Somerset

On 21 April 2016, HPT received notification about diarrhoea and vomiting, including 1 confirmed campylobacter infection among persons who attended a local restaurant in Chilcompton. Initial cases reported eating the duck liver parfait, which is a known risk factor for campylobacter.
We conducted a restrospective cohort study and administered a survey via email among people who made reservations and attended the restaurant for a meal between 20th to 24th April 2016.
A probable case was defined as any person who attended the restaurant at any time between 20st and 24th April and developed symptoms of vomiting, diarrhoea (3 or more loose stools within 24 hrs) or abdominal pain/cramps and fever 1 to 10 days after exposure. A confirmed cases was defined as any person who met the probable case definition and had a laboratory-confirmed faecal isolate testing positive for *Campylobacter spp.*
Out of 54 bookings made between 20-24th April , we received 39 valid responses (18% of total dining population and 30% of the diners contacted). The dates of onset were available for the four confirmed cases only. This particular restaurant was the only common venue visited by the four confirmed cases. Partial food histories were available for the four confirmed cases. All reported eating the duck liver parfait, information on the other food items consumed at the venue was not available. None of the remaining 38 respondents reported gastrointestinal symptoms following the dinner. The approximate incubation period shows that all cases became ill 2-3 days after eating at venue. No evidence of onward transmission from symptomatic cases was found.
The food exposure information collected from the cases and environmental investigation indicates that one batch of improperly cooked duck liver parfait served (up to 4-5 days in a row) during this time may be cause of the outbreak. Four consequent dinner dates were linked with confirmed cases, however we don't have certainty whether single batch was affected. Environmental samples taken from different batch, not the actual batch served to the unwell customers.
The survey was distributed only to people who pre-booked to attend the venue. Walk-in customers were not followed up and the number of walk in customers who visited the premises in this time period was not known.
The food history for the cases was incomplete and consumption of another common food item cannot be excluded.
Due to low response rate and lack of information about food exposure among cases, our ability to conduct further analytical study and derive firm conclusions about associated exposures and illness was limited.

Role and outputs: Principal investigator

Daiga was responsible for developing a protocol, constructing a questionnaire, developing a dissemination list, collecting the completed questionnaires, creating a database, data cleaning and analysis, and compiling the final report of the outbreak.
Output: Completed PHE outbreak report.

Gastrointestinal illness among wedding guests in Bristol

HPT was notified of 22/86 wedding guests reporting symptoms of vomiting and diarrhoea via Bristol Environmental Health Officers (EHOs) on 5 July 2016. A retrospective cohort study was conducted to identify the potential vehicle of the outbreak. Hard copies of questionnaires were distributed by EHO's to postal addresses of the wedding guests (N=23) with additional questionnaire electronically via an online survey link to respondents with e-mail addresses available (8 /23).
A case was defined as any person who attended or ate food items served at the wedding function on 2 July 2016 reporting either diarrhoea (3 or more loose stools in 24 hours), vomiting, or abdominal pain and fever within 10 days after the event.
We received 14 (82%) responses out of 17 persons contacted, which is 20% of total wedding guest population. 12 of the 14 responses were considered valid. All respondents to the survey were categorised as cases (n=12).The epidemic curve showed that cases reported symptom onset within two days (range 12 to 36hrs) of the wedding event, including one case who tested positive for norovirus.
The predominant symptoms reported by cases were vomiting, cramps, nausea, diarrhoea and fever. No responses were received from non-cases and the proposed cohort study was therefore abandoned due to a lack of data. No environmental investigation was conducted at the venue.
The source for this outbreak could have been person-to-person contact. Infection transmission also may have happened due to inadequate hygiene practices (through contaminated objects/ toilets or from any other area of

the venue which could be linked with consequent transmission to other participants of the wedding however we cannot draw firm conclusions without evidence from environmental investigations. Epidemiological investigations with questionnaire data collected from the wedding guests have captured only one of the two laboratories confirmed cases for Norovirus.
Poor response from the wedding guests (only 8 e-mail addresses and 17 postal addresses) obtained via contact of groom; we recognise that selection bias could have been introduced as some respondents may over-report desired behaviour/circumstances at the wedding function or prevent from answering some questions.

Role and outputs: Principal investigator
Daiga was responsible for developing a protocol, constructing a questionnaire, developing a dissemination list, collecting the completed questionnaires, creating a database, data cleaning and analysis, and compiling the final report of the outbreak.
Output: Completed PHE outbreak report.

Gastrointestinal illness among funeral attendees in Westcliffe

Following a wake at a church in Westcliffe on the 15th September 2016, approximately 20 people reported sickness and diarrhoea. The total number that attended the wake was approximately 35 people (including the parish). A local investigation was initiated on 21st September 2016, which included inspection of the caterers who have supplied food for the church, and associated food storage areas. The Environmental Health team attempted to contact all cases, with contact details provided by the organiser of the wake (N=14). An initial clinical case definition was developed which included any attendee of the wake on the 15th September who reported symptoms of diarrhoea and/ or vomiting within 7 days of attendance. Norovirus was subsequently isolated from two attendees and the case definition was revised to: confirmed case - any attendee of the wake on the 15th September who developed symptoms within 7 days, with a positive isolate of Norovirus in their stool sample and a probable case - any attendee of the wake on the 15th September who developed diarrhoea and/or vomiting within 7 days of the wake in the absence of another confirmed pathogen.
Ten respondents developed symptoms after the wake. Only three of the ten cases submitted stool specimens, of these norovirus was isolated in two cases; resulting in two confirmed cases and eight probable cases. All ten cases experienced symptoms of gastroenteritis with onset between 16 & 17th September 2016. The onset of symptoms occurred between 22.5 hrs and 48.5 hrs after the meal at the wake.
A questionnaire was used to identify food items associated with illness, and other possible links between the attendees at the event. In the survey we captured only symptomatic cases and no information was available on non-cases and their potential exposures due to non-response.
The main symptoms reported by respondents were consistent with a viral pathogen as the causative agent. The microbiological results (two of the cases tested positive for norovirus) provide some evidence that this outbreak occurred as a result of norovirus infection, with likely person to person spread, either through direct contact or fomites. Nevertheless, there is some uncertainty as one symptomatic attendee did not have norovirus isolated in their stool sample, however, no bacterial pathogens were isolated in any of the stool samples submitted. We recommended to work with future organisers of similar events to get complete list of attendees and contact details, where possible, and to develop bespoke incident specific questionnaires to facilitate early collection of all relevant exposures.

Role and outputs: Principal investigator
Daiga was responsible for developing a protocol, constructing a questionnaire, developing a dissemination list, collecting the completed questionnaires, creating a database, data cleaning and analysis, and compiling the final report of the outbreak.
Output: Completed PHE outbreak report.

Outbreak of group A Streptococcus type emm66, among homeless and people who inject drugs in England and Wales

In 2016 PHE's Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU) detected a national increase in a rare type of group A Streptococcus (GAS), emm66, and in September 2016 the type was linked to clusters of invasive disease among people who inject drugs (PWID) or were homeless. We hypothesised that the outbreak was linked to drug supply/distribution; a descriptive study was implemented to determine its extent and identify vehicles of transmission.
Cases were defined as individuals with confirmed GAS emm66 infections in England and Wales since January 2016 who were PWID, homeless, reported problematic alcohol use, or were epidemiologically linked. We identified cases

from routine notifications typed as emm66, obtaining information about travel, accommodation and drug-using behaviour from interviews and case records. Outreach services were advised about infection control and symptoms of GAS infection.
RVPBRU identified 32 emm66 infections from January 2016-January 2017. 29 (invasive GAS: 22) met the case definition (primary risk factors were: PWID: 21; homeless: 7; problematic alcohol use: 1), predominantly located in eight towns across southern England/Wales linked by major transport routes. Within three towns, cases were linked in time, through drug use, hostels or drug services. Travel and social contact between towns were limited. PWIDs that were interviewed mainly injected heroin (9/9), crack (7/9) and reported no notable changes in behaviour before illness.
The protracted incidence, geographical spread, use of drugs requiring heating before injection, and limited recent behaviour change are evidence against drug-related transmission. The location of cases along transport routes is striking. Emm66 infections since January 2016 have occurred predominantly among cases in this ongoing outbreak and emm66 may be the dominant circulating type among this population. We recommend increased awareness of early signs of GAS infection among affected groups and those who serve them. As these investigations continue, we expect lessons from this outbreak to emerge around transmission routes and effectiveness of control measures that will have relevance to other countries facing GAS outbreaks in vulnerable, under-served populations.

Role and outputs: As a member of the Outbreak Control Team, Daiga created and maintained the linelist for SW, contributed to production of epidemiological summaries, provided questionnaire entry on EpiData; and contributed to a rapid communication manuscript published in *Eurosurveillance* [5].

Cryptosporidium cluster associated with a lambing event

On Friday 7th April 2017, FES South West received an initial alert reporting 8 cases of cryptosporidium in the previous 28 days, including 5 notified since 4 April among residents of 2 local authorities. A cluster of 6 confirmed cases, including several teenagers, with onset around 22/03/2017 warranted further investigation..
A confirmed cases was defined as an individual who resides in council areas with a clinically compatible history of diarrhoeal illness with a date of onset on or after 22 March 2017, and who had Cryptosporidium parvum confirmed faecal sample processed by the national reference laboratory. Surveillance questionnaires were completed and available for all cases to elicit risk information, including environmental and food and drinking water exposures. There were 8 cases fitting the case definition (7 confirmed and 1 possible). The dates of onset of confirmed cases ranged from the 22 March to 28 March 2017. Enhanced questionnaires were received from all seven confirmed cases. The most commonly reported symptoms were diarrhoea (100%), vomiting (86%) and abdominal pain (57%). Nausea, headache and fever were reported bv 50% of respondents. Two out of seven respondents reported ongoing symptoms at the time of completion of the questionnaire, suggesting that symptoms lasted from at least 2 to 12 days. Four out of seven confirmed cases were linked with a lambing event at a local farm, and reportedsymptom onset between 25th March – 28th March and contact included various animals (lambs, cows, lizards, snakes at the farm). No other common links were identified.
This outbreak appeared to be an isolated event, as no further reports were received. On 18 April 2017, the outbreak was deemed over as 2 incubation periods had passed since last case onset, and cryptosporidium rates, had returned to normal seasonal level. Appropriate measures recommended, including reminder to school children of good hand hygiene, recreational water and drinking water, cautions when dealing with farm animals and adequate cleaning managment practices in the lambing farm.

Role and outputs: Principal investigator
Daiga collected the completed questionnaires, created a database, cleaned and analysed data, and compiled the final report of the outbreak.
Output: Completed PHE outbreak report.

Competencies developed:
Through all the outbreak investigations, I have learned about identification of potential disease outbreaks and required public health actions, methodologies for collecting and analysing data; good questionnaire design and online survey tools, and writing a study protocol incorporating methods appropriate to the public health problem. I have developed competence in using software packages (STATA, Excel, EpiData), generating hypotheses and defining a specific study question, and using statistical methods to measure associations. I have appreciated the importance of media communications to reach individuals/communities, and the impact of environmental investigations.

3. Applied epidemiology research

High impact of flooding on mental health two years after flooding: a cohort study in response to the 2013/14 floods in England

Introduction
The longer term impact of flooding on health is poorly understood. In 2015, following widespread flooding in the UK during winter 2013/14, Public Health England launched the National Study of Flooding and Health. The study identified a higher prevalence of psychological morbidity 1 year after the exposure to flooding.
Methods
A standardised questionnaire including comprehensive assessment of flooding-related exposures and validated instruments to screen for anxiety, depression and post-traumatic stress disorder (PTSD) was sent in 2016. 1.408 consented to follow up in the initial study. We classified exposures into categories: flooded, disrupted and unaffected, based on flood-related damage to accommodation, access to services and secondary stressors. We calculated prevalence and odds ratios for each outcome by exposure group relative to unaffected participants, adjusting for confounders and used McNemar test to assess change in outcomes between 2015 and 2016.
Results
A total of 1.064 (70%) responded in the year 2 follow-up (2016). The prevalence of psychological morbidity remained elevated amongst flooded participants [n=339] depression 10.6%, anxiety 13.6%, PTSD 24.5% and disrupted participants [n=512] depression 4.1%, anxiety 6.4%, PTSD 8.9%). We observed a greater reduction in anxiety -7.6% (95%CI 4.6-9.9) than in other mental health outcomes: depression -3.8% (95%CI 1.5-6.1) and PTSD: -6.6% (95%CI 3.9-9.2). Based on matched analysis, demographic variables, flooding nature or disruption did not have significant associations with improved anxiety, depression and PTSD outcomes.
Discussion
Between year 1 and year 2, there was a reduction in prevalence of all mental health outcomes in people affected by flooding, although the impact of flooding on mental health and wellbeing remains high two years after the event. Providers of primary care and mental health should take into account the potential impact of flooding on mental health, when planning services, especially in areas at high risk of flooding.

Role and outputs: Daiga was the principal investigator for the follow-up study (year 2016); the study is ongoing. She wrote the protocol, worked on questionnaire design, collected data, developed an analysis plan, analysed data, updated the study team, performed descriptive/multivariate analysis and matched analysis. A study report was written for PHE[6,] and a manuscript for publication is in progress.
Abstract accepted for oral presentation at ESCAIDE 2016[7].
Abstract accepted for oral presentation at the PHE Applied Epidemiology Scientific Conference 2016[8] and also presented as a poster presentation at the The Occupational and Environmental Epidemiology conference (ISEE), Rome, 2016[9]. In addition work presented as oral presentation in Cardiff, Wales during 2017 at the Health Protection Society CPD event [10].

Supervisor(s): Isabel Oliver

Competencies developed: Through the project, I have strengthened my ability to locate information, critically read and evaluate data and information sources, re-articulate and apply previous work by integrating new research within previous research frameworks and how to adopt a viewpoint, as well as completing work to strict deadlines. I have also enhanced my skills in statistical techniques and applications of the validated study instruments. Through the regular update meetings I have realised how important the team work and relationships with stakeholders are in managinh the project with integrity, and to keep open dialogue for future collaborations.

4. Communication

Publications in peer reviewed journals

An outbreak of acute respiratory illnesses in primary school children with low vaccine uptake, UK, 2016, Vaccine, 2017[3]

Conference presentations

2 oral presentations at international conference ESCAIDE 2016[4; 6]
1 poster presentation ESCAIDE 2017 [2]
1 poster presentation at The Occupational and Environmental Epidemiology conference (ISEE) 2016 [8]
1 oral presentation at a national conference [7]

Other presentations

1 oral presentation (Health Protection Society, Cardiff) [9]

5. Teaching activities

Lecture 1: "Principles of surveillance in health protection"
Lecture 2: "Epidemiology of infectious diseases"

Supervisor: Charles Beck

These lectures was delivered at the Canynge Hall, University of Bristol (part of the Health Protection Principles and Practice 5 days training course) on 27th March 2017.
Instructional Design: The session was intended for new staff members of the FES or other PHE teams with varying background level. Daiga used a power point presentation with interactive slides and addressed questions during the presentation to stimulate discussion and active participation.

Learning objectives: At the end of this session, participants will be able to highlight the differences between infectious and non-infectious epidemiology; to describe specific concepts unique to infectious disease epidemiology; to highlight the complexity in terminology and how to appply some of the terms in basic epidemiology models; to describe some of the intervention strategies in infectious disease epidemiology.

Role and outputs: Daiga was responsible for modifying and expanding existing training material, delivering a presentation to target audience, obtaining feedback from the KWL form, reviewing feedback and writing a reflective notes.There was additional evaluation done by the course organizers; mean score obtained at the session: 7.1 (range: 5 – 9).

Practical session: "Infectious disease Surveillance"

Supervsior: Charles Beck
Daiga co-faciliated a short practical exercise session, together with a consultant epidemiologist, which was focused on the interpretation of surveillance information and design of surveillance systems.

Role and outputs:: Daiga provided assistance during the practical exercise session, by answering questions and stimulating reflective learning.

Competencies developed: The training was very stimulating because of the high competence and experience of the organizers, trainers and participants. Devoting time to thoroughly documenting the presentations and the exercise was highly instructive. With the teaching activity, I learned how to interact with other public health professionals, and the importance of preparation before the lectures. By having engaged in these activities, I was able to further develop my oral communication competencies.

EPIET/EUPHEM modules attended

1. Introductory course, October 2015, Spetses, Greece

2. Outbreak investigation module, December 2015, Berlin, Germany.

3. Multivariable analysis module, March 2016, Vienna, Austria.

4. Rapid assessment and sampling module, June 2016, Athens, Greece.

5. Project review module, August 2015, Lisbon, Portugal.

6. Time series analysis module, November 2016, Bukarest, Romania

7. Vaccinology module, June 2017, Stockholm, Sveden

8. Project review module (PRM), August 2017, Lisbon, Portugal.

Supervisor's conclusions

Daiga has been an effective member of the Field Epidemiology team of Public Health England based in Bristol. She has contributed actively to the work of the team supporting the investigation of several outbreaks including two outbreaks published in the peer-reviewed literature. CPE is an important public health problem and a priority for PHE: Daiga's evaluation of the CPE Enhanced Surveillance System has been key to help inform the future arrangements for CPE surveillance in England, and her work has been used to develop priorities for future work to control CPE. Through her various projects, Daiga has developed significant epidemiological skills and greater confidence in data analysis. Her research project on the impact of flooding and health is of great public health importance as it is the first study to demonstrate that the increase in psychological morbidity in people affected by flooding persists for at least two years after exposure. This information is very useful for local authorities in their planning for flooding events. There is great interest in this work which is also being used to estimate the costs associated with flooding to inform government policy in future.

Coordinator's conclusions

Daiga was involved in a wide range of public health projects including multiple outbreak investigations, large-scale research and surveillance evaluation projects, and several teaching assignments. She demonstrated a positive attitude towards scientific review and was always ready to accept constructive criticism. Daiga took on new technical challenges and content areas, and worked effectively with many different colleagues to deliver high quality work. During her fellowship, she managed to enhance her epidemiological skills and has been diligent in seeking to improve her competence in all the required domains. I believe that Daiga has learned a great deal about public health surveillance, response and communications, and leaves this fellowship with an expanded professional skill set and improved confidence.

Personal conclusions of fellow

I have learned many new skills through the modules, which were re-enforced by applying them subsequently to practical study questions. I am particularly proud of contributing to the National Flooding Study, Evaluation of enhanced surveillance system for carbapenemase-producing Gram-negative bacteria in England, as well as various outbreak investigations, which had significant public health importance. The workload has been extremely varied and included analysing existing surveillance programmes; statistical analysis of complex research datasets, production of project reports and papers, as well as study protocols; and providing scientific support for investigations into local outbreaks.

I strongly believe this PHE training site is one of the best EPIET fellows can wish for, as it has transformed my professional experience to higher level with the opportunity to become part of an important European public health network, which typical education options can't achieve. EPIET has been a big professional and career leap for me, as I learned strong statistical and communication skills during the fellowship. I know I can either work in a

research setting, focusing on populations as a whole, or even clinical settings, concentrating on patients or infection control. Working and exchanging with EUPHEM fellows was also a good way to strengthen the close link between epidemiology and microbiology.

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